Accounting, Finance, Sustainability, Governance & Fraud: Theory and Application

Ana Paula Matias Gama
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Equity Valuation and Negative Earnings

The Case of the dot.com Bubble

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When you see reference to a new paradigm you should always, under all circumstances, take cover... There was never a paradigm so new and as wonderful as the one that covered John Law and the South Sea Bubble ... until the day of disaster.

(J.K. Galbraith, The Great Crash, 1955)

Foreword

The twenty-first century started with a financial bang, as the bubble built during the previous decade was severely punctured. Volatility reached new heights and the dot.com mania fizzled out as the number of IPOs became much scarcer. It is no surprise that the capital available for the financing of start-up companies suffered a significant reduction.

However, the world economy carried on, since the emerging economies, especially the so-called BRIC countries, seemed prone to capture a much larger share of the world wealth. Financial innovation was not deterred and the risk-sharing techniques reached a new stage with the widespread dispersion of apparently safe Collateralized Debt Obligations. The puncture of the real estate bubble triggered by the subprime crisis which followed led to the most severe downturn since the Great Depression, with ramifications yet to be tamed. Public policies aimed at controlling the side effects of the financial crisis changed the rules in ways that had not been seen before—when had we last witnessed long-lasting negative interest rates outside, perhaps, of Japan?

This is a challenging framework to attempt an examination into the valuation of most assets, let alone start-ups. However, it is more important than ever, as new clues are definitely needed in such turbulent times. A contrarian investor would not like to miss opportunities that may be ignored by the larger crowd. An entrepreneur may similarly sense market opportunities that large corporations may feel too shy to explore.

This book provides a powerful insight into a very timely issue—how can we value the most elusive of assets: new ventures at a time of high uncertainty? By addressing this topic, this work builds upon previous reflections and models from several leading authors in corporate finance. Damodaran addressed "the dark side of valuation" to suggest bold procedures to discount future cash flows projected from a very thin experience, while ignoring the "irrelevant" negative values of the past. The Gordon formula which permeates the many diverse valuation models requires serious adaptations to meet the current needs of investors and entrepreneurs alike, if

these are to be provided with the equity required to carry on with their initiatives, as debt gets even more out of reach in this volatile environment.

It is no surprise that current investors, be they wealthy individuals or more seasoned venture capitalists, feel insecure with the basic "comparables" and ratios often used to support investment and negotiations. Due diligence exercises, however extensive and resource consuming, often remain sterile without stronger valuation tools.

The thorough testing of a large number of companies and the use of models such as Ohlson's yield a significant contribution to academics as well as practitioners. Hard questions, such as the apparently illogical link between negative results and high capitalization, find a plausible explanation in this study. As this research shows, rather than reflecting market "irrationality", such a relation may be due to the implicit valuation of expenses in research and development or advertising for new brands that may have been registered as costs and may contribute to the generation of positive cash flows in the future.

This book sheds significant light on one of the most pressing "unknowns" in corporate finance, as identified by Braley and Myers: how investment decisions are carried out in practice. However, the benefits of clearing up this issue go well beyond the academic interest of corporate finance scholars, to serve economic agents with key decisions to undertake or even regulators aiming at designing efficient and reassuring norms that calm markets and channel resources to their most productive applications.

ISCTE-IUL
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Chapter 1
Introduction

Abstract The Internet has changed our lives enormously. In the late 1990s, the Internet constituted a technological revolution and created huge expectations for the new business models. Many entrepreneurs, supported by venture capital, have made fortunes, based on potential profits from their high-tech start-ups. Despite the fact that traditional models of economic evaluation did not present evidence justifying the great appreciation that the newly established companies were generating, many investors were nevertheless betting on future earnings to offset present losses. In this chapter, we provide an overview about the speculative bubble involving internet companies (*dot.com* or *net firms*) during 1999–2003, and we present the objectives and main research contributions of this study. Additionally, we present the structure of this book.

Keywords Internet · Dot.com companies · Valuation of internet firms · Economic bubbles

1.1 Initial Comments

The new economy sector was an integral part of the vertiginous growth of stock market prices by the end of the 1990s. Fama and French (2002) registered an annual rate of return of 8.81% in Standards & Poor's 500 from 1972 to 2000. From 1995 to 1999, the Center for Research in Security Prices (CRPS) registered an annual growth rate of 24%. Smithers and Wright (2000) reported Tobin's Q ratios for capitalization of the US stock market which had never before been observed in the twentieth century.

Shiller (2000) calculated the highest level ever for the multiple net profit (price earnings ratio—PER), adjusted based on the ten-year moving averages, superior even to the relative values of the period 1901–1929.

The elevated market capitalizations were influenced by social media which created a euphoric atmosphere associated with the period's innovation (Shiller 2000). Demers and Lewellen (2003) drew attention to the impact of the marketing

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campaigns associated with the Initial Public Offering (IPO) process, especially for the *net firms*.

Although the phenomenon of a positive valuation of losses is significant in the universe of Internet companies, it is not entirely new. Amir and Lev (1996) identified a similar behaviour in the mobile phone sector in the 1980s. Between 1984 and 1993, the 14 American mobile operators recorded negative results in 69% of the trimesters. Moreover, this percentage was even higher in the biotechnology sector (72%).

In view of these facts, analysts, professionals and academics, as well as the press, questioned the suitability of traditional evaluation methods, especially in the context of *net firms* during the period of the "dot.com bubble". So, a multiplicity of ratios based on web-variable traffic proliferated, e.g. "time spent browsing on the given site", "number of sites visited," "percentage of internet users", on the grounds that, since they were better able to capture the value chain of the *net firms*, these variables measured the network effect boosted by the *World Wide Web* space (*www*) more easily.

It was assumed, especially, that the increase of the Internet users would increase the turnover and reduce the unit fixed cost, making it easier to forecast sales and profitability of an emerging sector which showed a high level of losses.

Several authors have challenged this perspective, emphasizing that the source of value could be summarized as "growth" and "profitability".

Since the collapse of the dot.com bubble in 2001, the situation for start-ups has changed considerably, especially in relation to funding streams (which shrank significantly), as well as the expectations of economic agents regarding the risks of investing in this type of business.

In general, this significant market reversal generated a resource-shortage cycle and risk aversion that resulted in the creation of more appropriate methodologies to deal with technology-based start-ups. These not only minimized risks, but also minimized the financial losses associated with attempts to create innovative solutions.

The general idea is that start-ups are likely to fail and, to minimize the costs (psychological and financial) of these failures, entrepreneurs must deal with the start-up as a high-risk experiment and base their actions on processes that seek to minimize the waste of resources and reduction of learning time.

1.2 The Internet: History and Concepts

Wars of great scale, such as World War II, as well as others of smaller scope, epitomized the risk inherent in centralized computer networks. If the server was bombed, all stations would lose connection.

In the 1960s, during the so-called Cold War, ARPA (Advanced Research Projects Agency) belonging to the US Department of Defense, initiated the development of ARPANET, a network characterized by decentralization, so that if

one of the knots was hit and suffered damage, communication between other computers was still possible using other surviving connections.

In 1982, the transmission protocols and TCP/IP (Transmission Control Protocol and Internet Protocol) address became operational and the network was renamed the Internet (Intercontinental Network).

Gradually, the network gained greater penetration in academia, linking universities and enabling a better exchange of information and experiences among researchers.

Since 1989, with the fall of the Berlin Wall, the priorities that fostered the Arpanet project have been evolving; in 1992, the US government ended state control of the Internet and allowed it to be developed with funds from the private sector.

The *World Wide Web* (*www*), designed at the European Particle Physics Lab as a vehicle for sharing information on high-energy physics between physicists working on a dispersed international environment, adopted a standard called Hypertext Markup Language (HTML).

The Web resulted in a much more intuitive and user-friendly Internet, enabling its use by non-technical and non-academic people.

In 1990, the ARPANET ceased to exist, and commercial-service providers began to emerge, i.e. companies connected to the Internet and which enable subscribers to link their computers for network access.

From the onset of the *World Wide Web*, the Internet has experienced an evolution never seen before by other means of communication. In the US, for example, the Internet reached 50 million users within only four years, whereas to achieve this number of users it took the personal computer 16 years, television 13 years and the radio 38 years. In 2000, about 400 million people worldwide had access to the Internet.

With the subsequent development of new technologies such as mobile telephones connected to the *World Wide Web* at lower costs, the number of electronic users expanded in an unprecedented way.

1.3 The Internet and Electronic Commerce

Due to new technologies, business have adapted to available tools, targeting improvement of their business models and their relationship with various stakeholders. The use of Internet-based platforms for commercial operations was a natural consequence of the opportunities resulting from this new context.

Given that supply and sales transactions were the first enterprise tasks to be carried out, the term "*e-commerce*" became the popular term for such a virtual environment. However, the potential for electronic tasks is not restricted to purchase and sales transactions, so a broader concept, *e-business*, became recognized and understood.

Thus, the scope of the term e-business is greater than that of *e-commerce*, since the former includes not only the *e-commerce*, but also the contact and support activities which form the main mechanism of business. *E-commerce* is not just about commerce transactions or buying and sales over the Internet. It is a global reset strategy of the old business models with the aid of technology, adding value to the company as well as to its related parts.

One can consider, therefore, that *e-business* favours processes for direct contact between customers and suppliers, as well as it enables market analysis, investment analysis, the search of information about the macro-environment, market research, etc. The use of the Internet and other networks and information technologies function in support of *e-commerce*, communications and cooperation between companies, and business performance on the web, plus in support of internal company communication, as well as connections with clients and business partners.

As for *e-commerce*, we can define it as the buying and selling of information, products and services through computer networks.

1.4 e-Business Environment

Internet-technology-oriented business (*e-business*) improves productivity and increases the efficiency of various companies, delivering easier and faster communication with partners, suppliers and customers. *e-business* has been characterized as a complex fusion of business processes, enterprise applications, and the organizational structure needed to create a high-performance business model.

The electronic business environment enables different types of relationship, as shown below

- G2G: Government-to-Government—applications that enable integration between public agencies.
- B2G: Business-to-Government—applications that enable integration between business and government and vice versa.
- G2C: Government-to-Consumer—applications that enable integration between the government and consumers in general.
- B2C: Business-to-Consumer—applications that enable integration between business and private consumers.

In the beginning, the companies sought to put down their banners on the Internet only to signal their presence, not knowing how to produce a return. Later, emphasis was placed on the order flow and revenue and the relationship with different stakeholders.

The electronic business applications are part of the information management context, serving both the internal applications of the organization, and those applications linking partners, suppliers, and virtual communities. Some denominations are

Business Intelligence (BI): is the production of management information to support decisions about search, analysis and application of qualitative and quantitative information activities, which results in knowledge about the logic of the target market and about taking actions that are strategic in nature.
Knowledge Management (KM): focused on intellectual-capital management and knowledge of the organization. In short, it is the process for obtaining, managing and sharing the experience and expertise of employees. The goal is to have access to better information at the right time, using technology on a corporate level and scope.
Supply Chain Management (SCM): is the integration of the various companies that comprise the supply chain, in all its stages. Thus, the SCM does not consider only the physical production process, but the flow of information and capital between all companies involved in the chain. Hence, the communication constitutes a key element for the maintenance and supply chain management.
Customer Relationship Management (CRM): aimed at the management of all contacts made by the company with its customers. Generally, its main goal is to place the customer at the centre of business processes in order to create that kind of perception that enables us to anticipate the current and potential needs of that customer. The goal is to understand and strengthen relationships with the consumers of its products.
Efficient Consumer Response (ECR): corresponds to the initiatives to improve the efficiency of the entire chain. In this sense, industrial and commercial enterprises, as well as other supply chain members (logistics operators, banks, equipment and vehicle manufacturers, computer companies, etc.) work together in pursuit of meeting common standards and efficient processes that minimize costs and optimize productivity in their relationships.
Collaborative Planning, Forecasting, and Replenishment (CPFR): is a program that aims to be a valid alternative to the Efficient Consumer Response (ECR) taking advantage of its positive aspects, but presenting solutions towards the demands. ECR has a greater focus on the supplier, especially in reducing costs and streamlining businesses, so, the objective focus of CPFR is on the final consumer by means of joint management of processes and information exchange.

1.5 Dot.com Companies

Organizations that offer their products and do their business predominately on the Internet are *Dot.com companies*. They are so named because it is a simple and direct way to refer to the commercial domain (.com) at the end of their Web addresses.

In the late 1990s, dot.com companies based their business model on the number of accesses, visibility or even the creation of virtual communities. Therefore, intensive disclosure was essential for the image, and the expenditure of the

abundant venture capital available at that time provided the means to support this activity. The goal was to generate a competitive advantage aiming at the generation of compensatory profits in the future. TV ads in prime time, luxurious offices and acquisition of traditional companies were common examples of exorbitant spending. However, few companies survived to be able to tell the story.

Razi et al. (2004) studied the main features of many *dot.com* companies that went bankrupt during the speculative bubble and also identified the characteristics of those who successfully overcame this moment to survive. The potential causes for failure were separated into two main categories: controllable and uncontrollable causes.

Controllable causes are those under direct control of decision-makers and were divided into strategic, operational and technical causes. On the other hand, the uncontrollable causes are beyond the influence of the managers and were divided into technical and behavioural causes.

Among the most significant companies related to bubble, we highlight:

- Boo.com
- Books-a-Million
- Broadcast.com
- e.Digital Corporation
- Freeinternet.com
- GeoCities
- TheGlobe.com
- GovWorks.com
- Inktomi
- InfoSpace
- Kozmo.com
- Lastminute.com
- The Learning Company
- Lycos
- MicroStrategy
- Open.com
- Pets.com
- Pixelon
- Startups.com
- Think Tools AG
- Tiscali
- VA Linux
- Webvan
- WorldCom
- Xcelera.com

1.6 NASDAQ

The NASDAQ (National Association of Securities Dealers Automated Quotation) is one of the major stock markets of the world and was the first electronic stock exchange, connecting buyers and sellers directly, as well as providing enabling trading of the assets of high-tech companies, also called "*New Economy*" companies.

It has its origin in a petition of the Congress of the United States to the Securities and Exchange Commission (SEC), in view of a report on the safety of the markets which found unregulated markets to be opaque. The SEC proposed its automation resulting in the creation of NASDAQ. Its first session was on 8 February 1971. The IPO process on NASDAQ is much simpler and less expensive than on the New York Stock Exchange (NYSE), and that is why many medium and small businesses choose to launch their IPOs on NASDAQ.

After a deep restructuring in 2000, NASDAQ became a for-profit company fully governed by shareholders, issuing and exchanging its own shares in its own market.

It currently has about 2,800 listed companies, and its daily average turnover, in 2015, was approximately US $95 billion.

The NASDAQ Composite Index is the primary stock market index of the US electronic stock market. It reflects the market value of all shares traded on NASDAQ. This index is widely used by the financial market as an indicator of the performance of companies in the technology sector. Since there are US and non-US companies listed on NASDAQ, the NASDAQ Composite index cannot be considered an American stocks index. The success of the NASDAQ Composite Index stimulated the creation of other indexes used as performance indicators of various segments of the broad market of NASDAQ shares.

Until March 2000, when the NASDAQ index exceeded the level of 5,000 points, a pervasive demand for risky investments in technology companies was clearly evident, especially for Internet companies.

1.7 Economic Bubbles

An economic or speculative bubble could be described as a situation in which asset prices reflect unrealistic expectations about the future. It is "trade in high volumes at prices that are considerably at variance with intrinsic values" (King et al. 1993).

Considering that it is a very difficult task to identify intrinsic values in the daily life of the financial and capital markets, bubbles are not generally recognized until they are bursting, i.e. when asset prices start plummeting.

According to Singh (2013), individual agent behaviour can be rational, but the framework within which agents operate can produce prices which do not correspond to their fundamental values. Certainly, it is possible that individuals be strongly influenced by others in their decision-making, and this is generally known

as herd behaviour. Banerjee (1992) defines herding as "everyone doing what everyone else is doing, even when their private information suggests doing something quite different".

Many investors follow the thinking or directions of those around them or the advice of financial analysts. When specific stocks become popular for implausible prospects and investors seek to buy large holdings of these stocks, this collective action creates temporary price pressures which can drive prices up to high levels. After the large buying momentum ceases and facing the lack of economic reasons for maintaining high prices, the stock prices then may fall abruptly.

1.8 The Valuation of Internet Companies

During the period of full expansion of the speculative dot.com bubble, Damodaran (2000) published an article with a quite significant title: The dark side of valuation: firms with no earnings, no history and no comparables. Can Amazon.com be valued?

In that article, the author analyzed the obstacles which are faced when assessing young or embryonic companies: negative or abnormally low earnings, short historical data, and the lack, or small number of, comparable companies. In other words, limited history, small revenues in conjunction with big operating losses, and a propensity for failure make the dot.com companies tough to value because the types of problems appear conjugated.

The calculation of risk parameters, such as the beta ratio (in Capital Asset Pricing Model—CAPM), is impaired to the extent that one needs to work with a five-year-minimum time series.

When we have a very short period of time for analysis, it is difficult to capture variable fluctuations that occur on an annual or longer period and that can be very significant sometimes.

Another difficulty that arises from the lack of a data set is the inability to test the reasonability of the evaluation results, i.e. to compare the results of evaluations over different periods and at earlier times.

The absence of comparable firms is the third complicating factor of dot.com assessments. By "comparable firms" is meant firms that are really in the same business and that have similar characteristics and fundamentals. In addition to the use of prior-period data, analysts often use information about comparable firms in the evaluations. As a basis for projections, it is common to use risk indexes, investment volumes, or firms of similar size that work in the same industry.

Damodaran has developed alternative ways and solutions to manage this set of barriers to the assessments and better to choose among different alternatives. He begins by addressing each of the problems, and then concentrates on the specific event in which the conjugated problems arise in the same company.

There are three basic options for approaching the cases of companies with negative current results, namely: standardization of results; adjustments in projected

revenues in conjunction with adjustments in operating margins; and reduction of leverage.

To normalize the results mean to disregard the negative results, considering them as something abnormal, and to take the average of positive results, return on investment, return on equity or the profit margin from prior periods (if positive), or to use those same parameters of comparable firms, the year in which the company under evaluation had losses. By adopting this procedure, one also adopts the implicit assumption that the firm had not experienced abnormal behaviour during the period (or periods) observed.

One has to question the author about this procedure which seems somewhat arbitrary, based on the "feeling" of the analyst and, for this reason, to question its technical consistency. The adjustment in revenues and estimated margins is based on current revenues (which are never negative) and, on the same estimates, one estimates an operating margin and net margin overtime.

An alternative to this procedure is to estimate the investments in future years and the return on capital overtime to project the outcome. The estimate-operating margin is the sustainable margin, i.e. based on the history of the firm and the average margin of comparable firms. In addition, a period of adjustment in the operating margin is estimated, which will depend on, among other factors, the magnitude of the difference between current income and sustainable margins as well as the reasons for this difference, for example, economies of scale and investment in infrastructure, with a greater gestation period.

It is common to find operationally viable firms with high levels of debt. The debt might be due to, among other reasons, significant investments in infrastructure, generally associated to periods of long maturation, or leveraged buyouts.

The procedure of adjustment of the firm's leverage consists, initially, in estimating the optimal level of company debt, by a traditional analysis of cost of capital or, alternatively, to take an average for the specific segment.

There are some ways to adjust the degree of leverage, among which, the following three can be highlighted:

- Postpone investments and redeem the debt with cash generated from depreciation;
- Let the increase in revenues and operating income push up the value of the firm (if the debt grows at a slower pace than the firm value growth, then the debt ratio will fall);
- Raise funds by issuing shares or debentures (or admitting new members with capital) to pay the debt.

The choice between the different approaches to address the issue of corporate evaluations with losses involves understanding the reasons for which the results are negative, the firm's characteristics (e.g. if there is, or if there is not, a change in its scale over time); after this, and the procedures outlined above should be applied, as suitable.

It must be ascertained whether the phenomenon is transient, abnormal, or if the firm's business is cyclical; if the losses result from long-term operational problems, specific to the firm (and not in the sector in which it operates); or even if the poor results are due to structural problems.

It is not possible to change the fact of the youth of a company or that there are no comparable companies. So, in the evaluation of companies, the absence or scarcity of historical data about the evaluated firm is usually compensated by the use of comparable data and business information; and the absence or insignificance of comparable companies' data is balanced with by elements of the available time series.

There are important considerations to be made on the issue of comparability between companies. First, one must examine very carefully the issue of similarity of business, i.e. if the companies really operate with the same product and the same markets.

Another relevant issue is the richness of information available for each firm and the stability of these companies. For example, while there is less information about auto companies than Internet companies, the available information on the former are much more profound than about the latter.

Finally, the degree to which comparable companies are at different stages of their life cycles deserves a lot of attention from the analyst. Obtaining data from comparable companies in different stages of their life cycles would be ideal.

If the majority of comparable companies are in one stage, for example those considered "high growth", there is little information to estimate the rate and time of deceleration in the transition phase to stability. If all these problems are present at the same time, in the same firm, this is certainly a great challenge for evaluation,

However, Damodaran was not the first to address the issue of the evaluation of start-ups.

Ever since the pioneering works of Ball and Brown (1968) and Beaver (1968), the literature that examines the price/results (positive) is extensive. However, research on price/losses is scarce, and the empirical results obtained so far are contradictory. Nevertheless, and in spite of the few studies on this topic, the research carried out proposes three potential explanations for this phenomenon/anomaly.

Hayn (1995) proposed the first explanation. The losses assume a transitional nature, if they persist, shareholders exercise the liquidation option they hold on the company's assets. Thus, in the context of consecutive losses that indicate a higher likelihood of financial bankruptcy, the variable "equity" is more relevant for the assessment, acting as a proxy of the liquidation value of the company.

The second explanation states that the phenomenon of negative relations of price-earnings results from an incorrect appraisal of the model for specification—capitalizing of the results (earnings model) (Collin et al. 1999).

The third explanation holds that the losses by technology companies in start-up phase are due to high investments in intangible assets, particularly in research and development (R&D) and advertising (Chan et al. 2001). According to the Generally

Accepted Accounting Principles (GAAP), investments in intangible assets are treated at full cost in the year in which they are made.

Several studies have analyzed companies with losses, including those outside the Internet sector (Hand 2001, 2003; Kozberg 2009; Tokic 2004, 2005). These losses are often motivated by high investments in intangible assets (Kozberg 2009).

1.9 Objectives and Main Research Contributions

This study is inspired by the valuation models of Ohlson (OM) (1995) and Feltham and Ohlson (FOM) (1995): where an omitted variable from the model (book value of equity) is positively correlated to the dependent variable (the market value of the companys) and negative (positive) to the independent variable included in the model (net income); the exclusion of this type of variable induces a negative bias (positive) of the estimated coefficient of the independent variable; here resides the explanation for the anomaly of "positive evaluation of losses".

According to the evaluation models Ohlson (OM) (1995) and Feltham and Ohlson (FOM) (1995), the phenomenon of "positive evaluation of losses" can be explained by the effect of "conservatism accounting" which leads to the underestimation of assets resulting from not capitalizing on investments in intangible assets (e.g. R&D and advertising).

Hence, taking as a theoretical framework the evaluation models of OM and FOM, and given the magnitude of the phenomenon of "positive evaluation of losses" recorded in the universe of *net firms*, the central objective of this research is to analyze the relationship between the stock market capitalization and net income (loss) reported by the *net firms* throughout the *period of the new economy* (NEP). In particular, this study intends to analyze how the market evaluates the companies that have registered losses, depending on their magnitude and persistence. The effect of the life cycle will be examined. In brief, this study seeks to:

(i) To evaluate the effect of "accounting conservatism" on the relationship between the market value of equity (MVE) and the information reported in the financial statements of *net firms*;
(ii) To evaluate, in the context of systematic losses, the relevance of the main determinants of value (value drivers) to the market value of the equity of these companies;
(iii) To analyze the suitability of these variables as proxies for growth opportunities, given that investments in R&D and advertising are aimed at creating a critical customer mass to monetize the network effect generated by the Internet, creating a brand image (see the examples of Amazon and Yahoo). The latter to be accomplished by developing software and new platforms to improve web-site design, e-mail alerts and creating greater security mechanisms for online transactions.

The option for utilizing the evaluation models of OM and FOM is justified by the fact that these models represent a significant theoretical contribution to the field of models of business valuation, which is a highly relevant theme in the field of corporate finance. Based on the pioneering work of Miller and Modigliani (1961), these authors typified the impact of growth opportunities for assessing corporate value. But they innovate by introducing: (i) the effect of dynamic information at the level of abnormal returns and (ii) the impact of non-financial information, according to the theory of efficient markets.

So, given the dynamic information, which are defined as an autoregressive process of first order, in the medium term, and given the competition effect, the abnormal returns tend to converge to the industry average. The effect of non-financial variables is relevant to the extent that they are evidence of the limitations of financial statements, i.e. their inability to report in a timely manner all relevant information affecting investor expectations (lack of timeliness). This information is immediately incorporated into prices, but only later reflected in the financial statements. In this context, the financial statements underestimate the present value of growth opportunities held by the company.

The impact of these variables is particularly relevant in emerging sectors, such as the case of the Internet sector. On the one hand, it is a sector with some technological complexity; on the other hand, there is very limited historical information, which enhances the information asymmetry between managers (insiders) and investors (outsiders).

Considering specifically the analyzed phenomenon, the "positive evaluation of losses" in the universe of *net firms*, these models establish that the losses may occur early in the life cycle of companies, as originally envisaged by Myers (1977).

The justification is based on the fact that only a part of the investment is capitalized, mainly in intangible assets, the remainder being considered as costs for the year (conservatism accounting effect), in obedience to GAAP.

However, the market identifies this type of investment according to the probability of the existence of the future of growth opportunities, which supports the high expectations of supernormal returns associated with these companies (positive signals).

Models of OM and FOM demonstrate that growth may increase the expected value and business results. But due to the conservatism accounting effect, the company's value increases more rapidly than the expected value for the results, and this explains the two indicators: both the multiple results (PER) and the multiple of book value (M/B market-to-book) tend to record high levels, so the goodwill, as measured by the difference between the market value and the accounting value of equity tends to persist even in the medium term.

In fact, the results obtained allow us to conclude that investors

(i) Do not focus their attention for the purposes of evaluation, only in the variable "results", as an aggregate variable;
(ii) Value positively the variables R&D and advertising, which for accounting purposes are treated as costs, associating to these investments the probability

of the existence in the portfolio of greater opportunities for growth, so higher expectations of supernormal returns;

(iii) View the "equity—BVE" variable as particularly relevant for evaluation, recording the company losses. This is because the market sees the BVE variable as proxy, as foreseen by the models of OM and FOM, for normal future results;

(iv) Consider the BVE variable to be itself, also, a tool to reduce agency costs, particularly with creditors; and identifies it as a proxy for the "recognized assets", given the predominance of intangible assets in technology-based companies;

(v) See increased investment under "R&D" and advertising and in the line of results of Hayn (1995) and Joos and Plesko (2004), as linked to a change of the company's profile in the decade of the 1990s, i.e. small companies, mostly technology-based, which register losses that tend to assume greater magnitude and persistence.

In view of these results and the main contributions of this research, we emphasize that the registration of loss may not be indicative of a process of value destruction. In clear opposition to the theory of abandonment option, in certain contexts, the information content of losses is not irrelevant to the assessment; in particular if the losses are associated to the process of creation/growth performance, i.e. high growth opportunities. As a result, it is incorrect to evaluate the reported losses of all companies in the same manner, as this may lead to erroneous empirical findings.

Finally, companies in financial stress, particularly technology-based companies, tend to opt for Mergers & Acquisitions processes (M&A) as a restructuring strategy to the exemption of bankruptcy, which would imply a greater destruction of value.

1.10 Organization of the Work

We have structured the present book therefore as follows.

Chapter 2 focuses on the analysis of the evaluation models of Ohlson (OM) (1995) and Feltham and Ohlson (FOM) (1995), which originates from the model of Gordon, while still incorporating the principles of Modigliani and Miller (1958) and Miller and Modigliani (1961).

Chapter 3 examines the phenomenon of "positive valuation losses" and the information-content relevance of variable results and the content of equity. Chapter 4 analyzes the impact of the investments in R&D on the market value of the company, and evaluates the effect of growth on the market value of the company's equity, with a particular focus on the Internet sector. Chapter 5 presents the main aspects of the methodology defined for the empirical study. Chapter 6 presents the method. Chapter 7 analyzes the phenomenon of "positive valuation of losses" in companies of the new economy in the US, and the life-cycle effect of those companies. Finally, in Part III, the main findings of this research as well as for future research studies are presented.

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Part II
Literature Review

Chapter 2
The Ohlson and Feltham Ohlson Models

Abstract This chapter analyses the phenomenon of "positive valuation of losses" in the new economy companies in the US. One of the potential explanations of this phenomenon is that these companies are *start-up companies*, mostly technology-based, that invest massively in intangible assets, in particular research and development (R&D) and advertising. Under Generally Accepted Accounting Principles (GAAP), these investments should be considered at full cost in the year they occur. Thus, in this chapter, we analyse the Ohlson (OM) (Contemp Acc Rev 11(2):661–687, 1995) and Feltham and Ohlson (FOM) (Contemp Acc Rev 11(2):689–731, 1995) valuation models. Feltham and Ohlson (Contemp Acc Rev 11(2):689–731, 1995) demonstrated analytically, using dynamic information, that losses, particularly at the stage of *start-up* in growth and technology-based companies, are considered to be costs that create an effect of *conservatism accounting*, consequently, there is an undervaluation of assets, hence the results and equity. However, this situation tends to be reversed over time, because given the principle of rationality, the investors continue to invest in the company if those investments are associated with abnormal profitability expectations.

Keywords Technology-based companies · Positive valuation of losses · Ohlson and Feltham and Ohlson models

2.1 The Ohlson Model (OM)

Beaver (2002: 457) states: 'The F–O approach [Ohlson 1995 (OM) and Feltham and Ohlson 1995 (FOM)] is, in my opinion, one of the most important research developments in the past ten years'. The advantage of the Ohlson model (OM) is that it defined a conceptual framework that relates the market value of the company

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(MVE) with the past and the future financial information of the company, i.e. with current and future expected net income, with the book value of equity (BVE), and with dividends.[1]

The initial theoretical framework of OM was the neoclassical model of dividends developed by Williams (1938), but known as the Gordon and Shapiro (1956) model. Gordon postulates that: (i) the growth rate for dividends is constant; (ii) the preferences/beliefs of the agents are homogeneous; and (iii) they are neutral to risk. Hence, the dividend model is defined as follows:

$$P_t = \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t(d_{t+\tau}) \tag{2.1}$$

where

P_t share price at time t;
d_t net dividends paid at time t. The d_t variable reflects all net transactions with shareholders, such as the payment of dividends, new shares issued to finance new investments, and/or repurchase of shares. For simplicity, we designate this variable only for dividends;
$R = (1 + r_f)$, where r_f is the free-risk rate;
E_t [.] the expected value operator, conditional on information available at time t.

In this context, and assuming two principles:

(i) The principle of clean surplus relation (CSR), which states that

$$bv_t = bv_{t-1} + x_t - d_t \tag{2.2}$$

where

bv_t value of equity at the end of the period t. By analogy, bv_{t-1} corresponds to the value of equity in the previous period $(t - 1)$;
x_t the net results for the year t.

The variables "bv_t" and "x_t" are exogenous to the model.[2]

[1] According to Lo and Lys (2001), in 1999, and with reference to the OM model, the mean number of citations was already higher than nine.

[2] Holthausan and Watts (2001) criticize the OM model because it is a partial equilibrium model, where the financial variables used are defined exogenously to the model. But as Beaver (2002: 458) claims, parsimony is also a very important quality in any model, arguing that: "*By analogy, the capital asset pricing model* (*CAPM*) *has the demand for financial institutions, financial institutions yet we observe empirically*". With this reasoning, Barth et al. (2001: 90) state: *To our knowledge, there is no academic theory of accounting that derives the demand for accounting*

According to the CSR principle, any changes to the book value of the company (bv_t) are the result of income generated and retained in the company, i.e. $\Delta bv_t = x_t - d_t$, where d_t reflects all transactions directly with shareholders (i.e. distribution of dividends, issue of new shares to finance new investment projects and/or repurchases). The intuition behind this principle is that all transactions affecting the assets and liabilities of the company, and consequently, the value of equity, should be reflected in the income statement, and its effect is reflected in the net income variable. This property, and according to Zhang (2000), reconciles any changes in the value of the assets held by the company with the flow of income generated by them. Thus, Ohlson (1995) does not "force" that new investments are financed only via retained earnings, unlike the closed models of self-sustained growth (e.g. Gordon's model). Thus and in accordance with Miller and Modigliani (1961) the financing of new investment by retained earnings or issuing shares are perfect substitutes.

Dividends affect the level of capital (bv) in t, but the net income remains unchanged (x_t).[3] Analytically:

$$\partial bv_t / \partial d_t = -1 \tag{2.3a}$$

$$\partial x_t / \partial d_t = 0 \tag{2.3b}$$

$\partial x_t / \partial d_t$ is not obtained directly from (Eq. 2.3a), but is consistent with the same because $\frac{\partial \mathrm{bv}_{t-1}}{\partial d_t} = \frac{\partial \mathrm{bv}_t}{\partial d_t} + \frac{\partial d_t}{\partial d_t} - \frac{\partial x_t}{\partial d_t} = -1 + 1 - 0 = 0$ (Ohlson 1995: 667). Introducing the abnormal variable, defined as:

$$x_t^a = x_t - (R_\mathrm{f} - 1)\mathrm{bv}_{t-1} \tag{2.4}$$

where x_t^a measures the excess returns that the company receives.

Because the results exceed the cost of capital, Ohlson (1995) expressed the present value of expected dividends (PVED), based on the net income and the value of equity. Hence, the PVED is[4]:

$$P_t = \sum_{\tau=1}^{\infty} R_\mathrm{f}^{-\tau} E_t(x_{t+\tau}^a - \mathrm{bv}_{t+\tau} + R_\mathrm{f}\mathrm{bv}_{t-1+\tau}) \tag{2.5}$$

(Footnote 2 continued)

information arising from the equilibrium forces and provides the mapping of accounting information into price shares.

[3]This assumption is in line with the principle of perfect capital markets, so it excludes any signal effect associated with the variable "income".

[4]Expressing dividends according to the current results, through the CSR principle and replacing x_t, the expression obtained for the abnormal results, we obtain $d_t = x_t^a - \mathrm{bv}_t + R_\mathrm{f}\mathrm{bv}_{t-1}$.

This expression, after some algebraic transformations, allows us to redefine the PVED model as follows[5]:

$$P_t = \text{bv}_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t(x_{t+\tau}^a) \tag{2.6}$$

This model is well known and reported in the literature as the residual income valuation *model* (RIV) or Edwards and Bell (1961) model (White et al. 1997: 1062).

As shown by Lo and Lys (2001), the Gordon's model and RIV are analytically equivalent, so to reject the RIV means ignoring that financial assets are a function of the present value of expected future cash flows.

The innovation of Ohlson (1995) against the RIV model or the Gordon model lies in the treatment that gives the structure of the time series of abnormal results (x_t^a). To define the stochastic process that follows the variable x_t^a, Ohlson (1995) introduces the variable v_t—other information, i.e. a variable that captures relevant events in terms of information that affects prices, but are not yet reflected in the financial statements. This time lag of the occurrence of certain events that are relevant to the formulation of economic agents' beliefs on the growth of abnormal results of the company, is one of the limitations ascribed to the financial statements, or rather to its ability to disclose all relevant information timely, i.e. *lack of timeliness* (Rayn 1995; Beaver 2002). To fill this gap, Ohlson (1995) supports his model in a dynamic information, which he defines as an autoregressive process of first order, and which features the dynamics of abnormal results. Analytically, the dynamic information is defined as:

$$\begin{cases} x_{t+1}^a = wx_t^a + v_t + \varepsilon_{1,t+1} \\ v_{t+1} = \gamma v_t + \varepsilon_{2,t+1} \end{cases} \tag{2.7}$$

where the parameters w and γ are fixed and known and assume values between]0, 1[.[6] In a broad sense, these exogenous parameters to the model are determined by the environment that characterizes the company. The random terms $\varepsilon_{1\tau}$, $\varepsilon_{2\tau}$ have $E_t(\varepsilon_{k,t+\tau}) = 0$ with $k = 1.2$ and $\tau \geq 1$. The model imposes the independence of v_t in relation to x_t^a because $E_t[v_{t+\tau}]$ depends only on v_t, with v_t reflecting all (not just financial) information relevant to the estimation of abnormal returns, regardless of their past values. However, its effect is reflected in x_t^a, which is incorporated in the

[5]Note that $R_f^{-\tau} E_t(\text{bv}_{t+\tau}) \to 0$ *com* $\tau \to \infty$, i.e. the present value of capital converges to zero as the time horizon tends to infinity. The model assumes that the equity grows at a rate less than r_f.

[6]The parameters w and γ assume values greater than zero for economic conditions and values less than 1 in order to ensure stability/stationarity of the model. This condition implies that the $E_t(x_{t+\tau}^a) \to 0$ and $E_t(v_{t+\tau}) \to 0$ with $\tau \to \infty$. Indeed if $w = 1$, this means that growth opportunities persist indefinitely, which is not consistent with the empirical evidence.

variable bv_t, by the property of CSR.[7] This dynamic information enables the company to earn abnormal returns over a period of time, and this effect is captured by the parameter w. However, due to the competition effect the abnormal process, i.e. firms' profitability trend, tends to converge to the average of the economy—*mean reverting*.

Combining Eqs. 2.3a and 2.3b, the Eqs. 2.1 (PVED), 2.2 (Principle CSR) and 2.7 (dynamic information), Ohlson (1995: 669) defines the evaluation function based on the calculation of the expected value for the abnormal results. Hence, the enterprise value is defined as[8]:

$$P_t = bv_t + \alpha_1 x_t^a + \alpha_2 v_t \tag{2.8}$$

where

$$\alpha_1 = \frac{w}{R_f - w} \geq 0 \text{ and}$$
$$\alpha_2 = \frac{R_f}{(R_f - w)(R_f - \gamma)} > 0.$$

According to the OM, the market value of the company (MVE or P_t) is a linear function of the level of capital invested in the company (bv_t), the abnormal results (x_t^a) generated by the company and the variable (v_t)—other than the financial information. Ohlson (2000) suggests the analysts' forecasts for future one-year results could be a good *proxy* for the variable v_t. The market value of the company's equity is much more sensitive to the variables x_t^a and v_t, the greater the persistence of the parameters w and γ, exogenous to the model, and therefore $\alpha_1(w)$ and $\alpha_2(\gamma)$ are increasing in their determinants.

Equation 2.8 can be reformulated in terms of net profit (adjusted for dividends) and the value of equity (bv_t), where φ corresponds to the multiple of results—price earnings ratio (PER):

$$P_t = \kappa[\varphi x_t - d_t] + (1 - \kappa)bv_t + \alpha_2 v_t \tag{2.9}$$

with

$$\begin{cases} \varphi = \frac{R_f}{R_f - 1} \\ \kappa = (R_f - 1)\alpha_1 = \frac{(R_f - 1)w}{R_f - w}. \end{cases}$$

[7]The CSR defines $bv_t = bv_{t-1} + x_t - d_t$ being $x_t^a = x_t - (R_f - 1)bv_{t-1}$; replacing x_t in the CSR expression we obtain $bv_t = x_t^a + R_f bv_{t-1} - d_t$, an expression that shows that any relevant events from the point of view of information are contained in the value of equity (bv_t) through the "dynamic information".

[8]The analytical deduction of the Eqs. 2.8 and 2.9 appear in the Appendix 2.1.

The previous expression can be interpreted as a weighted average of the evaluation model based on the updated income flows—the discounted profits (*earnings model*) and the assessment model from stock of assets required for generated the income flows—the model on equity (*book value model*).[9]

Ohlson (1995) also shows that in the medium- and long-term, the variable (bv_t) is an unbiased estimator of the market value of the company (MVE), i.e. there is an *unbiased accounting* property. In the short term, Ohlson (1995) admits the existence of *goodwill*, which defines as the flow of abnormal results that the company expects to receive, and which are derived from trademarks, patents, location, customer loyalty, investment in R&D, advertising and specificity of the organizational model—intangible assets, which are potential sources of value creation. Analytically:

$$P_t - \mathrm{bv}_t = \sum_{\tau=1}^{\infty} R_{\mathrm{f}}^{-\tau}\left(x^a_{t+\tau}\right). \tag{2.10}$$

Indeed, using the evaluation function defined (Eq. 2.8), it is shown that:

$$E_t[P_{t+\tau} - \mathrm{bv}_{t+\tau}] = \alpha_1 E_t\left(x^a_{t+\tau}\right) + \alpha_2 E_t(v_{t+\tau}) \rightarrow 0 \; com \; \tau \rightarrow \infty. \tag{2.11}$$

i.e. in the medium and long term *goodwill* is null; *in this context* the book value of equity (bv_t) is an unbiased estimator of MVE.

2.2 The Extent of the Ohlson Model: The Feltham Ohlson Model (FOM)

In the work of Feltham and Ohlson (1995) (FOM), the authors introduce two new effects: (i) the understatement of operating assets, *accounting conservatism*; and (ii) growth in the operational assets. The effect *conservatism accounting* reflects the persistence of the difference between the market value of equity (MVE) and book value (BVE), which is the source of the *unrecorded goodwill*. This *unrecorded goodwill* may result due to an understatement of existing and/or an overestimation of expected abnormal results.

To demonstrate these two effects, the authors continue to assume the neoclassical model of discounted dividends (PVED) and in accordance with Miller and Modigliani (1961), Modigliani and Miller (1958) the irrelevance of dividend policy

[9]In theory, Ferreira and Sarmento (2004) argue that the equity valuation and evaluation on the basis of updated income streams should give the same value. However, empirically, and given the existence of *goodwill* associated with the presence of intangible assets and the relevance or lack of relevance of financial statements, which derives from their (in)capacity in terms of timely reporting of all relevant and reliable information, the two approaches tend to have marked differences.

and the separation between operating and non-operating activities. The separation of such activities will have different effects on the evaluation function.

