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MARKETS IN TRANSITION: UNDERSTAND THE DELISTING PHENOMENON BY CONDUCTING AN ANALYSIS OF THE DETERMINANTS IN THE ITALIAN MARKET

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ABSTRACT

The final master paper focuses on the study of delisting, referring in particular to delisting in Italy and, more generally, to other international evidence. Considering the heterogeneity in transactions and what is defined as delisting, we first considered the standard types of delisting, divided according to who initiates the procedure (the stock exchange or the company itself). We also examined the reasons and laws behind delisting, when the company violates the requirements stipulated by the exchange and legislation, when a company requests to be delisted, and how the legislation implements measures to safeguard the market and investors.

After that, we went through a theoretical analysis of the various financial and non-financial variables that can have particular effects on companies, leading them toward delisting. This analysis served as the theoretical foundation for the subsequent analysis, which puts this theory into practice to help investors and companies predict future delisting from these variables. This study is based initially on a simple comparative approach and then on a logit model that allows us to more accurately define each variable's impact on the final event of being delisted.

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INTRODUCTION

Recent years have seen a worldwide and continuously rising phenomenon entering the economic and financial environment. While in the past, corporate finance research focused on the decision of firms to go public, motivated by the increasing number of publicly traded companies, the last two decades have seen an overturning in the trend, with declining numbers of initial public offerings and increasing numbers of delisting (Bessler et al., 2023). Stock exchanges have different requirements that companies must meet to be listed, remain listed, delist, or suspend listing. Similarly, companies and their management have the ability to decide when and where to list or when is the right time to keep being listed or exit the market. As these decisions may depend on multiple factors, the listing and delisting decisions are usually noisy decisions that could leave traces and signals to pick up and that could contribute to our understanding of the phenomenon (Bessler et al., 2023).

The study investigates firms delisting to gain insights into firms' behaviours and extract information that could help investors and analysts understand the indicators that could potentially signal a delisting.

We have explained first the theory behind delisting, differentiating between the types of delisting, and providing helpful information on the legislative background of the delisting to help readers understand the topic (Chapter 1). Then, we scanned through financial and non-financial determinants and indicators that could signal the delisting of firms if correctly controlled and supervised, defining and describing the potential impact (Chapter 2). In the end, we proceeded with the true intent of this research, using financial and non-financial data and the collected theoretical information to develop a more timely and accurate delisting prediction by constructing a logistic regression model analysing real delisted firms (Chapter 3).

In this delisting analysis, we have distinguished between firms voluntarily and involuntarily delisted by the stock exchange, as we will illustrate later, to ensure that the sample of firms from which extracting data is the most consistent as possible. For the same reason, considering the high heterogeneity that past literature has discovered in voluntary delisting, as we will explain in the next chapter, we have focused only on firms involuntarily delisted from the Italian Stock Exchange, making inferences on this sample.

CHAPTER 1 - THE THEORY BEHIND DELISTING

In order to understand the delisting phenomenon and the popularity that this trend has had in recent years, we need to define delisting and illustrate in depth the different typology of delisting that makes companies leave markets voluntarily or involuntarily.

Starting from the background, a firm, before going through a delisting, needs to be publicly traded in a stock market or even in multiple ones with different currencies[1]. The delisting is defined as removing a listed company from a trading stock exchange, and in recent years, it has become an increasingly widespread practice with paramount importance in developed countries, including Italy, the central area of our analysis (Martinez & Serve, 2017).

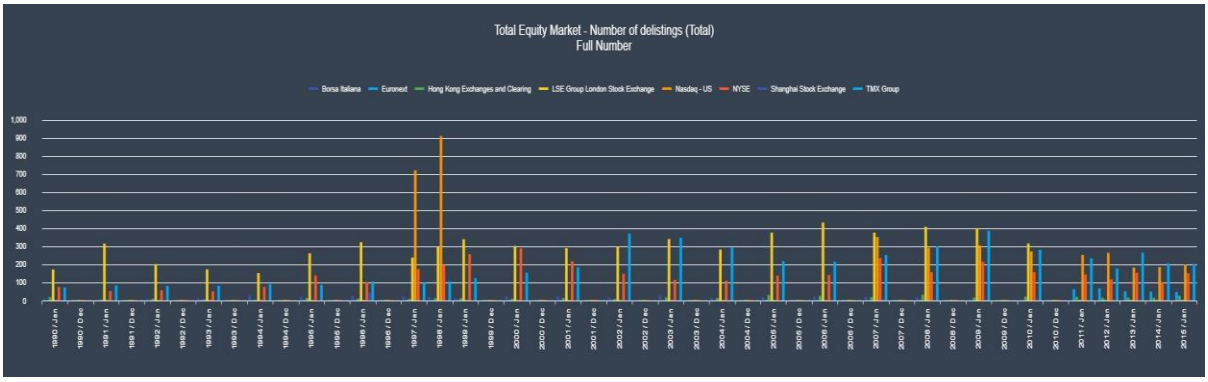

Table 1. Total Equity Market. Number of delistings (World Federation of Exchanges, 2023)

As it can be seen in the table taken from the World Federation of Exchanges (WFE) graph, in the last 25 years (from 1990 to 2015), an always increasing number of stocks have been delisted from the market. Only by looking at the major stocks exchanges of the world, (as the New York Stock Exchange, the Nasdaq, the Euronext, the London Stock exchange, the Toronto Stock exchange, the Hong Kong and the Shanghai stock), we have reported a number of 19440 firms delisted, with a particular increase in numbers during the financial crisis of 2007. Considering also the 292 firms delisted from the Italian exchange, we reach a high of 19732 (World Federation of Exchanges, 2023).

[1] This practice is often called dual-listing. Stocks can be traded in every Exchange in which they are listed, but to do so, they have to comply with the requirements of all the exchanges (which usually comports high costs for firms)

1.1VOLUNTARY VS INVOLUNTARY DELISTING

The passage from a publicly traded to a privately traded company can happen in two different ways, voluntarily and involuntarily, depending on whether the initiator of the delisting is the stock market authorities or the firm itself. In the former case, the stock market authority in which the company operates obliges the firm to delist, while in the latter, the firm decides to delist based on its own arbitrary decision (Martinez & Serve, 2017).

Even if the definition of these two macro-categories seems linear initially, further thorough analysis reveals these practices to be more heterogeneous than they appear.

As previously mentioned, involuntary delisting is triggered by the firm's non-compliance with the requirements of the stock market in which the stock is publicly traded. As the Nasdaq regulation mentions, “Securities of a Company that does not meet the listing standards set forth in the Rule 5000 Series are subject to delisting from, or denial of initial listing on The Nasdaq Stock Market.” (Nasdaq listing center, Art. 5801, 2009).

Involuntary delisting is, most of the time, an indication of the firm’s poor financial health or poor corporate governance and should be carefully considered and monitored by investors (primarily when a warning is issued by the stock exchange to the firm). Indeed, stocks can be delisted without prior notice. In general, exchanges have rules and procedures to delist a stock, and they usually involve providing the company with notice and an opportunity to appeal the decision. Article 5810 of the Nasdaq regulation states that the Nasdaq listing center will inform the Company that it has 45 calendar days to submit a plan to regain compliance with Nasdaq's listing standards, whenever it fails to respect one or more of them. The regulatory staff has the possibility to extend this deadline for up to an additional 5 calendar days, upon good cause shown, and they may request such information from the Company itself to determine whether to grant it or not. (Nasdaq listing center, Art 5810, IM-5810-2. Staff Review of Deficiencies (c), 2009). In the same way, the NYSE regulation states that if the Exchange’s regulatory team finds that the Affiliate Security fails to meet the listing standards, they will quickly inform the issuer of this breach and ask for a corrective action plan. Also, within five business days after receiving the compliance plan from the issuer, the regulatory team shall notify the Commission of the receipt, and indicates whether the plan

was accepted by regulatory staff or what other action was taken concerning the plan and states the time period provided to regain compliance with the Exchange's listing standards (New York Stock Exchange regulation, rule 497-c(3), 2006). If the firm does not regain compliance with the requirements, then it is removed from trading in the Exchange.

It is essential to mention that being delisted from a stock exchange does not imply the following delisting from all the other stock exchanges in which the company's shares are publicly traded. For instance, if a firm operating in the NYSE and the NASDAQ exchange markets is delisted from the former, its shares will still be exchanged in the NASDAQ. The exchanges usually have different requirements and rules; therefore, failing to meet the demands of the NYSE does not translate into an immediate delisting from the NASDAQ.

However, in case of specific failed requirements that are usually stated in the Market Exchange Regulation in which the stock is listed, the firm can, and will, be immediately delisted by the regulators to protect investors and the market's integrity. In the case of fraudulent activity or the undergoing of catastrophic events that make the company insolvent or bankrupt overnight, the Exchange may opt to choose an immediate delisting. However, since delisting is considered a serious action, it is usually accompanied by warnings. The leading causes for immediate delisting are bankruptcy (and bankruptcy filing), financial restructuring, and the firm's liquidation (Macey et Al., 2008). The NASDAQ and the NYSE (as many other exchanges) consider these three events crucial for the firm performance and trigger the mandatory delisting from the public market. On the other hand, the time of response of the exchanges differs since they may act more tolerantly [2].

Voluntary delisting is instead defined as the going private practice that the firm initiates. Since this category of delisting is characterized by a management decision, this free-will action is usually driven by a corporate plan to exploit different situations. For this reason, voluntary delisting is considered highly heterogeneous, and the literature about this proves it since past research has exploited the issue in a fragmented way (Martinez & Serve, 2017).

Until now, firms that undertake a voluntary delisting have been differentiated between firms that continue trading afterward and firms with no subsequent trading.

[2] It will be discussed more in depth later (legal and institutional settings paragraph)

Delisting without subsequent trading involves a transaction between the delisting firm and its shareholders. This type of delisting is usually followed by a transaction (acquisition or a public takeover bid) and is referred to as a Going Private Transaction (GPT), where firm ownership is concentrated in the hands of a few sets of investors who are not interested in having their equity publicly traded (Leuz et al., 2008). The no-trading condition can also be driven by a merger when the listed company is absorbed and, therefore, ceases to exist (no subsequent trading is the natural development of the merger transaction) (Martinez & Serve, 2011).

Voluntary delisting firms that continue to trade are firms that keep on trading actively on unregulated markets after deciding to withdraw from a regulated market [3]. This kind of transaction is also referred to as deregistration or "going dark transaction", and it is often done to cut compliance costs and to reduce the number of shareholders to have high control over the company's decisions. By doing so, the company operates in another market with fewer restrictions and regulations. This is a typical phenomenon of USAs companies, where over-the-counter markets and trading systems are developed. Another example of delisting with subsequent trading is cross-listing, when the firm ceases to trade on a foreign market but keeps its shares being traded on the domestic market (Martinez & Serve, 2017).

1.1.1 GPT DELISTING – AN IN-DEPTH VOLUNTARY DELISTING ANALYSIS

The going private transaction is one of the different types of voluntary delisting we mentioned, and it can be characterized by a merge delisting or a takeover (with or without leverage buyout). These denominations derive from the different corporate action names that characterize these delisting, mergers, and acquisitions (takeover) (Martinez & Serve, 2017).

