



Ca' Foscari
University
of Venice

Master's Degree programme
in
Global Development and
Entrepreneurship: Global Markets

Final Thesis

**Private Equity backing and
operational innovation in the Italian
environment:**

an econometric analysis of PE backed
firms and a perspective on the Search
Fund model for Italian SMEs

Supervisor

Ch. Prof. Monica Billio

Assistant supervisor

Ch. Prof. Teresa Grava

Graduand

Luca Tognon

Matriculation Number 885863

Academic Year

2025 / 2026

Alla mia famiglia, che mi ha insegnato i valori
che mi accompagnano quotidianamente, che non ha
mai smesso di fare il tifo per me e che mi ha consentito
di tagliare ogni singolo traguardo raggiunto finora.
Ai miei amici e a tutti quelli che mi vogliono bene,
parte integrante della mia vita e di tutte le mie esperienze.

Table of Contents

INTRODUCTION	1
1. THE PRIVATE CAPITAL INVESTMENTS AND INNOVATION.....	5
1.1 THE ALTERNATIVE INVESTMENTS AND THE PRIVATE CAPITAL	5
1.1.1 THE PRIVATE CAPITAL INVESTMENTS	5
1.2 THE PRIVATE EQUITY FUNDS.....	7
1.2.1 HOW DOES THE PRIVATE EQUITY FUND ACT AS AN ACTIVE INVESTOR?	8
1.2.2 HOW IS A PRIVATE EQUITY FUND STRUCTURED?	9
1.2.3 THE LEGAL FRAMEWORK	12
1.2.4 THE FUND ECONOMICS.....	14
1.3 THE PRIVATE EQUITY CATEGORIES.....	16
1.3.1 GROWTH CAPITAL AND EXPANSION FINANCING	17
1.3.2 BUYOUT AND LEVERAGED BUYOUT	18
1.3.3 REPLACEMENT CAPITAL	20
1.3.4 TURNAROUND, DISTRESSED AND SPECIAL SITUATIONS.....	21
1.3.5 RISK AND EXPECTED RETURN DIFFERENCES AMONG THE STRATEGIES	22
1.4 THE PRIVATE EQUITY INVESTMENT PROCESS.....	24
1.4.1 FUNDRAISING	24
1.4.2 ORIGINATION AND DEAL FLOW.....	26
1.4.4 TARGET VALUATION.....	28
1.4.5 CLOSING AND HOLDING PERIOD	30
1.4.6 EXIT	32
1.5 THE PRIVATE EQUITY VALUE CREATION.....	34
1.5.1 FINANCIAL LEVERS	34
1.5.2 OPERATING LEVERS	35
1.5.3 MANAGERIAL LEVERS.....	37
1.5.4 HUMAN CAPITAL LEVERS	38
1.6 THE INNOVATION	39
1.6.1 THE BROAD SENSE OF INNOVATION	40
1.6.2 WHY IS OPERATIONAL INNOVATION COHERENT WITH PRIVATE EQUITY?	41
2. THE ECONOMETRIC ANALYSIS.....	43
2.1. THE DATASET	43
2.1.1 PE BACKED COMPANIES DATASET	43
2.1.2 NON-PE BACKED COMPANIES DATASET	47
2.1.3 THE MERGED DATASET	47
2.2 THE PANEL ANALYSIS AND THE EMPIRICAL QUESTION.....	49
2.2.1 THE MODEL	51
2.2.2 THE OPERATIONAL INNOVATION PROXY INDEX.....	51
2.2.3 THE ROBUSTNESS OF THE OPERATIONAL INNOVATION PROXY INDEX	56
2.2.4 THE MODEL CONTROLS.....	59
2.2.5 MACRO-SECTOR-YEAR FIXED EFFECTS AND CLUSTERED STANDARD ERRORS.....	61
2.3 THE BASELINE REGRESSION	62
2.3.1 WHAT ARE THE REGRESSION AND THE OLS?	62
2.3.2 INFERENCE AND DIAGNOSTIC STATISTICS IN OLS	63
2.3.3 THE BASELINE REGRESSION OUTPUT	65
2.4 THE ROBUSTNESS REGRESSION OUTPUT	66