The non-operating activities include assets and liabilities traded in perfectly individualized markets, whereby the value of this class of asset tends to match its market value, generating investment with zero net present value (NPV). Therefore, the evaluation of such assets does not imply any specification, contrary to operating assets. The difficulties in the assessment of the value of operating assets are related in that they are not evaluated in a perfect, liquid market.

Assuming the separation between operating and non-operating activities and including the dividend policy, Feltham and Ohlson (1995) began by defining a set of accounting and financial variables, from which the evaluation function is specified.

Thus, considering a multiperiod context, where in each period [$t = 0, 1, 2 \ldots$], the company discloses all the information about its operating and non-operating activities; this information is described by Zhang (2000: 128) as follows:

> These data are random prior to their disclosure and the probabilistic structure governing their stochastic behaviour is exogenous.

In this context the variables considered are:

bv_t value of the company's equity at date t;
x_t net profit generated in the period $[t - 1, t]$;
d_t dividends at date t;
fa_t net non-operating assets (non-operating assets minus liabilities) at time t[10];
i_t result from non-operating activities in the period $[t - 1, t]$;
oa_t net operating assets, i.e. operating assets minus operating liabilities, on the date t;
ox_t operating result for the period $[t - 1, t]$;
c_t operating cash flow, i.e. the cash flow generated by operating activities net of investments;
P_t market value of the company (MVE) on date t.

The relations established between these variables are:

(i) in line with the OM, the principle CSR:

  (a) The book value of equity results from the aggregation of operating (oa_t) and non-operating assets (fa_t). Analytically: $bv_t = oa_t + fa_t$;
  (b) Similarly, the results generated by the two types of activities (operational —ox_t, and not operational activities—i_t), i.e. $x_t = ox_t + i_t$;
  (c) Consistent with the OM model, the principle that defines CSR:

[10]This variable can take a negative value when the non-operating liabilities exceed the non-operating assets. For convenience of analysis, and similarly to the d_t variable, it is considered $fa_t > 0$.

$$\mathrm{bv}_t = \mathrm{bv}_{t-1} + x_t - d_t;$$

(ii) Net interest relation (NIR)—Income generated from non-operating activities:

$$i_t = (R_\mathrm{f} - 1)\ \mathrm{fa}_{t-1} \text{ where } R_\mathrm{f} = 1 + r_\mathrm{f}. \tag{2.12}$$

The rate considered is the free-risk rate (r_f), which is independent of the financial situation of the company (i.e. fa_t is >0 or fa_t <0).[11] As it is assumed that the non-operating assets and liabilities are paid at the free-risk rate, this type of activity generates a net present value (NPV) of zero. The basic intuition of this reasoning is based on the principle that non-operating assets and liabilities are traded in perfect markets, which resemble a cash account (*numeraire asset*) measured without any risk (Morgenstern 1963).

(iii) Financial asset relation (FAR)—Relationship between net non-operating assets:

$$\mathrm{fa}_t = \mathrm{fa}_{t-1} + i_t - [d_t - c_t]. \tag{2.13}$$

At the beginning of the period, the company begins its activity with a volume of non-operating assets—fa_{t-1}. During the period t, these assets generate an income i_t, as dividends paid only at the end of the year t. The cash flow generated by operating activities (*cash flow to the firm*—c_t) is also determined at the end of the period. Note that the amount $[c_t - d_t]$ affects the level of non-operating assets at the end of the year, but not the level of income generated in the period (i_t). The variable c_t gains particular relevance in the FOM model, compared to the OM model.

(iv) O*perating asset relation* (OAR)—Relationship between net operating assets:

$$\mathrm{oa}_t = \mathrm{oa}_{t-1} + \mathrm{ox}_t - c_t. \tag{2.14}$$

The reasoning behind this relationship is similar to the CSR principle. The company starts its activity with a certain level of operational assets (oa_{t-1}), which generate an outcome in the period—operational results (ox_t); the cash flow (c_t) generated by operating activities is transferred to non-operating activities.[12] Given the FAR relation, the transference of c_t for financial

[11] In a context of perfect markets, the company cannot change interest rates. Moreover, given the *homemade* concept, individual investors cannot mimic the decisions of indebtedness of the company, since, at a higher or lower level of debt, the company is not a creative source of value Miller and Modigliani (1961), Modigliani and Miller (1958). To emphasize that, Feltham and Ohlson in 1999 incorporated risk aversion and the existence of heterogeneous preferences of investors in their article.

[12] If negative, c_t corresponds to net investments in operating assets (oa_t).

activities does not generate any gain or loss, because such transference is taken at market value, thus the c_t variable is objectively measured independently of any accounting principles underlying the valuation of operating assets (oa_t) (Feltham and Ohlson1995).

Since the criterion for decision-making by managers should be creating wealth, the aim of Feltham and Ohlson (1995) is to determine the value of the company and not the value that is distributed to shareholders (e.g. dividend model). Thus, with reference to the Gordon's model (PVED), in which the value is determined by the level of expected wealth transfer to shareholders $(d_{t+\tau})$, and considering the relationships between various financial accounting-defined variables (i.e. CSR, NIR, FAR and OAR), Feltham and Ohlson (1995) demonstrate the equivalence of the neoclassical model (PVED) with the following three expressions (Proposition 1)[13]:

$$P_t = \mathrm{fa}_t + \sum_{\tau=1}^{\infty} R_{\mathrm{f}}^{-\tau} E_t(c_{t+\tau}); \tag{2.15a}$$

$$P_t = \mathrm{bv}_t + \sum_{\tau=1}^{\infty} R_{\mathrm{f}}^{-\tau} E_t\left(x^a_{t+\tau}\right); \tag{2.15b}$$

$$P_t = \mathrm{bv}_t + \sum_{\tau=1}^{\infty} R_{\mathrm{f}}^{-\tau} E_t\left(\mathrm{ox}^a_{t+\tau}\right); \tag{2.15c}$$

Equation 2.15a, and according to Miller and Modigliani (1961), shows that the key factor to generating value for a company is the net present value of cash flow flows from operating activities and the risk that is inherent them. Equation 2.15b is equivalent to the PVED model (Eq. 2.6). Equation 2.15c specifies that, given the principle of separation between operating and non-operating activities, abnormal results derive from operating activities. Only the investments in real assets that have the capacity to create value, given the existence of economic agents in the markets with expertise in specific business and with inside information and skills that enable them to track innovation, thus sustaining their competitive advantages in the face of competition.

Therefore, in the terminology of Feltham and Ohlson (1995), and in line with Miller and Modigliani (1961), Modigliani and Miller (1958), the value of the company is $\mathrm{MVE}_t = \mathrm{fa}_t + (\mathrm{oa}_t + g_t)$. From this equation, it follows that *goodwill* is a function only of the expected results from abnormal operational results, i.e. it depends only on the operational activities.

[13]The analytical deduction of these formulas and their equivalence with the PVED model are reported in Appendix 2.2.

The demonstration is sustained by the CSR principle, and the NIR and FAR relations. Therefore:

$$\begin{aligned} P_t &= g_t + \text{fa}_t + \text{oa}_t \Leftrightarrow \\ P_t &- \text{fa}_t = \text{oa}_t + g_t \end{aligned} \tag{2.16}$$

using Eq. 2.15a, we obtain

$$\text{ao}_t + g_t = \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(c_{t+\tau}) \tag{2.17}$$

By Eq. 2.15c:

$$\begin{aligned} \text{ao}_t + g_t &= \text{oa}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(\text{ox}_{t+\tau}^{a}\right) \Leftrightarrow \\ g_t &= \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(\text{ox}_{t+\tau}^{a}\right) \end{aligned} \tag{2.18}$$

This expression has two implications: (i) *goodwill* (g_t) can be different from zero, i.e. the value of the operating assets (oa_t) differs from its current expected cash flows; and (ii) the bias from the difference between market value (MVE) and book value (BVE) does not differ just in the short term, as it tends to persist in the medium and long term. It is from the persistence of this differential that the problem of *unbiased accounting* versus *conservative accounting* arises.[14]

In this context, Feltham and Ohlson (1995) define the property *unbiased accounting* as occurring when the $E_t(g_{t+\tau}) \rightarrow 0$ *com* $\tau \rightarrow \infty$. As a negation of this property, there is *conservative accounting*, whereby the $E_t(g_{t+\tau}) \succ 0$ *com* $\tau \rightarrow \infty$. Thus the property *unbiased accounting* (Proposition 2) implies:

$$E_t(\text{oa}_{t+T}) = E_t\left[\sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_{t+T}(c_{t+T+\tau})\right] \rightarrow 0 \; com \; T \rightarrow \infty,$$

[14]For Ohlson (1995) *unbiased accounting* is characterized by a self-corrective process, in which the medium- and long-term abnormal results tend to zero and the return on equity ratio (ROE) converges to r (the cost of capital). Kothari (2001) highlights this autocorrective effect of the OM model, which makes the OM "immune" to the manipulation of policies and/or accounting principles. For example, any strategy to increase the results in t, will increase the bv_t. In the following period, this effect tends to be offset by a reduction of the abnormal results because the cost of capital [$(R_{\text{f}} - 1)$ * bv_{t-1}] increases.

or equivalently,

$$E_t\left[\sum_{\tau=1}^{\infty} R_f^{-\tau} E_{t+T}(\mathrm{ox}^a_{t+T+\tau})\right] \rightarrow 0 \; com \; T \rightarrow \infty. \tag{2.19}$$

Replacing ($\rightarrow$0) by (>0) occurs the *conservative accounting* effect. In other words, *unbiased accounting* occurs if the average value of operating assets (oa_t) equals the present value of future cash flows, or the abnormal operating results value is zero with $\tau \rightarrow \infty$. Hence, the proposition 2 suggests that *conservatism accounting* understates the book value of operating assets and/or overstates the present value of the abnormal of expected operating results.[15]

With the aim of considering the effect of the persistence of abnormal results, the effect of *conservatism accounting*, the growth in operating assets (oa_t), and operational results (ox_t), Feltham and Ohlson (1995) redefine the dynamics of information initially specified by the OM model. Thus, the dynamic information (*linear information model—LIM*) becomes defined as:

$$\begin{cases} \mathrm{ox}^a_{t+1} = w_{11}\mathrm{ox}^a_t + w_{12}\mathrm{ao}_t + v_{1t} + \varepsilon_{1,t+1} \\ \mathrm{oa}_{t+1} = \; + w_{22}\mathrm{oa}_t + v_{2t} + \varepsilon_{2,t+1} \\ v_{1,t+1} = \gamma_1 v_{1t} + \varepsilon_{3,t+1} \\ v_{2,t+1} = \gamma_2 v_{2t} + \varepsilon_{4,t+1} \end{cases} \tag{2.20}$$

where $E_t\left(\varepsilon_{j,t+\tau}\right) = 0$ with j = 1, 2, 3 and 4 and $\tau > 0$.

The dynamic of information depends now not only on the persistence of abnormal results, the effect captured by the parameter w_{11}, as well as the growth of investments in operating assets (reflected in the parameter w_{22}), but also on the effect of *conservatism accounting* at the level of operational assets via parameter w_{12}. The v_{1t} and v_{2t} variables, and in line with the OM model, aim to capture all available information that may change investors' expectations about the persistence of abnormal and growth resulting from new investments. Thus, the vector ($\underline{v}$—other information) can be interpreted, assuming the semi-strong principle of efficiency, i.e. the prices tend instantaneously to reflect all publicly available information $\left(\phi^m_t\right)$ (Fama 1976). If we subdivide $\left(\phi^m_t\right)$ into two, i.e. economic and financial information ($\left(F\phi^m_t\right)$ and other information $\left(NF\phi^m_t\right)$), then the vector $\underline{v}$ is identified with the latter subset of information, i.e. other non-financial information not yet incorporated in the financial statements. However, the FOM model emphasizes, that the

[15]This effect is most easily seen in the expression: $\sum_{\tau=1}^{\infty} R_f^{-\tau} E_t(c_{t+\tau}) = \mathrm{oa}_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t\left(\mathrm{ox}^a_{t+\tau}\right)$ deduced from the Eq. (2.15c). Given the objectivity in how the variable c_t (*cash flow to the firm*) is measured (which is independent of any criteria or accounting policy), an understatement of operating assets (oa_t) must be compensated by an overestimation of abnormal results (ox^a_t); thus the value of the variable c_t remains unchanged.

effect of these parameters is limited to the short term. In this context, the dynamic evolution of cash flows is characterized by:

$$c_{t+1} = w_{11} ox_t^a + \left[\left(R_f - w_{22}\right) + w_{12}\right] oa_t + \left[v_{1t} - v_{2t}\right] + \left[\varepsilon_{1,t+1} - \varepsilon_{2,t+1}\right] \quad (2.21)$$

The dynamics of cash flows depend on the current abnormal results of the w_{11}, w_{12} parameters that measure the understatement of operating assets (*conservatism accounting*), the increase in operating assets (w_{22}), and even the information that is being made available to the market (vector—$\underline{v}$).

Restrictions that can be imposed on the parameters of the LIM are:

(i) $|\gamma_h| \prec 1$ with $h = 1.2$.
The purpose of this restriction is to ensure that random events, whose effect is captured by v_{1t} and v_{2t} variables, and not reflected in the financial statements, have no impact on the medium and long term, i.e. $E_t\left[v_{h,t+\tau}\right] \to 0$, *com* $h = 1, 2$ *e* $\tau \to \infty$.

(ii) w_{11}, the parameter that measures the persistence of abnormal results assumes values ε]0, 1[. With this condition, the objective is to introduce restrictions to the persistence of abnormal results. Thus, $w_{11} \succ 0$ eliminates potential oscillations that would not be economically acceptable and $w_{11} \prec 1$, permits abnormal results that persist for some time, but its effect declines over time because the competition within the medium term tends to eliminate abnormal returns.

(iii) The parameter w_{22}, which reflects the effect of the increase in operating assets assumes values within the range]1, R_f[with $R_f = (1 + r)$. This restriction imposes limitations on the growth of operating assets in the long term to ensure convergence when calculating the present value of operating abnormal results $\left(\text{ox}_t^a\right)$ and the expected cash flows (c_t).

(iv) The parameter w_{12} enables us to introduce the dichotomy *unbiased accounting* $(w_{12} = 0)$ versus *conservatism accounting* $(w_{12} \succ 0)$, i.e. the problem of underestimation of operating assets.[16]

Given the reformulation of the LIM of the FOM, and continuing to take the neoclassical framework of PVED and relationships previously established between the variables (i.e. CSR, NIR, FAR and OAR), the evaluation function is now defined as:

[16]To impose $w_{12} \succ 0$ the model eliminates the effect of *aggressive accounting*, i.e. the MVE is less than BVE. This restriction simplifies the analysis, and is in accordance with the empirical evidence. Indeed, Feltham and Ohlson (1995: 701) find, and taking as reference the data from the Compustat database, that the MVE of companies tends to be greater than 2/3 of their BVE. Stober (1999) found the opposite (*aggressive accounting*), but only for the period 1973–1979, and justified as a consequence of the oil shock.

$$P_t = \mathrm{bv}_t + \alpha_1 \mathrm{ox}_t^a + \alpha_2 \mathrm{oa}_t + \beta \cdot v_t \tag{2.22}$$

with

$$\alpha_1 = \frac{w_{11}}{R_\mathrm{f} - w_{11}}$$
$$\alpha_2 = \frac{w_{12} R_\mathrm{f}}{(R_\mathrm{f} - w_{22})(R_\mathrm{f} - w_{11})}$$
$$\beta = (\beta_1, \beta_2) = \left[\frac{R_\mathrm{f}}{(R_\mathrm{f} - w_{11})(R_\mathrm{f} - \gamma_1)}, \frac{\alpha_2}{R_\mathrm{f} - \gamma_2}\right].$$

In this context, *goodwill* (g_t) corresponds to:

$$P_t - \mathrm{bv}_t = g_t = \alpha_1 \mathrm{ox}_t^a + \alpha_2 \mathrm{oa}_t + \beta \cdot v_t \tag{2.23}$$

that is *goodwill* is an increasing function of operating abnormal results, whose persistence is measured by the parameter w_{11} (the higher w_{11}, the higher is α_1), operating assets (oa_t) only when they are undervalued because the necessary condition for $\alpha_2 > 0$ is that $w_{12} > 0$ and, the variable v_t ($\underline{v}$). We should also notice that in both models (OM and FOM) the tax effect is ignored. However, given that both models assume a perfect capital market (i.e. the models do not admit the existence of costs derived from asymmetric information, agency costs and transaction costs), then the tax effect will not have a material effect on the evaluation function.[17]

2.3 The Effect of Conservatism Accounting

According to Richardson and Tinaikar (2004), the *accounting conservatism* effect can occur in a company as a result of investments in *items* such as R&D and advertising. In accordance with GAAP, this type of investment should be recorded as historical costs and recognized immediately as expenses (*ex ante conservatism)* which underestimate the present value of cash flows from these investments.

Given the company profile examined in this research namely, new economy companies[18] and companies with an Initial Public Offering (IPO) date that is contemporary with net firms—*non-net firms* (see Sect. 5.4.2), also which are firms that operate mainly in high-tech sectors (*high-tech firms*), we will focus our analysis on the first kind of *conservatism accounting* (*ex ante*) identified by Richardson and Tinaikar (2004)—the impact of immediate accounting as costs of investment in

[17]The deduction of this model (Eq. 2.22) is in Appendix 2.3.

[18]The concept of the new economy company is defined in Sect. 5.4.1.

intangibles such as R&D and advertising on the variables "MVE", "BVE" and "net income", the main determinants of value according to the OM and FOM.

Feltham and Ohlson (1995) show that growth companies, particularly technology companies in the early stages of their life cycle (*start-up* companies), where investments in intangible assets (e.g. R&D and advertising) predominate, have generally poor results or even negative results, since only a portion of their investments are capitalized, while the investments such as R&D and advertising are immediately recognized as an expense in the income statement. Consequently, and because these investments tend to persist over time, in addition to the understatement of the variable "results", the variables "assets" (*unrecognized assets*) and "equity" (BVE) are undervalued (McCrae and Nilsson 2001).

So consider the time $t = 0$, where the initial investment made by shareholders is $(-d_0)$, and is applied in non-operating assets (fa_0), so $-d_0 = \text{fa}_0$ and $\text{bv}_0 => 0$. Then, if $P_0 = d_o$ at this time, the *goodwill* (g_0) is null. The company continues to invest in operating assets (oa_t), and, by the OAR, the variable cash flow is negative, i.e. $c_1 < 0$, as consequences of these investments. Considering the Proposition 2 (Eq. 2.19), which defines the property *unbiased accounting* as:

$$E_t(\text{oa}_{t+T}) = E_t\left[\sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_{t+T}(c_{t+T+\tau})\right] \text{ with } \text{T} \to \infty,$$

or equivalently,

$$E_t\left[\sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_{t+T}(\text{ox}^a_{t+T+\tau})\right] \to 0 \text{ with } \text{T} \to \infty,$$

it is possible for a period of time $T\ \varepsilon\ [0, \infty[$, that the $\sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_0(\text{ox}^a_{\tau}) < 0$, implying that the company can expect to get negative results in the first years of its life, as the result of pursuing high-growth opportunities, particularly if they are associated with investments in R&D and advertising (counted as costs). However, this situation tends to be reversed, because in the future the company will only continue to undertake new investment projects if their expectations are associated with abnormal returns; otherwise we are looking at the effect of *free cash flow* (Jensen 1986). However, this phenomenon is more typical in companies in the maturity phase.

To better clarify the analysis, the authors define the Proposition 9, which uses on date 0 a null *goodwill*:

$$P_0 = -d_0 = \text{fa}_0 \text{ with } \text{oa}_0 = \text{ox}_0 = 0 \text{ but the } E_0(\text{oa}_1) > 0. \tag{2.24}$$

Thus, assuming *conservative accounting*, i.e. the understatement of operating assets:

$$E_0(\text{ox}_1^a) = E_0(\text{ox}_1) < 0. \tag{2.25}$$

In the context of *unbiased accounting*, we obtain equality.

Indeed, at the time $t = 0$, the evaluation function becomes: $P_0 = \text{fa}_0 + \beta_1 v_{10} + \beta_2 v_{20}$, or $P_0 + d_0 = g_0 = \beta_1 v_{10} + \beta_2 v_{20}$; so expectations about new growth opportunities at time $t = 0$ depend only on v_{10} and v_{20}. The relevance of this reasoning is relevant in emerging sectors, such as the Internet. It is a new sector in which expectations about high future abnormal returns are sustained in non-financial variables (v_t), whose proxies are associated with web-traffic variables, such as "number of visitors per website", "average time spent on website", "percentage of the Internet user population", etc. (Copeland et al. 2000; Damodaran 2001; Tockic 2004, 2005, among others).

Thus, in a scenario of *unbiased accounting* and according to LIM:

$$\begin{aligned} E_0(\text{ox}_1^a) &= E_0(\text{ox}_1) = v_{10} = 0 \text{ (given Proposition 9)};\\ E_0(\text{oa}_1) &= v_{20} > 0 \text{ (given Proposition 9)};\\ E_0(c_1) &= v_{10} - v_{20} = -v_{20} \text{ (see Eq. 2.20)}. \end{aligned} \tag{2.26}$$

The value of investing is v_{20} (negative values for the variable c_t represent investments in operating assets), which is fully capitalized.

In a scenario of *conservatism accounting*, and also taking into account Proposition 9, we obtain:

$$\begin{aligned} E_0(\text{ox}_1^a) &= E_0(\text{ox}_1) = v_{10} < 0;\\ E_0(\text{oa}_1) &= v_{20} > 0;\\ E_0(c_1) &= v_{10} - v_{20}. \end{aligned} \tag{2.27}$$

In this context, part of the cash flow is absorbed by losses because the value invested corresponds to v_{20}, but only the portion $(v_{20} - v_{10})/v_{20} < 1$ is capitalized, and the value ($v_{10} < 0$) is recognized as (negative) results in the net income statement ($v_{10} < 0$).

Feltham and Ohlson (1995) demonstrated, and considering the dynamic of information at the time of its initialization, i.e. at $t = 0$, and assuming that at this time the *goodwill* is null, the *conservatism accounting* effect explains how the first years of a company's life can register negative results. However, this situation begins to reverse itself as the company continues to invest. Based on the principle of rationality, the company only continues investing if the investments (growth opportunities) are generating abnormal returns, i.e. $E_t(\text{ox}_t^a) > 0$, because the objective of managers is to maximize the value of the company or equivalently maximize the selection of projects with positive NPV.

With reference to business *start-ups*, particularly companies in technology industries, the net results are not a good *proxy* for future results, as they tend to

incorporate high amounts allocated on investments in intangible assets, recorded as costs, as imposed by GAAP. Core et al. (2003) claim that IPO companies still report losses, because those companies are holding in their "portfolio" high-growth opportunities, so investors' attention focuses on the expectations of future growth. Myers (1977) has associated the persistence of losses with the existence of a high-growth opportunities portfolio.

Thus, using the RIV model, it is easy to explain why the multiples of price-to book value (P/B) and the (PER) tend to be high for those companies due the high expectations of future growth. Thus, defining the net profit (x_t) as $x_t = \text{ROE}_t * \text{bv}_{t-1}$ (return on equity—ROE) and rewriting the RIV model (Eq. 2.6), where r identifies the cost of capital, we obtain[19]:

$$\text{MVE}_t = \text{bv}_t + \sum_{\tau=1}^{\infty} \frac{E_t(\text{ROE}_{t+\tau}\text{bv}_{t+\tau-1} - r\text{bv}_{t+\tau-1})}{(1+r)^{\tau}}.$$

Dividing the above expression by the bv_t variable, we obtain the multiple of book value (P/B):

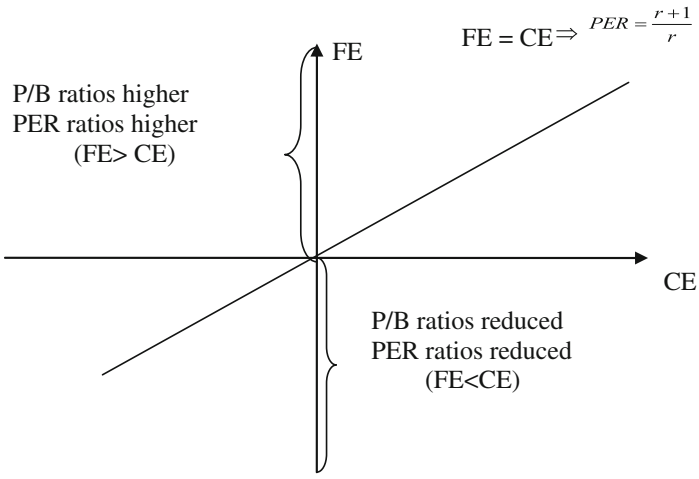
$$\frac{\text{MVE}_t}{\text{bv}_t} = 1 + \sum_{\tau=1}^{\infty} \frac{E_t[(\text{ROE}_{t+\tau} - r)\text{bv}_{t+\tau-1}]}{(1+r)^{\tau}\text{bv}_t}. \tag{2.28}$$

Equation 2.28 shows that the P/B ratio is a function of the expected abnormal results $\left(\frac{E_t(\text{ROE}_{t+\tau}-r)}{(1+r)^{\tau}}\right)$ and the growth of "stock" needed to generate results in the future $(\text{bv}_{t+\tau-1} / \text{bv}_t)$. In the absence of abnormal returns the value of this multiple is the unit.

Calculating now the PER, we add the dividends (d_t) to the RIV model, i.e. $P_t + d_t = (\text{bv}_t + d_t) + \sum_{\tau=1}^{\infty} \frac{E_t(x^a_{t+\tau})}{(1+r)^{\tau}}$. Given the CSR property, we can define $\text{bv}_t + d_t = \text{bv}_{t-1} + x_{t-1}$, and replacing this expression in the expression above, we obtain $P_t + d_t = (\text{bv}_{t-1} + x_t) + \sum_{\tau=1}^{\infty} \frac{E_t(x^a_{t+\tau})}{(1+r)^{\tau}}$, now calculating the PER we get:

$$\frac{P_t + d_t}{x_t} = \left(\frac{1+r}{r}\right) + \frac{1}{x_t}\left[\sum_{\tau=1}^{\infty} \frac{E_t(x^a_{t+\tau})}{(1+r)^{\tau}} - \frac{x^a_t}{r}\right]. \tag{2.29}$$

[19]Recall that the RIV model is equivalent to the PVED model, which assumes as a theoretical framework an economy, where the preferences of agents are homogeneous and they are risk neutral.



Source: White et al. (1997: 1071) adapted.

Fig. 2.1 The relationship between the multiples P/B and PER and future abnormal earnings (*FE*) and current earnings (*CE*)

The PER summarizes the determinant of the magnitude of this ratio, i.e. the difference between future abnormal earnings $\left(\sum_{\tau=1}^{\infty} \frac{E_t(x^a_{t+\tau})}{(1+r)^{\tau}} - \text{FE}\right)$ and current abnormal earnings $\left(\frac{x^a_t}{r} - \text{CE}\right)$. Graphically this is expressed in Fig. 2.1.

Along the 45° line, the expected abnormal earnings (FE) equals current earnings (CE). In this context, the current results are a good indicator of future performance. Above this line, growth affects PER ratios and future abnormal earnings (FE) exceed the current earnings (CE). Note that, even when the net results are negative, the PER ratios can take high values. In this context, the negative results are seen as transitory, e.g. the result of large investments in intangibles, recorded as costs, particularly in technology-based companies in the *start-up* phase (*accounting conservatism*).

Below the 45° line, because the future earnings (FE) are lower than the current earnings (CE), low PERs appear because the high values of CE are due to the presence of transitory *items,* which are not expected to persist in the future.

In summary, *goodwill,* measured by the difference between the market value (MVE) and the book value of equity (BVE) of the company, is the result of a dual effect: (i) the undervaluation of assets (*conservatism accounting*); and (ii) overestimation of the expected abnormal results. These effects are more pronounced in technology-based companies, especially in the *start-up* phase. Therefore, in accordance with LIM, the FOM at the time of the establishment of the company and

taking into account Proposition 9 as the same model, show that only part of the investment is capitalized, with the remainder recognized as cost. However, assuming the principle of rationality, it is expected that managers invest in new growth opportunities if they are associated to abnormal returns. Hence, the *net firms* and companies with contemporaneous initial purchase offer (IPO) dates (including *non-net firms and* very young companies during the *start-up phase*), often propose a new untested business idea), "moving" to the market with high losses valued positively by the market and sustain the phenomenon of *negative pricing of losses,* i.e. the positive valuation of losses. The evaluation of this type of company is particularly difficult, given the difficulty of estimating future cash flows. The volatility of their prices reflects this phenomenon.

Appendix 2.1: Deduction of the OM Model (Eqs. 2.8 and 2.9)

1. **Deduction of the Ohlson (OM) (1995) model—Eq. 2.8:**

Ohlson (1995) defines the valuation function as:

$$P_t = \mathrm{bv}_t + \alpha_1 x_t^a + \alpha_2 v_t.$$

with the parameters assuming the values:

$$\alpha_1 = \frac{w}{R_\mathrm{f} - w} \geq 0 \text{ and}$$
$$\alpha_2 = \frac{R_\mathrm{f}}{(R_\mathrm{f} - w)(R_\mathrm{f} - \gamma)} \succ 0.$$

To obtain this function we first assume:

(i) The matrix $P = R_\mathrm{f}^{-1} \begin{bmatrix} w & 1 \\ 0 & \gamma \end{bmatrix}$;

(ii) The dynamic of information is defined as:
$\left[x_{t+1}^a, v_{t+1}\right] = R_\mathrm{f} P[x_t^{a,}, v_t] + \left[\varepsilon_{1,t+1}, \varepsilon_{2,t+1}\right]$ and,

(iii) Assuming that the supranormal results are defined as:

$$R_\mathrm{f}^{-\tau} E_t\left(x_{t+\tau}^a\right) = [1,0] P^\tau \left[x_t^a, v_t\right].$$

Based on the *Residual Income Valuation Model* (RIV), the expression assumes:

$$P_t - \mathrm{bv}_t = \sum_{\tau=1}^{\infty} R_\mathrm{f}^{-\tau} E_t\left(x_{t+\tau}^a\right) = [1,0]\ \left[P + P^2 + \ldots\right]\ \left[x_t^a, v_t\right].$$

A series of matrices P + P^2 + … are convergent, given the square root of the characteristic of the matrix is less than unit. Thus, we could conclude that:

$$[1,0]P[I-P]^{-1} = [\alpha_1, \alpha_2], \text{ i.e.:}$$

$$[1,0]\left[R_{\mathrm{f}}^{-1}\begin{bmatrix} w & 1 \\ 0 & \gamma \end{bmatrix}\right]\left[\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} - R_{\mathrm{f}}^{-1}\begin{bmatrix} w & 1 \\ 0 & \gamma \end{bmatrix}\right]^{-1} = [\alpha_1, \alpha_2]$$

$$\begin{bmatrix} R_{\mathrm{f}}^{-1}w & R_f^{-1} \end{bmatrix}\begin{bmatrix} 1 - R_{\mathrm{f}}^{-1}w & -R_{\mathrm{f}}^{-1} \\ 0 & 1 - R_{\mathrm{f}}^{-1}\gamma \end{bmatrix}^{-1} = [\alpha_1, \alpha_2]$$

$$\begin{bmatrix} R_{\mathrm{f}}^{-1}w & R_{\mathrm{f}}^{-1} \end{bmatrix}\begin{bmatrix} \frac{1}{1-R_{\mathrm{f}}^{-1}w} & \frac{R_{\mathrm{f}}^{-1}}{\left(1-R_{\mathrm{f}}^{-1}w\right)\left(1-R_{\mathrm{f}}^{-1}\gamma\right)} \\ 0 & \frac{1}{1-R_{\mathrm{f}}^{-1}\gamma} \end{bmatrix} = [\alpha_1, \alpha_2]$$

$$\begin{bmatrix} \frac{R_{\mathrm{f}}^{-1}w}{1-R_{\mathrm{f}}^{-1}w} & \frac{R_{\mathrm{f}}^{-1}wR_{\mathrm{f}}^{-1}}{\left(1-R_{\mathrm{f}}^{-1}w\right)\left(1-R_{\mathrm{f}}^{-1}\gamma\right)} + \frac{R_{\mathrm{f}}^{-1}}{1-R_{\mathrm{f}}^{-1}\gamma} \end{bmatrix} = [\alpha_1, \alpha_2]$$

$$\begin{cases} \alpha_1 = \frac{R_{\mathrm{f}}^{-1}w}{1-R_{\mathrm{f}}^{-1}w} = \frac{R_{\mathrm{f}}^{-1}w}{R_{\mathrm{f}}^{-1}(R_{\mathrm{f}}-w)} = \frac{w}{R_{\mathrm{f}}-w} \\ \alpha_2 = \frac{R_{\mathrm{f}}^{-1}wR_{\mathrm{f}}^{-1}}{\left(1-R_{\mathrm{f}}^{-1}w\right)\left(1-R_{\mathrm{f}}^{-1}\gamma\right)} + \frac{R_{\mathrm{f}}^{-1}}{1-R_{\mathrm{f}}^{-1}\gamma} = \frac{R_{\mathrm{f}}^{-1}wR_{\mathrm{f}}^{-1}}{R_{\mathrm{f}}^{-1}(R_{\mathrm{f}}-w)R_{\mathrm{f}}^{-1}(R_{\mathrm{f}}-\gamma)} + \frac{R_{\mathrm{f}}^{-1}}{R_{\mathrm{f}}^{-1}(R_{\mathrm{f}}-\gamma)} \end{cases}$$

$$\begin{cases} \alpha_1 = \frac{w}{R_{\mathrm{f}}-w} \\ \alpha_2 = \frac{w}{(R_{\mathrm{f}}-w)(R_{\mathrm{f}}-\gamma)} + \frac{R_{\mathrm{f}}-w}{(R_{\mathrm{f}}-w)(R_{\mathrm{f}}-\gamma)} = \frac{R_{\mathrm{f}}}{(R_{\mathrm{f}}-w)(R_{\mathrm{f}}-\gamma)} \end{cases}.$$

2. **Deduction of the Eq. 2.9 of the OM Model**

Assuming the Eq. 2.8:

$$P_t = \mathrm{bv}_t + \alpha_1 x_t^a + \alpha_2 v_t,$$

and substituting x_t^a, we obtain,

$$P_t = y_t + \alpha_1[x_t - (R_{\mathrm{f}} - 1)y_{t-1}] + \alpha_2 v_t.$$

Due the CSR principle:

$$P_t = \mathrm{bv}_t + \alpha_1 x_t - \alpha_1(R_{\mathrm{f}} - 1)(\mathrm{bv}_t - x_t + d_t) + \alpha_2 v_t \Leftrightarrow$$
$$P_t = \mathrm{bv}_t + \alpha_1 x_t - \alpha_1(R_{\mathrm{f}} - 1)\mathrm{bv}_t + \alpha_1(R_{\mathrm{f}} - 1)x_t - \alpha_1(R_{\mathrm{f}} - 1)d_t + \alpha_2 v_t \Leftrightarrow,$$

$P_t = \mathrm{bv}_t[1 - \alpha_1(R_{\mathrm{f}} - 1)] + \alpha_2 v_t + \alpha_1 x_t + \alpha_1(R_{\mathrm{f}} - 1)x_t - \alpha_1(R_{\mathrm{f}} - 1)d_t$ and $\kappa = \alpha_1(R_{\mathrm{f}} - 1)$ thus,

$P_t = \mathrm{bv}_t(1 - k) + \alpha_2 v_t + \alpha_1[x_t + (R_{\mathrm{f}} - 1)x_t - (R_{\mathrm{f}} - 1)d_t]$,

$P_t = (1 - k)\mathrm{bv}_t + \alpha_2 v_t + \alpha_1 R_{\mathrm{f}} x_t - \alpha_1(R_{\mathrm{f}} - 1)d_t$, and $\varphi = \frac{R_{\mathrm{f}}}{R_{\mathrm{f}}-1}$, we obtain:

$$P_t = \kappa(\varphi x_t - d_t) + (1 - \kappa)\mathrm{bv}_t + \alpha_2 v_t.$$

Appendix 2.2: Deduction of the Equivalence of the Preposition Number 1 of Feltham and Ohlson (FOM) (1995) Model and Eqs. 2.15a, 2.15b and 2.15c

(i) Equation 2.15a: $P_t = \text{fa}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(c_{t+\tau})$
Assuming the FAR [$\text{fa}_t = \text{fa}_{t-1} + i_t - (d_t - c_t)$] and the definition of i_t [$i_t = (R_{\text{f}} - 1)\text{fa}_{t-1}$], the dividends could be expressed as:

$$\begin{aligned} d_t &= \text{fa}_{t-1} + i_t + c_t - \text{fa}_t = \text{fa}_{t-1} + (R_{\text{f}} - 1)\text{fa}_{t-1} + c_t - \text{fa}_t \\ &= R_{\text{f}}\text{fa}_{t-1} + c_t - \text{fa}_{t.} \end{aligned}$$

Hence for any sequence of the variables $c_t e$ fa_t ($\{c_{t+\tau}, \text{fa}_{t+\tau}\}_{\tau \geq 1}$), valuation function is:

$$\begin{aligned} P_t &= \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(d_{t+\tau}) = \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t[R_{\text{f}}\text{fa}_{t+1-\tau} + c_{t+\tau} - \text{fa}_{t+\tau}] \\ &= \text{fa}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(c_{t+\tau}), \end{aligned}$$

because $R_{\text{f}}^{-\tau} E_t(\text{fa}_{t+\tau}) \to 0$ *com* $\tau \to \infty$.

(ii) Equation 2.15b: $P_t = \text{bv}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(x_{t+\tau}^a\right)$
This equations corresponds to the Residual Income valuation Model defines in Eq. 2.6.

(iii) Equation 2.15c: $P_t = \text{bv}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(ox_{t+\tau}^a\right)$
Assuming operational and non-operational activities, the following expression corresponds to the operational abnormal results: $\text{ox}_t^a = \text{ox}_t - (R_{\text{f}} - 1)\text{oa}_{t-1}$, applying the OAR we obtain:

$$\begin{aligned} &\text{oa}_t = \text{oa}_{t-1} + \text{ox}_t - c_t, \text{substituting the variable ox}_t \\ &c_t = \text{oa}_{t-1} + \left[\text{ox}_t^a + (R_{\text{f}} - 1)\text{oa}_{t-1}\right] - \text{oa}_t \Leftrightarrow \\ &c_t = \text{ox}_t^a + R_{\text{f}}\text{oa}_{t-1} - \text{oa}_t. \end{aligned}$$

For any sequences of the variables $\left(\left\{\text{ox}_{t+\tau}^a, \text{oa}_{t+\tau-1}\right\}_{\tau \geq 1}\right)$, we obtain:

$$\sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(c_{t+\tau}) = \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(\text{ox}_{t+\tau}^a + R_{\text{f}}\text{oa}_{t-1+\tau} - \text{oa}_{t+\tau}\right) = \text{oa}_t + \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t\left(\text{ox}_{t+\tau}^a\right),$$

thus, $R_{\text{f}}^{-\tau} E_t(\text{oa}_{t+\tau}) \to 0$ *com* $\tau \to \infty$.

If we add fa_t to the above expression, and due the Eq. 2.15a, the valuation function is:

$$P_t = \sum_{\tau=1}^{\infty} R_{\text{f}}^{-\tau} E_t(d_{t+\tau}) = (\text{oa}_t + \text{fa}_t) + \sum_{\tau=1}^{\infty} \text{ox}_{t+\tau}^{a} = \text{bv}_t + \sum_{\tau=1}^{\infty} \text{ox}_{t+\tau}^{a}.$$

Appendix 2.3: Deduction of the Feltham and Ohlson (1995) —Eq. 2.22

Assuming the definition of goodwill:

$$g_t = P_t - \text{bv}_t$$

Multiplying the above expression by R_{f} and according Ohlson (2000):

$$R_{\text{f}} g_t = E_t\left[g_{t+1} + \text{ox}_{t+1}^{a}\right].$$

g_t could be defined as a linear function, such as:

$$P_t - \text{bv}_t = g_t = \alpha_1 \text{ox}_t^{a} + \alpha_2 \text{oa}_t + \beta \cdot v_t$$

with

$$R_{\text{f}} g_t = R_{\text{f}}\left[\alpha_1 \text{ox}_t^{a} + \alpha_2 \text{oa}_t + \beta \cdot v_t\right] = E_t\left[\alpha_1 \text{ox}_{t+1}^{a} + \alpha_2 \text{oa}_t + \beta \cdot v_t + \text{ox}_{t+1}^{a}\right] \Leftrightarrow$$
$$R_{\text{f}}\alpha_1 \text{ox}_t^{a} + R_{\text{f}}\alpha_2 \text{oa}_t + R_{\text{f}}\beta \cdot v_t = E_t\left[(\alpha_1 + 1)\text{ox}_{t+1}^{a} + \alpha_2 \text{oa}_{t+1} + \beta v_{t+1}\right].$$

Due the structure of Linear Information Model (LIM):

$$R_{\text{f}}\alpha_1 \text{ox}_t^{a} + R_{\text{f}}\alpha_2 \text{oa}_t + R_{\text{f}}\beta_1 v_{1t} + R_{\text{f}}\beta_2 v_{2t} = (\alpha_1 + 1)E_t(\text{ox}_{t+1}^{a}) + \alpha_2 E_t(\text{oa}_{t+1}) + \beta E_t(v_{t+1})$$

Substituting the expected values according the dynamic information:

$$R_{\text{f}}\alpha_1 \text{ox}_t^{a} + R_{\text{f}}\alpha_2 \text{oa}_t + R_{\text{f}}\beta_1 v_{1t} + R_{\text{f}}\beta_2 v_{2t} = (\alpha_1 + 1)(w_{11}\text{ox}_t^{a} + w_{12}\text{oa}_t + v_{1t}) + \alpha_2(w_{22}\text{oa}_t + v_{2t}) + \beta_1\gamma_1 v_{1t} + \beta_2\gamma_2 v_{2t}$$

Solving the equation based on that the probability should be one, thus:

$$\begin{cases} R_f\alpha_1 = (\alpha_1+1)w_{11} \\ R_f\alpha_2 = (\alpha_1+1)w_{12} + \alpha_2 w_{22} \\ R_f\beta_1 = (\alpha_1+1) + \beta_1\gamma_1 \\ R_f\beta_2 = \alpha_2 + \beta_2\gamma_2 \end{cases} \Leftrightarrow \begin{cases} R_f\alpha_1 = \alpha_1 w_{11} + w_{11} \\ R_f\alpha_2 - \alpha_2 w_{22} = (\alpha_1+1)w_{12} \\ R_f\beta_1 - \beta_1\gamma_1 = (\alpha_1+1) \\ R_f\beta_2 - \beta_2\gamma_2 = \alpha_2 \end{cases} \Leftrightarrow \begin{cases} \alpha_1(R_f - w_{11}) = w_{11} \\ \alpha_2(R_f - w_{22}) = (\alpha_1+1)w_{12} \\ \beta_1(R_f - \gamma_1) = (\alpha_1+1) \\ \beta_2(R_f - \gamma_2) = \alpha_2 \end{cases}$$

$$\Leftrightarrow \begin{cases} \alpha_1 = \frac{w_{11}}{R_f - w_{11}} \\ \alpha_2(R_f - w_{22}) = (\frac{w_{11}}{R_f - w_{11}} + 1)w_{12} \\ \beta_1(R_f - \gamma_1) = \frac{w_{11}}{R_f - w_{11}} + 1 \\ \beta_2(R_f - \gamma_2) = \alpha_2 \end{cases} \Leftrightarrow \begin{cases} \alpha_1 = \frac{w_{11}}{R_f - w_{11}} \\ \alpha_2(R_f - w_{22}) = (\frac{w_{11} + R_f - w_{11}}{R_f - w_{11}})w_{12} \\ \beta_1(R_f - \gamma_1) = \frac{w_{11} + R_f - w_{11}}{R_f - w_{11}} \\ \beta_2 = \frac{\alpha_2}{R_f - \gamma_2} \end{cases}$$

$$\Leftrightarrow \begin{cases} \alpha_1 = \frac{w_{11}}{R_f - w_{11}} \\ \alpha_2 = \frac{R_f w_{12}}{(R_f - w_{11})(R_f - w_{22})} \\ \beta_1 = \frac{R_f}{(R_f - w_{11})(R_f - \gamma_1)} \\ \beta_2 = \frac{\alpha_2}{R_f - \gamma_2} \end{cases}.$$

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Chapter 3
The Value Relevance of the Variables Earnings and Book Value of Equity for Valuation Purposes

Abstract Since the seminal work of Ball and Brown (J Acc Res 6(2):159–1478, 1968) and Beaver (J Acc Res 6:179–192, 1968), extensive literature has examined the relationship between the prices of securities and (positive) results reported by companies. However, analysis of price/losses is scarce, with contradictory results obtained so far. Ratio (price versus losses) gained relevance in 1990s, with well-documented results in new economy companies (Shiller in Irrational exuberance. Princeton University Press, Princeton, 2000). It is for this group of companies that the phenomenon "positive valuation losses" assumes its great of significance, although it was not an entirely new phenomenon. For example, Amir and Lev (J Acc Econ 22(1–3):3–30, 1996) documented this relationship in the mobile phone sector, also with reference to the US market, in the 1980s.