A merger is a voluntary fusion agreement that unites two or more existing companies into one new company. In the merger, all but one company ceases to exist legally. The merger differs from the other corporate actions (consolidation and acquisition) since it does not require a new company to be formed, and it is only done when the shares of the merged companies are bought in their entirety.

The acquisition is when one firm buys the shares or the assets of another to gain control of that company. The acquisition can occur at any share control percentage and involve a

[3] The opposite process, delisting from un unregulated market to being listed in a public regulated market is not considered to be a voluntary delisting, since it is an upward step for the firm (Martinez & Serve, 2017).

minority-majority or totality of the stakes. Purchasing more than 50% of a target firm's stock and other assets allows the acquirer to make decisions about the newly acquired assets without the approval of the company's other shareholders. The acquisition can be, therefore, defined as friendly or hostile. A hostile takeover is defined as one in which the first offer is opposed by the incumbent management, friendly instead as the takeover that is agreed with the board of directors. The bid is then successful if the bidder acquires the target on the base of its offers (Franks & Mayer, 1996). A hostile takeover is usually accomplished by tender offer[4]: the corporation seeks to purchase shares from outstanding shareholders of the target corporation at a premium to the current market price (Anastasia Giakomelu, 2021).

The firms that agree to merge are usually equal in terms of size, customer, and scale of operations, and for this reason, the term "merge of equals" is sometimes used, while acquisition often occurs with companies of different sizes (Marshall Hargrave, 2022). The M&A (mergers and acquisitions) actions can have different economic perspectives according to the type of firms involved in the corporate action. A horizontal M&A involves firms operating in the same industry, intending to achieve economies of scale. A Vertical M&A involves firms that operate in the same industry but at a different stage of the supply chain to achieve economies of scope. Conglomerates involve firms that operate in different industries intending to achieve lower operational risk by implementing a diversification strategy (Anastasia Giakomelu, 2021).

M&A delisting is a special category since it includes firms that meet the regulatory requirements of the Exchange but delist from it due to mergers or acquisitions. M&A delist also needs to be broken down into weak and strong delists, considering the mixed signal concerning the quality of their performance. Under the M&A delist class are the firms that would not have survived the regulations of the Exchange because of financial distress but are bought or merged before being involuntarily delisted by the Exchange (Chaplinsky & Ramchand, 2007).

The Going private transaction involves the delisting firm and its shareholders. The delisting can be the natural consequence of a merger when another firm absorbs a listed company and ceases to exist per se, or it can follow an acquisition or a public takeover bid when the firm

[4] The tender offer (the OPA process) will be explained later in the IPO vs OPA paragraph

ownership is concentrated in the hands of a few sets of investors who are not interested in having their equity publicly traded (Martinez & Serve, 2011). GPT will also differ according to the firm ownership's structure and the nature of the initiator of the delisting.

When the ownership of the company is diffused between multiple shareholders, the delisting will induce a change in the control, taking the form of a Leveraged Buyout (LBO). The takeover involves the participation of private equity investors, borrowing a high percentage of money, which is usually returned by selling the acquired company's assets. Instead, when the ownership of the firm is concentrated, the initiator of the delisting is the controlling shareholder, which can be a corporation if the firm is being delisted by the parent company or also individuals if the delisting is initiated by the firm's owner-managers (Martinez & Serve, 2017). When the acquirers are the owner-managers, the delisting is called Management Buyout since the incumbent management seeks the (full) equity ownership. These kinds of GPT involve a process called squeeze out[5], where the controlling shareholders want full equity ownership of the firm to delist it. The squeeze-out process can occur just when the acquirers (after the tender offers) have come to hold certain shares of the company's voting rights and exercise a minority buyout. When no outside private equity investors enter the process, the delisting can also be defined as "pure" (DeAngelo et al. 1984). This type of resolution comes from the issuer's shareholders meeting that has as its exclusive object the delisting of securities from the stock exchange and, therefore, is completely unrelated to further corporate events.

In a going private transaction, voluntary delisting happens after a listed company is merged with another firm or after a tender offer followed by the acquisition. When the acquisition is hostile, it is defined as a takeover since the target's management is opposed to acquisition by another firm. This type of action is still viewed as a voluntary delisting for the literature because the decision was taken by the firm and not by the stock market authorities (Martinez & Serve, 2017).

[5] Squeeze-out is the forced sale of stock owned by minority shareholders in a joint-stock company, usually in the context of an acquisition. State law governs squeeze-outs and requires fair cash value be paid to the minority shareholders from the acquiring corporation in Exchange for their stock (Cornell Law School, 2023)

1.1.2 COST-BENEFIT ANALYSIS

The cost of being listed in a stock market, as already mentioned, and complying with all the rules and laws specified by the different exchanges are often a burden for multiple companies listed all over the world. Moreover, for companies in financial difficulty, the benefits from being listed might not be even higher than the cost. For these reasons, the most used process to assess the efficiency and the overall benefits coming from being listed in a stock (or even multiple) exchange is the Cost-Benefit Analysis (CBA)[6].

"The Cost Benefit Analysis includes a systematic cataloguing of impacts as benefits (pros) and costs (cons), valuing in money (assigning weights), and then determining the net benefits of the proposal relative to the status quo (net benefits equal benefits minus costs)" (Boardman, Anthony E., et al. Cost-benefit analysis: concepts and practice. Cambridge University Press, page 2, 2017).

Since there are two main different types of CBA, the ex-ante and ex-post cost-benefit analysis, for firms that, as in our study, need to assess whether or not they remain public, the ex-ante cost-benefit analysis is the only suited one that allows taking direct and decisive action (go versus no-go decisions), but gives a poor estimate about the actual value of the specific decision, given the high uncertainty about future benefits and costs.

Bharath, ST and Dittmar, A.K., (2010) give an in-depth explanation of the Cost-Benefit Analysis process and how firms base their decisions to go private or remain public, and vice versa[7], for example, when the costs of listing exceed the benefits of remaining public (Bharath and Dittmar, 2010).

Therefore, voluntary delisting usually comes from a management decision based on Cost Benefit Analysis. Conducting their research, taking into consideration a large pool of listed and delisted firms, and studying the history of these companies from the IPO[8] to the eventual delisting, the two authors were able to understand better how different driver forces influence the choices of the firm to remain public or going private.

[6] The process used to measure the benefits of a decision, or taking action, minus the costs associated with taking that action (Adam Hayes, 2023)

[7] Since the factors used in their analysis for going public or private are the same (most of them), the authors state that the CBA can be used in the same way to evaluate a going public decision

[8] Initial Public Offering. It will be explained in the next paragraph

In their research study, the two authors identified as the main determinants in the cost-benefit analysis of firms, in their considerations to remain public or go private, the cost of producing information, and thus having less information about themselves in the public market, and the liquidity available to the firm, (a less liquid firm will be more likely to go private than its peers) (Bharath and Dittmar, 2010).

THE COST-BENEFIT ANALYSIS

EX-ANTE	EX-POST
• Allows to take a direct and decisive action • Gives a poor estimate about the actual value of the delisting decision	• Learn about the true value of the delisting • Used to predict the likelihood of future returns • Possibility to classify what were the causes of success or failure

Figure 1. The ex-ante vs ex-post cost benefit analysis characteristics

As mentioned above, the ex-ante Cost-benefit analysis, which is the only one available to firms in their delisting decision, is insufficient to understand whether the firm has benefited from the outcome of the CBA. The ex-post analysis should also be done by companies to learn about the real value of the delisting (if the delisting is the outcome of the analysis), but since firms after the delisting do not have any more obligation to publish and disclose to the public their financial statements and balance sheets, assessing the actual value of a delisting decision is not possible (without the proper information).

1.1.3 IPO VS OPA

The Initial Public Offer (IPO)[9] and the Tender offer (OPA)[10] are two exchange operations, used for two different purposes, yet also similar since one is the opposite of the other. The IPO, as the name suggests, is a particular type of public offer for sale or subscription aimed at admission to listing on a regulated market, while the OPA is the offer, invitation to offer, or promotional message aimed at the cash purchase of financial products (Borsa Italiana, 2018).

The Initial Public Offering constitutes the instrument through which a company obtains the circulation of securities among the public (the so-called creation of the free float), which is required to obtain the listing of its securities on a regulated market. Since the IPO is aimed at the indistinct public of investors, it constitutes a case of solicitation of investment, so the issuing company must organize the operation, observing the regulations of the Law[11], to ensure transparent information to the recipients of the offer.

In the takeover bid of the OPA, the bidding party acquires equity securities by paying cash to the shareholders of the target company. If these shareholders join the bid, they are liquidated and exit the shareholder base.

Since both operations are open to the public, under the requirement of transparency in the financial market, the company that wants to go through an IPO or an OPA needs to communicate it preventively to the primary competent authority, which in the Italian case is the Consob, to allow to the public to form a judgment about the operations (Borsa Italiana, 2018).

As mentioned, the final purposes of the Initial and the Acquisition public offers can be considered specular: the IPO has as objective the admission to a listing regulated market and a consequent increase in the number of investors and dilution of control, while the OPA is done by the management to gain control of the company, consolidating it by acquiring the major portion of company stocks sometimes to achieve the final objective of delisting of the company from the Exchange or merging it to another.

[9] "Offerta Pubblica Iniziale" in Italian
[10] "Offerta Pubblica di Acquisto" in Italian, from now on OPA will be used as substitute of Tender Offer
[11] The TUF in Italy, Testo Unico della Finanza, Legislative Decree 58/1998

INITIAL PUBLIC OFFERING (IPO)	TENDER OFFER OR "OFFERTA PUBBLICA DI ACQUISTO" (OPA)
• Public offer for sale or subscription of shares or other financial instruments • Has as objective the admission to a listing regulated market exchange • Obtain the circulation of securities among the public and the dilution of control • Need to be communicated preventively and in transparency	• Public offer, or invitation to offer, aimed at the cash purchase of financial products • Consolidate the control of the company through acquiring major portion of stocks • Has as final objective the delisting of the firm from the regulated market exchange • Need to be communicated preventively and in transparency

Figure 2. IPO vs OPA. Summary of major characteristics

The OPA, unlike the IPO, can become an obligatory process imposed by the law since it also serves as a mean of protection for investors and stabilization for businesses and the companies (Consob, 2023).

There are several types of OPA, differentiating according to compulsory or voluntary, and the number of shares involved in the offer[12]

Compulsory totalitarian takeover bid

It is the "classic" mandatory takeover bid, i.e., the one triggered if a person, due to purchases or an increase in voting rights, comes to hold an interest exceeding the threshold of thirty percent or has voting rights in excess of thirty percent. The person in question is obliged to promote a takeover bid addressed to all security holders on all securities (Article 106 of the TUF, paragraph 1, 1998).

[12] The different types of tender offers mentioned above are referring to the Italian Law (TUF). In most of other countries, the categories are similar, but with different thresholds for the number of stakes to hold

Mandatory consolidation takeover bid

In this case, the mandatory takeover bid obligation is triggered by purchases in excess of 5 percent or the increase of voting rights by more than five percent of the same, by those who already hold the shareholding related to the case of a mandatory totalitarian takeover bid but without holding the majority of voting rights in the ordinary shareholders' meeting (Article 106 of the TUF, paragraph 3, point b, 1998).