Keywords New economy companies · Positive valuation of losses · Value relevance of earnings and book value of equity

It is important to point out that this effect of positive valuation of losses occurred in a decade when there was an increasing number of small and young businesses, particularly technology-based firms (Hayn 1995; Basu 1997; Burgstahler and Dichev 1997; Collins et al. 1997, 1999; Chan et al. 2001; McCallig 2004; Joos and Plesko 2005) which report after the 90s, a greater magnitude of losses and a tendency to persist for longer periods of time (McCallig 2004; Joos and Plesko 2005). These effects, i.e. the report of losses and its persistence over time are particularly dominant in the samples analyzed (see Tables 5.3 and 5.4).

In this chapter, we will begin by analyzing the information content of the variable results for evaluation purposes. Briefly, we begin by analyzing profitable firms, and then focus our analysis on companies with losses. After that, we will introduce into the analysis the variable BVE which, along with the variable results, net income, is the main determinant of the value according to the OM and FOM, the theoretical framework in this study, and based on which we intend to empirically

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test the phenomenon of positive valuation of losses. As stated by Ohlson and Penman (1992: 553):

> These two summary measures ("book value of equity" and "earnings") achieve pre-eminent status by serving as primary indictors of a firm's value.

3.1 The Informational Content of the Variable Results

The variable results is relevant for evaluation purposes, or in other words, investors see the variable results as a valuable source of information linked to the company's value. According to the model of discounted cash flows, the value of a share results from the discounted future cash flows (CF), and the discount rate reflects the opportunity cost of capital and the risk inherent to the business (r). Assuming a flow of constant returns with an infinite duration (perpetuity), and based on the principle of continuity (going concern), the price [numerical expression of the value (Neves 2002: 4)] corresponds to:

$$P_0 = \frac{E_0(\mathrm{CF})}{(1+r)} + \frac{E_1(\mathrm{CF})}{(1+r)^2} = \cdots = \sum_{t=1}^{\infty} \frac{E_0(\mathrm{CF}_t)}{(1+r)^t} = \frac{\mathrm{CF}}{r} \tag{3.1}$$

Considering the variable results (X) as a proxy for future cash flows (unobservable) (Modigliani and Miller 1966), the price is as follows[1]:

$$P_0 = \frac{X}{r} \tag{3.2}$$

In this context, there are multiple studies that aim to examine the relationship between the price movements and the results reported by companies, i.e.:

$$P_i = \alpha + \beta X_i + e_i \tag{3.3}$$

If the variable results are relevant for evaluation purposes, it is expected that the parameter β should be positive and statistically significant because it measures the covariance between the variable price and results corresponding to the multiple of the results (PER = P_0/X = $1/r$). However, empirical studies have documented for the parameter β low values ranging from one to three (Kormendi and Lipe 1987)

[1]White et al. (1997: 1043) and Ferreira and Sarmento (2004: 31) show, in theory, the equivalence between the models based on the discount of cash flows and models based on stock of assets held by the company, from which is generated the expected revenue. If we assume that CF = ROE * (BVE) and in the medium–long term the ROE = r, being r the rate of the cost of capital and ROE the rate of return on equity, then: MVE = CF/r = (ROE * BVE)/r = BVE. Thus, as shown by Ohlson (1995), over the medium–long term the variable BVE is an unbiased estimator of MVE.

when theoretically the values of β, assuming a reasonable estimate for the PER ratio, should be between 8 and 20 (Kothari 2001: 129). Thus, even assuming that all companies record profits, the explanatory power of this model already shows very low values.[2]

There are several explanations to support the weak explanatory power of the variable results. Beaver et al. (1980) justify the lack of synchronization between the movements of prices and results based on the gap between the arrival of the new information on the market, since they are incorporated into the prices immediately but only later reported in financial statements [an effect captured by Ohlson (1995) and Feltham and Ohlson (1995) by the variable v_t]. Thus, there is increasing pressure for solid reporting of information from the company, i.e. for the company to report more and more information, also extra financial information, in particular information relating to business risk, and in a timelier manner. Guimarães (2004) suggests that the Internet is a very valuable vehicle for online dissemination of information.[3]

The "contamination" of the variable results with transitory *items*, which introduces noise into the variable results, is another explanation provided by Collins et al. (1994) and Ramakrishnan and Thomas (1993).[4] Ohlson and Shroff (1992) and Kothari and Zimmerman (1995) postulate that econometric factors justify the weak explanatory power between prices and results. They demonstrate that the choice of the methodology *price level* (Eq. 3.3), which assumes that results follow a random walk[5] enables prices to reflect a broader and timely set of information, provides

[2]If the variable results constitute an adequate proxy for future cash flows, the cost of capital is identical for all companies, and assuming no growth, the variable "results" should explain 100% of the cross-section changes in the variable "prices". For a detailed analysis see Kothari (2001).

[3]The importance of standardization of financial reporting is such that the new XBRL Extensible Business Reporting Language (XBRL) is being used for the electronic communication of business and financial data, cause of its versatility to be used throughout the world, regardless of language, type of business or adopted accounting system. For example, the Security Exchange Commission (SEC) announced that it will engage directly in the development of financial reporting globally, like the International Accounting Standard Board (IASB).

[4]It is assumed that the variable "results" (X) has three components: (i) permanent results (X^P), i.e. a flow of results that that the company is expected to sustain in the future, whose "persistence" depends among other factors of the customer portfolio held by the company, such as customer loyalty to the brand and product quality; (ii) temporary *items* (X^T), potentially resulting from discontinued operations and extraordinary *items*, and (iii) irrelevant *items* for valuation purposes (X^O) resulting for example from changes in accounting policies. Analytically, the price (P_i) is a function of $P_i = \alpha + \beta_P X^P + \beta_T X^T + \beta_o X^O$. Theoretically, the parameter β_T must take the value one ($\beta_T = 1$), because it is expected that the impact of a monetary unit of a *transitory item* in results has a similar impact on prices, restricting their effect to the year in which it is reported. $B_P > \beta_T$, because the market assigns a higher multiple (PER) to the permanent results given its persistence, which is expected to continue in the future. The parameter β_0 assumes a null value, given the irrelevance of this variable for evaluation purposes.

[5]The assumption that the results follow a random walk is sustained in the research of Ball and Watts (1972). But while the assumption that the prices follows a random walk is based on a solid body of theory, the theory of efficient markets, the application of this assumption to the variable 'results' is merely indicative.

non-biassed coefficients compared to the *return models* and *differentiated-price models*, which tend to be more used because they circumvent econometric problems such as heteroscedasticity.[6] However, these authors found that different methodologies continue to predict the constant statistically significant values different from zero, which is inconsistent with the theory. Thus they recommend the use of different methodologies, suggesting that the potential existence of nonlinear relationships between prices and the variable results should be explored (either empirically or theoretically).

Easton et al. (1992) in turn, invoke the clean surplus principle, i.e. that all available information sooner or later is incorporated into the variable results, thus they suggest that in *returns models* the investigations should cover a more broader horizons for measuring the variable results. The aim is to reduce potential errors of measurement of this variable. The empirical results obtained by these authors confirm the existence of a greater correlation between the variables returns and results when expanding the time horizon to measure the variable results.

The existence of a negative correlation between the free-risk interest rate and the parameter β (PER) is suggested by Collins and Kothari (1989). As the discount rate is calculated by adding a risk premium to the risk-free rate, the increase in the interest rate without risk (*ceteris paribus*) leads to the parameter β facing a decrease in value. This negative relationship stems from the (unexpected) impact of inflation on economic activity: the variation in the free-risk interest rates results from variations in the inflation rate, and, if the company reflects this effect in an increase in prices of goods/services sold, it is not expected that there is link between the risk-free rate and the parameter β (PER). Table 3.1 summarizes the main studies.

More recently, and due the greater number of companies registering losses, a line of research argues that the information content of the variable results for evaluation purposes is asymmetric, i.e. depending on the company reporting profits or losses. The asymmetry derives from the liquidation option that shareholders hold from the company. Traditionally empirical studies removed from the studies companies with losses (e.g. Beaver et al. 1980; Collins and Kothari 1989).

One of the pioneering studies in this area was the study of Hayn (1995). Hayn (1995) uses the *returns model*, where the annual returns are explained in terms of the annual results by shares to test the hypothesis

$$\beta(\text{and } R^2)_{\text{companies with losses}} < \beta(\text{and } R^2)_{\text{global sample}} < \beta(\text{and } R^2)_{\text{profitable companies.}}$$

[6]In the price level models, the variable prices are explained in terms of earnings per share. In return models, performance is explained by the earnings per share, deflated by the price at the beginning of the period. In turn, the differentiated-price models consider variations in either returns or results (Donnelly 2002). Donnelly (2002) shows similar results for the three methodologies if the variable results are not "contaminated" by transitory *items*. In the presence of these items, the results of different models tend to differ dramatically depending on the methodology used.

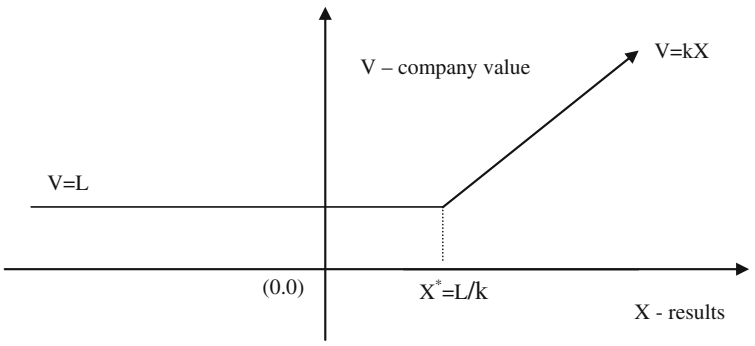
Table 3.1 Summary of the factors supporting the weak correlation between the variable results (positive) and the movement of prices

Authors	Explanatory facts
• Beaver et al. (1980)	– Lack of timeliness effect associated with financial information
• Ramakrishnan and Thomas (1993) • Collins et al. (1994)	– The noise introduced by transitory *items* (*item* 17 of the annual Compustat database) in the variable results
• Ohlson and Shroff (1992) • Kothari and Zimmerman (1995) • Donnelly (2002)	– Econometric factors. The different methodologies (price level regressions, returns model and different-priced models) tend to produce different results if the variable results are contaminated by transitory *items*
• Easton et al. (1992)	– Need to consider higher horizons to measure the variable results under the assumption of CSR (clean surplus relation)
• Collins and Kothari (1989)	– The impact of the free-risk interest rate

The results for the period from 1963 to 1990 confirm that the β parameter (and R^2) assumes values near zero in the sample of companies with losses; in samples with profits the parameter β takes values close to three and the R^2 stands at 17%. To ensure greater robustness of the results, Hayn (1995) creates portfolios based on the number of consecutive years in which companies report losses; she finds that the probability of a company reporting losses in a year is 14%, decreasing to eight per cent in companies that have registered six (or more) years of consecutive losses. As we increase the number of years in which companies report losses, the parameter β is negative (positive phenomenon of valuation losses) and R^2 even records a slight increase, which Hayn (1995) justifies on the basis that it is not sustainable that the company will stay in the market, registering consecutive losses, because in this context shareholders will liquidate the company.

When a company reports losses in a year, the price does not decrease necessarily to zero, but in proportion to the variation in the variable results. The justification for such behaviour, and according to Hayn (1995), results from the fact that the market interprets the losses as temporary, given the liquidation option held by shareholders. As shareholders hold a put option on future cash flows of the company, if the company faces the losses or unsatisfactory levels of results, shareholders exercise the liquidation option and sell their shares at a price proportionate to the liquidation value of the assets. Thus Hayn (1995) demonstrates positive valuation of losses (see Fig. 3.1).

With high levels of results (X), the value of the company results from capitalization of the results (k = PER). Reporting losses or unsatisfactory levels of results, the company value is $V = L$, where L is the liquidation value of the company. $X^* = L/k$ is the level of results below which it is preferable to shareholders exercise



Source: Hayn (1995: 133)

Fig. 3.1 The relationship between the value of the company's equity and results due to the liquidation option held by shareholders

the liquidation option.[7] Thus, Hayn (1995) shows that, for profitable companies ($X > X^*$), the price is strongly correlated with the results, tripling the multiple assigned by the market to such companies as seen, this variable acts as an appropriate proxy for expected future income streams as postulated by Modigliani and Miller (1966). For companies reporting losses, or with unsatisfactory levels of results ($X < X^*$—*temporarily depressed firms*), there seems to be no correlation between the price and the results (losses) because, in the case of persistent losses, shareholders opt to liquidate the company. These results are consistent with the existence of a nonlinear relationship between the variables "price" and "results", when the latter reaches extreme values.

Similarly, where the losses registered by a company tend to be transitory and so are irrelevant for assessment purposes, Subramanyam and Wild (1996) document an inverse relationship between the probability of default and persistence of the variable results, i.e. losses. The authors begin by estimating the returns obtained by investors on the basis of surprises registered at the level of results (unexpected earnings). Later, the probability of insolvency is introduced into the analysis, based on the methodology proposed by Altman (1968), as an interactive variable (i.e. calculating the product of the variable "surprises" in terms of results—unexpected

[7]Empirically Hayn (1995) defines two proxies to the liquidation value. The first proxy is identified with the credit risk rating assigned to the company, according to the methodology of Standard & Poor's. The second proxy is defined as follows $[(P\text{-}L)/PE_{IND}]/\sigma_{PER}$, where P is the market value of the equity of the company, L is the liquidation value of the company, PE_{IND} is the average PER ratio for the industry, and σ_{PER} corresponds to the standard deviation of the PER ratio of the company. The numerator expresses the excess market value of the company in results-based terms. The denominator measures the magnitude of the need to decrease the value of equity to be equal to its liquidation value.

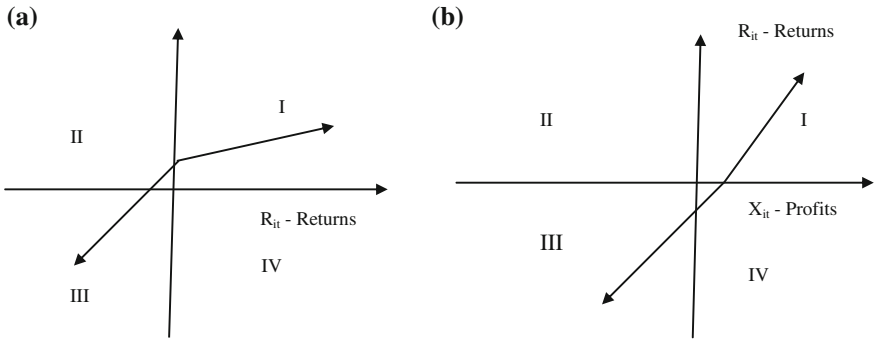
results).[8] As expected, the informational content of the variable results decreases as the losses become persistent because of the greater probability of insolvency of these companies. The results for the period 1981–1990 seem robust to the introduction of control variables that aim to capture the effect of: (i) failure of the debt service; (ii) the variability of the variable results (risk); and (iii) the correlation between the increase in the number of losses and the probability of insolvency.

Chambers (1997) shows similar results to Subramanyam and Wild (1996), i.e. the variable "results", when negative (losses), are irrelevant for valuation purposes. Chambers (1997) argues that the weak explanatory power of the variable "losses" depends on their degree of persistence (measured by the ratio between the present value of accumulated losses and the first loss reported). Subdividing the sample into several groups depending on the level of persistent losses, Chambers (1997) finds that, for the groups in which losses tend to be more persistent, the information content of the variable initial loss is more significant. These results show that faced by the persistence of losses, investors immediately incorporate the greatest degree of bankruptcy which these companies incur, a fact that, according to Chambers (1997) justifies the weak explanatory power associated with variable results when successive losses are reported because in this context the exercise of the liquidation option is imminent.[9]

Basu (1997) follows Hayn (1995), Subramanyam and Wild (1996) and Chambers (1997) line of research, to explore the existence of an asymmetric relation between the movements of the variable "prices" and the changes in the variable results. However, the theoretical basis is different. For Basu (1997), asymmetry in the information content of the variable results is due to the effect of the principle of prudence (one of the four types of accounting conservatism identified by Richardson and Tinaikar (2004)—see Sect. 2.3). According the principle of prudence in preparing the financial statements, actual and potential losses should be recognized immediately, while the potential gains should be deferred, i.e. they are measured only when realized: as a result, the variable results record losses more timely when compared to gains. To empirically measure this effect, he adopts a different method compared to Hayn (1995). Thus, in line with Beaver et al. (1980), and given that prices reflect a wider range of information than the financial information, Basu (1997) adopts the reverse regression methodology, where the annual results are now explained on the basis of annual returns. Assuming that the capital

[8]The bankruptcy probability (Z_{it}) is calculated based on the methodology of Altman (1968) and is defined as $Z_{it} = 1.2X_{1,it} + 1.4X_{2,it} + 3.3X_{3,it} + 0.6X_{4,it} + 1.0X_{5,it}$, where ($X_1$) measures the ratio of the difference between the value of current assets and current liabilities to total assets; (X_2) expresses the proportion of retained earnings over total assets; (X_3) measures the results before interest and taxes (EBIT) over total assets; (X_4) is the ratio of the market value of equity and preferred shares to the book value of total debt; and (X_5) is the quotient between total sales over the total assets. As Z_{it} is a continuous variable, the shorter the value of Z_{it}, the higher the probability of the company becoming insolvent.

[9]Note that Chambers (1997) excludes the sample companies in the start-up phase for the period 1976–1992 to avoid potential bias in the results resulting from the growth effect.



Fonte: Basu (1997: 12).

Fig. 3.2 **a** Relationship between the variables profits and returns according the principle of prudence. **b** Relationship between the variables profits and returns given the liquidation option by shareholders

market is perfect, the variable "returns" acts as a proxy for good and bad news.[10] As expected, the parameters associated with the recorded negative returns have higher statistically significant values compared to the positive returns. Basu (1997) concludes that, in being recognized immediately, the effect of the losses is limited to the period in which they occur, whereas future results are protected from bad current news. In contrast, profits tend to be more persistent and last over time, as they are recognized only when effective.

Establishing a comparative analysis with the results of Hayn (1995), Basu (1997) concludes that Fig. 3.2a (his own) is identified with Fig. 3.2b Hayn (1995) along a 45° reversed line. In Fig. 3.2a, with the use of reverse regression methodology, the parameter β is higher for companies that reported losses because, in accordance with the principle of prudence, the actual and/or potential losses are recognized immediately, while profits (potential) are deferred. Using the traditional method, in which the results (unexpected earnings) are the explanatory variable, they have a higher magnitude for the parameter β (Fig. 3.2b), confirming that for evaluation purposes, the market assigns high value to multiples because the variable results are seen as a consistent proxy for future results. As for the constant, Basu (1997) justify

[10]The empirical model estimated by Basu (1997) corresponds to $X_{it}/P_{i,t-1} = \alpha_0 + \alpha_1 \mathrm{DR}_{it} + \alpha_2 R_{it} + \alpha_3 R_{it} * \mathrm{D}R_{it}$, where X_{it} corresponds to the results of the company i for the period t, $P_{i,\,t-1}$ is the price of the shares i at beginning of period t (end of $t-1$), DR is a dummy variable that takes the value 1 when the company reports negative results (bad news), zero otherwise. According to Basu (1997), considering the variable "price", based on which are calculated returns (R) as an independent variable, and given that this variable reflects all available information in a more timely manner, the estimates provided by the method OLS (Ordinary Least Squares) are more accurate.

contrary to Hayn (1995) that positive values are a reflection of the good news of previous periods whose gains were deferred and only now (when effective) are recognized.

In this context, Basu (1997), along with Hayn (1995), Collins et al. (1997, 1999), McCallig (2004) and Joos and Plesko (2005), recognizes that in the period 1963–1990, there were an increasing number of companies with losses. The increase in losses derives from a double effect: (i) a greater degree of accounting conservatism in the reporting of financial information and, (ii) an increase in the liability of auditors.

In compliance with the principle of prudence, auditing the accounts constitutes a form of control and monitoring by shareholders of the behaviour of managers. In a context of uncertainty, managers have inside information about the company's future prospects. If the managers' incentive system is indexed to the results, they are encouraged to adopt accounting policies (creative accounting) that encourage in the increase of short-term net income. Lenders also claim a more timely reporting of losses (actual and potential), as the value of the option they hold about the company (put option) is more sensitive to decrease, rather than to increase, the value of the company. These requirements are particularly relevant in technology-based companies, whose value is mainly concentrated in intangible assets. In the event of business failure, such assets come to lose all of their value. Lenders have adopted the principle of prudence, as a strategy to reduce contract costs (monitoring costs) (Jensen and Meckling 1976).

The increase in the responsibility of auditors, particularly in view of recent accounting scandals, is another factor that has boosted a greater degree of accounting conservatism in the reporting of financial information. Basu (1997) also notes that taxes and the adoption of regulatory policies as factors intended to standardize accounting practices and procedures in order to achieve comparability between financial statements.[11]

In summary, and based on the above studies, we conclude that losses are irrelevant when estimating future income streams of a company or the market value of equity (MVE) because, if they exist, they tend to be transitory. If they do persist, then shareholders exercise the liquidation option they hold on the company's assets. These results raise the question about the homogeneous relationship that was assumed to exist between the movement of the variables "prices" and "results".[12] In this context, the variable (BVE) is a relevant determinant of the value of a company according OM and FOM.

[11]The standardization of accounting practices and policies is a global trend. As an example, we refer to the Regulation of the European Community (EC) no. 1606/2002 of the Parliament and of the Council of 19 July 2002 on the application of International Accounting Standards (IAS), in order to ensure a greater degree of transparency and comparability of financial statements with a view to a more efficient functioning of increasingly global capital markets.

[12]Hayn (1995) also notes that multiple results (PER), even for the group of profitable firms, has been decreasing over time, but she does not suggest any explanation for this result.

3.2 The Informational Content of the Variable Book Value of Equity

For Collins et al. (1999) the relevance of the variable BVE for evaluation is supported by three factors: (i) econometrics factors, because the omission of this variable induces in an estimated bias coefficient for the variable "results"; moreover the inclusion of variable "BVE" in the valuation model enables control of the effect of scale/size in "price levels models (Eq. 3.3), as shown by Barth and Kallapur (1996); (ii) with reference to the OM, the variable BVE is a proxy for future (normal) expected results; and (iii) the variable BVE is also a relevant proxy for the liquidation value of the company, when the company is in a situation of financial stress—for example, reporting continuous losses, as sustained by Hayn (1995), Berger et al. (1996), Burgstahler and Dichev (1997), Schnusenberg and Skantz (1998), and Barth et al. (1998).

The variable BVE is particularly relevant for assessment in a context where the company report losses. In this case, the variable loss is not relevant in predicting the future profitability of the company, as the losses are not sustainable indefinitely; then according to the principle of continuity, the BVE is assumed as a proxy for the present value of future normal results. In the case of persistent losses, the variable BVE assumes relevance as a proxy for the value of liquidation/abandonment of the company (e.g. Hayn 1995; Chambers 1997; Subramanyam and Wild 1996). Hence, the theory shows that the relevance of the BVE variable for evaluation purposes is inversely related to the financial health of the company (Beaver 2002).

Burgstahler and Dichev (1997) find that both the results and the BVE variables are relevant for evaluation. However, contrary to the OM, a convex relationship is sustained between the variables BVE and results—losses. Measuring the BVE, the level of resources held by the company, it acts as a proxy for the adaptation value of the company.[13] The results in turn act as a proxy for recursion value, i.e. for the present value of expected cash flows. In this context, the value of the option of adjustment/liquidation depends on the recursion value, and vice versa. Therefore, whenever the results reach satisfactory levels (higher return compared to the cost of capital), the results are the determinant variable for evaluation purposes. When profitability degraded, the ROE rate is at unsatisfactory levels [e.g. the *temporarily*

[13]Burgstahler and Dichev (1997) choose the name "adaptation option" because only 1% of firms on the Compustat database are settled. The authors argue that in situations of poor performance, companies choose to convert their resources, their line (s) of business, to more profitable activities, carrying out: restructuring, divestitures or investments in new lines of business, mergers and acquisitions (M&As), takeovers (acquisition of one company by another), spin-offs (partial segregation of an activity), management buyouts (MBO) (purchase of shares by the directors), sell-offs (expression assigned to a market or segment whose market prices at any given time, are on a downward trend, usually as a result of a shortage of purchase orders). Those options as suggested by Wysocki (1998) include the option of exploring new growth opportunities.

depressed firms identified by Hayn (1995: 145)]; shareholders attach greater weight to the variable BVE for evaluation purposes than to the adaptation option value.[14] In this scenario, the company chooses to adapt the line of business to focus on the most profitable alternative activities which, according to Jensen and Ruback (1983), has an ex-post effect on firm value.

Assuming an inverse relationship between the importance of BVE and the financial health of the company, Barth et al. (1998) argue that the explanatory power of the BVE is incremental as the company's financial health deteriorates. Again the main determinant of enterprise value is the results. The evaluation model proposed by these authors also encompasses both the BVE and the results variables; however, the theoretical support moves away from the OM, given the restrictive assumptions of this model (the autoregressive process assumed for the variable results; the dynamic of the variable other information; and the principle of risk neutrality). The results are, however, consistent with the OM.

Thus, the market value of the company will be a function of the variable BVE and results. The BVE provides useful information on the (extra) capacity of the company's debt, constituting a valuable instrument through which lenders can control the conduct of managers and shareholders, as the first acts in the interests of the latter and function accordingly as a proxy for the value of assets recognized in the balance sheet. The results are assumed to be the determining variable for the evaluation in a scenario of good financial health, being a proxy for the value of assets not yet recognized, not reflected in the balance sheet. For example, Barth et al. (1998) refer to investments, such as R&D, advertising, the technological expertise of the company, human capital and customer portfolio, as intangible assets, given that they count as costs in the year they are incurred, in respect of GAAP. Thus, according OM and FOM, they recognize the accounting conservatism effect in the variables BVE and results.

The authors' theoretical foundation derives from the fact that to undertake an investment project, and. assuming that they are rational in their decision making, managers only undertake new investment projects if these are associated with expectations of abnormal return, i.e. a positive NPV. On the acquisition date, assets are recorded at historical cost, and so the surplus (cash flow) expected at the acquisition date will be reflected in the variable "net income" in the following years,

[14]Assuming that the X_t variable is the variable results, the authors show that for a given level of BVE, the MVE is a convex function of the results. Analytically:

$$\begin{aligned} \mathrm{MVE}_t/\mathrm{BVE}_{t-1} &= \gamma_1 \mathrm{BVE}_{t-1}/\mathrm{BVE}_{t-1} + \gamma_2 X_t/\mathrm{BVE}_{t-1} + \varepsilon^* \\ &\Leftrightarrow \mathrm{MVE}_t/\mathrm{BVE}_{t-1} = \gamma_1 + \gamma_2 \mathrm{ROE}_t + \varepsilon^* \end{aligned}$$

(with $\varepsilon^*=\varepsilon/\mathrm{BVE}_{t-1}$). If the ROE rate falls to unsatisfactory levels, (γ_2) is irrelevant for assessment (approaches the zero value), and (γ_1) is irrelevant for valuation (approaches the unit value —it does not achieves a unit value because, for example, assets are recorded at the historical cost and not at fair value). The variable BVE is now the determinant variable for evaluation, because in this context the adaptation option is valuable. Similar reasoning is obtained, if it is now setting the level of the variable results (X_t).

and subsequently, as shown in OM and FOM, via the CSR property, in the BVE variable. Thus, in periods of good performance, the main determinant of the value of a company is based on the unrecognized assets. However, when the company's financial health deteriorates, and given that these intangible assets alone do not have value but are dependent on the overall value of the company, its value tends towards zero. Therefore investment in this type of asset is very risky, especially in technology-based companies.

Damodaran (2001) mentions that a combination of this investment profile, i.e. investment in intangible assets, in particular in companies in the start-up phase, which favours a growth maximization strategy and an increased debt, results in an explosive mix that significantly increases the probability of company default, because at this stage the results tend to be negative. An increase in indebtedness encourages owners to invest suboptimally and to take decisions that destroy value, which increases the risk to the company and decreases the debt value (Myers 1977). By investing in projects with high returns and high risk, investors are essentially betting against the money lenders. If the investment proves profitable, shareholders collect a significant portion of earnings; if the project fails, it is the creditors who bear the costs.

Inspired by the pioneering work of Black and Scholes (1973: 649), Berger et al. (1996) argue that shareholders hold a put option (which in America may be exercised at any time) on future cash flows of the company. If in a given period the cash flows fall short of the expectations of shareholders, they can exercise the put option and liquidate the company's assets. Authors such as Barth et al. (1998) and Berger et al. (1996) recognize that it is particularly difficult to determine the value of this put option because the liquidation value of the assets varies over time depending on economic conditions and the specificity of them. They propose that the value of the put option acts as a proxy for the liquidation value of the assets—*the exit value*— is defined as a function of the following variables:

$$\begin{aligned}\text{Exit value} = {} & 1.00(\text{cash and credit titles}) + 0.72(\text{clients}) + 0.55(\text{inventories}) \\ & + 0.54(\text{fixed assets}) - 1.00(\text{current liabilities}) - 1.00(\text{long term liabilities})\end{aligned} \tag{3.4}$$

According to Myers and Majd (1990) and Shleifer and Vishny (1992), the value of liquidation depends on the type of assets held by the company. The more general the higher the liquidation value, so the greater the likelihood of exercising the abandonment option, which is also very sensitive to the financial health of the company, as measured by the Z-score proposed by Altman (1968). It is in this context that Berger et al. (1996), like Barth et al. (1998), postulated the power of the variable BVE as a proxy for the liquidation value, when the financial health of the company degrades.

In this line of research, the results of Schnusenberg and Skantz (1998) are interesting. These authors also adopt the OM, documenting an increase in the explanatory power of the BVE not only for companies under financial stress, such as those reporting losses for ten consecutive years but not declaring bankruptcy and which are not settled, but for companies that, despite posting a good performance

with successive profits, opt for voluntary liquidation. In this context, the BVE is particularly relevant for evaluation, because, to liquidate the company, shareholders voluntarily sell to third parties the assets held by paying their debt (if any) and dividing the remainder among the shareholders. Abnormal returns recorded by these companies would reflect that the market had not anticipated this decision by shareholders. For example, the authors suggest that voluntary liquidation by shareholders is a response to a threat takeover.

The literature, in particular Francis and Schipper (1999), whose period of analysis extends from 1952 to 1994, has documented a fall in the explanatory power of the variable "net income" compared to the variable BVE, not ascribing to the OM a decrease in their explanatory power. According to Collins et al. (1997), the increase in the explanatory power of the variable BVE against the variable results based on a sample of North American companies for the period 1953–1993 is based on four key factors: (i) an increase in the number of companies reporting a higher volume of transitory *items* (annual *item* 17 in the Compustat database) and/or extraordinary *items* (for example, the authors mention costs resulting from restructuring and adapting business lines); (ii) an increase in the volume of investments in intangible assets (e.g. R&D and advertising); (iii) accordingly, and in compliance with GAAP, a simultaneous increase in the number of companies reporting losses (*conservatism accounting*); and iv) these effects occur in a context identified by Hayn (1995) which is characterised by a change in the business profile operating in the market, i.e. small companies, mostly technology-based, whose probability of default increases sharply, given that they report a higher volume of losses and for longer periods. These results seem to reinforce the explanatory power of BVE as a proxy for the liquidation value of the company.

However, given the results that were already obtained by Collins et al. (1999) when assessing the explanatory power of the variable "BVE" as a proxy for future results, and according to the OM, the author defined FTUX = r*BVE_{t-1} as a proxy for liquidation value,[15] which is calculated based on the liquidation value (exit value) proposed by Berger et al. (1996) (Eq. 3.4). Note that there is not clear predominance in terms of explanatory power of the variable BVE as a proxy for the liquidation value over the variable "FTUX", even in companies that report successive losses. Similar results are reported by Tan (2004) when analyzing the incremental explanatory power of the variables BVE and results in the context of the OM model in two groups of companies in a financial stress situation: companies that went bankrupt, and companies that have opted for a process of merger and acquisition (M&A). For Tan (2004), and as suggested by Burgstahler and Dichev (1997), the M&A process is an adaptation variable for companies with poor financial performance, i.e. those recording successive losses.

[15]When calculating the variable FTUX as a proxy for future earnings, Collins et al. (1999), to estimate the cost of capital, considered the value of 8.67% as a risk premium, similar to Berger et al. (1996).

Myers (1977) suggests that the report of losses and persistence of them are associated with high growth opportunities and/or a high proportion of investment in intangible assets. For Berger et al. (1996), their liquidation value (exit value) will be very low due to their specificity, thus the value of intangible assets will be only preserved just as long as the company remains in business as a whole.[16] In this context, and as demonstrated by Tan (2004), the M&A strategy preserves the value of the company, which is reflected in increased wealth for the shareholders. Thus, to those companies, the variable results show a strong association with price. As for the information content of the variable BVE, and in line with the OM, it seems to be more relevant as a proxy for future expected results and more significant for the sample of firms that have opted for M&A processes.[17] Tan (2004) concludes that the BVE does not reveal a significant explanatory power in relation to the group of companies making losses, which in part contradicts the results of earlier investigations (Collins et al. 1997; Barth et al. 1998; Francis and Schipper 1999). The explanation advanced by Tan (2004) is based on the restrictive nature of the sample: companies that have gone bankrupt or have opted for a process of M&A.

Barth et al. (1998) noted that technology-based companies invest heavily in intangible assets, thus it is not a clear border between the recognized assets measured by BVE and the unrecognized assets whose proxy is the variable results. As a result of conservative accounting, these companies tend to have negative values for the variable BVE. For the sample that went bankrupt, the authors found that 20% of companies registered negative values for the variable BVE in the year before bankruptcy. Given these results, they question the adequacy of the BVE variable as a proxy for the liquidation value.

By analyzing the properties of the estimated coefficients for the variables BVE and net income in the OM, Penman (1998) found that in 12 subgroups, the value of the median variable BVE assumed negative values, results that were difficult to interpret. These results are similar to Amir and Lev (1996), Francis and Schipper (1999) and Frazen and Radhakrishnan (2009) who for some years also reported negative coefficients for the variable BVE. Zhang (2000) shows analytically that these results are a consequence of strict accounting conservatism, particularly in technology-based companies in the start-up phase, reflecting the necessary adjustments in terms of additional investments in operating assets to ensure a flow of positive liquid results in the future.

The sharp increase in companies reporting losses, particularly following 1990s, was widely reported (e.g. Hayn 1995; Collins et al. 1997, 1999; Frazen and Radhakrishnan 2009; Chan et al. 2001; Joos and Plesko 2005, among others). In order to analyze the performance of the OM model for this type of company,

[16]Ramsey and Shapiro (2001) provide empirical evidence of this effect in the aerospace industry. Given the specificity of its assets, these tend to be sold at a low value in the event of liquidation.

[17]Tan (2004) to determine the likelihood of M&A resorted to proxy defined by Pestana and Ruland (1986), in which the probability of M&A versus failure is defined according to the percentage of shares held by the managers, the level of debt, the size, and the magnitude of the tax losses that may be deducted in future years.

Table 3.2 McCallig (2004) criteria for splitting the sample

	Current results	
Retained earnings	Profits	Losses
Positive	Maturity firms **(I)**	Firms candidates to exit the market **(III)**
Losses	Growth firms **(II)**	*Revenue investment firms* **(IV)**

McCallig (2004) begin by splitting the sample in terms of (1) report of profits or losses and (2) the nature of retained earnings (positive or negative). Thus four business groups were identified: Group I: profitable companies with positive retained earnings, which ranks as companies at maturity; Group II: companies which have positive results, but with accumulated losses, indicating growing businesses; Group III: companies reporting losses and positive retained earnings, which shows a deterioration in economic conditions, making these companies candidates for exit the market; and Group IV: companies that report losses and also have negative retained earnings, called revenue investment firms. This situation is summarized in Table 3.2.[18]

Focusing the analysis on the latter group of companies (group IV), McCallig (2004) postulate that the losses are a consequence of a strategy of aggressive investment in R&D. Given the persistence of this profile of investment in intangible assets, and in agreement with Zhang (2000), the variables results and BVE are subject to the conservatism accounting effect, given the cumulative effects over time of losses. In this context, the BVE, and as suggested by the OM, is not an adequate proxy for future results.

Empirically, and with reference to the OM, McCallig (2004) disaggregates the variable BVE in order to isolate the retained results (negative), which reflect the intangible assets investments made in the past. The empirical evidence obtained confirms the effect of positive valuation of losses (either for the variables "results" or "negative retained results"). As for the variable BVE, when they isolated the effect of retained earnings now as expected and according to the OM or the FOM reports a positive and statistically significant coefficient. McCallig (2004) further cites as an example the investigation by Burgstahler and Dichev (1997), in which the nonlinear relationship between the variables MVE and BVE is clearly due to the conservatism accounting to which the variable BVE is subject, in particularly in technology-based companies in start-up or growth phase, which he calls *revenue investment firms*. McCallig (2004) concludes that this group of companies are younger companies (with an average age of seven years), small, with greater specificity of assets, low fixed assets and with high growth opportunities, judging by the large investments in R&D and advertising. The author even suggests that

[18]Similar to our research (see Sect. 6.3), the variable "results" is a proxy for the stage of the firm's life cycle.

while in the 1970s companies tended to register small amounts of losses and for short periods of time, after the 1990s, the losses tended to last for longer periods, assuming greater magnitude, which, in the opinion of McCallig (2004), justifies the persistence of the phenomenon of positive assessment of losses by the market. With this research, McCallig (2004) recognized the phenomenon of positive valuation of losses by the market so far identified as an abnormal phenomenon, despite several investigations having already detected this phenomenon, and not only in new economy companies.

Collins et al. (1999) referring to the research by Hayn (1995) demonstrated that the effect of positive evaluation of losses detected by Hayn is due to an incorrect specification of the earnings capitalization model used. Citing Greene (2000), Collins et al. (1999) argue that when a relevant variable is omitted from the model, and the variable is positively correlated with the dependent variable (MVE) and negatively with the independent variable included in the model (results), the exclusion of this variable from the model induces a negative bias of the estimated coefficient of the independent variable—results. In this context, it is relevant to include the variable "BVE" in the valuation models. They maintain that the effect of positive valuation of losses is due to the omission of the variable BVE in the evaluation model. In line with McCallig (2004), Joos and Plesko (2005) designate positive evaluation of losses as a new phenomenon. In a replication of the study by Hayn (1995), the authors documented a favourable price reaction to losses which tends to revert quickly in profitable companies (in line with the contemporary literature), but the price also reacts favourably for companies that report successive losses, which contradicts the theory of the abandonment option. The authors demonstrate that for systematic losses recorded for the second sample, for the period 1990–2000, investors tend not to evaluate the variable "net income" on aggregate, but rather its various constituents, in particular R&D, which the authors identify as a proxy for future growth opportunities. Joos and Plesko (2005) conclude therefore that the persistence of the losses is associated with massive investments in R&D and advertising, especially after the 1990s. In the 1970–1990 sample, the percentage of companies reporting losses was 15%, a value that is duplicated for the period 1990–2000. This persistence of the losses means that they cease to be an appropriate proxy for the highest probability of liquidation, even after controlling for extreme observations via rank regressions.

Table 3.2 summarizes the current research which sees the losses, or rather their persistence, as an appropriate proxy for the financial liquidation option held by shareholders. In this context, the BVE is relevant as a proxy for liquidation value. It is important to stress that these investigations tend to focus their analysis on the period prior to 1996, which in our research is identified with the beginning of the NEP. We also include investigations whose sample period covers the entire 1990s in which losses tend to persist for longer periods. For this group of companies—the new economy companies (the subject of study), usually younger companies, small, technology-based, with greater specificity of assets and significant investments in R&D, the effect of positive valuation of losses is statistically significant, i.e. the higher the volume of losses the greater is the market capitalization of the company.

Table 3.3 Summary of the various studies on the information content of the variables earnings and book value of equity for evaluation purposes

Current losses, they tend to be transitory and so irrelevant to evaluation. If they persist, shareholders exercise the liquidation option they hold on the company's assets. In this context, the variable BVE is a proxy for the financial liquidation option of the company. The phenomenon of positive valuation of losses may occur, seen as an anomaly  BVE = *Proxy for the liquidation value of the company*			Given the increased number of companies reporting losses (particularly after the 1990s), which are explained in part by high investments in *items* such as R&D and advertising, recorded as costs in the year they are incurred, in line with GAAP, losses cease to be a consistent proxy for the financial liquidation option. The phenomenon of positive valuation of losses tends to emerge in association with technology-based companies in the start-up phase, a result of the effect of *accounting conservatism*. So for assessment purposes, it is relevant to disaggregate the variable 'net income' into its constituents  BVE (?) = *Proxy for the liquidation value of the company*		
Authors	Model(s)	Period	Authors	Model(s)	Period
Non-net firms[a]			**Non-net firms**[a]		
Hayn (1995)	Returns	1963–1990	Franzen and Radhakrishnan (2009)[h]	OM	1980–1998
Subramanyam and Wild (1996)	Returns	1981–1990	Collins et al. (1999)[i]	OM	1975–1992
Chambers (1997)[b]	Returns	1976–1992	McCallig (2004)	OM	1980–1997
Basu (1997)[c]	Reverse regression	1963–1990	Core et al. (2003)[j]	Model	1975–1999
Berger et al. (1996)[d]	Model	1984–1990	Tan (2004)[k]	OM	1985–1997
Collins et al. (1997)	OM	1953–1993	Joos and Plesko (2005)	OM returns	First sample 1970–1990
Burgstahler and Dichev (1997)	OM	1976–1994			Second sample 1990–2000
Barth et al. (1998)[e]	OM	1974–1993	**Net firms**[l]		
Schnusenberg and Skantz (1998)	OM	1975–1994	Trueman et al. (2000)	OM	1998Q1–2000Q2
Collins et al. (1999)	OM	1975–1992	Hand (2001)[m]	OM	1997Q1–2000Q3
Francis and Schipper (1999)	OM	1952–1994	Demers and Lev (2001)[n]	Model	Three dates 03/12/1999 28/2/2000 31/05/2000

(continued)

Table 3.3 (continued)

Amir and Lev (1996)[f]	OM and others	1988–1993	Knauff and Goot (2001)[o]	Model	1998–2000
Kothari and Zimmerman (1995)[g]	Price and return models	1952–1989	Kozberg (2009)	OM	02/1999–05/2001
			Tockic (2004, 2005)	Model from Miller and Modigliani (1961)	1996–2000
			Martínez and Clemente (2002)	OM	1996Q1–2001Q2
			Hand (2003)	OM (adapted)	1997Q1–2000Q3

[a]The designation "non-net firms" here is not restricted to the concept of the control sample used by us (see Sect. 5.3.2)

[b]Note that Chambers (1997) excludes from the analysis companies in the start-up phase

[c]The objective of Basu (1997) is to assess the impact of accounting conservatism in β (PER). The conclusion reached shows that losses (effective and potential), if any, are transitory, restricting their effect to one year in accordance with the principle of prudence

[d]The authors adopt multiple linear regression models, which explain whether the MVE on the basis of variables such as the present value of the expected cash flows, the exit value, excess book value = BVE—exit value, among others. They also explain the value of the abandonment option depending on the type of asset. We did not explain here the exhaustive list of all explanatory variables used

[e]The authors adopt the OM, but under a different theoretical framework, to avoid restrictive assumptions underlying the OM (e.g. the autoregressive process for the abnormal results and neutrality towards risk). They obtained conclusions in line with the OM

[f]These authors detect the effect of positive valuation losses (see their Table 2). They justify this result due the emerging nature of the sector at the time and rapidly growing—mobile phone companies. It is one of the first investigations to suggest the introduction into the valuation models of non-financial variables, for example the percentage of the population already covered by the network of mobile phones or the number of customers

[g]These authors have detected the effect of positive valuation of losses (see their Table 5), but do not provide any explanation for it

[h]Frazen and Radhakrishnan (2009) assess the explanatory power of the OM applied to four groups of companies that report losses: (1) companies that reported losses in a single year; (2) companies that reported successive losses and are involved in a process of recovery/adaptation; (3) companies in liquidation/bankruptcy; and (4) investment losses firms which, as in McCallig (2004), are companies that invest heavily in intangible assets, while remaining still in a start-up/growth phase

[i]These authors do not demonstrate a clear predominance in terms of the explanatory power of the exit variable, calculated as proposed by Berger et al. (1996), as a proxy for liquidation value compared to the variable FUTX = r * BVEt-1, as suggested by the OM, or as a proxy for future earnings, even in companies in financial stress (i.e. reporting successive losses) which are candidates to exit the market

[j]The authors do not adopt a specific theoretical model (e.g. the OM); however, they do detect the phenomenon of positive valuation losses: when introduced into the model as an independent variable, the variable results and it assumes negative values. The authors explicitly state that for 1999 the sample with losses includes 214 companies of the new economy, meeting the selection criteria adopted by Hand (2001)

[k]Tan (2004) focuses his research only on companies that have gone bankrupt or have opted for a process of M&A

[l]They list (but without limitation) investigations that focus on net firms, which are our object of analysis. It should be noted that, given the emerging nature of this sector, data were obtained on a quarterly basis

[m]The author adopts the model of OM and according to Amir and Lev (1996) includes also non-financial variables: web traffic variables, i.e. number of visitors per page, number of hours spent on the given site, number of pages visited and the percentage of Internet user population

[n]The authors did not adopt any formal evaluation model. A couple of web traffic variables (non-financial) are selected based on factor analysis, checking the effect of positive valuation of losses on the variable operating cash flow

[o]The particularity of this research is that it deals with the IPOs of European companies listed in the index EURO.NM. In order to explain the ratio MVE/BVE at the IPO date, the authors find that, for the variables results, operating cash flow and earnings before extraordinary *items* taken in isolation to avoid the effects of multicollinearity, the effect of positive evaluation of losses is reported

The theoretical support for this, as demonstrated by the OM and FOM, results from the accounting conservatism effect, in which losses are due to high investments in intangible assets (R&D and advertising), recorded as costs in full in the year in which they are incurred, in obedience to GAAP, but which for the market signal the probability of existence of higher growth opportunities (for the impact of the expected future abnormal results (FE) in the ratios P/B and PER, see Fig. 2.1).

In the next chapter, given the higher magnitude that investments in R&D and advertising assume, which are, according to Richardson and Tinaikar (2004), the main cause of the *conservatism accounting* modelled by OM and FOM, especially in technology-based companies in the start-up phase, we start by analyzing the impact of these investments on the market value of the company. In Sect. 4.3, we evaluate the effect of growth on the market value of the company, with a particular focus on the internet sector, highlighting the growth potential of this sector which is associated with massive investments in the intangible assets R&D and advertising. Table 3.3 presents a summary of the relevant studies on the information content of the variables earnings and BVE for evaluation purposes.

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Chapter 4
The Impact of Investment in Intangible Assets on the Market Value

Abstract Given the higher magnitude of investments in R&D and advertising that are assumed in *net* and *non-net* firms, this chapter analyses the impact of these investments on the market value of a company. We also evaluate the effect of growth on the market value of the company, with a particular focus on the Internet sector, highlighting the growth potential of this sector due its emerging nature.

Keywords Investments in R&D · R&D and market value · Growth · Internet as an emerging industry

4.1 Introduction

As presented in the Chap. 2, the FOM demonstrated analytically that goodwill, as measured by the difference between the MVE and the BVE is the result of three factors: (i) persistence of abnormal future results; (ii) other non-financial information that is coming to the market, which is incorporated immediately into prices and is later recognized in the financial statements (lack of timeliness—variable v_t); and (iii) the underestimation of the operating assets (*accounting conservatism*). With reference to non-operating assets, given the existence of liquid markets, the book value reflects the firm's market value.

The effect of the undervaluation of assets becomes relevant with the development of technology-based companies (high-tech firms). In this type of company, investments tend to be concentrated in R&D, marketing and advertising in order to promote the image of the company/services/products. In the absence of objective criteria that could be used to measure the future benefits associated with this type of investment (if any), GAAP accounting principles require their treatment as costs in full in the year they are incurred. These procedures tend to underestimate the net profit, the value of assets, and the value of equity, particularly in companies in the growth phase, and which causes a strong distortion in the information provided by financial statements.

In Chap. 3, our analysis focused on the information content for evaluation purposes of the variables net income and BVE as major determinants of value according

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to OM and FOM, with particular emphasis on the group of companies reporting losses. Based on the literature review, it appears that the phenomenon of positive valuation of losses is recent (have assumed relevance only in the 1990s), and is associated with start-up, technology-based companies with high growth opportunities. For growing businesses, it is important to disaggregate the net income into its constituents, in particular R&D and advertising, which for accounting purposes are considered costs, but which the market tends to evaluate as assets.

The value of intangible assets, including investment in R&D, advertising, intellectual capital, strategic partnerships, customer base established contracts, goodwill, location, brands and patents, etc. becomes decisive for the companies to innovate, differentiate products and services, and develop customer loyalty: in short, to create value. Thus, given the importance of this type of investment, this chapter begins by reviewing the impact of such investment on the MVE. Next, and given the emerging nature of the Internet sector/*net firms*, we focus attention on the growth potential for evaluation purposes. According to Copeland et al. (2000), Damodaran (2001) and Jorion and Talmor (2006), among others, at this stage, companies in general (not just the *new economy* companies) tend to adopt a growth maximizing strategy. Given their profile, technology-based companies' growth appears to be associated with massive investments in intangible assets, such as R&D and advertising.

4.2 The Impact of Investment in Intangible Assets on the Market Value

The value of a company should reflect the value of its net assets. A modern economy, according to Lev and Sougiannis (1996) and Chan et al. (2001), is characterized by the emergence of new sectors: sectors based on knowledge, software, and those related to biotechnology and telecommunications; therefore the value of these companies, commonly known as technology-based companies or high-tech firms, is mainly associated with the intangible assets they hold. As intangible assets, these authors refer to R&D and promotional campaigns and marketing (advertising) in the traditional studies on the industrial economy.

The prevalence of such assets makes the task of evaluation of this type of company particularly complex, since the recognition of an intangible asset is not a straightforward question: it has to be identified, even though it is without physical substance. In this sense, the costs of R&D cannot be associated with intangible assets, as they do not necessarily exist. It turns out that the research phase is often long and fruitless. According to FASB, this high degree of uncertainty about future economic benefits justifies why this kind of investment is not capitalized.[1]

[1]It is not the objective of this study to analyze the suitability or not of the GAAP currently in the US. The main arguments to support the accounting as expenses (rather than capitalization) of

Given these accounting practices, White et al. (1997), Copeland et al. (2000), Damodaran (2001), and Chan et al. (2001) among others argue that the traditional evaluation metrics, such as the multiple of results (PER) and the multiple of book value (P/B), suffer great distortion and volatility given the associated strong-growth expectations associated with those companies.[2] Chan et al. (2001) document for the period between 1975 and 1995, and with reference to the American companies listed on the NYSE (New York Stock Exchange), AMEX (American Stock Exchange) and NASDAQ (National Association of Security Dealers' Active Quotation), that the ratios of R&D over sales and R&D over the BVE, ratios that measure the intensity of investments in intangible assets, show an increased from 1.7 and 4.13 in 1975 to 3.75 and 10.88 in 1995, respectively. This effect seems to be higher for certain sectors, i.e. 737—computer programming, software and services; 283—drugs and pharmaceuticals; 357—computers and office equipment; 38—measuring instruments; 36—electrical equipment, excluding computers; 48—communications and 37—transportation equipment. Lev and Sougiannis (1996) also observe high growth in R&D and advertising expenses, particularly over the last 20 years, as a result of the emergence of new sectors. Similar empirical evidence is provided by Damodaran (2001: 9), whose comparative analysis includes the Internet sector. Thus, given the magnitude of technology-based companies in the current economy, it is important to analyze the impact of the investment in intangible assets such as R&D and advertising on the MVE of these companies.

In an efficient market, one would not expect any relationship between the variables MVE, R&D and advertising, as prices tend to reflect all publicly available information. However, markets are characterised by a set of imperfections, due to the effect of taxes, transaction costs, asymmetry of information and agency costs (Quintar and Zisswiller 1994); so it is reasonable to analyze the statistical relationship between these variables.

In this context, event studies seek to evaluate the market reaction to the announcement of new investment projects in R&D by companies. The research by Wooldridge (1988) was a pioneer study in this area. The author reported a positive reaction from the market to new investment projects in R&D. Adopting a similar methodology, Chan et al. (1990) and Zantout and Tsetsekos (1994) showed positive and statistically significant returns for the group of high-tech firms contrary to the results obtained for the group of low-tech firms. To guarantee robustness of the results,

(Footnote 1 continued)

intangible R&D and advertising are: (i) information asymmetry between managers and shareholders and the resulting agency costs that exist not only between managers and shareholders, but also between them and the lenders; (ii) contract costs between the parties, given once again the privileged position of managers' access to internal company information; (iii) fiscal motivations; (iv) restrict the possibility of a discretionary management of results by managers (creative accounting); and (iv) increasing the liability of auditors, given recent accounting scandals (Basu 1997; Kothari et al. 2002; Hand 2003).

[2]Figure 2.1, shows how the ratios PER and P/B could achieve high values in this type of firm, based on the expectation of high growth opportunities.

Szewczyk et al. (1996) used the Tobin's Q ratio (which allows them to control the industry effect) to analyze market reaction to the announcement of new R&D investment projects.[3] The results confirm the results recorded in 1994, i.e. the market positively evaluates the investments in R&D and advertising in technology-based companies. In the opinion of the authors, these results reflect perceptions by investors of a higher probability of their existence in the portfolio of this type of business with new growth opportunities, confirming the *investment opportunity hypothesis*. The negative returns or a decrease in the value of equity registered for the group of low-tech companies are justified by the authors as a consequence of agency conflicts on the free-cash flow. As postulated by Jensen (1986), the announcement of new investments in R&D and advertising in companies with high free-cash flow, or companies in general at maturity, intensifies the agency conflicts between managers and shareholders. The managers usually prefer to invest more even in low profitability projects, or even accept projects with negative NPV because the greater the volume of resources, the more power the management has. Investors prefer the distribution of the excess liquidity, whether in the form of dividends and/or the repurchase of shares. In addition to investigations based on the event studies, cross-sectional and/or pooled regression studies also analyze the existence of a statistically significant relationships between the MVE and the variables R&D and advertising.

Weiss (1969) argued that investments in R&D and advertising should be capitalized. But the empirical evidence in the 1970s showed inconclusive results. Peles (1971) detects a positive statistical significance for investments in R&D for the beer and tobacco sectors, revealing an insignificant statistical relation in the automobile sector. Abdel-Khalik (1975) reports a statistical significance for the variable R&D within the food industry and cosmetics, but no statistical significance for the tobacco sector, thus contradicting the results of Peles (1971). Picconi (1977) does not detect a statistical relationship between the variables R&D, sales and MVE. Sougiannis (1994) justify this contradiction in terms of empirical results with reference to the 1970s due to the small size of the samples used and some computational limitations in terms of econometric treatment. From the mid-1980s, the results seem to be more solid, confirming that the *items* R&D and advertising are relevant in determining the value of companies.

Dukes (1976) analyzed the perceptions of investors to information provided by the variables R&D and advertising and concluded that investors consider these variables when they formulate their expectations about the value of businesses, adjusting the net income reported by companies to the value of these variables. Ben-Zion (1978) found that the difference between the MVE and the BVE (unrecorded goodwill, according to the OM and FOM) is positively correlated with the ratio of R&D over sales. Following this line of research, Hirschey (1982) argued that the MVE depends on several signals sent to the market about the future profitability prospects of the company. The items R&D and advertising are potential indicators of

[3]In the study developed in 1994, Zantout and Tsetsekos used a dummy variable to differentiate the two groups of companies, high-tech and low-tech firms.

the future abnormal returns. His study showed that the ratio MVE to book value (a proxy for Tobin's Q) is explained on the basis of the results obtained by the company, its volatility, the degree of industry concentration measured by the share of sales of the four largest companies in the industry, the growth rate of sales, and the variables R&D and advertising. As expected, the variables R&D and advertising are associated with positive and statistically significant coefficients. The author concludes that these variables are relevant to determine the value of the company.

In an extension of this work, co-authored with Connolly in 1984, the authors maintain that the difference between the MVE and the book value (BV) of tangible assets[4] which they define as the *surplus value* (which we can identify with the *unrecorded goodwill* defined by the OM and FOM) is explained by the variables R&D and advertising and by the level of industry concentration. Analytically:

$$\frac{ab}{cd}\frac{\text{Surplus Value (unrecorded goodwill)}}{\text{Sales}} = f(\text{R\&D; Advertising, Industry Concentration}) \tag{4.1}$$

The statistical significance associated with positive coefficients for the estimated variables validates the results obtained in 1982. The authors interpret this result, as anticipation of the NPV associated for this type of investment by the market. This effect is strong if the company has a dominant position in the sector (Connolly and Hirschey 1984). This dominance, coupled with successive investments in intangible assets, enables the company to create barriers to entry and so perpetuate its competitive advantages, thus ensuring the capacity to obtain economic rents.

In order to introduce the industry effect and the dimension effect into the analysis on the assumption that the R&D variable is more effective in differentiating between the industrial and the non-industrial firms, Chauvin and Hirschey (1993) propose a model in which the ratio of MVE over sales is explained by the cash flows generated by the company, the sales growth, the risk, the market share of the company, and the variables R&D and advertising. The model is evaluated for the two groups of companies, industrial companies, where the variable R&D becomes relevant and non-industrial companies, for which advertising investments tend to dominate. The model also considers the effect of size, breaking down the sample into large, medium and small businesses. The results point to a strong statistical significance for the variables R&D and advertising, whether in industrial or non-industrial companies. The results are robust, confirming a positive statistical significance, regardless of company size. The authors conclude therefore that the variables R&D and advertising are useful to investors in formulating their expectations about the magnitude of future cash flows and the level of risk associated with them. Table 4.1 systematizes the main results obtained by Hirschey (1982, Connolly and Hirschey 1984, Chauvin and Hirschey 1993).

[4]The authors assume, however, that the book value of tangible assets is an imperfect proxy for the market value thereof.

Table 4.1 Relationship between MVE and the investment in R&D and advertising

Author / Variable	Hirschey (1982)	Estimated coefficient	Connolly and Hirschey (1984)	(Estimated coefficient)	Chauvin and Hirschey (1993)	Estimated coefficient
Independent variable	MVE/BV		(MVE-BV)/sales (*unrecorded goodwill*)		MVE/sales	
Dependent variables	1/BV		1/sales		1/sales	
	Net income/BV	Positive[g]			Cash flow/sales	–Positive (*L*, *M* and *S*)[g,e] –Positive (R&D, Adv)[g,f]
	Level of concentration in the industry (GC)[a]	Negative	Level of concentration in the industry (GC)[a]	Negative[g]	Share of the market	–Positive (L e M) –Positive (R&D)[g] –Positive (Adv)[g]
	Sales growth	Positive	Sales growth	Positive[g]	Sales growth	–Negative (L e M) –Positive (R&D)[g] –Positive (Adv)
	Risk (volatility of net income)	Negative[g]	Risk (volatility of net income)	Negative[g]	Risk[d]	–Negative (*L*, *M*) –Negative (R&D e Pub)
	R&D/BV	Positive[g]	R&D/sales	Positive[g]	R&D/sales	–Positive (*L*, *M* and *S*)[g]
	Advertising/BV	Positive[g]	Advertising/sales	Positive[g]	Advertising/sales	–Positive (*L*, *M* and *S*)[g]
			Nonlinear effect for the variable level of concentration in the industry $[(GC)^2]$[b]	Positive[g]		
			Diversification			
			R&D/Sales * GC[c]	Negative[g]		
			Advertisement/sales * GC[c]	Positive[g]		
			Sales growth * GC[c]			

[a]The level of concentration in the industry is measured by the ratio of the sales of the largest firms in the industry over the total sales of the industry
[b]The nonlinear effect is obtained by the square of the variable $[(GC)^2]$
[c]Interactive variables
[d]The variable risk is measured by the methodology of Garman and Klass (1995), i.e. ln of the difference between the high price and low price for 52 weeks
[e]*L* Large firms, *M* Medium firms, *S* Small firms
[f]R&D—identify the group of firms that invest more in R&D, i.e. industrial firms; Adv identify the group of firms that invest in advertising (non-industrial firms)
[g]Variable is statistically significant

In short, at this point we conclude that, based on the results obtained by the event study methodology, (e.g. Wooldridge 1988; Chan et al. 1990; Zantout and Tsetsekos 1994 and Szewczyk et al. 1996) or based on the results from the cross-sectional studies and/or pooled regression (Hirschey 1982; Connolly and Hirschey 1984; Chauvin and Hirschey 1993), the market positively values a company's investment in R&D and advertising. This positive valuation reflects the market expectations about the growth opportunities held by the company, and which derive from the existence of licenses, patents, specific knowhow, innovation and the capability of achieving significant market share, which require continued investments in R&D and advertising.

In this context, the market seems to evaluate companies according to their growth potential, so investors should pay a premium for the growth opportunities held by the company. Given the emerging nature of the Internet sector/*net firms*, we focus attention on their growth potential. We begin the analysis with the classical models of Modigliani and Miller (1961) and Malkiel (1963), establishing an analogy with the OM and FOM, in order to evaluate the impact of growth. We note that the growth potential of *net firms* is associated with strong investments in the intangible assets, such as R&D and advertising. The rationality of this investment strategy, popularized with the concept of "*winner takes all*" (Noe and Parker 2005), is based on the strong expectation of increasing returns to scale, enhanced by the network effects generated by the Internet.

4.3 The Company Value and the Potential Growth

According to Modigliani and Miller (1961), the value of a growing company (growth stock) is obtained by adding, to the present value of cash flows generated from existing assets, the present value of growth opportunities held by the company. Analytically:

$$V_0 = \frac{X}{r} + \left[\frac{k-r}{r}\right]\left(\frac{bX}{r}\right), \tag{4.2}$$

where

X net income generated by the company due to the assets in place;
k expected rate of return from new investments ($k > r$, given the presence of investment opportunities);
r cost of equity;
b the percentage of retained earnings by the firm to finance new investments.

Assuming that the firm retains all of the net income generated ($b = 1$), a condition that second Modigliani and Miller (1961) is a reasonable assumption given the growth phase of the firm, we obtain:

$$V_0 = \frac{X}{r} + \left[\frac{k-r}{r}\right]\left(\frac{X}{r}\right) = \frac{X}{r}\frac{k}{r} = \frac{X}{r}m, \tag{4.3}$$

where $m = k/r$, a multiple of profitability. As the company moves towards maturity, growth opportunities tend to fade, so $r = k$, and the company's value is the result of the capitalization of the results generated by assets in place, equivalent to the familiar Gordon model (a specific case of the OM) and consequently equivalent to the RIV model, as demonstrated by Lo and Lys (2001).

When studying the sharp decrease in prices that occurred in 1962, Malkiel (1963) demonstrates that the multiple of profitability (m) can be defined as:

$$m = \overline{m}\frac{(1+g)^N}{(1+r)^N}, \tag{4.4}$$

where

$\overline{m}$ the multiple of profitability of a company at maturity;
g growth rate;
r the cost of equity, assuming therefore g > r (given the existence of growth opportunities);
N the number of periods during which it is expected to obtain abnormal returns.

Malkiel (1963) shows three properties associated with growth companies: (i) the multiple of a growing company (m) is greater than a for company at maturity stage ($\overline{m}$) whereby PER(m) > (PER $\overline{m}$) (as shown previously in Fig. 2.1 on the basis of the RIV model); (ii) the multiple is a function of expected growth (g) and the number of periods of expected abnormal growth (N) [PER = f (g, n)]; and (iii) the volatility of (m) also depends on the growth rate (g) and the number of periods for which abnormal growth is estimated (N) [volatility = f (g, N)]. The author concludes that the price of such securities tends to be much more volatile [i.e. volatility (m) > volatility ($\overline{m}$)].[5]

Comparing the Modigliani and Miller (1961) model with the OM, we conclude that for both models the price of shares depend on the amount of existing assets (BVE) and growth opportunities held by the company. However, the OM differs from the Modigliani and Miller (1961) model, which assumes $b = 1$ (b—retained earnings), so the growth rate is permanent. For the OM abnormal returns depends of

[5]The motivation behind this study was to explain the sharp decrease of share prices in 1962. The author concluded that the largest decrease in prices was reported by growth shares, a result of strong volatility that characterised this type of shares. Ofek and Richardson (2002, 2003) reported similar results for the group of *net firms* with reference to the crash that occurred in March, 2000.

an independent autoregressive process of the BVE variable incorporating shocks from other non-financial sources of information via the variable v_t, which tend to converge quickly to the average profitability of the sector/industry due the competition in the economy. Thus, since Mao (1966) and Taylor (1974), it has been traditional to incorporate the concept of life cycle underlying the constant growth assumption of the Modigliani and Miller (1961) model. Thus, in the first stage, the company grows/invests at an exponential rate, while in the second stage the company grows at a constant rate. In the final stage, in which growth opportunities vanished, investments are restricted to the replacement of existing assets.

Comparing both models, both assume that the financing of new investment projects by retained earnings and the issuance of new shares are perfect substitutes. At maturity, the rate of return on equity (ROE) tends to equalize the cost of capital, as evidenced by the Eq. 2.11, which defines the permanent results.

Feltham and Ohlson (1995) as an extension of the initial model of Ohlson (1995), and in line with Malkiel (1963), demonstrate that the multiple of results in growing firms is higher than the multiple of firms in maturity stage. This effect occurs because: (i) the persistence of abnormal results, measured by the parameter w_{11}, which incorporates the growth effect (g) and duration of abnormal growth (N), according to the terminology used by Malkiel (1963); (ii) the volume of investments made (the increase in operating assets), expressed by the parameter w_{22}; and (iii) the effect of conservative accounting, reflected in the parameter w_{12}, a result of the underestimation of operating assets. This effect is very pronounced in start-ups firms particularly technology-based companies, given the predominance of intangible assets.

The evaluation of a company should take into account its life-cycle stage (e.g. Copeland et al. 2000; Damodaran 2001). Jorion and Talmor (2006) apply this view to the new economy companies (firms under study) showing that in the start-up/growth phase, these companies invest mainly in intangible assets, in particular in the *items* R&D and advertising. Therefore, given the increasing rise in technology-based sectors, including the Internet, as documented by Lev and Sougiannis (1996), Chan et al. (2001), Damodaran (2001), McCallig (2004) and Joos and Plesko (2005), among others, and the fact that investments in this type of company tend to concentrate the investments in intangible assets, and, given the literature review presented in this section, companies that report losses cannot be evaluated evenly.

The theoretical support for this reasoning derives from investments in intangible assets being associated with a twofold effect, i.e. a short-term effect and an average long-term effect. In the short term, investment in intangibles (e.g. R&D and advertising) increases the company costs (given the GAAP requirement of immediate accounting for them as costs, a procedure that tends to underestimate both the company's results and its assets). In the medium and long term, these investments generate cash flows, reflected in the volume of sales, whose impact extends to the results (Lev and Sougiannis 1996). Due this double effect, the literature suggests that the different stages of the firm life cycle could be distinguished by the variable results. Thus, profits are associated with companies that have reached maturity, or at

least steady growth, while losses are associated with younger companies in the start-up phase, dominated by a growth maximization strategy.

McCallig (2004), given the magnitude of the reporting losses by US firms in the 1990s, uses the net income variable as a proxy to identify the company's life-cycle stage. The results show that for the group of companies reporting losses (and accumulated losses), what he called revenue investment firms, the current and accumulated losses are derived from the *conservatism accounting*, because this type of company is dominated by the short-term effect associated with investments in intangibles assets. Sougiannis (1994) and Lev and Sougiannis (1996) present empirical evidence about the duality of short- and medium-term effects associated with investments in intangible assets. Sougiannis (1994) showed that investment in R&D is associated with profits, which reflect the benefits of the investments made in the past. The results are conclusive, confirming that the market evaluates positively current investments in R&D, as a direct effect. The indirect effect results from capitalization of the results generated by investments made in the past. The author documents a stronger result for the indirect effect, finding that on average the investment of a dollar in R&D provides an increase in net profits of more than two US dollars within 2 to 7 years. Note that the greater expressiveness in statistical terms of the indirect effect is a consequence of the fact that Sougiannis (1994) used a sample of companies in the mature stage. Lev and Sougiannis (1996) point to a time lag of 5 to 9 years for investments in R&D and advertising to start generating positive cash flows.

However, despite the extensive literature documenting positive assessment by the market of the items R&D and advertising (see Sect. 4.2, Table 4.1), Moore (2002) suggests that such statistical relationships lack solid theoretical support.[6] The FOM constitutes a theoretical framework that enables the explanation of the *unrecorded goodwill,* i.e. the difference between the MVE and the BVE, which reflects the present value of growth opportunities held by the company but not yet recognized in the financial statements. Recall that following the FOM, the *unrecorded goodwill* depends on the persistence of abnormal results and information other than financial that come to market and is incorporated immediately into prices and the *conservative accounting* effect (see Eq. 2.23; Richardson and Tinaikar 2004), which is persistent in technology-based companies in the start-up phase, as is the case of *net firms*.

The MVE of the youngest companies does not reflect the effect of reputation, a potentially valuable asset held by older companies (Diamond 1989). The implementation by the company of its obligations tends to signal to the market about the growth prospects which reside in the variables R&D and advertising. The implementation of such investments by the company can be seen by the market as the exercise of a call option (Moore 2002). Thus, this option can be defined as:

[6]For example, Moore (2002) refers to the arbitrary method in the calculation of depreciation adopted by Chan et al. (2001) in the value of assets or the amount of net investment in R&D and advertising, when they propose to analyze the impact of the investment in R&D in the MVE of technology-based companies in the start-up/growth phase.

$$\text{PVGO}_{(\text{R\&D,Pub})} = \text{Max}[E_t(X) - C, O] \tag{4.5}$$

where

- PVGO (R&D and advertising) is the present value of growth opportunities;
- C is the current investment to be made (the strike price);
- The underlying asset is identified with the investment project itself;
- $E_t(X)$ corresponds to the value of expected cash flows.

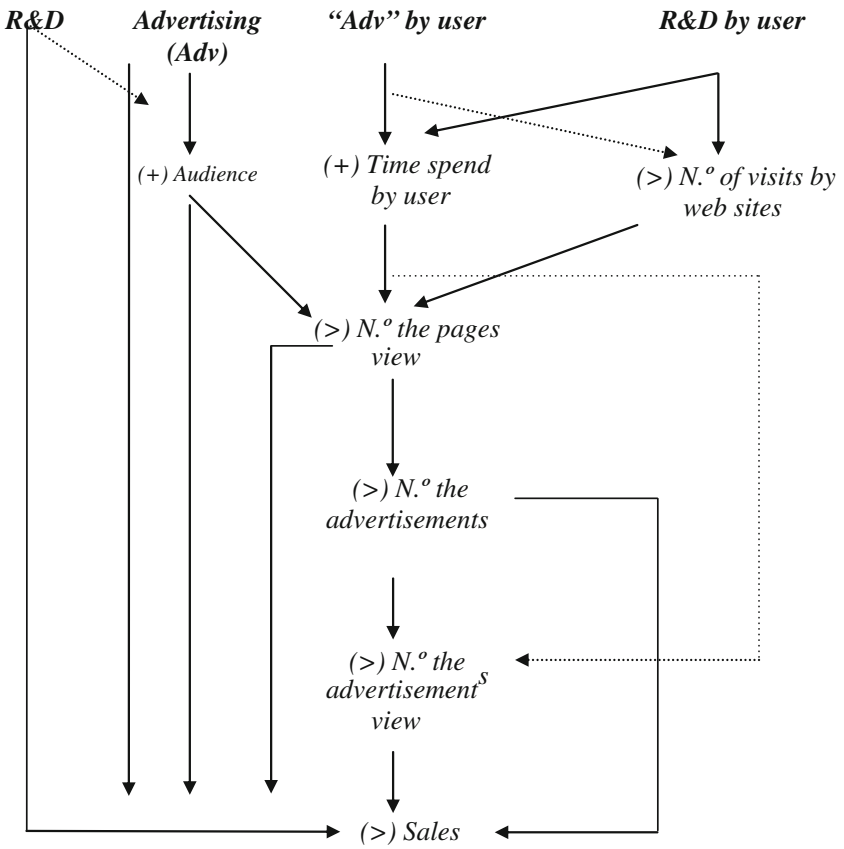
The estimation of the value of the variable $E_t(X)$ is complex. Thus, in the absence of a criterion for measuring objectively the benefits associated with these investments, this variable appears not to be reflected in the financial statements of companies. However, assuming the principle of rationality, it is expected that managers implement only in-the-money options, i.e. they invest in projects with expectations of abnormal returns (with NPV positive), where it is expected that a monetary unit invested generates an average rate of return greater than one invested in equity (Graham and Harvey 2001).

The net firms' strategy undertook massive investments in R&D and advertising. For example, Hand (2003: 258) documents mean values for the ratio of R&D over sales as ten per cent in companies with profits. In companies reporting losses, the ratio amounted to 39%. For the aggregate ratios of sales over R&D and advertising, the average is 37% for companies with profits, reaching 154% in companies with losses. These data refer to the period 1997–2000 (Q3), including the post-crash period of the "dot.com bubble". Given these data, Trueman et al. (2000: 147) said:

> As these statistics confirm, investors are clearly paying for growth rather than current performance.

Investment in advertising aims to attract the attention of investors to enhance the reputation and visibility of the company, and thus, increase web traffic in order to increase future sales (e.g. online sales, revenue from services, provision of advertising space on web pages, etc.). To measure the web traffic, multiple variables are used. Trueman et al. (2000) used "number of unique visitors", "number of pages viewed", and "time spent". Hand (2001b) also used the variable "percentage of population covered by Internet service". The high interest of investors increases the prices of shares, which enables the company to obtain additional funds to undertake growth opportunities. Furthermore, the larger the size of the company, then the greater is the confidence of investors in the company.

Investment in R&D is intended primarily for website design, software development, and computer platforms in order to facilitate the navigation on websites, to ensure safety, and simplify the online transaction process, and to create interactive software (e.g. email alerts) in order to retain customers. The rationality of this investment strategy derives from high-income expectations associated with the Internet network effect, boosted by the fact that users are connected to a globally dimensioned network



Adapted from Kozberg (2009).

Fig. 4.1 The effect of investment in R&D and advertising in abnormal future profitability based on the *networking* effect

(Lev 2001). Kozberg (2009) showed the impact of current investment in R&D and advertising in terms of the company's future profitability in Fig. 4.1.

Noe and Parker (2005) demonstrate analytically that a company which wants to participate in the *World Wide Web* should adopt an aggressive strategy by investing massively in intangibles (e.g. R&D and advertising) with the aim of creating strong barriers to entry for new competitors. This strategy—"*winner takes all*"—is characterised by a very asymmetrical distribution, highly positively skewed, in accordance with the Pareto distribution. In this context, this type of business tends to register a high probability of bankruptcy, but surviving companies enjoy increasing returns. Connolly and Hirschey (1984) also provide empirical evidence that the statistical significance of the variables R&D and advertising is enhanced if the company establishes a dominant position in the sector. This dominant position

enables the company to make continued investments in intangible assets, creating high barriers to entry, and thus perpetuating its growth opportunities. Kotha (1998) argues that the value of a website is greater when it engages a larger virtual community, as this makes it a most attractive website. The higher the virtual community, the greater the demand, and so the greater the potential for future revenues, lower fixed costs and marginal units, which is reflected in a substantial increase in the company's future profitability. In this sense, the web traffic boosts the Internet as an intangible asset valuable to the company.[7]

To measure the impact of intangible assets in the MVE of the *net firms*, Rajgopal et al. (2003: 137) operationalize the concept of network based on Metcalfe's law. According to Metcalfe's law, when (N) people are connected to a network, the value of this network will be equal to $N \times (N - 1) = N^2 - N$. To measure this variable, the authors use as a proxy the "number of unique visitors". The network variable is defined as

$$\text{network} = (\text{number of visitors})^2 - (\text{number of visitors}) \tag{4.6}$$

The authors conclude that there is a significant explanatory power of the network variable and so include this variable in the OM (which they implicitly assume as a proxy for the variable v_t), showing a significant increase in the value of R^2. They also show empirical evidence that the network variable is positively and significantly associated with future profits and sales (whose proxies were analysts' estimates), a result that in their opinion supports the existence of increasing returns to scale associated with investments in R&D and advertising.

However, these results are not consensual. Using the methodology of Almond and Koyck, Hand (2001a) concludes that most investments in R&D and advertising are not value creators, as the net present value (NPV) associated with these projects is negative. Value creation is identified only with the group of companies classified in the higher percentiles with reference to the ratio of R&D over sales. Pioneers and large firms have invested aggressively in intangibles, in clear agreement with the model of Noe and Parker (2005),[8] these results that indicate that the Internet sector tends to follow the structure of highly concentrated market.

The noise that typifies the evaluation of this type of project/company derives from the strong uncertainty associated with the estimation of future cash flows. In most the cases, they were still very young companies with some technological sophistication, who go to the capital market despite registering losses (the phenomenon of positive valuation of losses) with a new idea, not yet tested and which

[7]The numbers about the global growth of the internet population are impressive. Shiller (2000) points to a value of 100 million users in 1999, rising to projections for 2003 to 177 million, an estimated growth of 77%.

[8]Rajgopal et al. (2003) recognized that the pioneers were the most successful. This evidence is documented with the extension to the initial model introducing the interactive variable "network*Amazon", a company that Copeland et al. (2000) consider the symbol of the *new economy*.

requires high up-front investment, so that the potential results are far from guaranteed.

Alongside this uncertainty, and contrary to White et al. (1997) and Aboody and Lev (2000), it is also worth to mention the strong information asymmetry between insiders (managers) and outsiders (investors), with the consequent agency costs, given the investment profile that characterizes this type of company's investments in the intangible assets. The information asymmetry mainly derives from three factors: (i) the specificity of this type of investment, which hampers comparability between companies; (ii) the absence of organized markets for transactions of this type of asset (other than patents and licenses); and (iii) as these investments are treated as costs in the year they are incurred, they are not subject to impairment tests (i.e. comparison between cost of acquisition/production and market value), so no later additional information is available to investors about their investments.

As a result of the noise in the estimation of future cash flows and information asymmetry, there is great divergence in investors' expectations about the value created by this type of company. This divergence in expectations justifies the seemingly paradoxical behaviour of the market, with some authors holding that the technology-based companies tend to be undervalued by the market, while others hold the opposite opinion, asserting the overestimation of such shares.

In the functional fixation hypothesis (Hall 1993; Hall and Hall 1993), the market tends to undervalue this type of company because investors do not incorporate their expectations. Given the short time horizon, all future benefits associated with investments undertaken by these companies are mainly in intangibles. In the current study, the noise in the evaluation of this type of company derives not only from the strong uncertainty associated with the estimation of future cash flows (reflected in the high volatility of shares of these companies), but also from the distortion conveyed by the information in the financial statements on the profitability of these companies, given the costs of treatment of the variables R&D and advertising.

To analyze the volatility of returns recorded by technology companies, Chan et al. (2001) obtained a positive and statistically significant coefficient for the variable R&D/sales. These authors find that firms, with a higher ratio R&D/sales and poor performance in the previous three years (the period of analysis of portfolios created), are also those that have registered the highest growth rates in liquid results and provide the investors with abnormal returns, in line with the results obtained by Lakonishok et al. (1994) and Fama and French (1992), designating these companies by "*glamour stocks*" (i.e., companies with high ratios of R&D/sales and MVE/BVE).

Ikenberry et al. (1995), Loughran and Ritter (1995) and Lakonishok and Lee (2001) justify these abnormal returns based on the fact that the market tends first to ignore these companies given their poor performance (treatment of investment in intangibles as costs undervalues the short-term profitability), which for Chan et al. (2001) reflects the existence of a clientele effect associated with this type of company. Managerial support for successive investments in R&D and advertising is a vote of confidence in the future profitability associated with these investments. This vote of confidence is further highlighted by the great pressure to reduce

investment in these items, given its immediate impact on short-term profits. Lev and Sougiannis (1996) and Chambers et al. (2002) also argue that the abnormal returns offered by these companies are an additional premium, given the higher level of risk that is inherent in them. Kothari et al. (2002) provide empirical evidence in this sense. They conducted a research to explain the results obtained by technology-based companies on the basis of investments in tangible assets, introducing as variables "debt", "dimension", "industry" and "growth". They conclude that the results expected from the investments in intangibles are much more uncertain than expected results from investments in fixed assets. The estimated coefficient for intangible assets exceeds the estimated coefficient of fixed assets by about four times. According to the authors, this uncertainty accentuates the agency costs between managers/shareholders (insiders) and creditors (outsiders), because in case of bankruptcy, intangible assets, given their specificity and lack of organized markets for their transaction, tend to lose all their value. However, the literature reaches no consensus on the investor behaviour profile with reference to this group of companies. For example, Jensen (1993) takes the opposite view, arguing that investors tend to overestimate future abnormal results of technology-based companies, particularly when reporting losses, citing the example of biotechnology companies. See the specific case of high expectations created by the announcement of a potential cure for a type of cancer.