Compulsory residual takeover bid

If, as a result of a total takeover bid, the bidder comes to hold a stake of at least 95 percent, it is obliged to purchase the remaining securities from those who request them, paying a consideration equal to that of the previous takeover bid (Article 108 of the TUF, paragraphs 1 and 3, 1998). This obligation guarantees minority shareholders an exit option.

In addition, anyone who comes to hold a stake of more than 90 percent (even if not as a result of a takeover bid) is obliged to buy the remaining securities from those who request it if they do not restore within ninety days a free float sufficient to ensure the regular course of trading (Art. 108 of the TUF, para. 2, 1998).

Prior voluntary tender offer

It is a voluntary tender offer having as its object at least 60 percent of the ordinary shares of a company. If the following two conditions are met, the voluntary pre-emptive takeover bid determines the non-occurrence of the mandatory total takeover bid obligation: 1. the bidder has not acquired, even indirectly, an interest in the capital of more than 1% in the company whose shares are the subject of the takeover bid, during the year preceding the communication of the bid to Consob; 2. the effectiveness of the offer is approved by as many shareholders as hold a majority of the target company's ordinary shares (excluding the votes of the offeror, the majority shareholder and those acting in concert with them) (Article 107 of the TUF, 1998).

Squeeze Out

The squeeze-out is the final right that is due to whomever, after a totalitarian offer, comes to hold at least 95% of the capital of a listed Italian company to purchase the remaining securities within three months of the end of the offer. To avail himself of this right, however, the offeror must have declared it in the offer document (Article 111 of the TUF, 1998). The minority stockholders in the original corporation are forced to accept a cash payment for their shares, effectively "squeezing them out" of the resulting company. The acquirer obtains full ownership of the target for the original tender offer price. As the non-tendering shareholders also receive this price, the Law recognizes it as fair value, thus leaving the non-tendering shareholders no legal recourse.

As mentioned above, delisting the company from the exchange(s) in which the stock is listed might be the final objective, or sometimes a consequence, of the tender process. In case, at the end of the takeover period, the offeror achieves a percentage in target's share capital exceeding the "90% threshold", the company's shares will be delisted from the market by operation of Law unless the offeror declares its intention to restore a minimum free float (Delisting by operation of Law). Instead, If the takeover ended with a level of acceptance below the "90% threshold", the target may be merged with and into its controlling entity (i.e., the offeror). The merger into the offeror represents a method for obtaining the delisting of the selected firm since merging a listed company (i.e., the target) with and into a non-listed entity (i.e., the offeror) would determine, by operation of Law, the delisting of the target' shares from the market.

1.2 LEGAL AND INSTITUTIONAL SETTINGS

Delisting is the removal of a listed security from a stock exchange. The legal settings differ from country to country and exchange to exchange, but some common grounds exist in every country. They are designed to protect investors and ensure the stock market's integrity (Martinez & Serve, 2017).

The legal settings of the delisting are governed by a variety of laws and regulations, including securities laws, company laws, exchange rules, and institutional laws. These laws and regulations typically set forth the requirement for listing on a stock exchange, the grounds for delisting, and its process.

In most cases, a company must meet specific financial and operational requirements to be listed on a stock exchange. These requirements may include having a certain level of capitalization, meeting certain profitability thresholds, and maintaining a certain level of trading volume. If a company fails to meet these requirements, it may be delisted. In addition to failing to meet financial and operational requirements, a company may be delisted for engaging in illegal or unethical activity. They may include fraud, insider trading, or other violations of securities laws.

In the United States, the Securities and Exchange Commission (SEC) is responsible for enforcing the securities laws that govern delisting. The SEC's delisting rules are outlined in Regulation S-K, Item 802. These rules require a company to file a Form 25 with the SEC if it intends to delist its shares. Form 25 must provide the SEC with information about the reasons for the delisting and the procedures the company will follow to delist its shares (Securities and Exchange Commission, 2005).

The delisting of a company from the exchange has to follow some rules and aspects common to almost every exchange and country.

Companies must inform the exchange shareholders and regulatory authorities before delisting. This allows the shareholders to make informed decisions and plan their investments accordingly. Regulations may also stipulate acceptable reasons for delisting, such as mergers, acquisitions, restructuring, financial difficulties, or failure to meet continued listing criteria. The delisting may also require approval from regulatory bodies or stock exchange authorities to ensure that the process is conducted fairly and transparently. Therefore, public disclosure is fundamental, and companies must disclose their delisting reasons to the public and shareholders. This category needs to be protected, and fair treatment needs to be recognized to them. Exchanges and legal settings usually allow them to sell their shares at a fair price or provide other exit options. Delisting regulations also specify timeframes and procedures to be

followed during the process. It may be possible that even after delisting, companies need to fulfil certain reporting obligations to keep shareholders informed or appeal to delisting decisions and resolve disputes that may have arisen during the process.

As mentioned above, the Securities and Exchange Commission is responsible for providing the delisting regulations in the US. Public companies that wish to delist, or the national securities exchanges themselves, need to file a Form, the SEC Form 25, and the delisting will become effective ten days after the form has been filed with the SEC and most of the obligations are suspended on that date[13] (Securities and Exchange Commission, 2005).

There are also legal backgrounds for firms that cannot satisfy the requirements of the regulated market and, therefore, operate in less regulated markets. One example of this is the UK's Alternative Investment Market (AIM), which was created to attract young firms without the requirements for listing, of which oversight is entrusted to Nominated Advisors (NOmads), private entities chosen by the firms. They act as IPO advisors and as decentralized regulators, certifying the quality of new listing ends and ensuring the issuer's compliance with the rules of the AIM[14] (Martinez & Serve, 2017).

1.2.1 LEGAL SETTINGS IN ITALY

Since our analysis will focus on, and use for sampling, the delisted stocks from the Italian Exchange, it is fundamental to understand how the legal background for delisting works in Italy.

The first legal provision about the exclusion of a company from listing must be found in Art. 13 of the "Legge OPA" (l. 149/1992), where the right of withdrawal under article 2437 of the Italian Civil Code was recognized for shareholders of listed companies who dissented from the shareholders' meeting resolution concerning the merger of the issuer by incorporation into an unlisted company or by the establishment of a new company, also unlisted: "Shareholders of a company whose shares are listed on the stock exchange, who are dissenting from the resolution concerning the merger by incorporation of a new company or incorporation into a company whose shares are not listed on the stock exchange, have the right to withdraw

[13] The effective termination of the registration does not occur until 90 days after the delisting takes effect
[14] The loss of a NOmad is one of the causes for involuntary delisting on the AIM

pursuant to and in accordance with Article 2437 of the Civil Code." (Art.13, Legge 18 February 1992, n. 149).

In 1998, the Legge OPA was repealed, and a new Law of Finance, the already mentioned TUF (Testo Unico della Finanza), came into effect. The abrogated article 13 was replaced and transposed in the Art. 131 TUF alongside the Art. 133, was also regulating the exclusion from trading by assembly's will in cases of cross-listing (the migration in another Italian or European regulated exchange): "Italian companies with shares listed on Italian regulated markets, subject to a resolution of the extraordinary shareholders' meeting, may request the exclusion from trading of their financial instruments, per the provisions of the market regulations if they obtain admission to another regulated market in Italy or another European Union country, provided that equivalent investor protection is guaranteed, according to the criteria established by CONSOB by regulation." (Art.133 TUF, 1998). The central lack of the TUF was that there was no reference to what we had defined before as "pure delisting" since the only hypothesis of exclusion from trading by a will of the assembly needed a cross-listing substantiation (Scagliocca & De Niro, 2023).

Corporate Law was reformed in 2003 to cover this deficit, and the legislature introduced the Art. 2437-quinces of the Civil Code (which was subsequently accompanied by the repeal of Art. 131 TUF) into the Italian system, which recognizes the right of withdrawal to all shareholders of companies listed on regulated markets who did not participate as dissenting, absent, or abstaining in the shareholders' meeting resolutions involving the exclusion from listing, extending the scope of application of the right of withdrawal to all shareholders' meeting resolutions likely to cause the exclusion of listing from a regulated market. "If the shares are listed on regulated markets, shareholders who did not participate in the resolution resulting in the delisting, have the right to withdraw." (Italian Civil Code, Art. 2437-quinces, 2023).

The doctrine and the various articles cited above refer specifically to the first-mentioned objective of the delisting legislation, which is to protect the company's shareholders and investors. It is essential also to refer to the legal background of the exchanges, whose primary purpose is to safeguard the functioning of the market and those who operate in regulated public markets.

The Italian main stock market exchange is Borsa Italiana, also known as “Piazza Affari”, and based in Milan. The Exchange is regulated by the CONSOB[15], the Ministry of Economy and Finance agency. The different rules to follow to be listed and keep on being listed in Piazza Affari are published on the exchange regulation, where also some definitions are given.

As of Art. 2.5 of the Borsa Italiana Regulation, the exchange “may order the suspension from trading of a financial instrument, if the market regularity of the instrument itself is not temporarily guaranteed or is in danger of not being guaranteed or if the investor protection requires it”; and “may order the removal from listing and trading of a financial instrument, in case of prolonged lack of trading or if it considers that, due to special circumstances, it is not possible to maintain a normal and regular market for such instrument.” (Borsa Italiana, Art. 2.5, 2021).

For suspension from trading, the Exchange refers to the following elements:

- Dissemination or no dissemination of news that may affect the regular performance of the market
- Resolution to reduce the share capital to zero and to simultaneously increase above the legal limit
- Admission of the issuer to bankruptcy proceeding
- Dissolution of the issuer
- Negative opinion of the statutory auditor or statutory auditing company, or their inability to express an opinion, for two consecutive financial years.

In the suspension period, the exchange can also issue the removal from listing if in this period some substantial changes have occurred to protect the investors, within the limits of the responsibilities set forth in Art. 2.1.2.

Borsa Italiana can also dispose of the suspension from trading (Borsa Italiana, 2021):

- When the stock prices are less than the specific threshold set by the Instructions for a period of more than six months

[15] Commissione Nazionale per le Società e la Borsa

- When an issuer intends to give effect to an extraordinary transaction which could result in a theoretical price of the shares below the minimum threshold identified in the Instructions
- When an issuer intends to give effect to an increase of capital under an indivisible option that is not backed by suitable underwriting guarantees

For the purpose of removal from trading and listing, the exchange refers to the following elements:

- Average daily countervalue of trades executed in the market and average number of securities traded, taken over a period of at least eighteen months;
- Frequency of trades recorded in the same period;
- Degree of public dissemination of financial instruments in terms of countervalue and number of holders
- Admission of the issuer to bankruptcy proceedings;
- Negative opinion of the statutory auditor or statutory auditing company, or their inability to express an opinion, for two consecutive financial years;
- Dissolution of the issuer;
- Suspension from trading for a duration of more than 18 months.

In the cases mentioned in the Art.108 and 111[16] of the TUF, "...the securities subject to the purchases pursuant to the law shall be withdrawn from listing and trading with effect from the trading day following the last day of payment of the consideration…" (Art.2.5.1.6. Borsa Italiana, 2021).

"For the purpose of adopting the revocation measures referred to in Art. 2.5.1, paragraph 5, Borsa Italiana shall send the issuer a written communication with the elements that constitute the prerequisite for revocation and a time limit of not less than 15 days for the submission of written deductions." (Art 2.5.2, Borsa Italiana, 2021). It allows the issuer to request a hearing, as it is given to the Exchange whenever necessary. Borsa Italiana will give its decision within 60 days of sending the communication. The 60 days may be interrupted by Borsa Italiana if it deems it necessary to request additional data concerning relevant events occurring after the

[16] The art. 108 and 111 are the ones that regulate respectively to the squeeze out and the tender offer process

initiation of the revocation procedure. The initiation of the revocation procedure shall be communicated immediately to the CONSOB. Borsa Italiana also promptly notifies the public of the adoption of the suspension or revocation orders by means of notice.

Having talked about the elements that could lead a listed company from a suspension or removal from trading in a regulated market, it is essential to mention the requirements for the listing in Borsa Italiana. These are the so-called formal or admission requirements specific to every Exchange and stored in the Exchange's regulations (Borsa Italiana, 2023).

May be admitted to listing the shares representing the capital of issuers who have published and filed financial statements (even consolidated financial statements) for at least three fiscal years, and at least the most recent of which has been accompanied by an audit opinion. Consequently, the admission to listing cannot be arranged if the auditing firm has expressed an adverse opinion or has declared itself unable to express one.

Companies that are newly incorporated or have undergone, during the fiscal year preceding the year of application or subsequently, substantial changes in their capital structure must produce:

- the pro forma income statement and cash flow statement covering at least one fiscal year ended prior to the date of application submission;
- the pro forma balance sheet referring to the closing date of the fiscal year preceding the application for admission if the incorporation of the company or substantial changes occurred after that date;
- the additional interim pro-forma documents.

In addition, for admission to listing, the shares must have the following requirements:

- foreseeable market capitalization of at least 20 million euros;
- sufficient circulation, which is presumed to be achieved when the shares are distributed among the public for at least 25 percent of the capital represented by the category they belong to.

Alongside the formal requirements, some unofficial substantial requirements are not established by the exchange rules but are characteristic elements of a company. These are identifiable in growth prospects, transparency in accounting and corporate structure, quality and motivation of management, presence of an in-house investor relator, and adherence to corporate governance principles (Borsa Italiana, 2021).

Delisting is a multifaceted process governed by a complex array of laws and regulations, the ultimate objective of which is to protect investors and maintain the integrity of the stock market. While the rules and procedures may differ from country to country, there are common elements, such as the need for public disclosure, the involvement of regulatory bodies, and certain conditions that must be met for a company to be delisted. In the United States, the SEC oversees the delisting process, requiring companies to file a Form 25 and adhere to regulations set forth in Regulation S-K, Item 802. Similarly, in Italy, the regulations governing delisting are laid out in various articles and acts such as the “Legge OPA,” TUF, and provisions in the Italian Civil Code. Regulatory bodies like CONSOB oversee the delisting procedures in Italy in coordination with Borsa Italiana, the main stock market exchange. Alternative markets like the UK’s AIM provide an avenue for companies that cannot meet the stringent requirements of primary exchanges. These platforms offer a less regulated environment but are still subject to governance by entities like Nominated Advisors.

Given the consequences of delisting for companies and shareholders, the process is subject to rigorous procedural safeguards. Shareholders are provided with the right to withdraw in certain circumstances, and companies may have to meet ongoing reporting requirements even after they are delisted. In most jurisdictions, including Italy, the rationale behind these regulations is to balance the need for market efficiency with investor protection.

Overall, delisting is a crucial mechanism for ensuring the quality and integrity of listed companies on stock exchanges. By adhering to a stringent set of rules and procedures, regulators aim to protect investors and maintain financial markets' credibility, whether in the United States, Italy, or any other jurisdiction with a formal stock exchange. So, whether viewed through the lens of financial stability, legal compliance, or investor protection, delisting and

delisting regulations serve as an essential tool in maintaining the equilibrium and integrity of global financial markets.

CHAPTER 2 - CAPTURE DELISTING SIGNALS AND DETERMINANTS

Financial markets are based on contractual relationships that occur under conflicting conditions where, if one market player benefits, another loses. These contractual relationships reflect players' different economic decisions based on the quality, reliability, and timeliness of information related to the contract (Grossman and Stiglitz, 1980). As a matter of fact, in the financial market, there are players who have more and better-quality information than other players, and therefore, they can make informed economic decisions, which allows them to obtain more significant economic benefits. In a market where contracts are constantly being entered and renewed, lenders and investors require companies who are seeking capital to provide information about their performance. Companies and management are, therefore, induced to send signals to the market.

Understanding signals and capturing the determinants that companies disclose to raise capital is crucial for investors, traders, and analysts. Signals are essential cues or indicators that provide valuable insights into the behaviour and direction of financial assets, and capturing determinants is fundamental to successfully implementing investment strategies and maximizing returns.

Signals from the financial market can vary depending on their nature. The signals can be technical if they are derived from historical prices and data assets and fundamental when they are based on the underlying financial health and performance of the companies; fundamental non-financial signals need to be considered, too, as the macroeconomic and geopolitical events can generate fundamental signals to capture; sentiment signals also play a crucial role in determining prices since it can gauge the overall feeling and perception of market participants, which can influence investor behaviours and asset valuations (Picasso et al., 2019).

However, not every firm sends signals to the market, and when they do so, it is challenging to recognize authentic signals from misleading ones. According to the study of the signalling theory by Laura Bini et al., profitable companies disclose financial and non-financial key performance indicators relevant to the particular business to the public, independently of any legal requirement (Laura Bini et al., 2010). On the other hand, those companies that cannot produce positive economic performances are inclined to massage their disclosures, presenting useless or doctored indicators. The signalling theory was borne at the beginning of 1970, and it is based on the general assumption that by analysing the market, most profitable companies have something to gain from signalling their competitive advantage through more and better communications (Laura Bini et al., 2010).

If it were up to those firms themselves, the voluntary transparency of companies would be limited to the quality of their products. Therefore, only high-quality products will be disclosed to the public, considering the direct and indirect costs the disclosing activity causes to the firms. (Caratelli, 2006). For this reason, the practice of audit[17] has started to spread worldwide increasingly. To assure stakeholders and the whole market, auditing following International Financial Standards (IFRS) and multiple laws has become a necessary function in every company. Ensuring that companies provide accurate information to the public has become a primary concern of lawmakers, especially after the high-profile corporate scandals and the Sarbanes-Oxley Act[18] (also referred to as SOX act) of 2002 in the United States. In Italy and Europe, transparency has started to become a subject undergoing intense consideration only after the 2007-2008 banking crisis, when the lawmakers realised that firms and banks were still operating without proper restrictions in terms of disclosure of information. The MiFID[19] directive was then created to implement new measures, such as pre- and post-trade transparency requirements, and set out the standards of conduct to be followed by financial firms.

[17] A formal examination and verification of an individual's or organization's records and accounts, finances, or compliance with a set of standards (Cornell Law School, 2023)

[18] A U.S. federal law that aimed to protect investors by making corporate disclosures more reliable and accurate. The Act was spurred by major accounting scandals, such as Enron and WorldCom (today called MCI Inc.), that tricked investors and inflated stock prices.

[19] Market in Financial Instruments Directive, drafted in 2004 and in force since 2007

Amidst these efforts to enhance transparency and provide accurate information, the main tools analysts use to evaluate the economic performances of companies are represented by a set of ratios. These ratios are based on financial statement figures or market values, with profitability indicators among the most important. Notably, multiple lines of research have shown that analysts employ financial statement ratios to gauge a company's profitability and predict its probability of failure, the likelihood of obtaining a loan, and even the potential for merger and acquisition operations (Beaver et al., 2005). This underscores the growing importance of reliable financial reporting and the need for robust evaluation techniques in a landscape where transparency and accountability are increasingly valued. (Beaver et al., 1975).

To conduct a comprehensive analysis, analysts cannot stop taking into account only performance and financial-related indicators but need to consider non-financial indicators since they provide insights into the overall performance and health beyond just its financial numbers. This necessity was also recognized at the institutional level by the European Directive 51/2003, which stated that “to the extent necessary for an understanding of the company's development, performance or position, the analysis shall include both financial and, where appropriate, non-financial key performance indicators relevant to the particular business” (European Directive 51, art.10, 2003). Non-financial information indicates the firm's current status, while financial information available on the annual report and the financial statements refer only to the past years (historical and not current value). In addition, the frequency and information about a non-financial event, like a corporate change or the market perception, do not have limitations of accounting information, like accounting policies or estimations, and therefore cannot be estimated or manipulated. Considering that such events are also published in real-time by media reports or regulatory agencies, non-financial information can be considered as the one with the highest reliability and indispensable in a complete analysis (In Tae Hwang et al., 2014)

Multiples, ratios, and determinants will be fundamental for our research in the following paragraphs and chapters; after having described the most important ones, we will use them to understand if it is possible to predict a delisting (only involuntary as we will explain in the model construction paragraph), by looking at change, alteration, and deterioration of these indicators.

2.1 ANALYSIS OF FINANCIAL AND MOST RELEVANT INDICATORS SIGNALLING DELISTING

In this paragraph, we will discuss the Financial KPIs, the Financial Key performance indicators, which organizations use to track, measure, and analyse the company's financial health.

The focus of our attention will be on the profitability and financial indicators that are published on the annual reports of the firms, as it is considered to be the most reliable tool used by companies to communicate the core of their performance (Lang and Lundholm, 1993).

By understanding these metrics, firms can be better positioned in the market to know how the business performs financially. To unfold the different ratios and indicators of these companies is fundamental to learning how to perform the financial statement analysis and all the underlying information that can be extracted from this. Balance sheets[20],Income statements[21], cash flow statements,[22] and annual reports[23], are the best friends of analysts that help to understand how the firm is operating in the business against the other competitors (Tim Stobierski, 2020).

It is important to disclaim that ratios analysis is most efficient when used as comparison tools rather than as metrics in isolation, especially when compared to similar companies or the company's performance history.

We will talk first about the profitability measures, considered by analysts as the main determinants to estimate the health of a firm. Profitability signifies a company's capacity to yield profits from its invested funds. In this context, profitability ratios are crucial to gauge a company's competence in producing income concerning its revenue, assets, operational expenses, and equity. Robinson et al. (2015) assert that these ratios provide insights into a

[20] A statement that lists a business's assets, liabilities, and owners' equity at a specific point in time (Tim Stobierski, 2020).
[21] A statement that summarizes a business's revenues, expenses, and profits over a period (Tim Stobierski, 2020).
[22] A statement that captures how cash flow is affected by activities from the balance sheet and income statement, categorized into operating, investing, and financing activities (Tim Stobierski, 2020).
[23] A document that describes the company's operations and financial conditions, and typically includes the documents listed above, in addition to other insights and narrative from key figures within the company (Tim Stobierski, 2020).

company's competitive stance and managerial excellence, reflecting the company's success or failure (Robinson et al., 2015).

In tandem with profitability ratios, one should also look at efficiency ratios, highlighting a company's efficacy in leveraging its internal assets for income generation. Additionally, market ratios come into play to determine a company's valuation and its growth prospects, as seen through indicators like the Earnings per Share (EPS) and the Price-to-Earnings (P/E) ratio.