Focusing the analysis on *net firms*, and following Jensen (1993), there was an overestimation of the share price of these companies. The overstatement of the prices of such securities results from: (i) the effect of public impression, i.e. the media coverage, particularly in the 1990s, with a strong impact on the public, as documented by Shiller (2000); (ii) the fact that the media tend to focus their attention on successful pioneering companies (e.g. Yahoo and eBay); and (iii) the intense marketing campaigns involving IPOs, particularly *net firms* (DuCharme et al. 2001; Demers and Lewellen 2003; Jorion and Talmor 2006).

This suggests that the perception of high growth opportunities created by the Internet led investors to extrapolate strong-growth expectations to all *net firms*, based on the success of a small number of successful pioneers, for fear of "*losing the train of opportunity*". As demonstrated by Hugonnier et al. (2005) through a general equilibrium investment model, the option of deferral given the type of investment, such as investment in information technology, can erode the value of this type of option, even in a moderate risk-aversion scenario. In short, for evaluation, the literature is consensual, stressing that it is crucial to note the stage of the business life cycle. Anthony and Ramesh (1992: 204) contend that:

> At each stage of growth in an entity's life cycle, different measures of financial performance take on varying degrees of importance.

Thus, given the emerging nature of the Internet sector/*net firms*, we found that the strategy of these companies followed a maximization of growth. Given the profile of technology-based companies, investments are focused on the intangible assets—R&D and advertising. Given the tax procedures set out by GAAP, losses are a result of the effect of conservatism accounting. In this context, the *unrecorded*

goodwill (the difference between the MVE and the BVE) reflects the present value (PV) of growth opportunities held by these companies and is enhanced by the network effects created by the *World Wide Web*, not yet reflected in the financial statements. Under the principle of rationality, it is to be expected that managers only undertake investment projects that are associated with expectations of abnormal returns.

The next chapter, in Part II, we initiate the results of our empirical study. Given the magnitude and persistence of the losses reported by *net firms*, our goal is to analyze the valuation of these companies by the market, or more specifically, to examine the statistical relationship between market capitalization and reported losses.

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Part III
Empirical Study

Chapter 5
Period, Sample Selection and Definition of Variables

Abstract This chapter presents the definitions of the basic concepts underlying the empirical study. We begin by defining the period investigated, which we define as the New Economic Period (NEP) as well as the concept of *net firms*. Then, we define the procedures to select the sample. We present the number of observations and also the systematization of the investigation. For comparative purposes, we define also a match sample—*no-net firms* and finally we present the definition of the variables used.

Keywords Empirical study · New economy period (NEP) · *Net firms* · Control sample—*non-net firms*

5.1 Introduction

This chapter introduces the core concepts underlying the empirical study. Therefore, and due to the emerging nature of the Internet sector, we begin by specifying the period that will be investigated, which we call the *New Economy Period* (NEP) and the profile of the companies in the new economy—*net firms*. We also explain the procedures to select a *match sample*, i.e. non-net firms with an IPO contemporaneous to the net firms. With the selection of this match sample, we aim: (i) to control the effect of fashion (*fad*) associated with *net firms* documented by Lee (2001), Cooper et al. (2001) and further (ii) to compare results between the two samples in order to ensure robustness of the results and conclusions, since, according to Bartov et al. (2002), the phenomenon of "positive valuation of losses" seems to have assumed greater importance in the universe of *net firms*.

After selecting the two samples, we made a comparative analysis, particularly in light of the number of IPOs per year, and the partition of the companies on the basis of results achieved—profit or loss, movements on the market. Surprisingly, we found that the failure rate in both samples was very low, as opposed to the rate of mergers and acquisitions (M&A), which exceeded 80%. Further emphasis was done

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to the comparison in terms of the industry. Finally we define the variables used in the study. The database used is the Compustat North America.

5.2 Definition of the "*New Economy Period*—NEP"

One of the most important aspects of this research is to identify the *Period of the New Economy* (NEP) and hence define the object of study—new economy companies, which for brevity we will denote by the term *net firms*.[1]

It is difficult to identify the beginning of the NEP. Core et al. (2003: 54) state that the concept NEP first appears in *Dow Jones News Service* when it mentions that in 1994 the bank attributed to Nova Scotia's "old economy" a growth rate of 3%. On 09 May 2000, the Chairman of the U.S. Federal Reserve commented that economic growth had accelerated in the period of the new economy. In 1995 appeared the first *browser from* Netscape Communications, and Core et al. (2003) referred to Amazon the symbol of the new economy.

Thus, we identified the early period of the new economy (NEP) with the year 1996. The period of this research covers the years 1996–2003.

5.3 Definition of "*Net Firms*"

The definition of new economy company—*net firm*—also proves to be highly complex. The sector of activity (*Standard Digital Code—SIC*) is of little use, since this type of company tends to operate in different sectors, even considering the substantial arbitrariness of criteria.

However, the difficulty of defining a *net firm* is overcome by the creation of specific market indexes for these companies. Thus, for this research we consider *net firms*, companies listed in the *Internet Stock List* index (*ISDEX*).[2] However, the identification of *net firms* based only on this index brings us the problem that in our sample we include only surviving firms (*survivor bias effect*). Therefore, the empirical study should control for this effect.

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[1]The designation itself is not consensual. For example, Neves (2002: XVI) prefers the designation "Digital Economy". In the preface to this same book, Brealey opts for the concept "New Economy". In the present investigation we chose the concept "New Economy", which we designate by the acronym NEP as it was the concept with greater generalization (Copeland et al. 2000; Damodaran 2001; Penman 2001; Jorion and Talmor 2006; Kaplan 2002; Core et al. 2003).

[2]This index was originally created by the company WRSN—*Wall Street Research Net*, posted on the website http://www.wsrn.com, for the period 20 April 1999 to 11 November 2003. At the end of 2003, WSRN was acquired by the Internet.com company. Currently on the website http://www.bullsector.com/internet.html can be found multiple indexes on *net firms* [GSTI—*Internet Index* (WBC: ^ GIN), AMEX—Internet Components Index (AMEX: ^ IIX), Philadelphia Internet Index (STREET.COM: ^ DOT), U.S. Dow Jones (DJI: ^ DJUSNS)].

5.4 Criteria for Selection of Samples

5.4.1 *New Economy Companies:* "Net Firms"

In order to overcome the problem of the survival effect, we began by selecting a sample of *net firms* listed in the *ISDEX* index on 27 June 2003. Based on this date we obtained a list of 242 companies. Next, we analysed the reports of Morgan Stanley and (i) "*The Technology IPO* Yearbook—*8th Edition*" with a list of 286 *net firms* quoted on 6 March 2002, (ii) "*The Technology IPO Yearbook—7th edition*" with the 382 listed companies on 21 February 2001, (iii) "*The B2B Internet Report*" also of Morgan & Stanley, with 354 listed on 24 April 2000 and (iv) companies listed in "*The Internet Company Handbook*" also of Morgan & Stanley, with 108 listed on 25 May 1999. Based on these reports, it was possible to collect information about *net firms* listed before and after the *crash* that occurred in the first quarter of 2000.[3] Comparing our sample with Jay Ritter´s sample of *net firms*, we identified 534 companies on 2002.[4] Finally, we analysed the various investigations into these companies (see Table 5.2).

Tables 5.1 and 5.2 summarize this.

With this procedure, we initially identified 658 companies. A total of 24 companies have been excluded from this group because of a lack of information, i.e. the companies did not have their information tabulated in the *Compustat* database on the three key variables for analysis: "market capitalization—MVE", "value of equity—BVE" and "net income". We have also further eliminated 12 companies that were identified as outliers.

The identification of *outliers* deserves particular attention, because, based on the analysis of *boxplots* with reference to the variables "market capitalization—MVE", "equity—BVE" and "net income", the *outliers* identified were numerous. In order to preserve the representativeness of the sample and ensure the robustness of the results, we chose to identify *outliers* according to the analysis of "*inner fences*" and "*outer fences*" indicators calculated by Eviews (Eviews Manual 2004: 397).[5] Graphically this is expressed in Fig. 5.1.

After this purification process of the data, the final sample of *net firms* comprises 622 companies. This sample is one of the most representative of the new economy firms, compared with other studies (see Table 5.2), both in size, where the survival effect is taken into account, either with reference to the period under study, 8 years, and covering both periods: the pre-crash period (1996—first quarter of 2000) and

[3]The *crash* occurred in the first[t] quarter 2000; Demers and Lev (2001) documented a decrease of 45% in the ISDEX index for the period February to March 2000.

[4]This database can be found on the homepage of Jay Ritter: http://bear.cba.ufl.edu/ritter/ipodata.htm.

[5]Analytically: (i) *inner fences* = [1stQ – 1.5 * IQR; 3rdQ * +1.5IQR] and (ii) *outer fences* = [1stQ – 3rdIQR; 3rdQ + 3IQR], with Q-quartile and IQR—the difference between quartile (*inter quartile range*).

Table 5.1 New economy firms listed on ISDEX

ISDEX	27/06/2003	06/03/2002	21/02/2001	24/04/2000	25/05/1999	Jay Ritter
Number of companies	242	286	382	354	108	534

the post-crash period (second quarter 2000–2003) of the "*dot.com bubble*" (Demers and Lev 2001).

Indeed, one of the consensual aspects in the various studies on the subject of evaluation of *net firms* lies in the need to consider longer periods of analysis, given: (i) the emerging nature of the Internet industry (life cycle perspective), and especially (ii) the results for the period 1999–2000, which researches cover (see Table 5.2), should be analysed with "great caution" given the effect of the "*dot.com bubble*" (Penman 2001; Talmor 2001; Lewellen 2003).[6]

5.4.2 *Companies with a IPO Date Contemporaneous to* "Net Firms"*:* "Non-Net Firms"

The 1990s were clearly a period of "*hot markets*", a phenomenon widely documented in the literature on IPOs.[7] Loughran and Ritter (2003) documented a total of 6169 IPOs for the period of 1980–2000, 14% concentrated in the period 1990–1998 and 65% in 1999–2000. Ljungvist and Wilhelm (2003) present similar results for the period 1996–2000.

Thus, taking into account the cluster effect that the IPOs tend to register and particularly the results obtained by Bartov et al. (2002), who documented the effect of "positive valuation of the losses" only for *net firms*, we also select a sample of contemporaneous IPOs of *non-net firms* for comparison purposes (match sample), which we will designate by *non-net firms*. The use of a control sample has been revealed to be very useful in order to corroborate the results obtained for the main sample, despite limitations in their selection.

To select this sample, we used the database provided by the *National Association of Securities Dealers Automated Quotation* (NASDAQ), which contains all IPOs that occurred between 1990 and 2002 (until September) in the NASDAQ index.[8] Thus, we began by identifying in this database the *net firms* we had already selected. The next step was to identify *non-net firms* contemporary with

[6]The *dot.com bubble,* characterized by prices in a given period of time that diverge from fundamental values, was documented for example by Ofek and Richardson (2002, 2003), Ljungvist and Wilhelm (2003), Loughran and Ritter (2003), and Keating et al. (2003).

[7]As an example we quote: Ritter (1991) and Loughran and Ritter (1995).

[8]Thanks to Darren Hawkins, the department *NASDAQ International* for helping with this database.

Table 5.2 Sample sizes of *net firms*: systematization of other researches

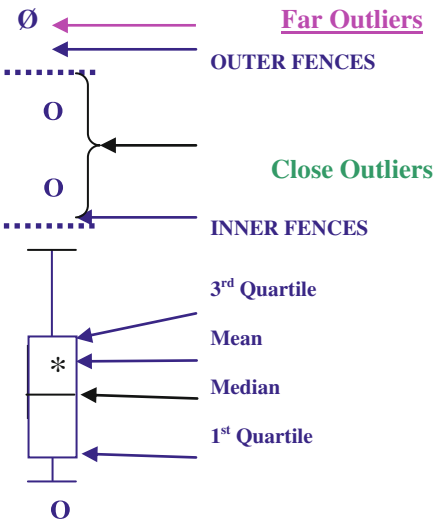
Authors	Number of companies	Period of analysis	Source of information
Core et al. (2003)	214	1999	Sample Hand (2001a) (Ψ)
Rajgopal et al. (2003)	92	1999Q1–2000Q3	Internet stock list
Keating et al. (2003)	148	Two dates: • 13/03/00 • 05/26/00	Internet stock list
Loughran and Ritter (2003)	534	1990–2000	• SEC—Securities and Exchange Commission • CRSP—Centre of Research Security Prices
Ljungqvist and Wilhelm (2003)	552	01/1990–02/2000	Sample Jay Ritter, added 18 companies
Demers and Lewellen (2003)	373: • 191 B2C • 182 B2B	Post 02/1999	Internet stock list
Hand (2003)	274	1997Q1–2000Q3	Internet stock list
Ofek and Richardson (2003)	305	1998Q1–2000Q4	Reports and Morgan Stanley
Bartov et al. (2002)	98	1996Q1–1999Q3	Internet stock list
Martinez and Clement (2002)	245	1996Q1–2001Q2	Internet stock list
Bowen et al. (2002)	174	1999	Report annual accounts (10-k)
Rajgopal et al. (2002)	45 (Only B2B)	Up to 09/2002	The B2B internet report and Morgan Stanley
Davis (2002)	273	Up to 08/2000	Internet stock list
Tokic (2004, 2005)	518 initial sample	1996–2000	All companies belonging to the two digits GIS *industry sub-sector*
Ofek and Richardson (2002)	400	1999	Reports and Morgan Stanley
Liu and Song (2001)	369	02/2000	Internet stock list
Hand (2001a)	274	1997Q1–1999Q2	Internet stock list
Hand (2001b)	285	1995Q1–2001Q2	Internet stock list
Bagnolli et al. (2001)	98	31/03/99–31/10/00	First call forecast analysts
Demers and Lev (2001)	84 (B2C only)	Three dates: • 3/12/1999 • 28/02/2000 • 31/05/2000	Internet stock list
Trueman et al. (2001)	95	1998Q4–2000Q2	Internet stock list

(continued)

Table 5.2 (continued)

Authors	Number of companies	Period of analysis	Source of information
Kozberg (2009)	316	02/1999–05/2001	Internet stock list
DuCharme et al. (2001)	342	1990–1999	Internet stock list
Hendershott (2001)	435	1995–2000	Venture Xpert Database (Thompson financial)
Schultz and Zaman (2001)	420	1996 to March 2000	Internet stock list
Trueman et al. (2000)	63	09/1998 and 12/1999	Internet stock list

Q—Information collected on a quarterly basis
B2B—Business–to–Business
B2C—Business–to–Consumer
Ψ—Sample the first version of a working paper "*Profit, Losses and Non-Linear Pricing of Internet Stocks*"



Eviews (2004:version 5.0: 397).

Fig. 5.1 Identification of *outliers*

the dates of the IPO of the *net firms*. The initial day differential was 3–5 days. For the period before 1999, the maximum differential was 30 days like Schultz and Zaman (2001), given that a lower number of IPOs occurred during this period. For the years 1999 and 2000, it was even more difficult to find "*a match firm*" given the predominance of *net firm* IPOs. This also made it impossible to control the industry

effect, i.e. the selection of *non-net firms* contemporaneous with the date of the *net firm* IPOs and belonging to the same sector (SIC).

The initial sample includes 564 companies. As the sample of *net firms,* the sample was subjected to a purification of data process, and 11 companies have been eliminated due to missing information. Twelve companies were classified as *outliers* according to the same criteria for *net firms*, thus having been removed for the entire period of analysis, i.e. 1996–2003. The final sample comprises 541 *non-net firms*.

In the following section, we analyse the composition of the two samples. Comparisons have also been established based on the results recorded by the companies in each sample, movements of entries and exits from the market, and sectors and markets where they are predominantly listed.

5.5 Composition and Comparative Analysis of the Two Samples: "*Net Firms*" and "*Non-Net Firms*"

5.5.1 The Samples of "Net Firms" *and* "Non-Net Firms"

Comparing the size of the two samples *net firms* (Table 5.3) and *non-net firms* (Table 5.4), with the total number of IPOs that occurred in three U.S. markets: NASDAQ, New York Stock Exchange (NYSE) and American Stock Exchange (AMEX) (Table 5.5), the two samples selected are representative of the number of IPOs that took place in the three markets. For example, in 1999 the number of IPOs accounted for 432 (279 *net firms* and 153 *non-net firms*), when the number of IPOs that took place on NASDAQ was 485 (see Table 5.5).

5.5.2 Comparative Analysis of "Net Firms" *Versus* "Non-Net Firms"

Comparing the two samples (Tables 5.3 and 5.4), we confirm a greater number of IPOs before the year 1996 for the group of *non-net firms* (26.43%), against 10.93% reported by *net firms*. Both samples highlight the "*cluster*" effect in time, verifying a strong concentration of the IPOs during the "*dot.com bubble*", i.e. the years of 1999 and 2000. The group of *net firms*, however, experienced a higher percentage—69.30% (44.86 and 24.44%) against 50.28% (28.28 and 22.00%) for the group of *non-net firms*. This preliminary result supports the "usefulness" of resorting to a control sample for comparative purposes. In the period after 2000, there are few IPOs in both groups, in line with the overall behaviour of the three markets: NASDAQ, NYSE and AMEX (Table 5.5).

With reference to the percentage of firms that left the market, the results are similar: 33.76% (210/622) in the group of *net firms* compared with 27.54%

Table 5.3 Composition of the sample of *net firms*

Year of IPO	Global sample	Split the sample		No. IPO by year	% IPO	Results reported by the companies on the date left the market[b]			Reason left the market				
		Profits	Losses			Profits	Losses	Total	M&A[c]	Bankruptcy	Liquidation	Private	Others[d]
≤1996	71	34 (48%)	37 (52%)	68	10.93	0	0	0					
1997	115	49 (43%)	66 (57%)	49	7.88	0	0	0					
1998	154	47 (31%)	107 (69%)	56	9.00	2	2	4	4				
1999	430	80 (19%)	350 (81%)	279	44.86	12	1	13	12	1			
2000	527	74 (14%)	453 (86%)	152	24.44	37	4	41	39				2
2001	428	36 (8%)	392 (92%)	7	1.13	59	9	68	60	1	2		5
2002	367	54 (15%)	313 (85%)	3	0.48	34	2	36	30		3		3
2003	307	101 (33%)	206 (67%)	1	0.16	43	5	48	34	1	4	2	7
s/data IPO				7[a]	1.13								
Total	2399			622		187 (89.05%)	23 (10.95%)	210	179 (85.24%)	3 (1.43%)	9 (4.29%)	2 (0.95%)	17 (8.10%)

The composition of the sample by year does not correspond to the formula: global sample + number of IPOs—number of firms that left the market, because some firms left the market in year $t + 1$ but we only have data to the year t. So, we consider that the firm left the market in the year t

[a]It was not possible to identify the date of the IPO

[b]If the company report data for the year t but left the marker on year $t + 1$, we consider that the firm left the market on date t

[c]M&A—Mergers and Acquisitions

[d]For example failed to obtain information from Security Exchange Commission (SEC)

Table 5.4 Composition of the sample of *non-net firms* (see footnote of Table 5.3)

Year of IPO	Global sample	Split the sample		No. IPO by year	% IPO	Results reported by the companies at the date left the market[b]			Reason left the market				
		Profits	Losses			Profits	Losses	Total	M&A[c]	Bankruptcy	Liquidation	Private	Others[d]
≤1996	143	81 (57%)	62 (43%)	143	26.43	2	0	2	2				
1997	191	109 (57%)	82 (43%)	60	11.09	1	2	3	3				
1998	212	120 (57%)	92 (43%)	52	9.61	7	2	9	9				
1999	356	182 (51%)	174 (49%)	153	28.28	14	11	25	20	1			4
2000	445	195 (44%)	250 (56%)	119	22.00	19	13	32	24	4			4
2001	402	140 (35%)	262 (65%)	5	0.92	16	9	25	22			1	2
2002	374	145 (39%)	229 (61%)	4	0.74	16	7	23	17			2	4
2003	336	146 (43%)	190 (57%)	0	0.0	20	10	30	25				5
No. IPO date				5[a]	0.92								
Total	2459			541		95 (63.76%)	54 (36.24%)	149	122 (81.88%)	5 (3.36%)	0 (0.00%)	3 (2.01%)	19 (12.75%)

[a]It was not possible to identify the date of the IPO
[b]If the company report data for the year t but left the market on year $t + 1$, we consider that the firm left the market on date t
[c]M&A—Mergers and Acquisitions
[d]For example failed to obtain information from Security Exchange Commission (SEC)

Table 5.5 The number of IPOs by market and by year

Year	NASDAQ		NYSE		AMEX		Total	
	Total	%[c]	Total	%[c]	Total	%[c]	Total	%
1992	442	10.26	80	10.94	6	4.88	528	10.23
1993	520	12.07	97	13.27	11	8.94	628	12.16
1994	444	10.30	82	11.22	13	10.57	539	10.44
1995	476	11.05	72	9.85	9	7.32	557	10.79
1996[a]	680	15.78	88	12.04	18	14.63	786	15.22
1997	494	11.46	87	11.90	22	17.89	603	11.68
1998	273	6.34	68	9.30	21	17.07	362	7.01
1999	485	11.26	49	6.70	11	8.94	545	10.56
2000	397	9.21	48	6.57	6	4.88	451	8.74
2001	63	1.46	35	4.79	3	2.44	101	1.96
2002[b]	35	0.81	25	3.42	3	2.44	63	1.22
Total	4309	83.46[c]	731	14.16[c]	123	2.38[c]	5163[c]	

[a]The begin of the New Economy Period (NEP)
[b]Information until September 2002
[c]Percentage of total IPOs (i.e. NASDAQ, NYSE e AMEX: total 5163) (http://www.nasdaq.com; http://www.nyse.com and http://www.amex.com)

(149/541) in the group of *non-net firms*. As for the exit reason, the results are interesting. In both samples we find that the main reason for leaving the market is due to mergers and acquisitions (M&A), in this case, more than 80%. The failure rate, in turn, is less than 5%, results that contradict our initial expectations.

Given the scale of the *crash*, with a fall of over 40% in the ISDEX index during the first quarter of 2000 (Demers and Lev 2001; Ofek and Richardson 2002, 2003; Keating et al. 2003), we expected to obtain a higher rate of bankruptcies, at least in the group of *net firms.* Surprisingly this group showed a lower failure rate (1.43 vs. 3.36% in the group of *non-net firms*).

The high percentage of M&As is justified, because the *Internet* is an emerging sector. Thus, initially attracted by the high share capitalizations, new firms enter in the market.[9] With the increased competition, and according to Kaplan (2002), we are witnessing a process of rationalization of this sector.

This empirical evidence seems to confirm the "*winner-takes-all*" strategy which Noe and Parker (2005) showed mathematically and which Hand (2001a), Hendershott (2001) demonstrated empirically. According to the model of Noe and

[9]Hendershott (2001) uses the term "imitation" to describe the IPO *boom* of *net firms* that occurred in 1999 and 2000. But the interesting fact according to the data of this author, and in line with the results reported by Schultz and Zaman (2001), is that this group of companies (imitators) could attract funding from venture capital as well as the involvement of the most prestigious investment banks (with a reputation to uphold) to the IPO process. Schultz and Zaman (2001) reported that the six major investment banks (CS First Boston, Deutsche Bank, Goldman Sachs, Merrill Lynch, Morgan Stanley and Salomon Brothers) were associated with 39.30% of the *net firms* IPO (*underwriter*) in the period 1996 to March 2001, against 27.40% of other contemporaneous IPOs.

Table 5.6 Composition of *net firms* and *non-net firms* by industry

SIC	*Standard Industrial Code* (*SIC*)	*Net firms*		*Non-net firms*	
		Total	%[d]	Total	%[d]
2834	Pharmaceutical preparations[a]	1	0.16	22	4.07
2836	Biological products (no diagnostic substances)[a]			17	3.14
3576	Computer communication equipment[a]	17	2.73	6	1.11
3577	Computer peripheral equipment, NEC[a]	2	0.32	8	1.48
3661	Telephone and telegraph apparatus[a]	13	2.09	10	1.85
3663	Radio & TV broadcasting and communications equipment[a]	10	1.61	8	1.48
3674	Semiconductors and related devices[c]	7	1.13	33	6.10
3826	Laboratory analytical instruments[c]			8	1.48
4812	Radiotelephone communications[a]	3	0.48	9	1.66
4813	Telephone communications (no radiotelephone)[c]	24	3.86	18	3.33
4832	Radio broadcasting stations[a,b]	2	0.32	9	1.66
4841	Cable and other pay television services[b]			9	1.66
4899	Communications services, NEC[a,b]	7	1.13	6	1.11
5961	Retail—catalog and mail-order houses[a]	31	4.98		
7370	Services—computer programming, data processing, etc.[c]	183	29.42		
7371	Services—computer programming services[c]	8	1.29		
7372	Services—pre-packaged software[c]	160	25.72	68	12.57
7373	Services—computer integrated systems design[a,b]	34	5.47	14	2.59
7374	Services—computer processing and data preparation[c]	2	0.32		
7389	Services—business services, NEC[a]	13	2.09		
8731	Services—commercial physical and biological research[c]			13	2.40
	Total	517	83.12	258	47.69

Industrial sector classified as high technology according the criteria of:
[a]Francis and Shipper (1999)
[b]Collins et al. (1997)
[c]Loughran and Ritter (2003)
[d]Percentage calculated based on the total companies by sample (622 *net firms*; 541 *non-net firms*)

Parker (2005), the pioneers that invest massively in intangibles, such as R&D and advertising, were the companies that survived. The strategy is to achieve high market shares, with the purpose of generating the network effect *made possible* by the *Internet* that enabling them to achieve increasing returns.[10]

[10]With this reasoning, Noe and Parker (2005) also support, albeit indirectly, the phenomenon of "positive valuation of losses" based on the "*conservatism accounting*" modelled by the FOM. At

Table 5.7 Number of companies listed by market

Market	*Net firms*		*Non-net firms*		Total	
	Total	%	Total	%	Total	%
NYSE—*New York Stock Exchange*	11	1.77	1	0.18	12	1.03
AMEX—*American Stock Exchange*	3	0.48	2	0.37	5	0.43
NASDAQ	505	81.19	482	89.09	987	84.87
Regional stock exchange	1	0.16			1	0.09
LBO—*Leverage Buy Out*	18	2.89	8	1.48	26	2.24
Ohers	84	13.51	48	8.88	132	11.35
Total	622	100	541	100	1163	100

Table 5.6 show that out of a total of 158 sectors, approximately 47.69% of *non-net firms* companies are classified as high-tech companies, according to the criteria defined by Collins et al. (1997), Francis and Schipper (1999), Loughran and Ritter (2003), sectors to some extent which are also emerging. This effect is not differentiated between the two samples. This emerging character becomes stronger in *net firms*, since the concentration of firms in high-technology sectors is even greater. Dispersing the aggregate sample by 74 sectors, the percentage of high-tech companies amounted in this group to 83.12%.[11]

Unsurprisingly, and in accordance with the overall market behaviour, we can see in Table 5.7 that more than 80% of *net* and *non-net firms* are listed on NASDAQ.

In the next section, we define the variables used in the empirical study, selected from the Compustat North America database.

5.6 Definition of Variables

The database used was Compustat—version Compustat North America. To collect data we chose to use information on an annual basis because: (i) this information corresponds to information already available after all corrections made to the financial statements (*restated financial statements*), and (ii) for the variable "advertising" (which corresponds to the description *Advertising*), the Compustat database only provides information on an annual basis. This variable is a key variable in this research, as it acts as *proxy* for growth opportunities for the group *net firms,* whose business model is B2C—"*Business to Consumers*" (see criteria for subdivision of the sample in Sect. 6.3). Choosing to work with quarterly data would involve manual collection of the data for this variable for both samples under study.

(Footnote 10 continued)

the *start*-up/*growth* phase and in order to create future growth opportunities, those firms invest massively in intangible assets which were accounted as costs under GAAP.

[11]See Appendixes 5.1 and 5.2 with the number of *net firms* and *non-net firms* by sector.

Also note that given that the *terminus of a* fiscal year may occur at different months, the data collection was made based on the "*calendar year basis*".[12] Activating this option, the database provides information that it is comparable between companies and in different periods of the year. This option also corrects the information of the effect of *stock splits* and dividends. As the unit of measurement, quantitative variables have been measured in thousands of dollars. Thus, in order to undertake the empirical study, information was collected for the variables as listed in Table 5.8.

We defined the variable *income before extraordinary items—available for common* (Res_IExt), and according to the manual of the Compustat data base (2004: 249), as corresponding to adjusted net income from extraordinary items (*item* Annual 192), discontinuation of operations, e.g. the result obtained with the closure of a given division (*item* Annual 66), less preferred dividends and the effect of change in accounting policies (Compustat Manual 2004).[13]

With reference to the R&D and advertising variables, and like other studies (e.g. Fama and French 1998; Core et al. 2003) outside the universe of *net firms* and Hand (2001b, 2003) in the universe of *net firms*, when the information is not available (*NA—not available*), these variables assume a null value. Although with this procedure, we are underestimating the values of these variables, this option allows us to "preserve" the sample size. Contrary to usual practice, we include in the sample firms that have negative values for the variable BVE.[14]

Since the universe of companies under analysis is characterised by firms in the *start-up*/growth stage, negative values for the variable BVE reflect the effect of *conservatism accounting* (Zhang 2000). Consecutive investments in R&D and advertising, tend to understate net income, with cumulative effects on the variables assets and BVE. Thus, a negative value for the variable BVE reflects the need for additional investments in operating assets (Zhang 2000). On the other hand, Damodaran (2001) argues that until the date of maturity of the debt, the purchase option (*call option*) owned by shareholders continues to have value, as far as the debt firm value may increase. Thus, when there is high volatility in firms[15] the risk can be an ally of the shareholder. By undertaking new investment projects, investors increase the likelihood of obtaining high yields if the investment is

[12]With reference to the two samples analysed, *net firms* and *non-net firms*, 53.88% (54.34%) of companies wound up the fiscal year in December, in March 4.66% (2.96%), in June 3.38% (4.99%) and in September 41% (4.34%), respectively. Note that for 35.67% of *net firms* and 33.37% of *non-net firms*, information about the closing month of the fiscal year was not available in the Compustat database.

[13]For a more detailed analysis of the preparation of Financial Statements according to GAAP, see Penman (2003).

[14]Collins et al. (1997, 1999), Burgstahler and Dichev (1997), Barth et al. (1998, 2003), Tan (2004), Joos and Plesko (2005) outside the universe of *net firms* and Hand (2001b, 2003) and Trueman et al. (2000), in the universe of *net firms*, excluded from the sample under analysis companies with a negative BVE.

[15]The high volatility patterns recorded for *net firms* are documented by Ofek and Richardson (2002, 2003).

Table 5.8 Variables Definition

Variables	Acronyms	Annual item
Balance sheet		
Property, plant and equipment—total net value	AF	8
Current assets—total	AC	4
Receivables—total	DR	2
Cash and equivalents	CTN	1
Current assets—others	OAC	68
Assets—total	AT	6
Common equity—total	BVE	60
Retained earnings	LR	36
Long-term debt—total	PMLP	9
Current liabilities—total	PCP	5
Liabilities—total	PT	181
Profit and loss account		
Depreciation and amortization	AMORT	14
Selling, general, and administrative expenses	CGA	189
Cost of goods sold	CMVMC	41
Advertising expenses	PUB	45
Research and development expenses	I&D	46
Special items	IExt	17
Income before extraordinary items—available for common	Res_IExt	237
Net income (loss)/profit	RL	172
Sales (net)	VENDAS	12
Statement of cash flows		
Operating activities-net cash flows	CFO	308
Others		
Market value of equity	MVE	MKVALF
Cash dividends—common	DIV	21

successful, and restrict their losses if the project fails (Myers 1977). Thus, eliminating these firms would imply in our view a distortion of the results to be obtained. Core et al. (2003: 51) conclude that by eliminating firms with negative equity in their sample, they removed about 7.5% of the companies in the *start-up* phase and 5.6% of high-tech enterprises.

In summary, we conclude that the differences are not significant between the two samples: indeed (i) both samples show a *cluster* effect in time of the number of IPOs that occurred, particularly in the NASDAQ market; (ii) the percentage of firms that exited the market was similar; (iii) the M&A is the main factor behind market exit; and (iv) both samples tend to operate in high-tech sectors. The findings also show that the companies that exit the market are those that reported the worst performance, i.e. the percentage of firms reporting losses. In the next chapter, we present the method employed in the study.

Appendix 5.1: Number of *Net Firms* by SIC

SIC	Description	No. firms
1040	Gold and silver ores	1
2721	Periodicals: publishing and printing	1
2741	Miscellaneous publishing	1
2750	Commercial printing	5
2834	Pharmaceutical preparations	1
2844	Perfumes, cosmetics and other toilet preparations	1
3089	Plastics products, NEC	1
3541	Machine tools, metal cutting types	1
3571	Electronic equipment	1
3576	Computer communication equipment	17
3577	Computer peripheral equipment, NEC	2
3578	Calculating and accounting machines (no electronic computers)	1
3651	Household audio and video equipment	1
3661	Telephone and telegraph apparatus	13
3663	Radio and TV broadcasting and communications equipment	10
3669	Communication equipment, NEC	2
3670	Electronic components and accessories	1
3674	Semiconductors and related devices	7
3690	Miscellaneous electrical machinery, equipment and supplies	1
3714	Motor vehicle parts and accessories	1
3825	Instruments for measuring and testing of electricity and electrical signals	1
3990	Miscellaneous manufacturing industries	1
4700	Transportation services	6
4812	Radiotelephone communications	3
4813	Telephone communications (no radiotelephone)	24
4822	Telegraph and other message communications	3
4832	Radio broadcasting stations	2
4899	Communications services, NEC	7
4955	Hazardous waste management	1
5045	Wholesale—computers and peripheral equipment and software	3
5065	Wholesale—electronic parts and equipment, NEC	1
5122	Wholesale—drugs, proprietaries and druggists' sundries	2
5400	Retail—food stores	1
5735	Retail—record and prerecorded tape stores	1
5812	Retail—eating places	1
5912	Retail—drug stores and proprietary stores	1
5940	Retail—miscellaneous shopping goods stores	1
5961	Retail—catalog and mail-order houses	31
5990	Retail—retail stores, NEC	3

(continued)

(continued)

SIC	Description	No. firms
6035	Savings institutions, federally chartered	1
6036	Savings institutions, not federally chartered	1
6162	Mortgage bankers and loan correspondents	2
6163	Loan brokers	1
6211	Security brokers, dealers and flotation companies	7
6282	Investment advice	1
6411	Insurance agents, brokers and services	4
6531	Real estate agents and managers (for others)	1
6794	Patent owners and lessors	1
7310	Services—advertising	7
7311	Services—advertising agencies	1
7320	Services—consumer credit reporting, collection agencies	1
7330	Services—mailing, reproduction, commercial art and photography	2
7331	Services—direct mail advertising services	5
7361	Services—employment agencies	1
7370	Services—computer programming, data processing, etc.	183
7371	Services—computer programming services	8
7372	Services—pre-packaged software	160
7373	Services—computer integrated systems design	34
7374	Services—computer processing and data preparation	2
7377	Services—computer rental and leasing	2
7380	Services—miscellaneous business services	1
7385	Services—telephone interconnect systems	1
7389	Services—business services, NEC	13
7812	Services—motion picture and video tape production	1
7841	Services—video tape rental	1
7990	Services—miscellaneous amusement and recreation	2
8200	Services—educational services	1
8600	Services—membership organizations	1
8700	Services—engineering, accounting, research, management	1
8711	Services—engineering services	1
8741	Services—management services	2
8742	Services—management consulting	9
9995	Non-operating establishments	1
	Total	622

Fonte: http://www.sec.gov/info/edgar/siccodes.htm (U.S. Securities Exchange Commission)

Appendix 5.2: Number of *Non-Net Firms* by SIC

SIC	Description	
100	Agricultural production-crops	1
1220	Bituminous coal and lignite mining	1
1311	Crude petroleum and natural gas	2
1382	Oil and gas field exploration services	1
1520	General bldg contractors—residential	1
1600	Heavy construction other than bldg const—contractors	1
1700	Construction—special trade contractors	1
2020	Dairy products	1
2040	Grain mill products	2
2086	Bottled and canned soft drinks and carbonated waters	1
2090	Miscellaneous food preparation and kindred products	1
2253	Knit Outerwear mills	1
2330	Women's, misses', and juniors outwear	1
2340	Women's, misses', children's and infants' undergarments	1
2390	Miscellaneous fabricated textile products	1
2522	Office furniture (no wood)	1
2650	Paperboard containers and boxes	1
2741	Miscellaneous publishing	2
2810	Industrial inorganic chemicals	1
2833	Medical chemicals and botanical products	2
2834	Pharmaceutical preparations	22
2835	In vitro and in vivo diagnostic substances	8
2836	Biological products (no diagnostic substances)	17
2844	Perfumes, cosmetics and other toilet preparations	1
2870	Agricultural chemicals	1
2890	Miscellaneous chemical products	1
3089	Plastics products, NEC	1
3140	Footwear (no rubber)	1
3270	Concrete, gypsum and plaster products	1
3290	Abrasive, asbestos and miscellaneous non-metallic mineral products	1
3312	Steel works, blast furnaces and rolling mills (coke ovens)	1
3350	Rolling drawing and extruding of nonferrous metals	2
3440	Fabricated structural metal products	1
3452	Bolts, nuts, screws, rivets and washers	1
3510	Engines and turbines	1
3533	Oil and gas field machinery and equipment	1
3540	Metalwork machinery and equipment	1
3541	Machine tools, metal cutting types	1
3559	Special Industry machinery, NEC	8

(continued)

(continued)

SIC	Description	
3570	Computer and office equipment	1
3571	Electronic equipment	1
3572	Computer storage devices	2
3576	Computer communication equipment	6
3577	Computer peripheral equipment, NEC	8
3578	Calculating and accounting machines (no electronic computers)	2
3620	Electrical industrial apparatus	1
3621	Motors and generators	2
3651	Household audio and video equipment	2
3652	Phonographs records and prerecorded audio tapes and disks	1
3661	Telephone and telegraph apparatus	10
3663	Radio & TV broadcasting and communications equipment	8
3669	Communications equipment, NEC	2
3670	Electronic components and accessories	1
3672	Printed circuit boards	4
3674	Semiconductors and related devices	33
3679	Electronic components, NEC	3
3690	Miscellaneous electrical machinery, equipment and supplies	1
3714	Motor vehicle parts and accessories	2
3716	Motor homes	1
3823	Industrial instruments for measurement, display, and control	3
3825	Instruments for measuring and testing of electricity and electrical signals	5
3826	Laboratory analytical instruments	8
3827	Optical instruments and lenses	3
3829	Measuring and controlling devices, NEC	5
3841	Surgical and medical instruments and apparatus	3
3842	Orthopedic, prosthetic and surgical appliances and supplies	5
3844	X-Ray apparatus and tubes and related irradiation apparatus	2
3845	Electromedical and electrotherapeutics apparatus	10
3861	Photographic equipment and supplies	3
3873	Watches, clocks, clockwork operated devices/parts	1
3942	Dolls and stuffed toys	1
3944	Games, toys and children's vehicles (no dolls and bicycles)	1
3949	Sporting and athletic goods, NEC	2
3990	Miscellaneous manufacturing industries	2
4213	Trucking (no local)	4
4400	Water transportation	1
4512	Air transportation, scheduled	2
4731	Arrangement of transportation of freight and cargo	2
4812	Radiotelephone communications	9

(continued)

(continued)

SIC	Description	
4813	Telephone communications (no radiotelephone)	18
4832	Radio broadcasting stations	9
4833	Television broadcasting stations	3
4841	Cable and other pay television services	9
4899	Communications services, NEC	6
4924	Natural gas distribution	1
4953	Refuse systems	3
4955	Hazardous waste management	1
5010	Wholesale—motor vehicles and motor vehicle parts and supplies	1
5020	Wholesale—furniture and home furnishings	1
5045	Wholesale—computers and Peripheral Equipment and Software	3
5047	Wholesale—medical, dental and hospital equipment and supplies	1
5063	Wholesale—electrical apparatus and equipment, wiring supplies	1
5065	Wholesale—electronic parts and equipment, NEC	1
5072	Wholesale—hardware	1
5080	Wholesale—machinery, equipment and supplies	2
5122	Wholesale—drugs, proprietaries and druggists' sundries	2
5171	Wholesale—petroleum bulk stations and terminals	1
5180	Wholesale—beer, wine and distilled alcoholic beverages	1
5190	Wholesale—miscellaneous nondurable goods	1
5311	Retail—department stores	1
5331	Retail—variety stores	1
5500	Retail—auto dealers and gasoline stations	1
5621	Retail—women's clothing stores	2
5651	Retail—family clothing stores	1
5700	Retail—home furniture, furnishing and equipment stores	1
5731	Retail—radio, tv and consumer electronics stores	1
5735	Retail—record and prerecorded tape stores	1
5812	Retail—eating places	10
5900	Retail—miscellaneous retail	2
5940	Retail—miscellaneous shopping goods stores	1
5944	Retail—jewellery stores	1
5945	Retail—hobby, toy and games shops	1
5961	Retail—catalog and mail-order houses	4
5990	Retail—retail stores, NEC	1
6020	National Commercial Banks	25
6035	Savings institutions, federally chartered	6
6099	Functions related to depositary banking, NEC	1
6141	Personal credit institutions	2
6153	Short-term business credit institutions	2

(continued)

(continued)

SIC	Description	
6162	Mortgage bankers and loan correspondents	1
6163	Loan brokers	1
6200	Security and commodity brokers, dealers, exchanges services	1
6211	Security brokers, dealers and flotation companies	1
6282	Investment advice	1
6331	Fire, marine and casualty insurance	1
6351	Surety insurance	1
6411	Insurance agents, brokers and services	4
6513	Operators of apartment buildings	1
6794	Patent owners and lessors	3
6798	Real estate investment trusts	2
7310	Services—advertising	3
7331	Services—direct mail advertising services	1
7359	Services—equipment rental and leasing, NEC	1
7361	Services—employment agencies	2
7363	Services—help supply services	1
7370	Services—computer programming, data processing, etc.	4
7371	Services—computer programming services	2
7372	Services—pre-packaged software	68
7373	Services—computer integrated systems design	14
7374	Services—computer processing and data preparation	1
7380	Services—miscellaneous business services	1
7389	Services—business services, NEC	2
7819	Services—allied to motion picture production	1
7830	Services—motion picture theatres	1
8011	Services—office and clinics of doctors of medicine	1
8071	Services—Medical Laboratories	1
8200	Services—educational services	4
8351	Services—child day care services	1
8700	Services—engineering, accounting, research, management	1
8711	Services—engineering services	2
8731	Services—commercial physical and biological research	13
8734	Services—testing laboratories	1
8741	Services—management services	3
8742	Services—management consulting	4
9995	Non-operating establishments	1
	Total	541

Fonte: http://www.sec.gov/info/edgar/siccodes.htm (U.S. Securities Exchange Commission)

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Chapter 6
Method

Abstract This chapter analyses the phenomenon of "positive valuation of losses" in companies of the new economy in the US. We start by analysing the life-cycle effect of those companies. Because the value of a company is a function of the value of the current assets and the net present value of future growth opportunities, we examine the pattern of the evolution of the variables investments in total assets, R&D and advertising over sales and/or debt in the short and medium to long term. We also include in the analysis the ratio market to book value (MVE/BVE). Based on the trend analysis, we conclude that the main source of value of *net firms* and the *non-net firms* (match sample), still belong to the future growth opportunities held by these companies.