Profitability ratios can be further divided into two principal types: margin ratios and return ratios. While margin ratios show a company's ability to translate sales into profits, return ratios focus on its ability to provide returns to its shareholders based on their capital infusion. A spectrum of margin ratios such as gross profit margin, operating margin, net margin, EBIT, EBITDA, and cash flow margin is employed to understand a company's profitability situation, each addressing different parts of the cost structure. The margin between profits and costs expands when costs are low and shrink as additional costs are considered. Return ratios instead provide information on how well returns are created for the investors. These return ratios compare investments in asset or equity to net income (i.e., return on assets, return on invested capital, return on equity, Etc.), and through these, an analyst can understand the company’s capability of managing investments (Adam Hayes, 2023).

Between the most important return ratios to analyse, we have the return on asset and the Return on Invested capital, and as for the margins, they reveal most of their information when considered together and compared with historical returns.

The Return on Asset, commonly known as ROA, is the net income divided by total assets. The metric analyses how effectively the company deploys its assets to generate sales and profits. The more efficiently the company uses its assets, the higher the ROA will be, meaning it manages its balance sheet to generate profits. The ROA figure gives investors an idea of how effectively the company converts the money it invests into net income. The higher the ROA number, the better because the company is able to earn more money with a smaller investment. A higher ROA means more asset efficiency. Return on Asset is also used more than the return on equity since it accounts for the company’s debt while ROE does not. ROA factors in how leveraged a company is or how much debt it carries since total assets include the amount borrowed to run the operations. At the same time, this could be a disadvantage

for some analysts who consider the ratio better suited for banks since they carry the value at market value, but for non-financial firms, debt and equity remain strictly separated (Avi, 2017). We will consider it in our analysis since the main strength of the ratio is the ability to assess the effectiveness of the profitability of the company quickly, mainly when used as a screener for investments.

The Return on Invested capital (ROIC for short), is calculated by dividing the net operating profit after tax (NOPAT) by the invested capital[24], and it is used to assess a company's efficiency in allocating capital to profitable investments. It reflects how well a company puts its capital from all sources (bondholders and shareholders) to work to generate a return for those investors. Since the invested capital used in the calculation comes from debt and equity, it is considered a more advanced metric than ROE (that uses only shareholders' equity). Understanding these metrics makes it possible to evaluate the company's value. If ROIC exceeds the Weighted Average cost of Capital[25], value is created, meaning the company is healthy and growing. When the ROIC is instead lower than the cost of capital, it suggests an unsustainable business model (Credit Suisse, 2014).

Closely linked to profitability ratios, we can find the market (valuation) ratios, which are necessary to measure a company's profitability and understand its value by looking at how it performs in the market. They examine the economic status of a company in the wider marketplace, therefore pertinent to publicly traded firms (Almumani, 2018). The two most relevant ratios we will see are the Earning per Share (EPS) and the Price-Earning (P/E) ratio.

The EPS is a straightforward metric calculated by dividing the company's net income by the average number of its outstanding shares for the year. It serves as an indicator of the company's financial health. A robust EPS suggests that the company has adequate profits to either reinvest or distribute as dividends to shareholders. By comparing the current EPS with its past figures, investors can discern trends in profitability, evaluating its historical

[24] Invested capital is the total amount of money raised by a company by issuing securities, which is the sum of the company's equity, debt, and capital lease obligations. It is not a line in the financial statement since it is composed by voices that are listed separately on the balance sheet (Investopedia, 2022)
[25] The firm's average after tax cost of capital from all sources, defined as the average rate that a company expects to pay to finance its assets.

performance and future potential. A consistently increasing EPS signals a stable and promising investment, while fluctuating or diminishing EPS may raise concerns.

The latter is the Price/Earnings ratio, which is strictly related to the Earnings per share since it is calculated by dividing the EPS by the stock price. Investors and analysts use the P/E ratio to determine the relative value of a company shares with one of the companies in the same business or compare it with the historical P/E of the company. In essence, the Price Earnings ratio indicates the dollar amount an investor can expect to pay to invest in a company to receive 1 € of the company's earnings. Therefore, the P/E ratio shows what the market will pay today for a stock based on its past or future earnings. A high P/E could mean a stock's price is high relative to earnings and possibly overvalued. Conversely, a low P/E might indicate that the current stock price is low relative to earnings (Jason Fernando, 2023).

Liquidity ratios are essential financial metrics that evaluate a company's capability to meet its short-term debt responsibilities using readily available assets. Quick ratio is a prominent ratio used to gauge a firm's liquidity status. This ratio assesses the company's capacity to settle its current liabilities using assets that are readily convertible to cash. To compute the quick ratio, one divides the company's most liquid assets, such as cash, cash equivalents, marketable securities, and accounts receivables, by its current liabilities. Notably, assets like inventory are excluded from this calculation due to potential challenges in their immediate liquidation. A higher quick ratio signifies more robust liquidity and overall financial health. Conversely, a lower ratio indicates potential challenges in meeting short-term debt obligations. Typically, a quick ratio of 0.8 is perceived as the norm, suggesting that the company possesses adequate liquid assets to cover its current liabilities. A quick ratio below 0.8 implies potential difficulties in addressing short-term liabilities promptly, whereas a ratio exceeding 0.8 indicates a comfortable liquidity position, enabling the company to clear its current debts immediately. (Avi, 2017).

Debt and Leverage indicators are crucial components for evaluating a company's financial health and performance. These metrics provide insights into a firm's ability to manage its financial obligations and how much it relies on borrowed funds to finance its operations and growth. Leverage refers to using borrowed funds to finance investments or operations, and debt is a mechanism of financial leverage because it allows a company to acquire assets or

invest in projects without recurring (entirely) to the firm's equity capital. Debt and leverage are, therefore, heavily linked, and their ratios provide most of the information when studied together. The debt ratio is a metric that quantifies a company's leverage by comparing its total debt to its total assets. It indicates the proportion of a company's assets that are financed through debt. If the ratio exceeds 1, the company has more debt than assets, suggesting a substantial reliance on borrowed funds relative to its resources (Julie Dahlquist, Rainford Knight, 2022). A high ratio indicates that a company may be at risk of default on its loans if interest rates suddenly rise. A ratio below 1 means that a more significant portion of a company's assets is funded by equity. Despite being a simple and easy-to-compute ratio, the debt ratio helps determine a company's capacity to service its long-term debt commitments. As mentioned earlier, a lower debt ratio signifies that the business is more financially solid and lowers the chance of insolvency (Adam Hayes, 2023).

The debt-to-equity leverage ratio, calculated by dividing the total liabilities by total shareholders' equity, is one of the most common and used leverage ratios. It measures the degree to which a company is financing its operations with debt rather than its own resources. A high debt/equity ratio generally indicates that a company has aggressively financed its growth with debt (Julie Dahlquist, Rainford Knight, 2022). This can result in volatile earnings due to the additional interest expense, but if the company's interest expense grows too high, it may increase the company's chances of default or bankruptcy. A drop in the share price may reflect the outweighing of the cost of debt financing. It is difficult to say what a good debt-to-equity ratio or a good debt-to-asset ratio is for a firm since these two ratios we have mentioned use debt as the numerator, and firms in the market use debt and leverage for different capital needs. Generally speaking, high use of debt and a debt-to-equity ratio's value over 2 is considered risky; the opposite of this, a meagre ratio may suggest that the company is not taking advantage of debt financing and, therefore, is unfavourable for the company.

It is worth mentioning the importance of stock liquidity, especially while talking about listing and delisting. Liquidity in share trading is of paramount importance for analysts and investors and a primary benefit of going public firms. At the same time, if the stock's liquidity benefits deteriorate, the firm will be more likely to go private. Turnover is often used in delisting studies as a proxy for stock liquidity (Martinez and Serve, 2017). Turnover, also defined as the volume of transactions and, therefore, the trading volume, can be estimated through the

natural log of daily shares traded in the past 12 months or as the natural logarithm of sales for the fiscal year. The volume of transactions also gives an essential indication of the size of the firm and its market relevance. Firms that are bigger in size are, at the same time, more liquid and more able to cover direct and indirect costs related to disclosure and listing.

Risk can also be considered while analysing a company's performance and financial health. Firms that take on more risk than the others are also the ones that disclose most of their information. We will also take into consideration the risk measure in the next chapter while studying the delisting through the beta index, which is a proxy of the whole firm's level of risk, including financial risk. (Bini et al., 2010). The beta of a company reflects the volatility of its stock price relative to the broader market's movements. A beta value of 1.0 signifies that the stock moves in tandem with the market, implying that it carries the same systematic risk as the market. If the beta is less than 1.0, it suggests that the stock is less volatile and, hence, less risky than the market. Conversely, a beta exceeding 1.0 indicates that the stock has greater volatility and higher risk than the market. (at the same time, risky stocks generate more profits for investors).

The cost of disclosure of information, which is the last financial determinant in this chapter, must also be mentioned in this analysis. In 2005, the European Union adopted the International Financial Reporting Standards (IFRS). Firms listed in the EU that publish consolidated financial statements are required to apply these international accounting standards. However, IFRS implementation is costly. According to Vulcheva (2011), the initial and recurring costs of applying IFRS can be respectively as high as 31% and 0.06% of firms' turnover. Given the findings provided by the literature about delisting, Vulcheva (2011) hypothesizes that the costs of IFRS are sufficient to force some firms to go private, and she shows an overall increase in delistings in the year of the EU's IFRS adoption (Vulcheva, 2011).

Cost of reporting and governance can also be recognized as non-financial indicators since they depend significantly on a firm's governance structure.

2.2 ANALYSIS OF NON-FINANCIAL INFORMATION TO PREDICT DELISTING

Non-financial information is sometimes more meaningful than financial indicators since they can provide diverse stakeholders with earlier warning signals for predicting delisting. Non-financial information is generally disclosed to the public promptly because it requires no procedure involving settling accounts and audits, and firms publicly disclose relevant information frequently based on disclosure regulations. This is a critical factor in predicting the delisting year for a particular firm because non-financial information enables the use of disclosed information during the year of the firm's delisting. In contrast, financial information enables the use of information only for the year immediately before the delisting. Therefore, financial data available in the delisting year tends to be limited to accounting data for the previous year (In Tae Hwang et al., 2014).

If a firm is delisted, the investors need to recover their investment before the stock price declines to minimize their economic loss. Therefore, it is essential to have information that can be used to predict delisting in a timely manner. By looking at advanced warning signals, which we will illustrate in this chapter, investors and stakeholders can take necessary measures in advance and minimize the social cost of delisting.

2.2.1 ASSESSMENT OF CORPORATE GOVERNANCE PRACTICES AND OWNERSHIP STRUCTURE AS POTENTIAL DELISTING SIGNALS

Corporate governance plays a pivotal role in a firm's listing and delisting. First, companies must have and keep specific corporate governance standards to and keep on being listed (such as producing reports, having a majority of independent directors, and audit committees)[26]. Corporate governance can also be one of the main drivers of delisting since an inadequate or ineffective governance structure might push managers and shareholders to realign, exiting the market to reduce agency conflict between them (Martinez & Serve, 2017).

[26] This is true only for some stock exchanges, like the Nasdaq, that keeps an approach of full compliance. In Europe, for example, the regulation is less strict and do not provide specific criteria to keep, but an approach of "comply or explain". Corporate governance is still kept under surveillance and has a strong impact on investor decisions (Martinez & Serve, 2017)

By looking closely at the corporate governance of a firm, and especially at corporate governance actions during the life of the firm, it is possible to detect non-financial variables to use for delisting provisions with proper timing.