Keywords Positive valuation of losses · Investment in R&D and advertising · Life cycle effect · Research hypotheses

6.1 Introduction

Given the heterogeneous nature of *net firms* (e.g. Morgan Stanley subdivides this sector into 11 subsectors), first we split the sample into two group: firms that report profit and firms that report losses, given the asymmetrical nature with which this variable is assessed by the market. Then, we proceeded with the partition of the sample into two subgroups: "B2B—*Business-to-Business*"—assuming that this group invests mainly in R&D, and "B2C—*Business-to-Consumer*"—where now the predominant investment focuses on advertising. Thus, the empirical analysis examines four groups of companies: "R&D_B2B with profits and losses" and "Pub_B2C with profits and losses".

In addition, because we aim to analyse the relationship between the market capitalization of *net firms* and the losses reported by these companies, in point Sect. 6.4, we begin by respecifying the OM and FOM. Subsequently, we used the

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methodology of Fama and MacBeth (1973) to analyse how the market evaluates the *net firms* based on the main determinants of their value over time (life cycle). Finally, we formulate the research hypotheses, highlighting the importance of establishing a comparative analysis between two samples, i.e. *net* and *non-net firms*, in order to ensure robustness of the results (e.g. Lee 2001; Cooper et al. 2001).

6.2 The Effect of Life Cycle

The value of a company is the sum of the value of its total assets from which it expects to generate revenues in the future and the present value of growth opportunities (Miller and Modigliani 1961; Feltham and Ohlson 1995; Ohlson 1995; Copeland et al. 2000; Damodaran 2001; Brealey and Myers 2003). As discussed earlier, the technology-based companies, as *net firms*, initially report a high level of losses as a strategy for maximizing growth. Technology-based companies invest massively in intangible assets which cannot be capitalized under GAAP. The effect of the *network* boosted by the Internet is touted as the main driver of this strategy, which popularized the concept of *winner-takes-all* with the aim of quickly achieving the highest market shares (e.g. Noe and Park 2006).

Thus, given the emerging nature of the Internet sector, we begin by analysing the evolution of the variables "sales", results" and "investment" in these companies/sector. This comparison aims to examine whether the impact of certain variables on the financial value of the company changes throughout the life cycle of the company/sector. Thus, we analyse the pattern of evolution of the variables: "age", "sales", "total assets (TA)", "earnings before extraordinary *items* (Res_IExt)", "total liabilities", "long-term debt", "R&D", "advertising (adv)", "equity" and the ratio "MVE/BVE", "total liabilities/total assets", "R&D/sales", and "advertising/sales". We examine the "results before *items* extraordinary (Res_IExt)" because, given the principle of continuity, it is not sustainable over time to maintain the effect of extraordinary *items* (Penman 2003). In discussing the results we will return to this issue.

From an econometric point of view:

(i) Given the strong asymmetry that characterizes the distribution of the variables under analysis, we analyse the trend using the average value of the variables, and also the median value.
(ii) To calculate the ratios of the variables, we followed the method suggested by Chan et al. (2001), i.e. we aggregate the value of the numerator as well as the values of the denominator in order to reduce the effect of outliers.

In summary, the trend analysis will be conducted based on the scheme of Fig. 6.1.

As a first step, we analyse the behaviour of variables over time, i.e. from 1996 to 2003. Since the variables do not reveal a statistically significant trend, we

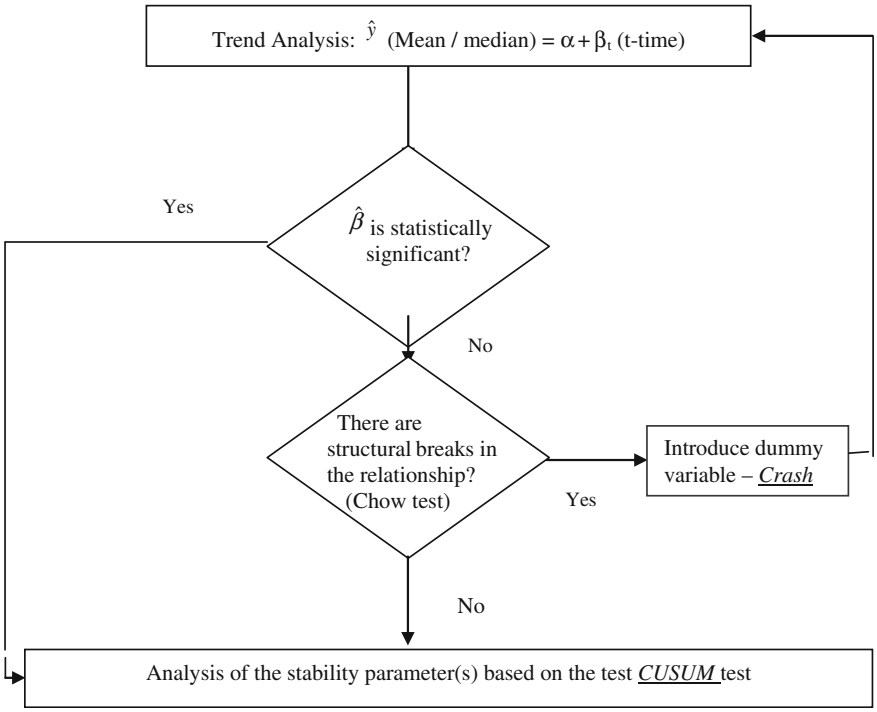


Fig. 6.1 Trend analysis

investigate the possibility of structural breaks. To detect the existence of potential structural breaks, we used the *Chow Breakpoint* test, which allows a comparison to be made of the estimated coefficients for two or more subgroups of the sample as well as checking for any statistically significant differences.[1] The criteria for the subdivision of the sample in different subsets are the responsibility of the investigator (Eviews Manual 2004: 568).

Given the period under study, our criterion for the breakdown of the sample was the year 2000, the year of the *crash*. In the presence of structural breaks, we introduced a dummy variable—"*crash*"—which takes the value one for the *post-crash* period (2000–2003) and zero for the previous period, i.e. 1996–1999.[2] We conclude the trend analysis using the CUSUM test, which is calculated based on recursive estimation for analysis of the stability of the parameters.[3] Verification of this stability (instability) is relevant based on the results obtained by Demers and

[1]See Eviews Manual (2004: 568) for more information about this test.

[2]The Hensen test (Johnston and Dinardo 2001: 130) can overcome this arbitrariness of the criteria for the subdivision of the sample. However, the same is not available in version 5.0 of the EViews.

[3]For more detail information see Johnston and Dinardo (2001: 130).

Lev (2001), Tockic (2005) and Keating et al. (2003). These authors detect changes, for example for the variables "cash flow", "results (losses)" and "volatility", which lost statistical significance in the *post-crash* period. Table 6.1 presents the results for the trend analysis.

The values obtained for trend analysis in the group of *net firms* (Table 6.1) shows that:

(i) The variable "age" shows an increase in the mean and median values significant at the 1 and 5% level, respectively. The decrease for the year 1999 reflects that the "boom" of the IPOs occurred in this year;
(ii) The variable "sales" indicates a similar pattern, reporting the median value a statistical significance at the 1% level;
(iii) The variable sales growth reports an increase as well as the investment in the R&D variable, even after the *crash*, as well as with the increase of the age of the company[4];
(iv) The variable "Total Assets" has also seen an upward trend, but with a lower statistical significance (the median value is only statistically significant at the 10% level), which may reflect the predominance of intangible assets (R&D and advertising investments), which cannot be capitalized under GAAP;
(v) Despite the sales increase, the "results" remain negative (losses). For the years 2000 and 2001, the periods after the effect of the *dot.com bubble* and based on the CUSUM test, the parameter $\hat{\beta}$ reveals a strong instability (see Appendix 6.1). Although having detecting a structural break with the CHOW test, we found that, with reference to the average and during the *crash*, the negative coefficient is statistically significant (significant at the 10% level), confirming the persistence of the phenomenon of positive valuation of losses. This result suggests, and in line with the results obtained by McCallig (2004) and Joos and Plesko (2005), a tendency for high-tech companies to report losses for longer periods.[5]
(vi) Regarding the ratio "MVE/BVE", the coefficient only becomes statistically significant after the introduction of the variable "crash" (the Chow test reveals a structural break for the year 2000). As expected, the *post-crash* reverses the sign of this coefficient, reinforcing its significance, reflecting the sharp drop recorded by these companies in terms of market capitalization. What is surprising, and based on the result of the CUSUM test, is that the coefficient $\hat{\beta}$ proved to be stable over the entire period (see Appendix 6.2);

[4]It is possible that the values of this variable are undervalued because in the absence of information; for example for the variable R&D (na—*not available*), we assign a null value, in order to preserve the sample size.

[5]This persistence of the losses, and as noted by Keating et al. (2003), was not due to the dissemination of new information to the market after the *crash* of *dot.com bubble*, e.g. more pessimistic information about the *analysts forecasts* or even for the performance of the "web traffic" variables (e.g., number of visitors, pages viewed, time spent in the query data *website*, and the growth rate of the Internet-user population).

Table 6.1 Trend analysis for the sample of *net firms*

Variáblesa		1996	1997	1998	1999	2000	2001	2002	2003	$\hat{\beta}$	CUSUM testc	Crashd		CUSUM testc
												$\hat{\beta}_{pre\text{-}crash}$	$\hat{\beta}_{post\text{-}crash}$	
Ageb	Average	1.65	2.06	2.40	1.81	2.28	3.18	4.19	5.29	0.465***	E			
	Median	1.00	2.00	2	1.00	2.00	3.00	4.00	5.00	0.50**	E			
Sales	Average	111.16	104.90	102.82	87.65	133.20	144.86	153.77	180.22	10.71**	E			
	Median	26.76	35.25	38.09	26.20	46.87	52.04	56.52	65.50	5.24***	E			
Total Assets	Average	118.42	143.51	161.67	299.25	551.33	342.67	352.20	408.18	46.03**	E			
	Median	52.90	57.54	60.13	86.27	127.82	91.39	95.55	90.76	7.03*	E			
Results (Res_IExt)	Average	−2.37	−6.33	−15.04	−31.07	−111.20	−153.85	−80.56	−18.44	−11.67	I (00 and 01)	12.84	−128.66*	E
	Median	−0.83	−3.07	−5.53	−13.65	−28.76	−34.91	−15.23	−4.73	−2.28	I (00 and 01)	2.54	−25.31	E
Total liabilities	Average	62.57	79.64	89.61	136.31	211.45	171.32	195.27	245.97	25.98***	E			
	Median	9.88	12.56	14.20	16.04	25.37	24.33	26.08	28.36	2.82***	E			
Long term debt	Average	20.42	30.26	35.75	58.29	73.55	51.44	43.18	42.08	3.32	E	0.82	13.10	E
	Median	0.16	0.21	12.10	12.36	00.29	0.13	0.05	0.05	−0.02	E	−0.015	−0.017	E
R&D	Average	4.57	6.25	7.92	7.20	16.30	20.12	18.38	17.65	2.36**	E			
	Median	3.08	1.15	1.13	2.34	6.43	7.65	6.05	5.20	0.75**	E			
Advertising	Average	0.45	1.37	2.28	4.32	7.29	5.29	4.34	4.50	0.66*	E			
	Median	0.00	0.00	0.00	0.00	0.33	0.26	0.06	0.00	0.016	E	−0.06*	00.40**	E
BVE	Average	55.22	61.46	70.24	151.61	326.75	168.22	153.76	159.12	19.74	E	−10.97	161.21	E
	Median	31.22	35.56	37.75	60.41	90.47	58.73	47.49	47.70	3.19	E	−2.49	29.82	E
MVE/BVE	Average	5.54	6.33	8.08	16.70	2.21	2.64	2.18	5.01	−0.66	E	2.16*	−14.78**	E
	Median	4.64	4.62	5.32	11.39	1.25	1.47	1.42	3.40	−0.55	E	1.37*	−10.07**	E
T.Liab./T.A	Average	12.53	0.55	0.55	0.46	0.38	0.50	0.55	0.60	0.003	E	0.025	−0.112	E
	Median	0.19	0.22	0.24	0.19	0.20	0.27	0.27	0.32	0.015**	E			

(continued)

Table 6.1 (continued)

Variáblesa		1996	1997	1998	1999	2000	2001	2002	2003	$\hat{\beta}$	CUSUM testc	Crashd		CUSUM testc
												$\hat{\beta}_{pre\text{-}crash}$	$\hat{\beta}_{post\text{-}crash}$	
R&D/Sales	Average	0.04	0.06	0.08	0.08	0.12	0.14	0.12	0.10	0.011**	E			E
	Median	0.12	0.03	0.03	0.10	0.14	0.15	0.11	0.08	0.006	E	−0.015	0.11**	
Adv/Sales	Average	0.004	0.013	0.0222	0.0493	0.0548	0.0365	0.028	0.025	0.003	E	0.002	0.004	E
	Median	0.00	0.00	0.00	0.00	0.007	0.005	0.001	0.000	0.003	E	−0.001	0.008	E

[a]See definition of variables in Table 5.8

[b]This variable is calculated with reference to the date of the IPO, because we do not have information at the date of the foundation of the company

[c]For the representation of the *CUSUM* test we adopt the following legend: "E" means stability in behaviour of the parameters, i.e. parameters were found to be in the confidence interval defined by default ($\alpha = 5\%$) by *EViews*, "I" reports the opposite scenario. In brackets we indicate whether the last two digits of (s) year (s) in which there was instability in the parameter estimates (β). For example, we report the result of this test for the variable "results (Res_IExt)" [I] and "MVE/BVE [E] in Appendices 6.1 and 6.2, respectively

[d]Estimated parameters after introducing the variable dummy "crash", which takes the value 1 for the period post-*crash* (2000–2003) and 0 for the previous period (1996–1999). This variable is included whenever the Chow test becomes statistically significant

(***), (**) and (*) indicates statistically significant at 1, 5 and 10% level, respectively

(vii) It should be noted that the variable "BVE" has a positive coefficient, but not statistically significant, even after the introduction of the variable "crash". The highest value obtained for the year 2000 is easily explained, as it reflects the capital rose in the IPOs processes.

With no increase in equity, and systematically reporting losses, companies can only finance investments through the use of debt. Both the "total liabilities" and the ratio "total liabilities over total assets—T. Liab/T.A." report a statistically significant increasing trend. However, the medium- and long-term increase in a small magnitude (the variable long-term debt is not statistically significant), thus, the predominance of short-term debt reflects the high agency costs associated with this type of company. These are companies operating in an emerging sector, with some technological complexity and with a very limited historical record. Lenders come in renegotiating the *ceiling* of short-term debt, an efficient way to monitor this type of company (Jensen and Meckling 1976).

Given these results, and with reference to the characterization of the life cycle of the company/sector proposed by Damodaran (2001: 13), we conclude that in the period under review, the Internet was still a fast-growing sector. The "sales" continue to increase in line with investments in "R&D" (see the very similar values for the mean and median of the ratio "R&D/Sales" [(0.10)(0.08) − 2003], particularly in the period *post-crash*. In this context, the persistence of losses as sustained by the FOM is (in part) a consequence of the *conservatism accounting* effect, particularly in start-up companies. Strong pressures at the level of liquidity, which such companies were subjected to after the *crash*, and in line with the results obtained by Demers and Lev (2001) and Keating et al. (2003), are overcome using a strategy of merger and acquisitions (M&A), as documented in Sect. 5.4 (see Tables 5.3 and 5.4). The M&A strategy enables companies not only to overcome the situation of financial *stress*, but also to achieve the desired dimension confirming the *winner-takes-all* strategy (Noe and Parker 2005). The fact that the processes of M&A have occurred mainly through the exchange of shares, according to data from Schultz and Zaman (2001), suggests a clear sign of confidence of both parties (buyer and the acquired companies) in this sector.

Therefore, we emphasize that the main source of value of these companies is still associated with the exercise of future growth opportunities. The recovery of the ratio MVE/BVE in the years 2002 and 2003 [the mean and median values for these years are 2.18 (1.42) and 5.01 (3.40), respectively], is justified in our view by the fact that, after the euphoria generated about this sector, and due to consecutive investments in R&D, the expectations of future cash flows of this sector are still viewed as positive signs by the market. Table 6.2 shows the results for the sample *non-net firms*.

The results for the sample of *non-net firms* (Table 6.2) are similar to those obtained for the sample of *net firms*, revealing, however, a greater statistical significance. Thus, the trend of increase in "sales" is accompanied by an increase in Total Assets, the investment in "R&D" and "advertising". The "results" also negative are persistent throughout the period under review (1996–2003),

Table 6.2 Trend analysis for the sample of *non-net firms*

Varibles[a]		1996	1997	1998	1999	2000	2001	2002	2003	$\hat{\beta}$	CUSUM test[c]	Crash[d]		CUSUM test[c]
												$\hat{\beta}_{pre\text{-}crash}$	$\hat{\beta}_{post\text{-}crash}$	
Age[b]	Average	1.99	2.38	2.98	2.59	2.87	3.86	4.89	5.21	0.453***	E			
	Median	1.00	2.00	3.00	2.00	2.00	3.00	4.00	4.00	0.369***	E			
Sales	Average	92.47	109.94	131.44	131.53	153.32	175.67	199.78	237.63	19.28***	E			
	Median	41.41	44.36	60.31	55.57	56.47	64.23	67.97	82.42	4.974 ***	E			
Total Assets	Average	111.38	130.05	199.55	291.07	356.36	397.74	409.51	466.69	54.01***	E			
	Median	49.51	59.84	81.89	93.63	122.87	137.20	146.69	159.55	16.66***	E			
Results (Res_IExt)	Average	1.08	−0.86	−0.24	−6.10	−22.84	−37.11	−33.88	−10.85	−4.476**	I (02)			
	Median	0.92	0.85	1.50	0.25	−2.49	−5.67	−3.04	−1.69	−0.738**	E			
Total liabilities	Average	58.15	72.72	127.88	187.58	208.77	235.91	261.85	306.06	36.027***	E			
	Median	12.38	17.73	25.48	27.88	29.27	31.15	34.12	41.83	3.65***	E			
LongTermDebt	Average	21.85	23.52	36.77	88.00	109.67	132.32	152.95	177.12	24.314***	I (99 and 00)			
	Median	12:56	0.97	1.45	1.76	1.18	0.98	1.41	0.91	0.032	E	−0.811	−1.56	E
R&D	Average	5.05	5.48	6.86	6.28	10.28	15.57	16.20	17.66	2.048***	E			
	Median	12:51	0.96	0004	0.00	2.44	4.81	5.20	4.01	0.745**	E			
Advertising	Average	0.48	0.43	0.64	0.91	1.14	1.1	1.40	17.58	1.503*	I (00,01,02)			
	Median	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	–[e]	–			
BVE	Average	52.47	56.11	69.59	96.61	136.76	156.49	142.20	156.89	17.41***	E			
	Median	33.78	37.43	44.35	60.66	73.20	73.18	66.84	74.39	6.43***	E			
MVE/BVE	Average	3.40	4.47	4.47	6.40	3.41	2.77	1.77	3.00	−0.291	E	0.34	−3.31**	
	Median	2.77	2.76	1.99	2.95	2.04	2.05	1.35	2.71	−0.097[f]	E			
Liab./TA	Average	0.52	0.56	0.64	0.59	0.64	0.66	0.014**	E					
	Median	0.25	0.31	0.24	0.23	0.23	0.26	−0.006	E	0.012*	−0.096*	E		

(continued)

Table 6.2 (continued)

Varibles[a]		1996	1997	1998	1999	2000	2001	2002	2003	$\hat{\beta}$	CUSUM test[c]	Crash[d]		CUSUM test[c]
												$\hat{\beta}_{\text{pre-}crash}$	$\hat{\beta}_{\text{post-crash}}$	
R&D/Sales	Average	0.055	0.05	0.0522	0.0478	0.067	0.0886	0.0811	0.0743	0.005**	E			
	Median	0.012	0.022	0.0001	0.000	0.0431	0.0749	0.0765	0.0487	0.009**	E			
Adv/Sales	Average	0.005	0.004	0.005	0.007	0.007	0.006	0.007	0.074	0.006	I(00,01,02)	0.01	−0.003	R (02)
	Median	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	–[e]	–[e]			

[a]See definition of variables in Table 5.8

[b]This variable is calculated with reference to the date of the IPO, because we do not have information at the date of the foundation of the company

[c]For the representation of *CUSUM* test, we adopt the following description: "E" stands for stability in the behaviour of the parameters, i.e. the parameters belong in the confidence interval defined by default ($\alpha = 5\%$) by EViews; "I" reports the opposite scenario. In brackets, we indicate the last two digits of (s) year (s) in which instability occurred. As with the *net firms,* we present the *output* for this test for the variables "results (I)" (Appendix 6.3) and the ratio "MVE/BVE (E)" (Appendix 6.4)

[d]Estimated parameters after introducing the variable dummy "crash", which takes the value 1 for the period post-*crash* 2000–2003 and 0 for the previous period 1996–1999. This variable is included whenever the Chow test becomes statistically significant

[e]Values are always zero

[f]The variable "crash" was not introduced because no structural break was detected

(***), (**) and (*) indicates statistically significant at 1, 5 and 10% level, respectively

confirming once again the phenomenon of positive valuation of losses. However, the magnitude of their values is much lower than the values reported by *net firms* (see Appendix 6.3). The trend in the ratio "MVE/BVE" and in line with the group of *net firms* is negative and not statistically significant. Only with the introduction of the variable "crash" (due to the breakdown of the structure verified by the Chow test and only for the mean), does the coefficient for this variable assume negative values statistically significant *post-crash* (see Appendix 6.4).

As in the *net firms*, and unsurprisingly given the prevalence of high-tech companies (see Table 5.6), this group also experiences strong growth, where the main source of value is associated with future growth opportunities, based on the values reported by the variables R&D and R&D/Sales. However, growth appears to be more sustained, because the funding is allocated by indebtedness, in the long term. In addition, the increase in the variable BVE showed a statistical significance of 1% for both the average value and the median values for the 8 years under review. In the group of *net firms,* this variable was not proven to be statistically significant, nor was it for the mean values or the median values.

6.3 Criteria for Subdivision of Samples

From the trend analysis, we conclude that the Internet sector is still growing fast. The main source of value for *net firms* is the future growth opportunities. The successive investments in intangible assets (R&D and advertising), and assuming the principle of rationality, are positive signals to the market about the future value of cash flows. The current losses appear to be the consequence of the effect of *conservatism accounting*, as modelled by the FOM. A similar pattern of behaviour is recorded for the sample of *non-net firms*, an expected result, given the prevalence also in this sample of high-tech companies. But to make a better analysis of this effect, i.e. *conservatism accounting*, it is important to split the group of firms into those firms that report profits and those losses.[6]

According to the theory of abandonment option (Hayn 1995; Chambers 1997; Subranmanyam and Wild 1996), losses assume a transitory nature, so they are irrelevant for estimating future cash flows, and consequently, the value of a company. The persistence of losses makes the abandonment option more valuable for shareholders because it gives them the option to liquidate the company. But given the company's profile in the samples under study, high-tech companies in the *start-up phase*, and given the type of investment that tends to characterize those firms, losses are not an adequate proxy for the likelihood of the abandonment option for

[6]For example, Trueman et al. (2000: 151) recognized that given the limited number of observations (217 observations for the quarters September 1998 to December 1999), they were unable to estimate the model of OM expanded with the introduction of the *web traffic* variables for the two groups of companies: companies with profits and companies with losses.

these companies. In this context, the variable results assume importance as a *proxy* for the phase of the life cycle of the company.[7]

The choice of this variable as a *proxy* for the stage of the life cycle is based on the duality of the effect of the short-, medium- and long-term association with investments in intangible assets (Sougiannis 1994). In the short term, given the imposition of GAAP, these investments are treated as costs. Thus, only in the medium and long term [5–9 years, according to Lev and Sougiannis (1996)] it is expected that these companies will start to generate positive cash flows.

Thus, it is assumed that a company with profits has already reached a stage of stable/mature growth, while a company with losses is identified as a company under *start-up* with accelerated growth.[8] This classification captures four effects: (i) unrecognized assets associated with intangible assets (R&D and adv); (ii) differences in persistence in the growth of various *items* along the life cycle of the company; (iii) the impact of risk; and (iv) the size effect (Barth et al. 1998).

To better characterize the two groups of companies and to examine the accuracy of the choice of the variable "results" as a proxy of the stage of the life cycle of companies, we analysed in Tables 6.3 and 6.4, with reference to both samples, i.e. net firms and non-net firms, the statistically significant differences between means and medians for the variables: "age", "MVE", BVE", "results", "sales", "R&D", "advertising (adv)", "R&D/sales" and "advertising(adv)/sales" by year (i.e. 1996–2003).

Based on the results shown in Table 6.3 (panel A and B), the results of the variable MVE are statistically different at 1% for the median values, except for the years 1998 and 1999. This result is easy to justify, since the year 1999 was the year that the *net firms* approached the peak of the market capitalization (see Fig. 6.2). Note that the value of the variable MVE is systematically higher for the group of companies that have profits compared to the group with losses, with the exception of 1998, and with reference to the average group whose difference is not statistically significant.

For the variable BVE, the results for the mean values differ substantially from the median values. Given the strong asymmetry that characterizes the distribution of the variables under analysis, the study focuses on the results for the median. Thus, for all the years, except 1998, the differences are statistically significant; moreover, the corresponding value of equity for the group with losses is about the half of the value reported by the group with profits (48.63 million compared to 81.63 million US dollars—median values).

As expected, the losses are systematic throughout the period for the group that recorded losses, which is also the largest group of companies. This persistence is

[7]The variable "age" is not appropriate, because it is calculated with reference to the date of the IPO of the company.

[8]McCallig (2004) complements the analysis using the analysis of the variable "retained earnings". However, this author selects all listed companies in the US markets (NASDAQ, NYSE, and AMEX) since 1980 and does not impose any criteria for selecting the sample. Thus, the companies selected are at different stages of the life cycle.

Table 6.3 Differences between means/medians in the sample of *net firms*: companies with profits and companies with losses

Variables[b]		N[c]	Age	MVE	BVE	(Res_IExt)	Sales	R&D	Adv	R&D/Sales	Adv/Sales
Periods											
Panel A: Means[a]											
1996	Profits	34	1.75	480.5**	86.2*	11.09**	205.6**	5.06	0.17	0.075	0.004*
	Losses	37	1.53	145.8	26.8	14.7	24.36	4.12	0.70	4.402	0.052
1997	Profits	49	2.23	583.9*	89.9*	12.98**	183.9**	7.79	1.31	0.069	0.008*
	Losses	66	1.95	244.9	40.4	20.7	46.24	5.10	1.41	1.223	0.063
1998	Profits	47	2.27	469.4	90.9	12.77**	194.1**	8.69	2.56	0.065	0.016*
	Losses	107	2.72	610.8	81.2	27.3	62.75	7.58	2.16	0.671	0.097
1999	Profits	80	2.61	4055.5*	181.6	18.35**	210.8**	11.6**	5.12	0.07	0.025
	Losses	350	1.63	2184.1	144.8	42.4	59.5	6.19	4.14	0.798	0.298
2000	Profits	74	3.07	1207.5*	259.5	22.6**	279.6**	12.6	9.95	0.09**	0.026*
	Losses	453	2.13	644.4	337.7	133.1	109.3	16.9	6.93	0.37	0.204
2001	Profits	36	4.06	1207.1**	255.6	20.02**	267.7**	14.2	7.35	0.081	0.022
	Losses	392	3.10	374.6	160.2	169.8	133.6	20.7	5.10	0.439	0.064
2002	Profits	54	4.49	1001.2**	288.9**	24.26**	256.7*	14.3	10.6**	0.082*	0.026
	Losses	313	4.14	220.2	130.4	98.6	136.0	19.1	3.3	0.387	0.029
2003	Earnings	101	5.49	1798.7**	301.5**	29.30**	315.7**	21.1	9.94**	0.09	0.015
	Losses	206	5.19	306.1	89.3	41.8	113.8	15.9	1.83	0.69	0.014
Panel	Profits	475	4.28	1586.7**	211.3	20.36**	235.4**	13.0	6.57**	0.093*	0.022**
Data[d]	Losses	1924	4.57	740.64	174.6	96.9	118.1	14.8	4.34	0.633	0.133
Panel B: Medians[d]											
1996	Profits	34	1	272.05**	59.23**	5.10**	71.24**	4.27	0	0.022**	0
	Losses	37	1	105.19	21.02	8.45	10.18	1.96	0	0.234	0
1997	Profits	49	2	229.27**	49.55**	4.92**	80.19**	0	0	0**	0
	Losses	66	2	111.54	18.27	10.78	16.9	1.23	0	0.193	0

(continued)

Table 6.3 (continued)

Variables[b]		N[c]	Age	MVE	BVE	(Res_IExt)	Sales	R&D	Adv	R&D/Sales	Adv/Sales
Periods											
1998	Profits	47	2	251.19	48.87	7.67**	106.1**	0.2	0	0.003**	0
	Losses	107	2	168.71	42.47	11.29	22.31	1.13	0	0.123	0
1999	Profits	80	1	825.89	93.10**	7.09**	102.7**	2	0	0.011**	0**
	Losses	350	2	678.28	56.0	19.35	21.28	2.34	0.09	0.161	0.005
2000	Profits	74	2	249.93**	116.9	8.83**	129.2**	4.96	0[e]	0.069**	0**
	Losses	453	2	100.74	84.95*	36.47	39.87	6.63	0.38	0.20	0.014
2001	Profits	36	3	459.78**	119.7*	7.49**	136.3**	5.14	0.03	0.036**	0.001
	Losses	392	3	76.69	56.65	40.65	47.96	7.76	0.27	0.198	0.006
2002	Profits	54	4	261.74**	69.77**	10.87**	107.8**	2.79	0.04	0.027**	0.001
	Losses	313	4	52.73	41.63	20.13	48.62	6.38	0.06	0.184	0.002
2003	Profits	101	5	461.24**	100.7**	10.32**	104.3**	5.77	0.04	0.08**	0.001
	Losses	206	5	107.37	23.92	12.09	43.53	4.73	0	0.182	0
Panel	Profits	475	4	368.29**	81.63**	7.42**	98.53**	3.56	0.01**	0.033**	0**
Data	Losses	1924	4	128.40	48.63	24.29	33.75	4.89	0.06	0.185	0.002

[a]The test of equality of means tests whether each subgroup has the same mean. If so, then the mean variance between groups must be equal to the variance within each group. As we analyse the equality of means between only two subgroups, the *EViews* reports the statistic *T*, which are obtained from the square root of the *F* statistic, assuming only one degree of freedom in the numerator

[b]Variables are in millions of dollars, except ratios. See definition of variables in Table 5.8

[c]N = Number of firms in each group

[d]The test for differences between medians is the non-parametric *Kurskal–Wallis one-way ANOVA by ranks*. This test is a generalizing *Mann–Whitney* test for more than two groups. The basic intuition is to establish *ranks* among various subgroups. If the sum of subgroup 1 is identical to the sum of subgroup 2, then the two groups have identical values for the median. *EViews* also provides other non-parametric tests, such as: the *Wilcoxon signed ranks test*, the *Chi-square test* and the *van der Waerden* (*normal scores*) *test* (EViews Manual 2004: 309)

[e]The difference is only statistically significant at a significance level of 10%, according to the χ^2 test

(**) and (*) identifies statistical differences significantly at 1 and 5% level, respectively

Table 6.4 Differences between means/medians in the sample of *non-net firms*: companies with profits and companies with losses

Variables[b]		N[c]	Age	MVE	BVE	(Res_IExt)	Sales	R&D	Adv	R&D/sales	Adv/sales
Periods											
Panel A: Mean[a]											
1996	Profits	81	2.17	214.06	59.18	7.36*	114.1*	4.8	0.46	0.07*	0.004*
	Losses	62	1.76	131.55	43.70	7.11	64.27	5.36	0.50	0.84	0.03
1997	Profits	109	2.36	307.54	70.05**	8.80**	256.0**	4.9	0.30	0.06	0.003*
	Losses	82	2.41	175.83	37.58	13.7	48.67	6.25	0.60	6.51	0.017
1998	Profits	120	3.09	452.59*	92.19**	12.71**	200.5**	5.81	0.82	0.04	0.004
	Losses	92	2.83	126.73	40.11	17.13	41.4	8.23	0.41	13.38	0.171
1999	Profits	182	2.72	441.34*	86.50	10.48**	174.7**	4.83*	0.94	0.05	0.005
	Losses	174	2.44	803.44	107.2	23.44	86.36	7.8	0.87	1.63	0.40
2000	Profits	195	3.30	494.29	111.5	13.93**	214.8**	6.85**	1.02	0.05**	0.005
	Losses	250	2.55	443.74	156.4	51.52	105.4	13.0	1.23	2.2	0.08
2001	Profits	140	4.35	607.92**	146.7	14.26**	243.8**	11.2*	1.51	0.07**	0.006
	Losses	262	3.61	339.06	161.7	64.55	139.3	17.9	0.92	1.87	0.012
2002	Profits	145	5.49	378.91**	157.7	16.75**	292.1**	9.81**	1.76	0.06**	0.006
	Losses	229	4.52	170.60	132.4	65.94	141.4	20.4	1.18	1.63	0.018
2003	Profits	146	5.18	684.32**	230.2**	23.91**	357.9**	15.0**	38.3	0.06*	0.137
	Losses	190	5.24	306.77	100.6	37.56	145.2	19.7	1.64	1.67	0.013
Panel	Profits	1118	4.28	466.77**	123.4	13.97**	225.8**	8.16**	5.9	0.06**	0.022
Data	Losses	1341	4.98	351.35	118.6	44.18	111.6	14.4	1.04	2.88	0.089
Panel B: Medians[d]											
1996	Profits	81	2	123.01**	38.5**	4.79**	59.53**	0.51	0	0.018	0
	Losses	62	1	66.13	23.88	−3.83	16.28	0.62	0	0.044	0
1997	Profits	109	2	126.59**	45.89**	4.19**	77.24**	0.05*	0	0.0004**	0
	Losses	82	2	58.22	23.01	−6.19	18.33	2.67	0	0.125	0

(continued)

Table 6.4 (continued)

Variables[b]		N[c]	Age	MVE	BVE	(Res_IExt)	Sales	R&D	Adv	R&D/sales	Adv/sales
Periods											
1998	Profits	120	2	102.08**	52.45**	5.71**	94.98**	0**	0	0**	0
	Losses	92	3	50.19	25.69	−7.45	27.2	4.31	0	0.14	0
1999	Profits	182	2	142.6	57.41**	5.84**	88.49**	0**	0	0**	0
	Losses	174	2	163.75	37.89	−10.08	24.82	2.34	0	0.11	0
2000	Profits	195	2.5	151.76	72.52	7.03**	115.8**	0**	0	0**	0
	Losses	250	2	149.13	74.94	−18.61	32.56	7.18	0	0.189	0
2001	Profits	140	4	246.41**	116.7**	8.44**	131.0**	0**	0	0**	0
	Losses	262	3	120.25	63.75	−20.36	38.34	8.61	0	0.184	0
2002	Profits	145	5	158.98**	96.97**	7.02**	124.2**	0**	0	0**	0
	Losses	229	4	70.92	50.11	−22.26	39.3	10.2	0	0.212	0
2003	Profits	146	5	297.79**	147.2**	9.48**	152.1**	0**	0	0**	0
	Losses	190	4	134.46	48.82	−14.9	48.13	8.41	0	0.196	0
Panel	Profits	1118	4	158.0**	67.38**	6.32**	103.8**	0**	0	0**	0
Data	Losses	1341	4	101.66	46.95	14.67	33.53	5.81	0	0.176	0

[a]The test of equality of means tests whether each subgroup has the same mean. If so, then the mean variance between groups must be equal to the variance within each group. As we analyse the equality of means between only two subgroups, the *EViews* reports the *t* statistics, which are obtained from the square root of the *F* statistic, assuming only one degree of freedom in the numerator

[b]Variables are in millions of dollars, except ratios. See definition of variables in Table 5.8

[c]N = Number of firms in each group

[d]The test for differences between medians is based on the non-parametric *Kurskal–Wallis one-way ANOVA by ranks*. This test is a generalizing *Mann–Whitney* test for more than two groups. The basic intuition is to establish *ranks* among various subgroups. If the sum of the subgroup 1 is identical to the sum of subgroup 2, then the two groups have identical values for the median. The *EViews* also provides other non-parametric tests, such as the *Wilcoxon signed ranks test*, the *Chi-square test* and the *van der Waerden* (*normal scores*) *test* (EViews Manual 2004: 309)

(**) and (*) identifies statistically significant differences at 1 and 5% level, respectively

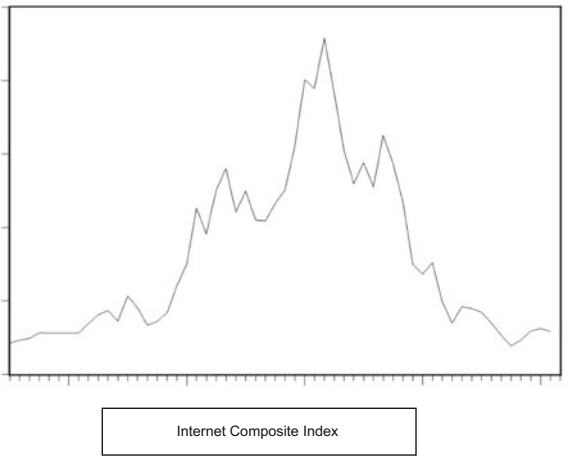


Fig. 6.2 Dow Jones Internet Composite Index—Monthly Closing Prices in the period July 1997 to February 2002

not changed even after the *crash* (i.e. the year 2000) in line with the results that we have obtained for trend analysis. The variable "sales" for this group recorded successive increases over time; however, the value corresponded to one-third of the volume of sales recorded for the group of companies with profits (33.75 million dollars loss group; 98.53 million dollars in profits group—median values).

Now focusing the analysis on the R&D and advertising variables, there are no relevant differences in investment volumes in the two groups (i.e. profit and loss companies). Indeed, the group that reported losses invests approximately mean values of $14.8 million dollars in R&D and reported sales of 33.75 million dollars (median values); while the group with profits reported an investment in R&D of $13 million dollars with sales of 98.53 million dollars. Given that a reduction in these *items* (R&D and advertising) would allow a substantial reduction in the volume of short-term losses, these results indicate that a decrease in the investment in those variables, particularly in R&D in companies that report losses, could be seen as a sign of confidence on the part of the managers, as well as by the investors, regarding the good prospects for future profitability associated with this type of investment.

This conclusion is reinforced when we analyse the R&D/sales ratio. The differences between medians are statistically significant at 1% for all years. We emphasize that this ratio lies in approximately 20% for the group of companies with losses (panel data), and that the level tends to remain steady even after the *crash,* against 3.3% in the group with profits (also according to panel data).

In summary, the results of the sample *net firms* reflect a more aggressive policy of investment in intangible assets by the group of firms with losses, particularly in R&D (note that the sales volume of this group is about one-third of that of the group with profits). This policy suggests that the losses (partially) derive from the

conservatism accounting effect. In this context, the splitting of the sample between firms with profits and companies with losses proves to be a good proxy. Table 6.4 now focuses our analysis for the sample of *non-net firms*.

By conducting a similar analysis for the sample of *non-net firms*, i.e. comparing the results obtained for the two groups of companies (i.e. profit and loss companies), for the variable MVE, except the period of the *crash* (1999 and 2000), the differences between the two groups for the median are statistically significant at 1% level. However, given the panel data values, we note that the difference between the two groups for the median is not as sharp (158 million dollars for the group with profits compared to 101.66 million in the group with losses) as for the sample of *net firms* (368.29 million dollars for the group with profits compared to 128.40 million dollars for the group with losses).

With reference to the variable BVE, the behaviour of this variable is similar to the group of *net firms*. With reference to the mean value, the differences are not significant for 5 years, contrary to the behaviour of the median, where the differences are significant for the entire period.

The differences for the two groups of companies, by reference to the average/median values of the variable "results (Res_IExt)", as expected, are systematically significant at a 1% level. However, it should be noted that the magnitude of the losses is small compared to the values recorded for the group of *net firms* with losses. The median value for the group of non-net firms with losses is 14.67 million dollars (panel data) compared with 24.29 million dollars (panel data) for the sample of *net firms* with losses.

With regard to the sales variable, the behaviour does not differ between the two samples and the differences are systematically significant for either the mean and median values. The median value of this variable (panel data) in the sample of *non-net firms* for the group with losses amounts to 33.53 million dollars, a value similar to that recorded by the *net firms* group with losses (33.75 million dollars).