Variations in the company name could be the first governance non-financial determinant for detecting a deteriorating performance. Some firms change their name to revamp their image when they are undervalued in the securities market or show poor performance. Yoon and Choi (2007) stated that changes in the firm name are not related to short-term business performance and have a negative effect on firm value. Therefore, firms employing an "expedient" name change are more likely to be delisted than those that do not (Yoon and Choi, 2007).

When a company faces low profitability and unsmooth cash flow, a liquidity deficit will happen, whatever (new investment, debt redemption, Etc.) the purpose of raising capital is. Generally, a company with depressed business performance makes it difficult to solve the liquidity problem through the normal processes in the financial circle, and the firm will try to raise funds through capital increases. Consequently, the frequent capital increases of a firm with deteriorating management status could be considered a danger signal for its possibility of delisting (In Tae Hwang et al., 2014).

CEOs have considerable influence on the management of the entire firm. Therefore, frequent changes in the CEO can lead to an unstable management structure and prevent the firm from concentrating on long-term profits. In particular, if the CEO changes more frequently than the average, the firm may not have a normal management structure. That is, the firm's performance may decrease such that the CEO leaves.

Variation of major shareholders needs to be also kept under control. Frequent changes of major shareholders increase the likelihood of disagreement between them, and it can be a factor that destabilizes the business status and management. The likelihood of being delisted increases when the largest stakeholders change frequently. At the same time, it important to watch also how concentrated is the ownership of the firm. Differences in shareholding might be the cause of the wide information gap between executives and shareholders. Firms with high ownership concentration may reduce this information gap, and at the same time, firms whose major shareholders account for a small shareholding are likely to face conflicts over

management rights, and the major shareholders are likely to sell their shares. To summarize, conflicts over management rights and frequent changes in major shareholders can destabilize management and increase the likelihood of delisting (In Tae Hwang et al., 2014).

The board of directors is an organization that makes crucial decisions on all management aspects and takes responsibility for those decisions. As an effective mechanism to mitigate the agency problem arising from the separation between management and ownership, the board can undertake valid supervision of the management behaviour (Hu et al. 2012). On the other hand, changes in the firm name, major shareholders, or CEO are generally approved by the board of directors. Therefore, the frequency of board of directors' meetings is likely to increase when there is an increasing need for such changes, and thus, an increase in this number implies some management problems. In this regard, firms with a large frequency of board of directors' meetings are more likely to be delisted (Chen et al. 2006).

2.2.2 MARKET AND INDUSTRY-SPECIFIC DETERMINANTS OF DELISTING

Our analysis can also consider market and industry-specific factors as non-financial determinants. Environmental factors are seen as essential role players in the investors' analysis. One of the main reasons is that disclosure practices differ from industry to industry and country to country. Institutional variables, such as culture, legal orientation, or economic structure, affect firm activity and its communication (La Porta et al., 1998). According to the authors, firms of common-law-oriented countries are more inclined to provide the market with voluntary disclosure than civil-law-oriented countries. At the same time, the level of disclosure in corporate annual reports depends also on the firm's sector and industry.

Also, when discussing determinants in the context of a broader market environment, we need to refer to factors that affect companies across industries and markets, like economic recession or booming markets, global geopolitical events, and monetary and regulatory changes.

A market in recession or an economic boom is linked to two different phenomena that could have, as a consequence, the same result. As a matter of fact, in a bear market, firms are more likely to perform poorly and struggle to maintain their financial performance. Reduced consumer spending, decreased business investments, and lower demand for products and

services can lead to financial challenges, which in turn can result in delisting. On the other hand, when the overall stock market is hot, companies might experience inflated stock market prices, which are not representative of their actual financial performance. In the case of market realignment, the companies' stock price could drop instantly, causing financial trouble and eventually delisting. An overly optimistic and valuated market could also affect the investors' reactions to all announcements and market events (Richard J. Rosen, 2006). Investors are not the only ones who could be affected by this over-optimistic perception of the market. Also, companies operating during this period are inclined to overestimate the performance and, therefore, the synergies that could be created from mergers and acquisitions with other companies. According to Jovanovic and Rousseau (2001), merger waves are driven by changes in the business environment that increase overall stock prices and lead to more profitable opportunities. This overestimation may lead firms to make more bad acquisitions (considering them ex-post) and lead to financial distress (Jovanovic and Rousseau, 2001).

2.2.3 MARKET SENTIMENT AND INVESTOR PERCEPTION

Market sentiment and investor perception play pivotal roles in shaping a company's status and future and possibly influencing delisting events. These factors are integral components of the broader market environment that can significantly impact a company's performance, stock price, and ultimately, its listing status on a public stock exchange, and mass media are a pervasive force in shaping the public's perception. Media framing has, in this matter, a strong impact since, in addition to acting as an agent that reports reality, it makes a difference in the public's perception of a particular issue, and it may convey the dominant view which prevails between investors and the simple public (Mutz & Soss, 1997).

News on market events and the way in which media present the news can influence the market and investors, facilitating the appearance of an irrational exuberance (Le Bris, 2016). The media tend to be selective about what to report, but their news is often driven towards underperforming firms or firms with non-conforming behaviours. Underperformance and non-compliance indicate a higher risk for market participants, so these firms are more likely to attract greater media attention than others. Therefore, firms that are of more interest to investors are more likely to be covered by the press. An example that could group both of

these categories is the delisting from a sustainability index. Firms make investments in sustainability to increase performance and value growth and, at the same time, raise their reputation. Reputation is arguably the most important of intangible assets.

Hence, companies prioritize the triple bottom line by equally valuing economic, social, and environmental aspects. This means they aim for a balanced focus on people, the planet, and profits. (Elkington, 2004). Firms are increasing their investments in sustainable projects to gain more reputation. A strong reputation can yield higher returns by enabling companies to set premium prices, recruit top talent, and draw in investors. Moreover, a good reputation helps firms in negotiations with stakeholders. An excellent social reputation indicates the firm's capacity to fulfil future obligations. In so doing, building upon a firm's activities in a social context is a way to start a cycle of positive engagement with stakeholders, both directly and indirectly associated with the business. (Fombrum and Shanley, 1990). As mentioned above, inclusion in the sustainability index and socially responsible investing is becoming essential for shareholders and, therefore, for the media. Sustainability indexes are external bodies that serve as information intermediaries between a firm and its stakeholders, making objective, neutral, and professional assessments of each company's sustainability report. Being delisted from a sustainability index for being socially or environmentally irresponsible could badly affect the reputation of the firm, and increasing the chances of media coverage and influencing public perception. Being socially or environmentally irresponsible might create problems for a firm in the medium to long term. For instance, when evaluating the impact of expected losses from poor management on the ability to settle debt, it results in a considerable decrease in company value (Angeloantonio Russo & Massimo Mariani, 2013).

In conclusion, we have assessed that agents operating in financial markets have different information, and one group's gains usually correspond to losses for the others. These relationships pivot on economic choices influenced by the quality, reliability, and timeliness of information, and the lack of knowledge presents a challenge for some parties to navigate the market. For this reason, we have explained the significance of signals for market participants and their heterogeneous nature. Financial and non-financial signals were analysed to understand better a company's well-being and potential delisting beyond financial metrics. With these foundational concepts in place, the focus will shift to practical application. The forthcoming chapter will explore the real-world instances of firms that have undergone

delisting from the Italian market in recent years. This empirical investigation aims to bridge theory with reality, examining the extent to which the identified signals and determinants hold relevance and predictive power in actual market scenarios. By engaging in this empirical exploration, we aim to contribute to understanding how these concepts manifest in the practical landscape and their implications for identifying potential delisting patterns.

CHAPTER 3 - THEORY IN PRACTICE: TESTING DETERMINANTS AND SIGNALS IN A SAMPLE OF ITALIAN DELISTED STOCKS

3.1 STUDY METHOD AND DESCRIPTION OF VARIABLES

This study aims to develop a more timely and accurate delisting prediction model for listed firms based on financial and nonfinancial information. As we have understood from the literature about delisting in the first chapter, it has different characteristics when divided into voluntary and involuntary. In addition, the heterogeneity in the voluntary delisting between firms delisted by management choice, by M&A delisting, or even between voluntary delisting with and without subsequent trading does not allow us to consider delisting as a whole. Building a prediction model with such a heterogeneous sample would possibly cause biased results, reduce the validity of the sample, and cause misleading conclusions. For this reason, we decided to focus only on involuntary delisting[27].

The prediction is done through the employment of a logit model.

Logistic regression (logit) is a well-known procedure, used as a variant of multiple regression, in which the response is binary rather than quantitative (Bunge & Judson, 2005). The logit model weights the independent variables, while assigning a Y score to each company in the sample, in form of delisting probability (equal to 1 if the company was delisted, and 0 if continuously listed) (Trueck & Rachev, 2009).

[27] This will also be reported on the limitations and further research chapter.

$$DELISTi,t = \beta 0 + \beta 1ROA(t-1) + \beta 2EPS(t-1) + \beta 3QUICK(t-1) + \beta 4DEBT(t-1) + \beta 5LEV(t-1) + \beta 6SIZE(t-1) + \beta 7chNAME(t-1) + \beta 8chCEO(t-1) + \beta 9chCAP(t-1) + \varepsilon$$

The dependent variable is the delisting status (DELIST), and the independent variable were divided into financial and nonfinancial information. The financial information was obtained from the financial statements disclosed to the market after auditing (taken from the Bloomberg database), and nonfinancial information were obtained from company news and investors relations (taken from multiple databases, such as Bloomberg, Aida, Orbis, and from multiple websites and news, such as Banca d'Italia, Il sole 24 ore, Milano Finanza). The study applies the following variables, corresponding to financial and nonfinancial information.

$DELIST_{i,t}$	Coded as 1 if firm i is delisted in period t, and 0 otherwise
Financial Variables	
$ROA_{i,t-1}$	Return on Asset for firm i in period t-1
$EPS_{i,t-1}$	Earning per Share for firm i in period t-1
$QUICK_{i,t-1}$	Quick Ratio for firm i in period t-1
$DEBT_{i,t-1}$	Debt Ratio for firm i in period t-1
$LEV_{i,t-1}$	Leverage Ratio for firm i in period t-1
$TURN_{i,t-1}$	Turnover for firm i in period t-1
Nonfinancial Variables	
$chNAME_{i,t-1}$	Variations in the corporate name i in period t-1
$chCEO_{i,t-1}$	Frequency of chief executive officer changes of firm i in period t-1
$chCAP_{i,t-1}$	Frequency of fluctuations in capital and shareholders of firm i in period t-1

We selected the following financial/nonfinancial variables:

ROA: it states if the company is using its assets efficiently to generate profit. A higher ratio means the company is more efficient while a lower ROA could mean that improvement is needed. By looking at ROA trend, it is possible to verify if the company is facing a phase of low profitability that could mean a distressed company, and in the end a delisting.

EPS: It is a measure of the profitability of the company. A higher EPS, means a profitable firm and a deteriorating ratio could determine the delisting of the company.

QUICK RATIO: it represents the ability to pay current liabilities with assets that can converted to cash quickly, so how the company manages short term liabilities. The higher the ratio result, the better for the company. Looking at trend analysis, if the ratio decreases, also the financial situation of the firm decreases, at least considering the intertemporal situation (Avi, 2017).

DEBT RATIO: it describes the portion of the company's assets that are financed by debt, and it helps in determining the capacity to finance long term debt commitments. A high debt ratio increases the chances of default and delisting, since continuously listed companies with lower debt ratio are more likely to remain solvent during time.

LEVERAGE RATIO: it measures the degree to which a company is financing its operation with debt rather than its own resources. The higher the ratio, the higher the probability of financial distress and the inability to meet the required debt obligations, and therefore default. At the same time, a lower value could signify for the company to miss out on growth opportunities and the mismanage of the company.

TURNOVER: As the firm size grows, and therefore its turnover, the more likely is that a company will perform better and dispone of more immediate liquidity to cover its short-term debt and costs. Therefore, larger firms are less likely to be delisted.

VARIATION IN COMPANY NAME: firms that changes their name to boost and recover its image are more likely to be delisted than those that do not.

VARIATION IN CEO: frequent variation in the chief executive officer could lead to an unstable management and a higher possibility of being delisted.

FLUCTUATIONS IN CAPITAL: the likelihood of being delisted might increase with frequent fluctuations in capital, usually done when the company is in a liquidity crisis or in general in a negative financial situation.

The other financial and nonfinancial variables mentioned in the previous chapter were not selected for the unavailability of data in the historical financial statements and news of the companies in the sample, but they need to be considered still as important variables (as we will mention in the future research paragraph) that could be monitored by the investors.

It is important to note that, practically speaking, the effect of any signal on profitability and prices can be ambiguous. In this study, the ex-ante implication of each signal is conditioned on the fact that these firms are financially distressed at some level (as firms undergoing involuntary delisting). For example, an increase in leverage can, in theory, be either a positive or a negative signal, according to a firm's situation, market, and financial situation. However, for financially distressed firms, the negative implications of increased leverage seem more plausible than the benefits garnered through reduced agency costs or improved monitoring (Myers and Majluf, 1984).

3.2 SAMPLE SELECTION AND COMPARISON ANALYSIS

In this chapter, we analysed the financial and non-financial information and indicators of a sample of firms as mentioned above. To build this sample, we have taken all the delisted firms in Italy from 2011 to 2020 from the two major markets in Italy, Euronext Milan and Euronext Growth Milan, also referred to as MTA[28] and AIM[29]. These two markets embody all the Italian listed equity firms, from the small-size firms (in the AIM) to the large-size ones (in the MTA). From this sample of 167 firms, we have eliminated firstly all the firms delisted through an M&A deal or by issuer request, therefore, all voluntarily delisted companies and reduced the sample to 52 firms. We have then removed all the firms that operated in finance, insurance, and real estate since they have industrial characteristics, and all the firms of which there was not enough audited financial information available.

[28] MTA: Mercato Telematico Azionario
[29] AIM: Alternative Investment Market

Delisted firms from 2011 to 2020		167
Less:		
Firms voluntarily delisted	(115)	
Firms in finance, insurance, and real estate	(11)	
Firms without enough audited financial information available	(8)	
Total		33

Table 2. Description of sample selection procedure

After the selection procedure, we have found 33 companies, that are the starting point for our model. For a comparison of delisted firms, we selected a total of 66 matching firms (a 1:2 ratio) based on the type of industry (Industrial, consumer discretionary, health care, communications…), the market, and the historical market capitalization. The specific standards for the selection were: (1) continuously listed firms for the same time period of the matching delisted firm; (2) same exchange (Euronext Milan and Euronext Growth Milan); (3) same industries; (4) firms with a market capitalization and an asset size similar to the one of delisted firms three years before their delisting; and (5) firms with qualified audit opinion.

From these delisted and listed companies, we have built a comparison to run a descriptive analysis to prepare the ground for the logistic regression model. Descriptive statistics can help understand each variable's distribution, identify outliers and missing values, and discover the possible existence of multicollinearity between predictor variables and the correlation between predictors and the dependent variable.

To build the comparison, we have considered the financial and non-financial information of the three years before the delisting of the company, or the last three financial years with audited information prior to the delisting (t-1; t-2; t-3) for both delisted and the continuously listed firms. The observations in the descriptive analysis are in this way: 99 from the delisted sample (33 year-observations) and 198 from the listed one (66 year-observations), to see if a deteriorating performance and a delisting can be recognizable with a simple analysis of some financial and non-financial determinants over the years.

		Delisted firms			Listed firms				
Variable	Expected sign	Mean	Median	Standard deviation	Mean	Median	Standard deviation	t-test	Welch t-test
ROA	(-)	-10,32	-5,41	19,223	0,922	1,351	19,915	-4,64***	-4,69***
EPS	(-)	-0,745	-0,14	3,415	-0,476	0,067	5,454	-0,45	-0,52
QUICK	(-)	0,787	0,495	1,276	0,945	0,77	0,633	-1,42	-1,16
DEBT	(+)	0,898	0,815	0,488	0,655	0,649	0,283	5,39***	4,55***
LEV	(-)	1,482	2,169	14,306	3,261	1,711	8,697	-1,32	-1,11
TURN	(-)	3,811	3,831	1,726	4,676	4,819	1,533	-4,38***	-4,20***
chNAME	(+)	0,1919	0	0,4208	0,0505	0	0,219	3,81***	3,14***
chCEO	(+)	0,1717	0	0,377	0,0555	0	0,251	3,15***	2,76***
chCAP	(+)	0,306	0	0,484	0,136	0	0,344	3,47***	3,10***

Table 3. Summary of major variables.

Notes: The table reports summary statistics of variables. Our sample comprises 33 delisted firms from 2011 to 2020. For a comparison of delisted firms, we selected a total of 66 matching firms (a 1:2 ratio) based on the type of industry, the market, and the total asset size. There were 99 firm-year observations for delisted firms and 198 for continuously listed firms. Variable definitions and measurements are provided in the Appendix 1. ***, ** and * denote significance at the 1, 5, and 10% levels, respectively. T-statistics are from t-tests of the differences in the means and Welch t-test are

from t-test of the differences in the means, but without the assumption of equal variances of the variables in the two samples.

The table shows the summary of the independent variables, both financial and non-financial. In terms of descriptive statistics for financial variables, the average value for Return on Asset were -10,32 and 0.922 for delisted and continuously listed firms, respectively (at the 1% level). As expected, the delisted firms' ratio value was lower than those listed. The results were not as strong as predicted for the Earnings per Share and the Quick ratio instead. The average value of both variables was lower for delisted firms than for the continuously listed ones (-0.745 and -0.476 for the EPS ratio; 0.787 and 0.945 for the Quick ratio), as expected, but the difference was not considered to be statistically significant in our sample of firms. In the same way, the LEV ratio was 3.2, higher in continuously listed firms considering their growth opportunities, while 1.4 for delisted firms, which may indicate their inability to grow and their mismanagement. The debt ratio was instead statistically significant at the 1% alpha and equal to 0.9 for delisted firms, which was almost 30% higher than the one of the listed firms (0.65), expressing a better balance between the amount of assets and liabilities of a firm, since an imbalance could lead to delisting. The last relevant financial determinant was the Turnover, which states the stock's liquidity and the volume of transactions of the firm. Looking at the TURN variable, it is possible to see how, in the delisted sample, the final mean of 3.81 is lower than the one of the listed sample (4.67), as expected, since near the year of the delisting, companies have less liquidity from a decrease in market transactions.

All the non-financial variables taken into consideration to explain delisting were instead statistically significant. Even though the median was equal to zero in both the samples, the difference in the mean of the variables was highly important to predict a delisting. For the number of the chNAME changes, delisted firms changed their name 0.192 times on average, whereas for listed firms, 0.051 times, indicating that delisted firms changed their names more frequently than continuously listed ones. The two groups showed a significant difference at the 1% level for changes in the firm name, indicating that the market did not favour firms that changed their name to disguise their negative image.

For the frequency of fluctuations in capital (chCAP), delisted firms increased their capital 0.3 times on average, whereas continuously delisted ones, 0.136 times (at the 1% level), indicating

that delisted firms raised funds through capital increases more frequently than continuously listed ones and implying that frequent number of changes in capital may indicate the firm's excessive dependence on external funds, which might increase the likelihood of delisting. For the frequency of change in CEO and management (chCEO), delisted firms changed their management 0.172 times on average, while continuously listed firms only 0.055 times. These signals show that frequent changes in CEO and management and unstable management structure may accompany the probability of delisting.

3.3 LOGIT REGRESSION AND RESULTS

We conducted a univariate analysis to examine and develop useful variables for predicting delisted firms based on nonfinancial and financial information. Based on the results of the univariate analysis, we conducted a multivariate analysis to predict delistings (Table 4).
The table shows the results of the logit analysis conducted on financial and nonfinancial on information, firstly information taken from the sample of delisted and listed firms one year before delisting, at t-1, and then taken from a new sample, extracted through the propensity score matching technique. Propensity score matching is a statistical technique used in observational studies to estimate causal treatment effects and reduce sample selection bias. Its basic idea is to find in a large group of nonparticipants (continuously listed firms) those individuals who are similar to the participants in all relevant pretreatment characteristics (listed firms) (Caliendo et al., 2008).

The logit regression ran on the nonmatched sample returned a good and statistically significant at the 1% level goodness-of-fit of the model (71%), showing that the predictors included in the model were improving the fit compared to the null model[30]. Also, the model's concordance (AUC[31]) was equal to 0.94. A high AUC value (close to 1) suggests the model has strong discriminative power. That is, it does an excellent job distinguishing between the different outcome classes and making correct classifications.

[30] The null model serves as a baseline to compare other models against, and it includes only the intercept term and no other predictor variables.
[31] Area Under the Receiver Operating Characteristic Curve. It is a performance metric used for evaluating the predictive power of the logit model

Variable	Logit model t-1	Vif	Logit model t-1 after propensity score matching	Vif
Constant	-0,7549 (2,094)		-0,8765 (2,047)	
ROA	-0,0503* (0,027)	1,207	-0,0465* (0,027)	1,201
EPS	0,1805 (0,228)	1,179	0,1740 (0,222)	1,171
QUICK	-0,8268 (1,059)	1,8	-0,5625 (1,103)	1,788
DEBT	2,5771 (1,635)	1,594	2,2874 (1,589)	1,545
LEV	-0,0214 (0,030)	1,156	-0,0219 (0,028)	1,156
TURN	-0,6702*** (0,232)	1,428	-0,5558** (0,243)	1,587
ChCAP	2,6264 (1,067)	1,253	1,5078 (1,018)	1,253
ChCEO	3,323*** (1,09)	1,426	2,9034*** (1,092)	1,55
ChNAME	1,6371*** (0,992)	1,145	2,2826** (0,993)	1,209
Chi-square	71%***		38%***	
Concordance	0,944		0,89	
AIC	75,532		73,7	
N	99		66	

Table 4. Logit regression results.

Notes: The table reports the results of the logit analysis based on nonfinancial and financial information. We ran logit regression with control variables as shown. (t-1) is one year before sample firm delisting (or the last financial year with audited information prior the delisting). ***, ** and * denote significance at the 1, 5, and 10% levels, respectively. Vif values are calculated to verify the multicollinearity problem among variables, Chi square and AUC were also calculated to assess the predictive and explanatory power of the model.