Analysing the R&D variable, the differences between the two groups (companies with profits and companies with losses) are systematically significant at 1% level of significance. This result differs from that obtained for *net firms*. However, the group with losses invests more resources, $5.8 million (median values—panel data), compared with an approximately zero value (also for the median values) for the group with profits, a similar behaviour reported by the *net firms*. This differential behaviour is reflected in the ratio R&D/sales. Because the analyses base on mean values should be conducted with caution, given the strong asymmetry in the distribution of this variable, we focus the analysis on the median values.[9] Thus, similarly to the group with losses in the sample of *net firms*, the share of revenue from sales and investment that affects R&D stands at 17.6% (panel data), a figure that shows an increasing trend, even after the *crash*.

[9]See Appendix 6.5, where we report the number of companies by year, with reference to the group with losses in both samples, when the value of investment in R&D exceeds the value of sales.

Table 6.5 Split of the samples according to business model

Non-net firms	Net firms	
	R&D	Advertising (Adv)
Profits	R&D_B2B	Pub_B2C
Losses	R&D_B2B	Pub_B2C

In summary, for both samples and their groups (companies with profits and companies with losses), the variables under review recorded a similar behaviour: (i) there is clear evidence of a more aggressive investment strategy by the group of companies making investment in R&D compared with advertising, and (ii) in both samples and for the group of companies with losses, the share of sales that affects the investments in R&D is about 20% (median value—panel data). Thus, the results suggest that the losses tend to persist for longer periods, and are justified, in part, based on the effect of *conservatism accounting*. In both samples the group with losses is the one that registers more observations over the period under review (1996–2003). This result is consistent with the results obtained by trend analysis and the results of McCallig (2004) and Joos and Plesko (2005).

Given the heterogeneity that characterizes the business model adopted by *net firms*, which can be differentiated as *business-to-business* (B2B) and *business-to-consumer* (B2C), each sample (companies with profits and companies with losses) is further subdivided into two subgroups based on the values recorded by the R&D and advertising variables.[10] Thus, we assume that the B2B group invests primarily in R&D, while the B2C group favours investment in advertising. As a criterion, the study defines: when the variable R&D is reported as greater (lower) than the variable advertising, the company is classified in group B2B (B2C). For comparative purposes, we extend this partition of the *non-net firms* sample in Table 6.5.

6.4 Methodology of Fama and MacBeth

Given the persistence and magnitude of the losses recorded in both samples (the group with losses is consistently the group with more observations—Tables 6.3 and 6.4), our objective is to analyse the (statistical) relationship between market capitalization and net results reported by these firms over the new economy period (NEP).

[10]The Morgan Stanley reports (*The Technology IPO Yearbook*—8th and 7th edition) subdivide the Internet sector into 11 subsectors: (1) *Internet Portal*; (2) *Internet Commerce*; (3) *Internet Infrastructure*; (4) *Internet B2B Software*; (5) *Internet Financial Services*; (6) *Vertical Portal*; (7) *Internet Infrastructure Services*; (8) *Internet Consulting & Application*; (9) *Internet Advertising & Direct Marketing Services*; (10) *B2B Commerce*; and (11) *Multi-sector Internet Companies*. However, subdividing the sample into these 11 subsectors is not possible from an econometric point of view, given the small number of observations for certain subsectors.

The empirical model to estimate is the OM. Thus, and rewriting the Eq. 2.8:

$$P_t = bv_t + \alpha_1 x_t^a + \alpha_2 v_t$$

and substituting the variable abnormal results (x_t^a—Eq. 2.4) in the previous expression, we obtain:

$$P_t = bv_t + \alpha_1 \left[x_t - \left(R_f - 1\right) bv_{t-1}\right] + \alpha_2 v_t \tag{6.1}$$

Assuming the CSR principle, the previous expression can be rewritten as:

$$P_t = (bv_{t-1} + x_t - d_t) + \alpha_1 x_t - \alpha_1 \left(R_f - 1\right) bv_{t-1} + \alpha_2 v_t \tag{6.2}$$

Since the v_t variable "other information" is an orthogonal variable, the independent variable—x_t^a[11] variable assumes a zero value, and by introducing the constant, which in part "aggregates" the effects associated with the variable "v_t," i.e. the "shocks" from other sources of information other than financial information, which are immediately incorporated into prices and only later are reflected in the financial statements, we obtain the empirical model to estimate:

$$\begin{aligned} (P_t + d_t) &= (1 + \alpha_1) x_t + \left[1 - \alpha_1 (R_f - 1)\right] bv_{t-1} + \alpha_2 v_t \Leftrightarrow \\ \text{MVE}_{it} &= \alpha_0 + \alpha_1 x_{it} + \alpha_2 bv_{i,t-1} + e_{it} \end{aligned} \tag{6.3}$$

The equation clearly shows the relevance of variables "net income—x_{it}" and "equity (lag 1 year)—$bv_{i,t-1}$" as the main value drivers of the OM (Ohlson 1995: 670).[12] Because our main objective is to analyse the statistical relationships between the accounting and financial variables, like Francis and Schipper (1999: 327), we assume that the intrinsic value of securities and market value have the same structure.

Assuming MVE as a dependent variable, the model (Eq. 6.3) will be affected by large companies (*scale-effect*) (e.g. Easton and Sommer 2003). Accordingly, we apply the logarithmic transformation to the variable MVE, which can compress the range of the variation, making more uniform the variance of the error, thereby controlling more easily the effect of *outliers*. This procedure was also adopted by Berger et al. (1996), Francis and Schipper (1999) and Hand (2001), among others.[13] The transformed model now corresponds to a log-linear model.[14]

[11]Given the orthogonality of this variable, its omission from the model does not bias the estimation of the remaining coefficients of the model (Greene 2008).

[12]By including in the model the variable equity at the beginning of the year, we exclude the effect of net income variable, also an independent variable in the model.

[13]With this transformation, the distribution of the dependent variable is altered, but the new distribution indicates strong adherence to the normal distribution assumption of the ordinary least squares method (OLS) (Gujarati 2002).

[14]See Greene (2008) for an interpretation of the coefficients of this model.

Since the main objective is to analyse how the MVE varies over time, i.e. the life cycle, the main factors identified by the OM model ("net income" and "equity") as the main *value drivers* and in line with the methodology of Fama and MacBeth (1973), we estimate a regression for each year separately applying the ordinary least squares method (*OLS*). Thus, our inference will be based on the average of the parameters estimated for the period 1996–2003 (i.e. NEP).

Analytically, the model (Eq. 6.3) takes the following form:

$$\mathrm{MVE}_{it} = \alpha_0 + \sum_{j=1}^{H} \alpha_{j,t} F_{i,j,t} + e_{it} \quad \text{com } i = 1, 2 \ldots N \tag{6.4}$$

where H identifies the number of explanatory variables included in the model, N the number of listed companies in the sample, and $F_{i,j,t}$ represent the explanatory variable j for firm i at time t (1996–2003). The null hypothesis to test is:

$$H_0 = \frac{\sum_{t=1}^{T} \alpha_{jt}}{T} = 0 \quad \text{for } t = 1, 2, \ldots T$$

i.e. the average of the time series of the estimated parameters over time is zero.

The main advantages of this methodology according to Fama and French (1998) are as follows: (i) greater control of the survival effect (*survivor bias effect*), because it does not require companies to have a long lifetime; this effect is relevant in our samples (see Tables 5.3 and 5.4, when we analyse the "movements" of entries and exit in the market by these companies—net and non-net firms); (ii) because the regression is based on cross-section data, each year we can always include a higher number of observations compared to the time series; (iii) as it is possible to include a larger number of observations over the year, this increases the precision of estimated parameters; and (iv) making inferences based on the average value of the parameter(s) estimated reduces the effect of volatility recorded from year to year, which is particularly relevant in the present investigation, since the effect of the *dot.com bubble* affected the *Internet* sector from 1999 to 2000 (see Fig. 6.2).

Next we formulate the research hypotheses to be tested.

6.5 Research Hypotheses

Empirical research on losses is scarce, and the results obtained are so far contradictory. Traditionally the information content of losses for evaluation was very low, given their transitory nature. In this context, the shareholders could exercise the abandonment option which they hold on firms (Hayn 1995; Chambers 1997; Subramanyam and Wild 1996).

However, post 90s, an increase in the number of listed companies that report losses can be observed, including many *non-net firms* (Hayn 1995; Collins et al.

1997, 1999; McCallig 2004; Joos and Plesko 2005). Hayn (1995) had noted that those firms tend to be smaller and operate in high-tech sectors. As a result, these companies tend to favour investments in intangible assets, particularly in R&D and advertising *items* (Chan et al. 2001; McCallig 2004; Joos and Plesko 2005).

As modelled by the FOM model, high investments in intangible assets and the effect of *accounting conservatism* justify that companies, particularly technology-based ones and companies in the *start-up* phase register large losses because a significant portion of their investment is considered costs (FOM—Proposition 9). However, due to the magnitude and profile of the investments as in intangible assets, there are great expectations about future abnormal returns, which in turn sustain the high market capitalizations which these companies report. In this context arises the question about the adequacy of losses, or rather their persistence, as a *proxy* to pursue the abandonment option in this group of companies.

Thus, given:

(i) The effect of *conservatism accounting* modelled by Feltham and Ohlson (1995), which reflects the understatement of the variable "operating assets" given the accounting costs as investments in R&D and advertising, which are prevalent in technology-based companies in the *start-up* phase;
(ii) The definition of the variable "operating cash flows", and the understatement of the variable "operating assets—oa_t" that has to be compensated for by an overestimation of "abnormal future operating results—ox_t^a" (FOM): Hence, the variable "operating cash flows" remains unchanged, given the independence of any accounting policies[15];
(iii) The investment in R&D and advertising tends to predominate in the samples under study, which increases with sales and age (Tables 6.1 and 6.2); and
(iv) The fact that this investment strategy tends to be more aggressive in the group of companies that recorded losses, since for this group the ratio R&D/sales assumes higher values, which in our view is a clear sign of the confidence of managers in terms of future profitability (lower investment in such assets allows the company to decrease in the short-term the volume of losses),

we formulate the first research hypothesis:

Hypothesis 1: *For younger firms (net and non-net firms) losses are positively valued by the market*

With the formulation of the first hypothesis, and in line with the results of McCallig (2004) and Joos and Plesko (2005), we assume—outside the universe of *net firms*—the statistical significance of the phenomenon of positive valuation of losses of technology-based companies in the *start-up*/growth phase by the market (this criteria agrees with the companies under study).

[15]Remember that the operating cash flow variable is defined as: $\sum_{\tau=1}^{\infty} R_f^{-\tau} E_t(c_{t+\tau}) = oa_t + \sum_{\tau=1}^{\infty} R_f^{-\tau} E_t\left(ox_{t+\tau}^a\right)$ (se footnote 15).

To empirically test this hypothesis, we express the market value of the company (MVE) equity on the results before *extraordinary items.*[16] The model to be tested is defined as follows:

$$\mathrm{MVE}_{it} = \alpha_0 + \alpha_1 \left(\mathrm{Res\_IExt}\right)_{it} + \varepsilon_{it} \tag{6.5}$$

with $i = 1, 2 \ldots N$ and $t = 1996–2003$.

The phenomenon—*positive valuation of losses*—is a new phenomenon, and the results so far have achieved little consensus. Collins et al. (1999) argue that this phenomenon is due to an incorrect specification of the evaluation model. Thus, they criticize the valuation models based on the capitalization of results (*earnings model*) used by Hayn (1995). They empirically show the relevance of the inclusion of the variable BVE in the evaluation model, arguing that the negative coefficient obtained for the variable results, is due to the omission of the variable BVE of the evaluation OM and FOM models.

The theoretical explanation seems to be consensual on the relevance of the variable BVE for evaluation purposes, despite that arguments diverge sharply. For the theory of abandonment option, the relevance of this variable is inversely related to the financial "health" of the company. Its relevance is sustained as a *proxy* to the liquidation value. The abandonment option exercise by shareholders tends to occur in a context where the company records successive losses, and investors tend to immediately incorporate the highest probability of bankruptcy that those firms incur (Hayn 1995; Berger et al. 1996; Subramanyam and Wild 1996; Collins et al. 1997; Burgsthaler and Dichev 1997; Barth et al. 1998; Collins et al. 1999).

In turn, given the most recent investigations post 90s that document a larger number of small businesses operating in high-tech sectors which report losses of greater magnitude and for longer periods, the variable "net income—losses" has weak predictive power of future profitability. Thus, the principle of continuity suggests that losses are not sustainable indefinitely. According to the OM, the BVE variable measures the stock assets held by the company which is a *proxy* for future normal results. Given the definition of permanent results by Ohlson (1995), in the medium term it is expected that the company will generate a rate of return equal to the cost of capital. The losses are well supported in the *conservatism accounting* effect, given the investment profile that characterizes this type of company—investments in intangibles.

Hence, given the principle of continuity (note that the number of bankruptcies in the samples under study was lower than 5%), and assuming that the persistence of losses incurred by the companies of the samples under study is a reflection of the

[16]We claim again that, given the principle of continuity, it is not expected that the effect of the *extraordinary items* persists in the medium and long term.

effect of *accounting conservatism* (based on the values assigned to the variables R&D and R&D/sales), the variable results is somewhat related to future profitability. Based on the OM, we identify the variable BVE as *proxy* for the normal expected future results in the medium and long term. Thus, we formulate the second hypothesis that held for both samples:

Hypothesis 2: *The equity (BVE) is positively related to MVE*

The model to estimate is the Eq. (6.6):

$$\mathrm{MVE}_{it} = \alpha_0 + \alpha_1 \left(\mathrm{BVE}\right)_{i,t-1} + \alpha_2 \left(\mathrm{Res\_IExt}\right)_{it} + \varepsilon_{it} \tag{6.6}$$

with $i = 1, 2 \ldots N$ and $t = 1996–2003$.

Since we include in the sample companies with negative BVE, we do not anticipate a priori the impact of these observations on the coefficients to be estimated (i.e. the variables results or BVE). As modelled by Feltham and Ohlson (1995), the financial statements do not recognize the net present value (NPV) associated with intangible assets, thus, the *unrecorded goodwill* which is a results of the differential between the market value and book value of equity, tends to be very high (and persistent) in technology-based companies, as a consequence of a dual effect:

(i) the understatement of assets as a result of the investment in intangible assets being treatment as costs and;
(ii) the fact that the market, particularly given the emerging nature of the Internet sector, assumes a higher probability of the existence of future growth options and, thus, has higher expectations for abnormal returns.[17]

Thus, the implementation of these investments can be interpreted as the exercise of an option (*call option*) by the company in order to undertake growth opportunities held in their portfolio.[18] Assuming the principle of rationality, the exercise (following) of the purchase options are a clear signal to the market that managers only exercise the options if the options are *in-the-money*.

[17]We recall that Eq. 2.23 analytically defines *unrecorded goodwill* as: $P_t - bv_t = g_t = \alpha_1 ox_t^a + \alpha_2 oa_t + \beta \cdot v_t$. Thus, the underestimation effect is captured by the parameter α_2 (oa_t—operating assets). The impact of the existence of a greater or lesser number of growth opportunities in the portfolio is reflected in the parameter α_1, which measures expectations about abnormal profitability, and β, which reflects all information other than financial that is coming to market, and which is useful to investors in formulating their expectations about the growth of this sector (companies), which is immediately reflected in stock prices, but only subsequently reported in the financial statements.

[18]We emphasize once again, and with reference to the investment model of general equilibrium (e.g., Hugonnier et al. 2005), that the option of deferral of certain investments (e.g., investment in information technologies) can "destroy" the value of these investments, even considering a scenario of moderate risk aversion.

Based on this framework, and given the empirical results of Chauvin and Hirschey (1993), Connolly and Hirschey (1984) and Hirschey (1982) for the 80s, Joos and Plesko (2005) have analysed one sample of *net firms* throughout the 90s and show that the market seems to positively value the investment in this type of *item* in clear anticipation of the net present value (NPV) by disaggregating the variable "results" into its constituents. With this breakdown we aim first to examine whether or not the effect "positive valuation of the losses" is the result of *conservatism accounting*, and thus the adequacy of the variables R&D and advertising as *proxies* for growth opportunities for these companies. Thus, given the stage of the life cycle of the companies, whose *proxy* is the variable "results", and in line with the *investment opportunity hypothesis* (Szewczyk et al. 1996) and the assessment by the market, of the asymmetrical relationship of the *items* R&D and advertising, the company makes a profit or loss; so for profitable companies, already in a stage of maturity or steady growth, the market interprets that the "profits" reflects the present value (PV) of past investments, consequently the indirect effect associated with this type of investment dominates (Sougiannis 1994). For companies reporting losses in the *start-up* phase, losses are associated with (successive) investments in R&D and advertising (*conservatism accounting*). Investment in these *items* aims to increase the potential provided by the *network-effect* space [*World Wide Web*—(www)], which is creating new growth opportunities on a global scale, in order to obtain increasing returns, as modelled by Noe and Parker (2005).

In this context, we formulated the third hypothesis:

Hypothesis 3a: *There is a positive relationship between the variables R&D and advertising and the market value of firms in the start-up phase when firms report losses (net and non-net firms)*

Hypothesis 3b: *There is a negative relationship between the variables R&D and advertising and the market value of firms in stable growth/maturity (net and non-net firms)*

To test these hypotheses, the study empirically adjusted the variable results before extraordinary *items* to the values recorded by the variables R&D and advertising. Hence the Eq. (6.6) is defined:

$$\mathrm{MVE}_{it} = \alpha_0 + \alpha_1 \left(\mathrm{BVE}\right)_{i,t-1} + \alpha_2 \left(\mathrm{Res\_I\&D}\right)_{it} + \alpha_3 \left(\mathrm{R\&D}\right)_{it} + \varepsilon_{it} \text{ and} \tag{6.7}$$

$$\mathrm{MVE}_{it} = \alpha_0 + \alpha_1 \left(\mathrm{BVE}\right)_{i,t-1} + \alpha_2 \left(\mathrm{Res\_Adv}\right)_{it} + \alpha_3 \left(\mathrm{Adv}\right)_{it} + \varepsilon_{it} \tag{6.8}$$

where the variables "Res_I&D" and "Res_Adv" measure the value of the variable results prior to the investment in R&D and advertising, respectively, and the index i identifies the number of firms in the sample under analysis ($i = 1, 2 \ldots N$) and t the period under study (1996–2003).

Since our aim is to analyse the relationship between market capitalization and losses incurred by the companies, and assuming that these are a result of large investments in intangible assets (*conservatism accounting*), our choice was to adjust the results to the amounts invested by year in those variables (i.e. R&D and advertising).

In this context, we exclude the possibility of including in the analysis lagged values for these variables because: (i) companies in the maturity/stable growth NPV of the investments made in the past are already reflected in the variable results (the indirect effect dominates—Sougiannis 1994); (ii) in younger companies that register losses, the current investment in these variables acts as a *proxy* for growth opportunities held in their portfolio; (iii) given this type of investment is considered in full expenses in the period they occur, they are not subject to any impairment tests (comparison between the cost of acquisition/production value and the market value); and (iv) any additional information is not provided to investors in the following years. Therefore, we argue that it is based on the current values of these variables (i.e. R&D and advertising) that investors formulate their expectations about the magnitude of future cash flows and the level of risk that are associated with them.

Furthermore, given the principle of continuity (*going concern*), losses are not sustainable indefinitely. At any given moment in time, it is expected that companies manage to have earnings. Based on this reasoning, and given the period under analysis (NEP) which now involves 8 years, the fourth hypothesis states:

Hypothesis 4: *The market evaluates differently the determinants of firm value as the sector/companies moving towards maturity*

We emphasize the appropriateness of the methodology of Fama and MacBeth (1973) to test these hypotheses, since it allows the null hypothesis that the mean of the time series of the estimated coefficients over time is zero.

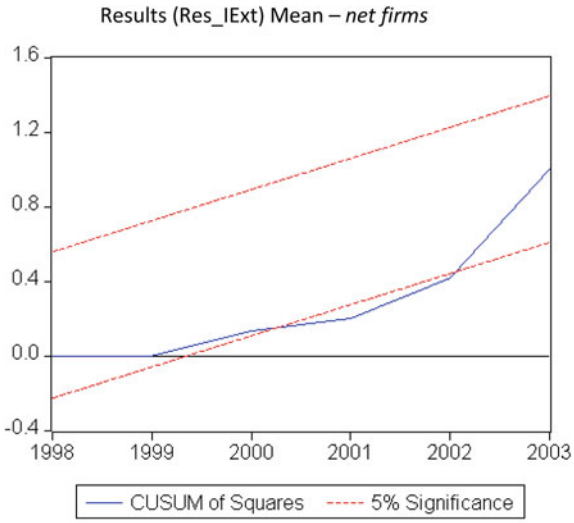
Finally, and in order to contrast the results between the two samples analysed, *net firms* and *non-net firms*, the fifth hypothesis is:

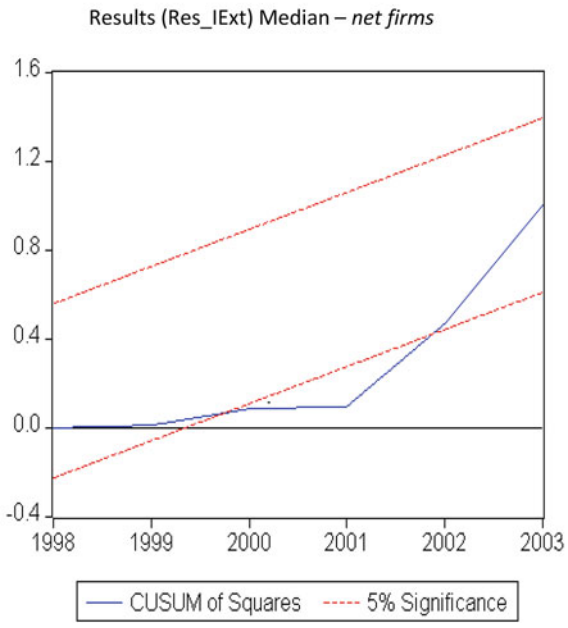
Hypothesis 5: *The variations in the market value of the net and non-net equity firms are explained by the same determinants: "results", "BVE", "R&D" and "advertising"*

This hypothesis is particularly relevant because it allows us to test the extent of the fashion (*fad*) effect documented by Lee (2001), Cooper et al. (2001) and Ofek and Richardson (2003) which shows a greater expression of the phenomenon *positive valuation of the losses* in the Internet sector.

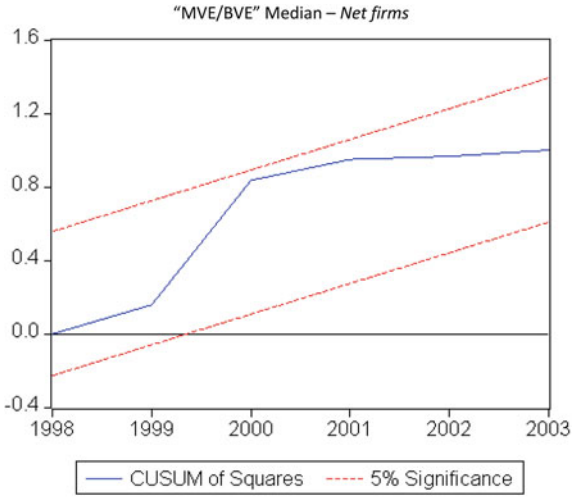
In the next chapter, we conduct the empirical analysis and discuss the results.

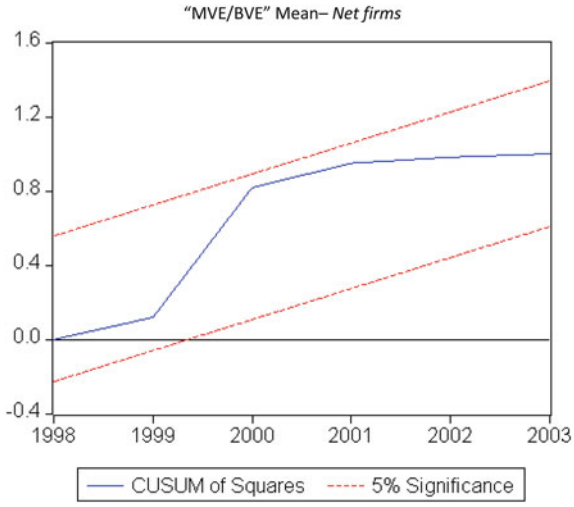
Appendix 6.1: The CUSUM Test for the Variable "Results Res_IExt"—*Net Firms*



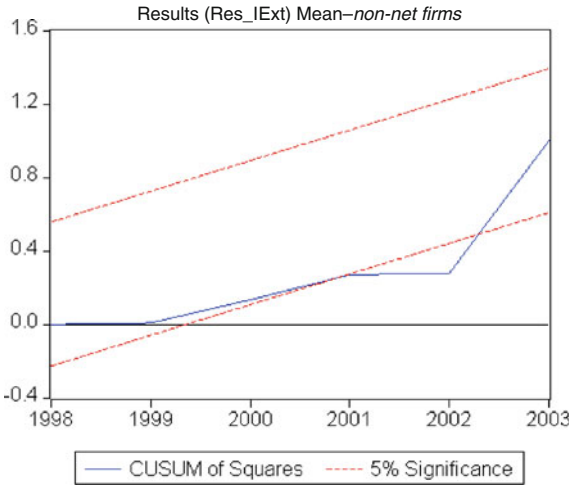


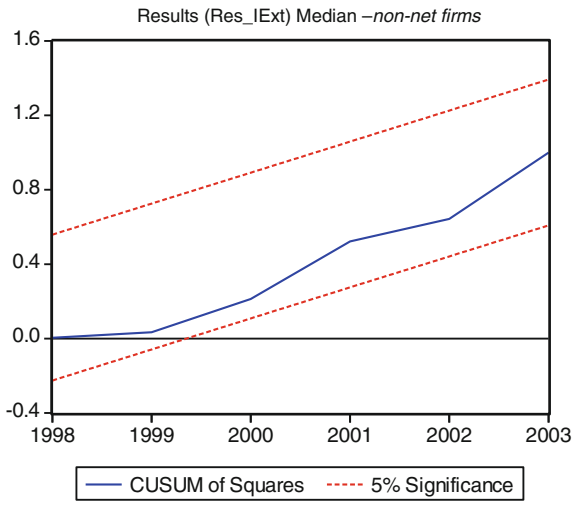
Appendix 6.2: The CUSUM Test for the Variable "MVE/BVE"—*Net Firms*



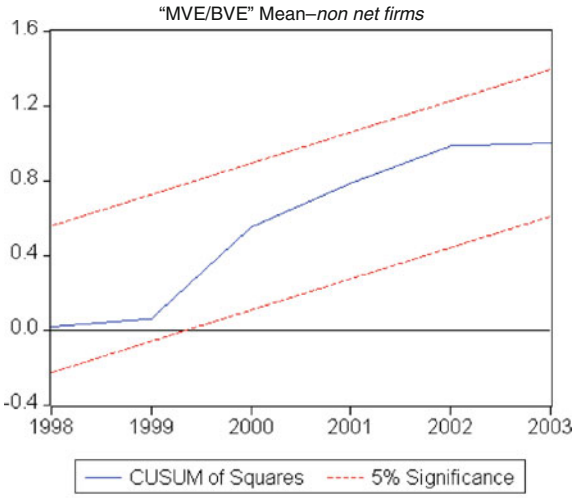


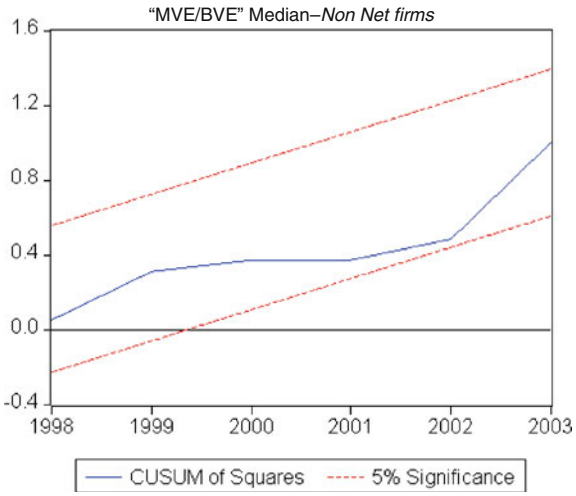
Appendix 6.3: The CUSUM Test for the Variable "Results Res_IExt"—*Non-net Firms*





Appendix 6.4: The CUSUM Test for the Variable "MVE/BVE"—*Net Firms*





Appendix 6.5: Percentage of Firms with R&D Expenses Greater than Sales

Sample	1996	1997	1998	1999	2000	2001	2002	2003
Non-net firms:	62	82	92	174	250	262	229	190
No. Firms: R&D/SALES > 1	9	14	14	25	54	53	47	34
% Firms: R&D/SALES > 1	14.52%	17.07%	15.22%	33.78%	21.60%	20.23%	20.52%	17.89%
Net firms:	37	66	107	350	453	392	313	206
No. Firms: R&D/SALES > 1	6	10	10	26	32	27	20	13
% Firms: *R&D/SALES* > 1	16.22%	15.15%	9.35%	7.43%	7.06%	6.89%	6.39%	6.31%

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Chapter 7
Analysis and Discussion of Results

Abstract Given the magnitude and persistence of losses reported by the companies under study, this chapter aims to test empirically the phenomenon of "positive valuation of the losses" based on the theoretical framework of the OM and FOM models. The objective is to understand how investors assess this type of company, given the persistence and the continuous reporting of losses. So, after some considerations on the econometric procedures, we analyze the results obtained with reference to each of the research hypotheses formulated.

Keywords Persistence of losses · Positive valuation of losses · Ohlson and Feltham and Ohlson models · Empirical results

7.1 Discussion and Analysis of Results

7.1.1 Econometric Aspects

We begin by estimating the Eq. 6.5 for both samples and for the two subgroups of companies: companies with profits and companies with losses. Table 7.1 presents the results of regressions year by year for the *net firms*, with the aim of estimating the aggregate coefficients according to the methodology of Fama and MacBeth (1973). Because the estimated coefficients could be correlated over time, we used the Ljung-Box statistic tests.[1] If the estimated coefficients show a positive auto-

[1]The Box-Ljung statistic is defined as: $LB = n(n+2)\sum_{k=1}^{m}\left(\hat{\rho}_k^2/n-k\right) \sim \chi_m^2$, where m is the number of degrees of freedom, k is the number of autocorrelation coefficients to calculate, and n the number of observations (Ljung and Box 1978).

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correlation, and as suggested by Core et al. (2003), the t-statistic was calculated by adjusting the standard deviation by the method of Newey and West (1987) assuming six lags.[2]

With respect to the annual regressions estimations: (i) whenever we detected the heteroscedasticity, this effect was corrected using the White (1980) test; (ii) with respect to multicollinearity, we apply the variance inflation factor (VIF) and the values are less than ten; (iii) the Durbin–Watson statistic (DW) shows the absence of autocorrelation; and (iv) with regards to the assumption of normality, whenever the Jarque–Bera test (JB) was rejected, the Kolmogorov–Smirnov (KS) is applied.[3] Next we present and discuss the results:

7.1.2 Validation of Empirical Research Hypotheses

7.1.2.1 Validation of Research Hypothesis 1

Regarding the first hypothesis the results are reported in Table 7.1.

The results reported in Table 7.1 show that the coefficient of the variable results (Res_IExt: earnings before extraordinary *items*—annual *item* Compustat 237) in the sample of *net firms* with losses is negative and statistically significant at a 5% level. Because this subsample registers consecutive losses, the market seems to positively value the losses incurred. Notice that the number of companies with losses over time is persistent (and the most significant subgroup). Thus, the first hypothesis is accepted.

When comparing the results obtained with the sample of *non-net firms* (Table 7.2), the variable earnings before extraordinary *items* (annual *item* Compustat 237) report a negative value as expected, however with a lower statistical significance. The empirical validation of the phenomenon "positive valuation of losses" is not consensual, even in the universe of *net firms*. For example, Trueman et al. (2000), Martinez and Clement (2002), Hand (2003) and Tockic (2005) empirically support this phenomenon throughout the period studied [these authors cover all the period of the *crash* except Trueman et al. (2000)]. Hand (2001), using a sample split according to the variable *web traffic*, only documents this phenomenon in the pre-*crash* period like Kozberg (2009) and Demers and Lev (2001). In the post-*crash* the variable reverses in sign. However, out of the universe of *net firms*, very few studies on this topic report this phenomenon. One example is

[2]Similar to the White (1980) test, which does not need prior knowledge about the pattern of heteroscedasticity, the Newey and West (1987) method is robust in the presence of autocorrelation. If the residuals are not autocorrelated, the adjustment of standard deviations by the Newey and West (1987) method is similar to the method of ordinary least squares. According to Greene (2000), we estimate the standard deviations assuming six *lags o*n the assumption that residuals are not correlated over six periods.

[3]For detail information about the tests: DW, JB and KS, see Gujarati (2002).

Table 7.1 Annual regressions for the sample of *net firms* (model 6.5)

		Sample with profits			Sample with losses			
	#N[a]	α_0^b	Res_IExt[b]	R^2 Adj. (%)	# N[a]	α_0^b	Res_IExt[b]	R^2 Adj. (%)
1996	34 (2)	5.05*** (28:20)	0.05*** (5.215)	44.26	37 (0)	4.08*** (17.195)	−0.026*** (−3.838)	16.23
1997	49 (1)	5.06*** (30.462)	0.037*** (5.781)	40.31	66 (0)	3.94*** (16.762)	−0.022*** (−2.978)	19.85
1998	47 (1)	4.84*** (21.714)	0.047*** (4.268)	27.24	107 (4)	4.67*** (25.452)	−0.014*** (−4.351)	14.47
1999	80 (5)	6.44*** (31.475)	0.02*** (3.532)	12.68	350 (16)	6.19*** (59.44)	−0.005 (−4.227)	6.94
2000	74 (2)	5.08*** (25.246)	0.022*** (4.859)	20.83	453 (3)	4.42*** (45.728)	−0.002*** (−4.065)	9.81
2001	36 (1)	5.40*** (21.72)	0.027*** (4.264)	32.93	392 (10)	4.15*** (39.645)	−0.001*** (−5.484)	8.20
2002	54 (5)	4.61*** (18.276)	0.03*** (5.468)	35.29	313 (12)	3.69** (34.438)	−0.002*** (−3.318)	8.42
2003	101 (5)	5.50*** (37.112)	0.017*** (7.647)	36.50	206 (15)	4.07*** (30.818)	−0.007*** (−5.43)	12.20
Mean[c]		5.25***	0.031***	31.25		4.402***	−0.01**	12.02
T-Statistics[d]		26.545	7.087			15.93	−2859	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1\ (Res\_IExt)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company and Res_Ext the results before extraordinary *items*

[a]Number of observations with negative BVE for the variable value in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the estimated coefficients average, including the constant

[d]The t-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 8½ (***) and (**) indicate significance of 1 and 5% level, respectively

the study by Collins et al. (1997) for the period 1953–1993; Collins et al. (1999) and Frazen and Radhakrishnan (2009) obtained a R^2 of 9 and 6% respectively, very similar to values reported by us for the sample of *net firms* (12.02%) and *non-net firms* (10.30%). Core et al. (2003) also noted this phenomenon in the two samples: high-technology companies and *start-up* companies.

These results and the *cluster* effect that characterized the IPOs in both samples support the first hypothesis, i.e. younger firms, particularly technology-based ones, with negative results are positively valued by the market. Thus, the market appears to associate losses with the high investments in intangible assets, hence the effect of *conservatism accounting* is compensated for by an overestimation of expected abnormal results.

The lower statistical significance for the sample of *non-net firms* can be explained by the fact that in spite of the number of companies with losses persisting over time, the difference between the number of firms reporting profits and losses is not so marked as in the sample of *net firms*, as can be seen in Fig. 7.1. Moreover, when comparing the magnitude of losses reported by the two samples, the values

Table 7.2 Annual regressions for the sample of *non-net firms* (model 6.5)

Year	Sample with profits				Sample with losses			
	# N[a]	α_0^b	Res_IExt[b]	R^2 Adj. (%)	# N[a]	α_0^b	Res_IExt[2]	R^2 Adj. (%)
1996	81 (2)	4.23^{***} (32.02)	0.07^{**} (7.065)	40.20	62 (3)	3.46^{***} (17.761)	-0.078^{***} (−4.844)	26.90
1997	109 (5)	4.62^{***} (37.216)	0.033^{***} (3.107)	26.37	82 (2)	3.72^{***} (17.725)	−0015 (−1.647)	5.30
1998	120 (0)	4.43^{***} (42.447)	0.034^{***} (9.499)	42.85	92 (1)	3.84^{***} (22.658)	−0.005 (−1301)	1.00
1999	182 (5)	4.52^{***} (35.439)	0.051^{***} (5.772)	25.34	174 (9)	4.74^{***} (25.706)	-0.012^{**} (−2124)	9.00
2000	195 (6)	4.18^{***} (31.46)	0.058^{***} (8.699)	38.14	250 (6)	4.52^{***} (32.028)	-0.003^{**} (−2.029)	4.20
2001	140 (4)	4.52^{***} (34.919)	0.060^{***} (10.152)	47.79	262 (10)	4.28^{***} (37.117)	-0.004^{***} (−5975)	11.74
2002	145 (3)	4.44^{***} (34.68)	0.036^{***} (5.691)	40.12	229 (10)	3.83^{***} (29.525)	-0.002^{**} (−2.201)	5.70
2003	146 (4)	5.09^{***} (39.077)	0.023^{***} (5.700)	36.52	190 (12)	4.34^{***} (31.365)	-0.011^{***} (−5.122)	18.54
Mean[c]		4.505^{***}	0.0456^{***}	37.17		4.09^{***}	−0.016	10.30
T-Statistics t[d]		45.437	7.87			25.995	−1.832	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (Res\_IExt)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company and Res_Ext the results before extraordinary ∼ *items*

[a]Number of observations with negative BVE for the variable value in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the estimated coefficients average, including the constant

[d]The t-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 8½

(***) and (**) indicate significance 1 and 5% level, respectively

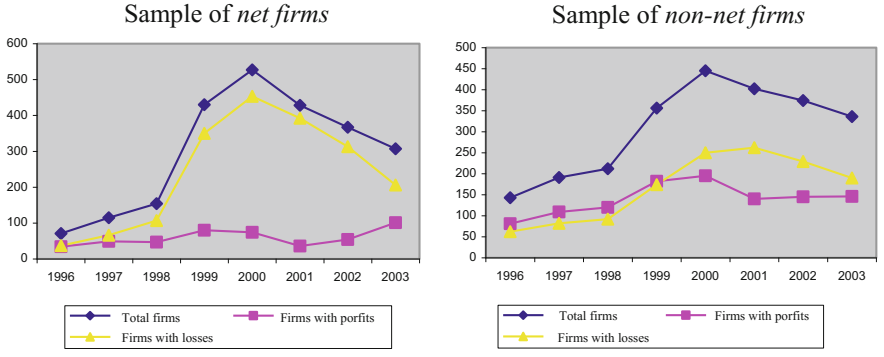

Fig. 7.1 **a**, **b** Evolution of the number of firms per sample depending on the reported value of the variable results

are substantially lower. In the sample of *net firms* the values of the mean and median value for this variable are, respectively, 96.9 and 24.29 million dollars (panel data) (Table 6.3). In the sample of *non-net firms* (Table 6.4), the losses amounted to 44.18 and 14.67 million dollars for the mean and median, respectively (panel data). These figures allow us to associate a fashionable effect (*fad*) (e.g., Bartov et al. 2002) that is more pronounced in the sample of *net firms*, which Jorion and Talmor (2006) justified due the high growth opportunities associated with *net firms*, given the emerging nature of this sector.

We recall that when we use the variable results before extraordinary *items*, we are violating the CSR assumption of the OM, which relies on the overall net income of the company—*comprehensive income*.[4] However, similarly to Dechow et al. (1999) and Collins et al. (1999), the effect of extraordinary *items* is a short-term one. Indeed, if we estimate the model 6.5 using the net income variable (annual *item* Compustat 172), the results do not change.[5]

Regarding the group with profits in both samples, and as expected, the explanatory power of the model is higher (i.e. adjusted R^2) compared to the group with losses (31.25 vs. 12.02% in the sample of *net firms* and 37.17% against 10.30% in the sample of *non-net firms*). These results confirm that the explanatory power of positive results is enhanced by their persistence (Miller and Modigliani 1961). As argued by Basu (1997), the effect of *conservatism accounting*, and given the principle of prudence, generates an asymmetric effect of evaluation because losses (*bad news*) tend to be recognized immediately in the period in which they occur, thus future results are protected from bad news. As for profits, these tend to be more persistent and lasting over time, since they are recognized only when they are effective and measured objectively.

7.1.2.2 Validation of Research Hypothesis 2

The phenomenon "positive valuation of the losses" is a new one, highly prevalent in the 1990s. Some authors argue that the results obtained so far are controversial and not robust resulting from an incorrect specification of the evaluation model. Collins et al. (1999) argue that this phenomenon is the result of omitted variables,

[4]According to the FASB (*Financial Accounting Standard Board*), *comprehensive income* is defined as: "*... The change in equity (net assets) from operations ... and other events and circumstances from non-owner sources. It includes all changes in equity except during the period those resulting from investments by owners and distributions to owners*" (para 70).

[5]For the sample of *net firms*, R^2 stands at 11.89%, and the estimated coefficient for the variable results (−0.0099) is statistically significant at 5% level in the group with losses. In the group with profits, the R^2 amounts to 27.68% and the estimated coefficient (0.028), revealing significance at 1% level. Similar results are recorded in the sample of *non-net firms*: R^2 reported a value of 9.48% in the group with losses, and the estimated coefficient (−0.015) is not statistically significant. In the group with profits, R^2 achieves a mean of 33.95%, with an estimated coefficient (0.0428) significant at a 1% level.