The ROA metric for the unmatched sample was equal to -0.0503 and statistically significant at the 10% alpha. This information is consistent with the expectation built in the descriptive analysis, indicating that delisted firms are likely to have a lower Return on Assets than continuously listed ones. All the other relevant financial variables taken to study the delisting

in the Italian market followed the sign as expected from the summary of major variables. However, they were not statistically significant in predicting it, except for the Turnover (TURN) value. The result of the logit regression showed a value of -0.67, statistically significant at the 1% alpha. Therefore, a decrease in the liquidity coming from the market transaction can be considered a relevant predictor in a delisting study.

Non-financial variables resulted instead to be more significant in a delisting analysis. The frequency of chief executive officer and top management changes was positive and significant at the 1% level for year t-1. This suggests that CEOs may leave their delisted firm because they have no confidence in the firm's revival and perceive an increase in its enterprise risk, causing instability in the management. The frequency of change in name proved also to be statistically significant at the 1% level. The estimate was also positive, showing how firms near delisting tend to change their names to revive their image and regain market trust more than continuously listed firms.

	Y	ROA	EPS	QUICK	DEBT	LEV	TURN	ChNAME	ChCEO	chCAP
Y	1	-0,477	-0,042	-0,287	0,481	-0,11	-0,293	0,361	0,446	0,392
ROA	-0,477	1	0,21	0,314	-0,687	0,0514	0,072	-0,227	-0,3018	-0,197
EPS	-0,042	0,21	1	0,164	-0,143	0,023	-0,035	0,0026	-0,05	-0,038
QUICK	-0,287	0,314	0,164	1	-0,511	-0,032	-0,094	-0,1168	-0,129	-0,205
DEBT	0,481	-0,687	-0,143	-0,511	1	-0,046	-0,086	0,308	0,262	0,233
LEV	-0,11	0,0514	0,023	-0,032	-0,046	1	0,176	-0,225	0,057	-0,002
TURN	-0,293	0,072	-0,035	-0,094	-0,086	0,176	1	-0,1624	0,01	0,017
chNAME	0,361	-0,227	0,0026	-0,1168	0,308	-0,225	-0,1624	1	-0,019	0,148
chCEO	0,446	-0,3018	-0,05	-0,129	0,262	0,057	0,01	-0,019	1	0,323
chCAP	0,392	-0,197	-0,038	-0,205	0,233	-0,002	0,017	0,148	0,323	1

Table 5. Correlation matrix between the variables of the logit model

By studying the correlation between the logit regression variables, we could also draw more conclusions about the model. For example, we can see how the near-zero correlation between the independent variable EPS and the constant Y reflects the logit regression result that considers this variable as non-statistically significant and possibly redundant in a delisting study. Another noteworthy result that we can extract from the matrix (Table 5.) is the strong relationship that the variables ROA and DEBT have with the dependent variable Y (my constant) and between themselves. ROA is strongly and negatively correlated with the dependent variable (-0.477), suggesting that as the Return on Asset increases, the event of delisting decreases, and vice versa. This is also proved by the logit regression, where Return on Asset is one of the statistically significant independent variables in predicting the outcome. From the correlation matrix and the results of the comparative analysis, we have seen how the DEBT ratio is moderately correlated with the dependent variable and significant at the 1% level in the t-test on the difference between the means (Table 3). However, this significance did not result in the logit model. The reason for this might be found in the high correlation between the variable ROA and DEBT, which was equal to -0.687. A high correlation could have impacted the model and the actual effect of the variables, being less able to disentangle the effect of one variable from the other. This could have also caused interpretability problems, introducing issues of multicollinearity.

After making inferences on correlation, we also studied the Variance Inflation Factor (VIF)[32] for each independent variable, in order to understand the multicollinearity between the variables. High correlation would make difficult to isolate the effect of each variable on the dependent variable (the delisting). From the results in table 4, it can be seen that multicollinearity between the variables was not actually an issue in our sample, since the highest VIF value is equal to 1.8, which suggest low multicollinearity.

After having inferred the logit regression model based on the initial sample of 33 delisted firms and 66 continuously listed ones, we conducted the propensity score matching technique to investigate and draw conclusions from a new smaller sample but with unbiased estimates of the delisting effect. The regression conducted on the new sample of 33 delisted firms and 33 listed ones with matched characteristics resulted in a smaller goodness-of-fit result of 38%,

[32] The Variance Inflation Factor is a metric commonly used to detect the presence of multicollinearity in multiple linear regression model

but still statistically relevant at the 1% level after the Chi-square test. This drop in the goodness-of-fit (the difference between the logit model and the null model) can be justified by the significant decrease in the sample size (even though the residual deviance has changed from 56 to 53.7 after the matching technique). In addition, after matching, the distribution of covariates between the treated and control groups should be more similar, potentially leading to a model that explains less of the variance than before that was due to the imbalance between the groups.

Even though the goodness-of-fit has reduced, the same variables remained statistically significant based on the Wald Test[33], indicating a good fit. ROA, TURN, chNAME, and chCEO remained statistically significant after the propensity score matching, giving validity to these variables when predicting a delisting in Italy. The concordance result remained high after the matching, showing the high predictive power of both models.

Also, in the second sample, the variables proved to be uncorrelated with each other, showing a lower VIF value for each variable. As a matter of fact, the highest one in the new sample is equal to 1.78.

The AIC results were similar in both models, 75.5 and 73.7 in the unmatched and after-matching model, respectively, showing that the relative quality of fit increased after the propensity score matching, but not drastically.

3.4 LIMITATION AND FURTHER RESEARCH

The model, as can be seen by some of the results, presents some limitations that need to be addressed and explained to allow future research to pick up from where we have left. Firstly, as mentioned in the study method, we have only focused on involuntarily delisted firms. This causes different limits in our analysis, such as missing out on insights and patterns in the voluntary delisting process. By not analysing voluntary delisting, we are not getting a comprehensive understanding of all the factors and characteristics involved in the phenomenon of delisting, and the patterns and implications derived from our analysis may

[33] Commonly used test in linear and logistic regression to test the significance of individual and multiple coefficients simultaneously

not be applicable in the case of voluntary delisting. At the same time, the choice of using only involuntary delisted firms to build a consistent sample has strongly impacted its size.

The main limitation of the model we constructed was certainly the sample size. Even though small samples introduce limitations that must be carefully considered when drawing conclusions, they are often unavoidable in research due to time or data availability, like in our case. The number of involuntary delisting from the Euronext Milan Exchange was not high, particularly when taking out of the sample financial and real estate companies. The small sample we considered, especially after the propensity score matching technique, could lack the statistical power to detect real effects, and some variables that might have been important did not appear to be statistically significant. Coefficients calculated with small samples like ours are less reliable, even if the general fit of the model is sound and excludes multicollinearity between the variables.

At the same time, we need to consider another limitation that might have affected our models' results. Due to the presence of non-financial data in our independent variables of consideration, we must take into account the possibility of companies' lack of transparency in their internal management operations, especially when in financial needs and near the delisting, like in our study. The difficulty in obtaining non-financial data might have impacted the model. The lack of access to critical information and the possibility of finding non-financial data without the same degree or quality as financial data might have caused data quality or completeness issues, affecting the model's reliability.

The choice of the variables could have also impacted the results of the model. Since some of the variables proved to be not statistically significant, they might have reduced the interpretability of the model and the other variables and caused overfitting.

For this reason, it is fundamental to address the problems and limitations that the model might have had and consider them as a starting point for future research on these topics, which we will now mention.

After considering the limits of the research and the model, it is possible to think about future research to offer further knowledge on the subject matter. Since from the results, it was possible to see how the non-financial variables had a substantial impact on the model for the

prediction of delisting, further research could investigate in more depth the relation between delistings and different non-financial variables, such as significant changes in shareholders, frequency of extraordinary board of directors, and market sentiments[34]. Also, the choice of financial variables can be made by considering only low-correlated variables, which could bring more meaningful results to the analysis, or by studying more financial variables related and interconnected to delisting decisions, like the cost of financial disclosure for publicly traded firms.

From the analysis of our model's limits, new questions need answers in possible future research. For example, would the same test have delivered the same outcome in a different sample if the study had considered the companies delisted in a different demographic group, such as the Asian or American market? Or, would an increase in the data frame of the study, and therefore an increase in the sample of treated firms, have brought additional findings to the analysis and yielded better information, or would it have confirmed our results?

Given the complex nature of delisting and the multiple subcategories in it, future research could benefit from a segmented analysis approach by treating each subcategory (voluntary delisting with/without subsequent trading, M&A delisting, etc.) as a unique subset and building prediction models tailored to each. Doing so would allow for more precise insights, mitigating the heterogeneity in the delisting and helping investors to understand every possible situation better.

These are possible ways to add more insights to the delisting literature and make inferences on the topic in an advanced way. Further research diverting in this direction could also help policymakers understand the implication of a timely and corrected financial and especially non-financial disclosure of information and focus on the potential policy intervention to help the market and protect investors.

[34] Variables that we mentioned in the second chapter, but that were not analysed for the missing of quality data

CONCLUSIONS

In this study, we employed six financial and three non-financial variables to develop a delisting prediction model by targeting the Italian stock market of involuntary delisted firms from 2011 to 2020, making inferences on a sample that could best represent the market's current situation.

The analysis results drawn from the output of the logistic regression model indicate the possibility of predicting a delisting in the Italian stock exchange by keeping some financial and non-financial signals under surveillance. Mainly, non-financial signals proved to be more relevant in the prediction model than financial ones since 66% of the non-financial variables used to predict delisting were statistically significant, while in the case of financial variables, only 33%. In sum, involuntary delistings are most of the time an indication of the firm's financial instability, but, as we have seen, investors should pay close attention not only to quantitative data based on financial information but also to qualitative factors not expressed in financial statements. The delisting of a firm tends to have an irregular effect on the economy. Therefore, listed firms' stakeholders and investors should carefully monitor financial and non-financial information signals.

Limitations in our research, such as focusing only on involuntary delistings or the variables' choice, provide room for further studies. There remains potential for researchers to explore other markets, various periods, and other forms of delisting that would help investors obtain more insights to predict delistings more timely and understand the drivers that shape the decisions of firms on the stock exchanges.

To conclude, as the financial world evolves and responds to broader trends, it becomes necessary for investors and researchers to adapt and elaborate new methods. In its intent to explain the theory behind delisting and understand whether it is possible to make timely predictions on it in the Italian Stock Exchange's dynamics, this research has hopefully offered valuable insights for those interested in the subject.

LIST OF APPENDIXES

APPENDIX 1. Definition of variables

Variable	Definition
ROA	Return on Asset = net income / total assets
EPS	Earnings per share = net income / weighted average of number of common share outstanding
QUICK	Quick ratio = liquid assets / total current liabilities
DEBT	Debt to asset ratio = total debt / total asset
LEV	Debt to equity ratio = total debt / total equity
TURN	Natural logarithm of the number of yearly sales
chNAME	Variations in corporate name
chCEO	Frequency of chief executive officer and top management changes
chCAP	Frequency of fluctuations in capital

LIST OF FIGURES AND TABLES

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