Table 7.3 Correlation matrix—sample of *net firms*

Panel A: Companies with losses (n = 1.924)						
	MVE	BVE	RL	Res_IExt	R&D	Adv
MVE	1	0.588**	−0.300**	−0.311**	0.327**	0.111**
BVE	0.404**	1	−0.717**	−0.699**	0.385**	0.190**
NI	−0.150**	−0.666**	1	0.976**	0.323**	−0.232**
Res_IExt	−0.155**	−0.675**	0.990**	1	−0.320**	−0.236**
R&D	0.262**	0.381**	−0.379**	−0.389**	1	0.132**
Adv	0.133**	0.152**	−0.19**	−0.192**	0.084**	1
Panel B: Companies with profits (n = 475)						
	MVE	BVE	RL	Res_IExt	R&D	Adv
MVE	1	0.676**	0.627**	0.650**	0.407**	0.241**
BVE	0.482**	1	0.539**	0.585**	0.377**	0.193**
NI	0.380**	0.622**	1	0.967**	0.216**	0.174**
Res_IExt	0.395**	0.715**	0.936**	1	0.217**	0.181**
R&D	0.456**	0.537**	0.466**	0.490**	1	0.282**
Adv	0.507**	0.737**	0.590**	0.642**	0.526**	1

**Correlation is significant at the 5% level. Numbers below the diagonal represent Pearson correlations. Spearman's correlations appear above the diagonal [For a definition of the coefficients of variation of Pearson and Spearman's correlations, see Gujarati (2002)]. The correlation matrix was calculated according to a panel data structure. MVE corresponds to the market value of equity, BVE is the book value of equity, NI and RL Res_IExt corresponds to the amount of net income and earnings before extraordinary *items.* R&D and Adv report the amount invested in research and development and advertising, respectively

explicitly referring to the omission of the BVE variable from the model 6.5. The argument is sustained by the fact that the BVE variable is positively correlated with MVE (dependent variable) and negatively (positive) with the results (independent variable). Therefore omitting this variable from the evaluation model induces a negative (positive) bias to the estimated coefficients for the variable results.[6]

Thus, in order to validate empirically the arguments of Collins et al. (1999), we examine the correlation matrix for each sample and its subgroups. The results are reported in Tables 7.3 and 7.4 and confirm the results predicted by Collins et al. (1999).

For the group with profits (*net* and *non-net firms*) the correlation between the BVE and all the other variables is positive and statistically significant at a 5% level. For the subsample with losses, the correlation of BVE with the variable results (Res_IExt) changes the sign, i.e. becomes negative, keeping a statistical

[6]Considering the OM (model 6.3), omitting for simplicity the index referring to the company (i) $\text{MVE}_t = \alpha + \alpha_1(\text{Res\_IExt})_t + \alpha_2(\text{BVE})_{t-1} + \varepsilon_t E(\alpha_1) = \alpha_1 \left[\frac{\text{cov}(\text{Res\_IExt,BVE})}{\text{var}(\text{Res\_IExt})}\right] * \alpha_2$. Then, the coefficient α_1 depends on the covariance between the variable "results—Res_IExt" and the variable "BVE" and the coefficient α_2, which measures the relationship between the dependent variable (MVE) and the independent variable BVE (Greene 2000).

Table 7.4 Correlation matrix—sample of *non-net firms*

Panel A: Companies with losses (n = 1.341)						
	MVE	BVE	RL	Res_IExt	R&D	Adv
MVE	1	0.714**	−0.445**	−0.473**	0.443**	−0.09**
BVE	0.495**	1	−0.665**	−0.651**	0.381**	−0.065**
NI	−0.183**	−0.633**	1	0.962**	−0.347**	−0.015
Res_IExt	−0.198**	−0.628**	0.965**	1	−0.350**	−0.021
R&D	0.188**	0.390**	−0.184**	−0.183**	1	−0.0133**
Adv	0.098**	0.124**	−0.384**	−0.385**	−0.039	1
Panel B: Companies with profits (n = 1.118)						
	MVE	BVE	RL	Res_Ext	R&D	Adv
MVE	1	0.732**	0.693**	0.700**	0.345**	0.031
BVE	0.515**	1	0.609**	0.632**	0.193**	0.051
NI	0.626**	0.508**	1	0.972**	0.102**	0.073**
Res_IExt	0.678**	0.599**	0.892**	1	0.095**	0.072**
R&D	0.629**	0.519**	0.553**	0.599**	1	0.011
Adv	0.003	0.019	0.022	0.023	−0.007	1

**Correlation is significant at 5% level. Numbers below the diagonal represent Pearson correlations. Spearman's correlations appear above the diagonal [For a definition of the coefficients of variation of Pearson and Spearman's correlations, see Gujarati (2002)]. The correlation matrix was calculated according a panel data structure. MVE corresponds to the market value of equity, BVE is the book value of equity, NI and Res_IExt corresponds to the amount of net income and earnings before Extraordinary *items,* R&D and Adv report the amount invested in research and development and advertising, respectively

significance of a 5% level. Given these results, the next step was to introduce the variable BVE into the valuation model (model 6.3).

Tables 7.5 and 7.6 show the results for both samples and both groups.

Focusing the analysis on the group with losses, with the introduction of the variable BVE in the evaluation model, the effect of positive valuation of losses disappears in the sample of net firms. These results are partially consistent with the results of Collins et al. (1999), for whom the phenomenon of valuation of losses is the result of an incorrect specification of the evaluation model, referring specifically to the capitalization results model. This conclusion is even stronger when we analyze the results for the sample of *non-net firms*. Figure 7.2 shows how the omission of the variable BVE induces a negative (positive) bias on the estimated coefficient for the variable results when it records losses (profits).

The inclusion of the variable BVE increases the explanatory power for both groups. For the sample of *net firms* the increase in the adjusted R^2 is 14.63% (the increase is 12.02–26.65%) compared to 21.59% in sample of *non-net firms* (R^2 goes from 10.30 to 31.89%), which indicates that this variable has an incremental explanatory power for firms with losses, in addition to the variable results.

Thus, given the increase in the explanatory power of the evaluation model after inclusion of the variable BVE in the group with losses, and that: (i) in both samples

Table 7.5 Annual regressions for the sample of *net firms* (model 6.3)

Year	Sample with profits					Sample with losses				
	# N[a]	α_0^b	BVE[b]	Res_IExt[b]	Adj. R^2 (%)	# N[a]	α_0^b	BVE[b]	Res_IExt[b]	Adj. R^2 (%)
1996	34 (2)	5.03*** (27.07)	0.0005 (0.426)	0.049*** (4.682)	42.79	37 (0)	3.45*** (13.589)	0.022*** (3.664)	−0.007 (−0.471)	46.53
1997	49 (1)	4.89*** (28.278)	0.003** (2.424)	0.032*** (4.96)	45.92	66 (0)	3.79*** (16.799)	0.006* (1.856)	−0.012*** (−3.194)	28.63
1998	47 (1)	4.59*** (20.551)	0.008*** (2.898)	0.012 (0.781)	37.51	107 (4)	4.33*** (24.347)	0.006*** (5.093)	−0.008** (−2.533)	30.88
1999	80 (5)	6.17*** (28.276)	0.0028** (2.412)	0.001** (2.062)	28.74	350 (16)	6.12*** (62.868)	0.001*** (4.597)	−0.004*** (−3.813)	12.03
2000	74 (2)	4.79*** (19.526)	0.002*** (4.612)	0.013*** (2.928)	35.77	453 (3)	4.38*** (46.144)	0.001*** (3.072)	−0.0002 (−0.59)	16.80
2001	36 (1)	5.23*** (21.683)	0.002*** (2.534)	0.016*** (2.237)	42.15	392 (10)	3.92*** (35.277)	0.002*** (3.937)	0.001** (1.98)	23.82
2002	54 (5)	4.64*** (16.392)	0.001** (2.221)	0.016* (1.959)	36.51	313 (12)	3.47*** (27.47)	0.003*** (3.549)	0.003** (2.423)	24.91
2003	101 (5)	5.50*** (34.726)	0.0004 (0.639)	0.014** (2.195)	36.74	206 (15)	3.94*** (30.24)	0.004*** (7.214)	0.002 (1.176)	29.54
Mean[c]		5.11***	0.0024**	0.02***	38.27		4.174***	0.005**	−0.003	26.65
T-Statistics[d]		27.364	2.897	4.271			13.795	2.21	−1.598	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_IExt)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity and Res_IExt the results before extraordinary *items*

[a]Number of observations with negative BVE for the variable value in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the average of the estimated coefficients, including the constant

[d]The t-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 8½

(***), (**) and (*) indicate significance level of 1, 5 and 10%, respectively

Table 7.6 Annual regressions for the sample of *non-net firms* (model 6.3)

Year	Sample with profits					Sample with losses				
	# N[a]	α_0[b]	BVE[b]	Res_IExt[b]	Adj. R^2 (%)	# N[a]	α_0[b]	BVE[b]	Res_IExt[b]	Adj. R^2 (%)
1996	81 (2)	3.94*** (34.521)	0.011*** (5.381)	0.0354*** (3.412)	55.83	62 (3)	3.23*** (19.331)	0.014*** (5.328)	−0.008 (−0.422)	49.82
1997	109 (5)	4.19*** (37.474)	0.011*** (6.706)	0.003 (0.455)	47.80	82 (2)	3.30*** (13.147)	0.016*** (3.271)	0.012 (1.45)	35
1998	120 (0)	4.17*** (34.661)	0.006*** (3.058)	0.018*** (3.058)	50.28	92 (1)	2.87*** (16.749)	0.023*** (8.422)	0.014*** (3.586)	44.15
1999	182 (5)	4.39*** (32.935)	0.003*** (3.179)	0.04*** (4.185)	29.06	174 (9)	4.51*** (25.981)	0.003*** (2.592)	−0.008** (−2.212)	22.18
2000	195 (6)	3.95*** (28.511)	0.005*** (3.615)	0.039*** (4.794)	44.07	250 (6)	4.22*** (28.183)	0.002*** (5.09)	−0.0001 (−0.094)	20.46
2001	140 (4)	4.35*** (36.488)	0.003*** (4.199)	0.046*** (11.236)	54.20	262 (10)	4.08*** (34.220)	0.003*** (6.199)	0.020** (2.464)	28.54
2002	145 (3)	4.25*** (33.963)	0.003*** (3.339)	0.025*** (4.034)	48.89	229 (10)	3.52*** (29.332)	0.003*** (6.062)	0.002*** (2.85)	25.74
2003	146 (4)	4.94*** (36.664)	0.002*** (4.827)	0.016*** (3.532)	44.21	190 (12)	4.12*** (31.341)	0.002*** (5.059)	−0.005*** (−2.65)	29.22
Mean[c]		4.274***	0.005***	0.028***	46.79		3.74***	0.008**	0.003	31.89
T-statistics[d]		38.181	4.117	5.235			17.993	2.841	0.867	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_IExt)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity and Res_IExt the results before extraordinary *items*

[a]Number of observations with negative BVE for the variable value in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the average of the estimated coefficients, including the constant

[d]The t-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 8½

(***), (**) and (*) indicate significance of a 1, 5 and 10% level, respectively

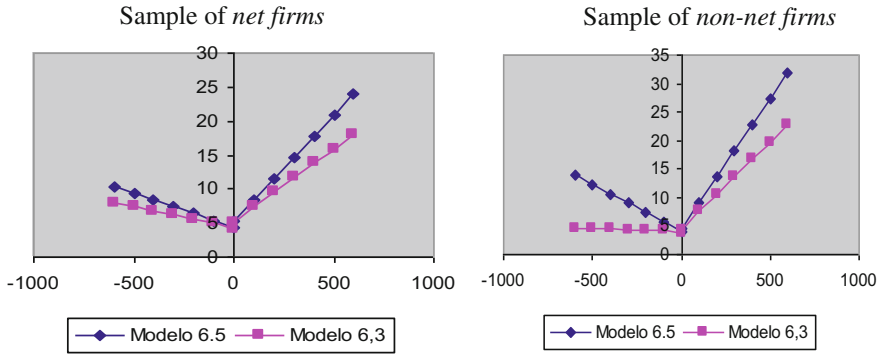

Fig. 7.2 Relationship between the estimated coefficients after controlling for BVE variable (model 6.3) and without the control for BVE variable (model 6.5)

the group reporting losses has more companies (Tables 5.3 and 5.4); (ii) the number of bankruptcies recorded in the samples under study is lower (Tables 5.3 and 5.4); and (iii) the investment profile of this group of companies is characterized by investment in intangible assets compared to the group with profits (Tables 6.3 and 6.4),we argue that the variable BVE and, in light of the OM, is a *proxy* of future normal results for the companies reporting losses in those companies—*net* and *non-net firms*.

Moreover, given the profile of the samples under study, high-technology companies (Table 5.6), i.e. those where intangible assets are considered as immediate costs, consequently, have no value when considered alone, especially in a situation of poor financial performance (e.g. when the company report losses) and due the absence of organized markets for their assets (except for trademarks and patents); in this context, the variable BVE is also a *proxy* for recognized assets. Thus, this proves to be a valuable variable for reducing the costs of monitoring/control by creditors (Jensen and Meckling 1976). With these results and according to the theory of the abandonment option, which associates a higher probability of bankruptcy with persistent losses, the market is recognizing the variable BVE as a good proxy to the liquidation value of the firms.

With reference to the profit group (in both samples), the results are as expected. The profits continue to be the main determinant of value for these companies, as supported by Miller and Modigliani (1961). The additional explanatory power after including the variable the BVE in model 6.5 is substantially lower compared to the group with losses (in the sample of *net firms* the increase was 7.02%, compared to 9.62% in the sample of *non-net firms)*. As for the variable BVE, this also has a positive and statistically significant coefficient. Consistently positive results, and according to the CSR principle, reinforce the value of the *stock* of assets held by the company, increasing its future ability to generate positive results. Based on the above results, we support the second hypothesis: the BVE is positively related with MVE (for both *net* and *non-net firms*), and according to the OM is a *proxy* for the company's future results.

7.1.2.3 Validation of Research Hypothesis 3

Given the results for the first hypothesis, the market seems to positively value the losses reported either by *net firms* or *non-net firms* by linking them to the impact of investments in intangible assets (*conservatism accounting*). For this type of company, the difference between the market value and book value of equity (*unrecorded goodwill*—Tables 6.3 and 6.4) is very high. In this context, contrary to the theory of the abandonment option, the losses are not a *proxy* for the highest probability of bankruptcy which those companies incur. As modelled by Feltham and Ohlson (1995), the *unrecorded goodwill* is due to the fact that the financial statements, and in accordance with GAAP, do not recognize the value of the cash flows associated with investment projects of R&D and advertising which are typical in technology-based companies.

These accounting procedures tend to accentuate the *conservatism accounting* effect, i.e. the undervaluation of the assets of these companies, and consequently, the value of the results. But on the other hand, the market combines these investments with the existence of larger growth opportunities, particularly in *net firms*, given the emerging nature of this sector, generating great expectations about future abnormal returns.

Thus, the implementation of these investment projects in R&D and advertising is as a *call option*, and given the principle of rationality, it is expected that managers undertake only those options that are *in-the-money*, i.e. they invest in projects that are associated with medium-term expectations of abnormal profitability. It is therefore important to disaggregate the "income" variable into its constituents, in order to examine how the market assesses the R&D and advertising variables, *proxies* for growth opportunities.

Thus we aim to empirically test how the *conservatism accounting* affects the statistical relationship between the market value of the equity of *net firms* and the related financial information. The sustainability of these variables as *proxies* for growth opportunities is documented in the correlation matrix (Tables 7.3 and 7.4). The Pearson and Spearman correlations among the variables MVE and R&D are positive and statistically significant at a 5% level. For the advertising variable, the results are more tenuous, but investigations are unanimous in associating this variable with a short-term effect (e.g., Sougiannis 1994; Chan et al. 2001).

The results from the model 6.6 are reported in Tables 7.7 and 7.8. The findings show that for both samples, and with reference to the group with losses, and as expected, the variable R&D has a positive and statistically significant coefficient. This result, in line with the *investment opportunity hypothesis*, indicates that the market evaluates this variable as an asset (and not as a cost), thus anticipating the net present value (NPV) associated with this type of investment. We can therefore conclude that investors, for this particular group of companies, use this variable to formulate their expectations about future cash flows and the level of risk associated with them. Ben-Zion (1978) argued that the difference between the market value and book value of the equity of a company (the *unrecorded goodwill* in OM and

Table 7.7 Annual regressions for the sample of *net firms* (model 6.6)

Year	Sample with profits						Sample with losses					
	# N[a]	α_0^b	BVE[b]	Res_R&D[b]	R&D[b]	Adj. R^2 (%)	# N[a]	α_0^b	BVE[b]	Res_R&D[b]	R&D[b]	Adj. R^2 (%)
1996	34 (2)	4.92*** (25.492)	−0.0006 (−0.489)	0.044*** (4.106)	0006 (0.176)	45.95	37 (0)	3.45*** (15.337)	0.022*** (4.306)	−0.007 (−0.78)	0.002 (0.091)	44.97
1997	49 (1)	4.88*** (29.03)	0007 (1.268)	12:03*** (4.674)	−0.011 (−0.898)	49.16	66 (0)	3.68*** (15.772)	0.005 (1.508)	−0.011*** (−3.741)	0.047** (2.69)	31.59
1998	40 (1)	4.69*** (19.822)	0.007** (2.561)	0019 (0.856)	−0022 (−0.633)	39.23	89 (4)	4.24*** (21.303)	0.005*** (3.325)	−0.008** (−2.078)	0.023*** (2.213)	29.53
1999	64 (3)	5.94*** (26.163)	0.0067*** (4.128)	−0.006 (−0.884)	0018* (1.822)	35.74	258 (11)	6.11*** (44.344)	0.001*** (3.763)	−0.002 (−1.424)	0.038*** (3.566)	18.14
2000	59 (1)	4.51*** (15.135)	0.003*** (3.44)	0007* (1.869)	0018 (1.045)	34.96	343 (1)	4.53*** (41.304)	0.0004*** (2.864)	−0.0002 (−0.518)	0.007** (2.047)	21.74
2001	36 (1)	5.15*** (21.636)	0001 (1.016)	0019** (2.603)	−0.003 (−0.324)	45.30	314 (6)	4.07*** (30.274)	0.001*** (3.539)	0.001** (2.558)	0.006 (0.994)	25.24
2002	44 (3)	4.61*** (17.597)	0002 (1.364)	0.026** (2.276)	−0.024 (−1.349)	36.29	265 (8)	3.43*** (27.025)	0.002*** (4.133)	0.004*** (3.923)	0.009 (1.551)	30.27
2003	88 (4)	5.39*** (39.851)	0.0002 (0.576)	0.011** (2.475)	0002 (0.371)	46.77	183 (13)	3.96*** (31.341)	0.004*** (6.636)	0.003 (1.316)	−0.003 (−0.948)	30.68
Mean[c]		5.011***	0.0032**	0019**	−0.002	41.68		4.183***	0.005**	−0.002	0.016**	29.02
T-statistics[d]		29.89	2.853	3.497	−0362			13.681	2.019	−1.288	2.52	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_R\&D)_{it} + \alpha_3 (R\&D)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity, Res_R&D the results before extraordinary *items* and R&D the amount invested in research and development

[a]Number of observations with negative values for the variable BVE in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the average of the estimated coefficients, including the constant

[d]The t-statistic (two-tailed test) calculated from the ratio of the average standard deviation multiplied by 8½

(***), (**) and (*) indicates significance level of 1, 5 and 10%, respectively

Table 7.8 Annual regressions for the sample of *non-net firms* (model 6.6)

Year	Sample with profits						Sample with losses					
	# N[a]	α_0^b	BVE[b]	Res_R&D[b]	R&D[b]	Adj. R^2 (%)	# N[a]	α_0^b	BVE[b]	Res_R&D[b]	R&D[b]	Adj. R^2 (%)
1996	81 (2)	3.93*** (33.04)	0.011*** (5.359)	0.039*** (2.784)	−0.04* (−1.946)	55.32	62 (3)	3.15*** (18.704)	0.014*** (5.462)	0.004 (0.206)	0.025 (1.212)	51.78
1997	109 (5)	4.19*** (37.616)	0.011*** (5.894)	0.0005 (0.078)	0.014 (0.984)	48.19	82 (2)	3.08*** (11.332)	0.015*** (3.1)	0.013 (1.646)	0.029* (1.866)	39.75
1998	120 (0)	4.17*** (37.27)	0.006*** (4.473)	0.01* (1.713)	0.007 (0.64)	52.67	92 (1)	2.69*** (15.966)	0.019*** (6.834)	0.01*** (2.819)	0.031** (2.357)	50.53
1999	157 (4)	4.42*** (30.923)	0.003* (1.907)	0.024** (2.088)	0.0001 (0.004)	32.56	155 (9)	4.25*** (25.833)	0.001*** (2.705)	−0.017*** (−3.812)	0.053*** (5.472)	28.00
2000	173 (5)	4.00*** (26.887)	0.005*** (3.313)	0.031*** (3.931)	−0.022* (−1.853)	44.44	214 (5)	3.95*** (23.626)	0.002*** (4.78)	−0.0002 (−0.410)	0.033*** (4.753)	30.96
2001	59 (1)	4.94*** (31.769)	0.001 (1.139)	0.034*** (4.801)	−0.025*** (−2.334)	61.02	183 (6)	4.1*** (24.858)	0.002*** (2.806)	0.002 (0.002)	0.019*** (3.772)	38.88
2002	56 (1)	4.67*** (35.867)	0.002*** (3.361)	0.012* (1.813)	−0.005 (−0.473)	59.10	164 (5)	3.38*** (26.556)	0.001** (1.902)	0.001 (0.884)	0.025*** (5.960)	42.28
2003	60 (3)	5.29*** (31.663)	0.001*** (2.501)	0.002 (0.397)	0.007 (0.844)	45.64	139 (5)	4.35*** (37.03)	0.001*** (2.916)	−0.0004 (−0.175)	0.016*** (4.373)	38.23
Mean[c]		4.452***	0.005**	0.019**	−0.008	**49.87**		3.619***	0.007**	0.002	0.029***	**40.05**
T-statistics[d]		26.279	3.523	3.618	−1.12			16.506	2.533	0.471	7.075	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_R\&D)_{it} + \alpha_3 (R\&D)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity, Res_R&D the results before extraordinary *items* and R&D the amount invested in research and development

[a]Number of observations with negative values for the variable BVE in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the average of the estimated coefficients, including the constant

[d]The t-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 8½

(***), (**) and (*) indicate a significance level of 1, 5 and 10%, respectively

FOM terminology) was positively associated with the ratio of R&D over sales; this ratio measures the intensity of investments in intangible assets.

Concerning the variable results adjusted for R&D expenses "Res_R&D", and the similarity to the model 6.3, the coefficient of this variable remains negative but not statistically significant in the sample of *net firms*. In the group *non-net firms,* the coefficient of this variable reverses the sign, i.e. it is positive and not statistically significant. These findings suggest that *conservatism accounting* remains for *net firms* even after we adjust the variable results for investments in R&D. The results of the variable BVE show a positive and statistically significant coefficient, indicating, as predicted by the OM, that BVE is a good proxy for the value of the assets necessary for the company to undertake in the future the growth opportunities in its portfolio.

The findings also show that after the breakdown of the variable "results" into its components, the increase of the explanatory power of the model 6.6, is higher in the subsample of *non-net firms* 8.16% (i.e. 31.89–40.05%, model 6.3) compared to 2.37% in the sample of *net firms* (26.65–29.02%, model 6.3). We can sustain this result by the fact that the values of the variable R&D are underestimated in order to preserve the sample size; when the values of this variable are not available (na—*not available*), we assume zero. As to the group with profits in both samples, the asymmetric evaluation of variable R&D is confirmed by the market, i.e. the coefficient of the variable is negative but not statistically significant. For the group with profits in both samples, the primary determinant of value is the profit variable (Res_R&D), significant at a level of a 5%. As for the variable R&D, the coefficient is negative, indicating that this group of companies is associated with a more stable phase. The variable results already reflect the net present value of the investments made in the past, so having a predominately indirect effect, as suggested by Sougiannis (1994). The weak statistical significance for this variable is explained due to the fact that these companies are very young. Tables 6.3 and 6.4 show that the differences between mean and median for the variable "age" are not statistically significant.

The results for the variable BVE, due to the CSR principle, indicate that the value of assets increases, in order to enhance future results. However, and as expected, the increase in the explanatory power of the model is very low (3.41% in the sample of *net firms* and 3.08% in the sample of *non-net firms*), which confirms that the main determinant of the value of these companies is the persistence of the variable "results".

To examine the impact of the variable advertising, the model 6.7 was estimated. The results are shown in Tables 7.9 and 7.10.

For the sample of *net firms*, we could not estimate the model for the group of companies with profits, given the small number of observations. For the group with losses, we only have information since the year 1998. Note that the *boom* of observations focused on the period *dot.com bubble*, i.e. 1999–2000.

Regarding the results obtained, these are similar to those obtained for the B2B_R&D group. The variable advertising has a positive and statistically significant coefficient but only at a 10% level, indicating that the market seems to value

Table 7.9 Annual regressions for the sample of *net firms* (model 6.7)

Year	# N[a]	Sample with losses					
		# N[b]	α_0^c	BVE[c]	Res_Adv[c]	Adv[c]	Adj. R^2 (%)
1998	7	18 (0)	4.28*** (11.377)	0.006*** (4.756)	−0.003 (−1.229)	0.06*** (5.033)	56.64
1999	16 (2)	92 (5)	5.28*** (27.533)	0.004*** (4.352)	−0.002 (−0.932)	0.008 (0.83)	27.04
2000	15 (1)	110 (2)	3.15*** (16.983)	0.001** (2.289)	0.0004 (1.398)	0.018*** (4.673)	27.23
2001	0	78 (4)	2.85*** (12.123)	0.003*** (3.598)	0.0021** (2.046)	0.019*** (3.221)	42.54
2002	10 (2)	48 (4)	2.75*** (9.764)	0.004* (4.251)	0.003 (0.943)	0.012 (1.354)	40.10
2003	13 (1)	23 (2)	3.41*** (8.377)	−0.0002 (−0.0002)	−0.013 (−1.927)	0.038*** (3.344)	28.47
Mean[d]			3.618***	0.003*	−0.002	0.026*	**37.00**
T-statistics[e]			5.417	3.218	−0.837	3.07	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_Adv)_{it} + \alpha_3 (Adv)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity, Res_Adv the results before extraordinary *items* and Adv the amount invested in advertising

[a]Insufficient number of observations to estimate the regression model 4.7 for the subsample with profits

[b]Number of observations with negative values for the variable BVE in brackets

[c]T-statistic for the estimated coefficients from year to year in brackets

[d]Corresponds to the average of the estimated coefficients, including the constant

[e]The T-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 6½

(***), (**) and (*) indicates significance level of 1, 5 and 10%, respectively

this variable as an asset and not a cost. The variable results despite the adjustment investment of the investment in advertising remain negative, but not statistically significant. Note that the results for this group should be treated with some caution, given the high volatility of the number of observations. In 2003 we only have 23 companies, while in 2000 the number of these companies was 110.

For the sample of *non-net firms,* it is also impossible to estimate the model 6.7 before the year 1999 due to the small number of observations. Regarding the results for both groups (companies with profits and companies with losses), the findings again show an asymmetry in the market in assessing the variable "advertising. This variable reports a negative (positive) coefficient significant at level a 5% (1%) in sample with profit (losses). Hence, the results supported Hypotheses 3a and 3b.[7]

[7]Remember that Hypothesis 3a is post-dated: There is a positive relationship between the variables R&D and advertising and MVE in companies in the *start-up phase, reporting losses*. Hypothesis 3b predicted the inverse relationship for profitable firms in a more mature phase.

Table 7.10 Annual regressions for the sample of *non-net firms* (model 6.7)

Year	Sample with profits						Sample with losses					
	# N[a]	α_0^b	BVE[b]	Res_Adv[b]	Adv[b]	Adj. R^2 (%)	# N[a]	α_0[b]	BVE[b]	Res_Adv[b]	Adv[b]	Adj. R^2 (%)
1999	25 (1)	4.01*** (8.767)	−0.0001 (−0.016)	0.08*** (4.0)	−0.056 (−1.07)	34.4	19 (0)	2.92*** (4.285)	0.006*** (4.426)	−0.004 (−0.885)	0.071 (1.074)	53.82
2000	22 (1)	3.11*** (9.844)	−0.001 (−0.032)	0.13*** (6.853)	−0.151*** (−5.04)	72.21	36 (1)	2.76*** (8.104)	0.003*** (3.854)	−0.001 (−0.515)	0.055** (2.305)	39.25
2001	81 (3)	3.80*** (22.965)	0.005*** (3.79)	0.052*** (5.359)	−0.052** (−2.285)	52.94	79 (4)	3.18*** (13.981)	0.003*** (2.711)	0.001 (1.077)	0.09*** (2.963)	34.20
2002	89 (2)	3.77*** (23.703)	0.003*** (4.015)	0.039*** (5.077)	−0.016 (−0.819)	52.79	65 (5)	2.55*** (8.73)	0.007*** (4.105)	0.009*** (3.085)	0.071** (2.408)	34.96
2003	86 (1)	4.49*** (31.428)	0.002*** (4.055)	0.021*** (4.9)	−0.021*** (−4.852)	52.43	51 (7)	3.48*** (12.614)	0.003*** (2.368)	−0.004 (−0.672)	0.03 (1.005)	30.53
Mean[c]		3.835***	0.002**	0.065**	−0.059**	52.95		2.98***	0.004***	0.0003	0.063***	38.55
T-statistics[d]		21.778	2.242	4.3	−3.076			23.228	6.365	0.177	8.019	

Estimated model

$MVE_{it} = \alpha_0 + \alpha_1 (BVE)_{it} + \alpha_2 (Res\_Adv)_{it} + \alpha_3 (Adv)_{it} + \varepsilon_{it}$

where MVE represents the market value of the company, BVE the book value of equity, Res_Adv the results before extraordinary *items* and Adv the amount invested in advertising

[a]Number of observations with negative value for the variable BVE in brackets

[b]T-statistic for the estimated coefficients from year to year in brackets

[c]Corresponds to the average of the estimated coefficients, including the constant

[d]The T-statistic (two-tailed test), calculated from the ratio of the average standard deviation multiplied by 5½

(***), (**) and (*) indicate a significance level of 1, 5 and 10%, respectively

7.1.2.4 Validation of Research Hypothesis 4

Given that this research proposes as a *proxy* to the phase of the life cycle of the company the variable results, i.e. companies with profits are assumed to be undergoing a steady growth/maturity phase compared to firms with losses in the *start-up* phase, the previous results show that the market assesses asymmetrically the investments in R&D and advertising, according to whether companies report profits or losses, as documented in Tables 7.7, 7.8, 7.9 and 7.10. Therefore, we conclude that the market evaluates differently the determinants of the value of the company/industry as it moves toward maturity.

These results find theoretical support in Proposition 9 of the FOM, and due to the *conservatism accounting* effect, i.e. in the early years of the life of a company, the company reports negative results, because only a small portion of investment is capitalized and the remainder is immediately considered as a cost (e.g. investment in R&D and advertising) which reduces the cash flows of the period. However, given the principle of rationality, the company only continues to invest if the investment opportunities generate abnormal returns. Moreover, these results are consistent with those obtained by Sougiannis (1994), who documents the duality of the effect of the short and medium/term associated with investments in R&D, whereas investors associated a positive informational content with current investments in R&D and advertising (direct effect). However, the indirect effect resulting from the capitalization of income generated by the investments in the past is more statistically significant.

7.1.2.5 Validation of Research Hypothesis 5

Hypothesis 5 tests empirically whether the variations in the MVE in *net firms* and *non-net firms* are explained by the same determinants, i.e. results, BVE, R&D and advertising. Although the results obtained are very similar for the two samples (see Tables 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9 and 7.10), the results in Table 7.1 show that the effect of a "positive valuation of losses" is more pronounced in *net firms* in line with the results obtained by Lee (2001) and Cooper et al. (2001). These authors document that, with the simple inclusion of the term "*dot.com*" in the company name, sometimes without any substantial change in the *core business* of the company, the companies showed significant abnormal returns, which tended to persist over time. Also Bartov et al. (2002), when analyzing the process of the IPO *pricing*, noted that the variables "losses" and "negative cash flow" are positively valued by the market with reference to *net firms* as compared to a sample of contemporaneous IPOs. In line with these results, we associate a fashionable effect (*fad*) with the sample of *net firms*, which relies, in our opinion, on the emerging nature of this sector, and the strong expectation associated with this sector in the near future.

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Part IV
Conclusions

Chapter 8
Conclusions and Suggestions for Further Research

Abstract This chapter presents the main conclusions of the study and suggestions for further researcher. Based on the results obtained, we provide also some recommendations to policy makers, financial analysts and regulators.

Keywords Persistence of losses · Positive valuation of losses · Ohlson and Feltham and Ohlson models · Net firms

The central objective of this research was to analyze the apparent anomaly between the report of losses and the high market value of equity registered by companies in emerging sectors. This study examines a specific set of companies—new US companies—*net firms*. This effect is not totally new: for instance, Kothari and Zimmerman (1995: 176) had identified this phenomenon; however they failed to provide any explanation for it. Thus, given the magnitude of this phenomenon in the 90s, our research explains this phenomenon as:

(i) Due the accounting conservatism effect, the information reported by the financial statements underestimate the growth opportunities owned by these companies. For example, Trueman et al. (2000, 2001), Hand (2001), Martínez and Clement (2002), and Rajgopal et al. (2002), based on the work of Amir and Lev (1996), who for the first time introduced non-financial variables into the valuation models, demonstrate that the weak explanatory power of financial variables is partly offset by the inclusion of *web traffic variables*, which better capture the value chain of these companies, facilitating the prediction of future profitability, especially the volume of sales;

(ii) When we analyzed the life cycle (eight years) and used the methodology used by Fama and MacBeth, we aim to enhance the relevance over time of the determinants of value for these companies. Loughran and Ritter (2003) and Ljungqvist and Wilhelm (2003), in line with current literature, demonstrated that IPOs tend to have a cluster effect in time. Knauff and van der Goot (2001) and Bartov et al. (2002) confirm this effect in this group of companies.

(iii) Given the investment profile that characterizes this type of company, investment in intangible assets represent a "slice" of the significant value

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allocated to the expectations of a higher probability of the existence of growth opportunities, hence the greater the risk of such securities (Myers 1977). These results complement the results of Rajgopal et al. (2002) who document the persistence of abnormal returns associated with these securities. Ofek and Richardson (2002, 2003) justify these abnormal returns as a reward against the higher level of risk inherent to them. The results are robust, given the representativeness of the sample, the reporting period (eight years), the accuracy in controlling the survival effect (survivor bias effect), by the inclusion of companies with negative equity (against the current practice in empirical studies) and the comparison of the results with a control sample —*non-net firms* (match sample).

Thus, the key findings are:

(i) Companies created during the period of the *New Economy* Period (NEP)—net firms and others (e.g. contemporaneous IPOs) are mostly technology-based, and have a focused investment profile in intangible assets; the increase in sales tends to be accompanied by increased investment in R&D and advertising, even with the increasing age of the company, which explains that the group with losses is the most numerous and persistent group of companies. This group is the group that invests more aggressively in intangibles as a proportion of their sales volume. These results confirm that losses in companies in start-up phase/growth, particularly those that are technology-based, are a result of accounting conservatism effect, as modelled by the FOM, for accounting purposes and in compliance with GAAP.

(ii) When assessing how the effect of "conservatism accounting" affects the relationship between the market value of the equity of these companies and the results—losses, we conclude that the market positively evaluates the variables R&D and advertising in the group with losses in both samples *net* and *non-net firms*, confirming the *opportunity investment hypothesis*. Investors seem not to fix their attention on the variable results as an aggregate variable, but associated a higher volume of investment to R&D and advertising to the probability of the existence of larger growth opportunities. This result confirms the clientele effect, documented by Chan et al. (2001), characteristic of this type of company. The persistence of the investment in these items over the reporting period (eight years) reveals the confidence of managers in the projects in their portfolio. For the group with profits, these variables (i.e. R&D and advertising) are valued negatively, i.e. as costs, predominant the indirect effect (Sougiannis 1994), i.e. the variable results already reflect the effect of the investments made in the past. Thus, as demonstrated by Modigliani and Miller (1966), the results are the main determinant of the value of these companies; thus the statistical significance of the variable results increases with its persistence.

(iii) The statistical relevance of the phenomenon of "positive valuation of the losses" is large in the sample of net firms. This result can be explained by the following facts:

- The group of *net firms* includes a larger number of companies with high losses. Even after the adjustment of the variable results by the investments in R&D and advertising, its value remains negative, showing an effect of conservatism accounting which is more severe in this sample. This result indicates the need to include other variables for calculating the growth opportunities, such as proxies for *web traffic*;
- This group contains a higher percentage of technology-based companies and;
- The volatility is higher, particularly in the subgroup with losses in consequence of the strong uncertainty that characterize the investments in intangible assets (Kothari et al. 2002).

(iv) However, the results of Collins et al. (1999), who argue that the phenomenon of positive valuation of losses is due the omission of the variable equity (BVE) from the model, are partially confirmed. With the introduction of the variable equity (BVE) in the valuation model, the phenomenon of positive valuation of losses disappears in the sample of *non-net firms*, persisting but with no statistical significance in the sample of the *net firms*. The importance of including this variable in the valuation models is unquestionable for the group with losses in both samples. The inclusion of this variable in the valuation models registers an increase explanatory power in both samples. This result shows and, in line with OM and FOM models, that variable equity (BVE) is a proxy for expected future abnormal results, given the limited information content of the variable results when the company report losses. In this context, the theory of abandonment option, which associates a higher probability of liquidation to a company that show a higher persistence of the losses, seems not to be appropriate. Thus, the report of loss cannot be indicative of a process value destruction.

(v) We emphasize also that the BVE variable is assumed as a tool to reduce agency costs, particularly with creditors as it identifies itself as a proxy for the "recognized assets", given the predominance of intangible-based assets.

In summary, this study focused on the relationship between market capitalization and profitability (negative) of the companies in the "*new economy*", in US *net firms*. Although not entirely new, this phenomenon will certainly be repeated although with some specific characteristics. So given the results obtained, we highlight the main contributions of this research:

(i) Increasing investment in the 90s, and in line with McCallig (2004) and Joos and Plesko (2005), appears linked to a change in the business profile of firms operating in the market: small companies, mostly technology-based that report a higher magnitude losses for longer periods;

(ii) The report of losses may not be indicative of value destruction, in clear opposition to the theory of abandonment option;

(iii) Therefore, the information content of the losses is not irrelevant for assessment purposes, if they arise in association with them, particularly in the start-up phase/growth performance of high growth opportunities;
(iv) Given the asymmetrical nature by the market in the assessment of the variables R&D and advertising, and hence the variation of statistical significance of the variable results over time, we find that the Internet industry is still an emerging sector, associated with new business opportunities, so it is wrong to treat equally all companies that report losses, as this may lead to erroneous empirical findings;
(v) Companies in financial stress, particularly technology-based, tend to opt for mergers and acquisitions (M&A) processes as a restructuring strategy to the detriment of bankruptcy, which would imply a greater destruction of value.

Based on these results, some recommendations are relevant to policy makers, financial analysts and regulators:

(i) agents (managers) should define strategies to generate high cash flows and appropriate economic rents, avoiding the pitfalls of a fashion phenomenon and situations of capital myopia. As specified by the models of OM and FOM, the abnormal returns tend to converge quickly to the industry average due to the actions of the competition.
(ii) Financial analysts should be based on the potential for profit generation and its growth in order to avoid situations of overvaluation and the generation of financial bubbles;
(iii) Regulatory authorities should review the rules of reporting and publishing of financial information to provide investors a broader intelligence picture and a more timely window to make their investment decisions.

This work also raises a set of lines for future research:

(i) It is important to extend the review period towards a better assessment of the interaction between the effect of the life cycle and the value created by continuous investments in R&D and advertising.
(ii) Another extension of this research would be a comparative study with the traditional sectors, in order to analyze potential differences and similarities. For example: what is the impact of the Internet on generation of sales, on the structure cost and on the creation of new business opportunities or the internationalization process.
(iii) The characteristics of the random term OM model give the investigator the freedom to define the functional form of the model to make estimates, which depends on assumptions about the relationship between the dependent variables, independent, and the random term. Given the results of the Ramsey test are systematically significant, this indicates an incorrect potential model specification; moreover, the results obtained under Eq. 7.11

reveal a possible existence of non-linear relationships between variables (Ye and Finn 1999). Thus, another potential extension of this investigation would assume that the random term is multiplicative instead of additive. In this context, Box–Cox transformation would prove to be more suitable.

(iv) Given the suggestion of Ohlson (2000), and having available the analysts' forecasts of future results, it would be interesting to use this variable as a proxy for the v_t variable, i.e. other non-financial information. In addition, it is relevant to validation if the abnormal results follow an autoregressive first order process AR (1). For example, Callen and Morel (2001) show that the abnormal results tend to follow an autoregressive process of second-order AR (2) and not of the first-order AR (1), as predicted by OM and FOM models.

From the modelling point of view, the challenges are equally large. It is relevant to introduce more flexibility to the assumptions of OM and FOM, e.g. the preferences (beliefs) of the investors are not homogeneous and the capital markets are not perfect; thus it is important to introduce the effects of asymmetric information, transaction, bankruptcy and agency costs, and the taxes effect. Furthermore, some studies show non-linear relationships between the variables: "market capitalization", "equity" and "results", particularly when this variable reaches extremes. For example, Yee (2000) and Zhang (2000) find that whenever the company adjusts its investment policy in terms of results, this generates a non-linear relationship between the market value of equity and the company's results. Ye and Fin (1999) show that when the abnormal rate of return on equity (not the abnormal results) follows an autoregressive first order process and the company does not pay dividends (assume therefore that the company is still in the start phase-up/growth), then the company's value is not a linear function of the equity and results. Burgstahler and Dichev (1997) also conclude that there is a convex relationship between the market value of equity and the company's results, when they reach unsatisfactory levels.

Thus the determination of the company's value due to accounting financial variables in a non-linear relationship presents a high potential for future research. Bernard (1995: 735) noted:

> The Ohlson model represents the base of a branch (for) capital market research … Ohlson (1995) and Feltham and Ohlson (1995) return to" step one "and attempt to build a more solid foundation for further work. Our challenge is clear.

The determination of the sources of enterprise value is a central concern of business finance which is far from exhausted, even in traditional sectors, with greater stability and less contestability. By analyzing the most dynamic industrial sector in recent years, we hope to have contributed to the clarification of this issue by introducing the theoretical framework of the OM and FOM models which have scarcely been used in empirical studies.

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