2.5 THE CONDITIONAL ASSOCIATION	69
3. THE SEARCH FUND MODEL AND ITS IMPACT ON THE ITALIAN SMEs ENVIRONMENT.....	71
3.1 THE SEARCH FUNDS, PRIVATE CAPITAL INVESTMENTS.....	71
3.1.1 FROM PRIVATE EQUITY TO SEARCH FUNDS	71
3.1.2 SEARCH FUNDS AS ENTREPRENEURSHIP THROUGH ACQUISITION	72
3.1.3 THE SEARCH FUNDS AS A HYBRID MODEL BETWEEN BUYOUT, GROWTH CAPITAL AND REPLACEMENT CAPITAL	73
3.2 THE SEARCH FUND LIFECYCLE, RISKS AND RETURNS	74
3.2.1 THE SEARCH CAPITAL RAISING	74
3.2.2 SEARCH, ORIGINATION, TARGET IDENTIFICATION AND TRANSACTION CLOSING.....	76
3.2.3 OPERATING HOLDING PERIOD	79
3.2.4 EXIT	81
3.3 SEARCH FUNDS IN THE ITALIAN SMEs ENVIRONMENT.....	82
3.3.1 WHY ITALY IS STRUCTURALLY SUITABLE FOR THE SEARCH FUND MODEL	83
3.3.2 GROWTH OF THE ITALIAN SEARCH FUND MARKET AND THE ITALIAN SEARCHERS.....	87
3.3.3 ITALIAN REGULATIONS AND LEGAL STRUCTURE FOR THE SEARCH FUNDS	88
CONCLUSIONS	91
APPENDIX.....	93
1.4.2 ORIGINATION AND DEAL FLOW	93
1.4.3 DUE DILIGENCE	93
2.2.2 THE OPERATIONAL INNOVATION PROXY INDEX.....	94
2.2.3 THE ROBUSTNESS OF THE OPERATIONAL INNOVATION PROXY INDEX.....	99
2.4 THE ROBUSTNESS REGRESSION OUTPUT	101
2.4.1 CORRELATION BETWEEN THE OPERATIONAL INNOVATION PROXY INDEXES.....	101
REFERENCES.....	103
CHAPTER 1 - THE PRIVATE CAPITAL INVESTMENTS AND INNOVATION	103
CHAPTER 2 - THE ECONOMETRIC ANALYSIS.....	107
CHAPTER 3 - THE SEARCH FUND MODEL AND ITS IMPACT ON THE ITALIAN SMEs ENVIRONMENT	109
CHARTS AND TABLES	111

INTRODUCTION

In recent years, private capital investments have become increasingly relevant, and they assumed a central role in the developed economies. These instruments actively support corporate growth, ownership transitions and long-term value creation. Within this context, the Private Equity model represents the most representative form of investment. It acts as an active financial investor, acquiring significant, or controlling, stakes of private companies and participating in their strategic and operational development.

The Private Equity model relies on does a specific investment logic. It operates with a medium-long term horizon, acquire illiquid ownership stakes with the aim to increase the value of portfolio companies before converting into a liquid exit the investment. This value creation process is usually implemented by several levers such as financial engineering, governance improvement, managerial professionalisation, operational efficiency, commercial expansion and strategic repositioning. So Private Equity can be interpreted as an active ownership model designed to transform the companies in which it invests.

In this research, especially in Chapter 1, is emphasised the relationship between Private Equity ownership and innovation. In the mature private companies' context, innovation may take an operational form with process improvements, working capital optimization, higher scalability, improved margins, digitalisation, managerialisation and more efficient internal systems. In that sense this thesis is focuses on operational innovation. Therefore, the broad concept of innovation explored in this analysis doesn't rely on patents, trademarks or R&D expenditures. As stated before, Private Equity often invest in companies with a stable and established business model, positive cash flows and identifiable improvement opportunities. So, this makes the two concepts strictly consistent.

In the Chapter 2, with the purpose to measure the degree of operational innovation is developed an operational proxy index, based on some innovation-related financial metrics. The main scope of this thesis is to analyse whether Italian firms backed by Private Equity funds exhibit higher levels of operational innovation proxy scores than comparable non-Private Equity backed firms operating in the same sector-year environment.

The research empirical question of this thesis is the following:

Do Private Equity backed companies exhibit higher sector-year-adjusted levels of operational innovation proxy scores than comparable non-Private Equity backed firms operating in the same macro-sector-year environment, conditional on observable firm-level

characteristics?

The dataset in which the empirical analysis is based presents a key limitation represented by the absence of the Private Equity fund entry year, that is the moment in which the fund acquires an ownership stake in the company. Without this information, it isn't possible to set a pre-investment and post-investment period in Private Equity backed firms. So, the empirical analysis cannot implement a difference-in-differences design and estimate whether a causal effect of Private Equity ownership on innovation is present. Instead, the developed econometric model estimates whether a conditional association between Private Equity backed firms and higher operational innovation proxy scores (than non-PE backed firms) is measured.

The econometric model is based on a panel dataset of 20.419 Italian companies observed over the period 2016–2024. For the regression analysis, after excluding observations with missing values in the selected control variables, the final regression sample includes 20.042 firms and 180.378 firm-year observations. With the aim to compare the companies with homogeneous industry dynamics and common shocks the firms are grouped into eight macro-sectors: Industrials & Manufacturing, Business & Financial Services, Healthcare & Life Sciences, Technology & Digital, Infrastructure & Real Assets, Consumer & Retail, Energy & Utilities and Other Services. The empirical model is estimated through a pooled firm-year Ordinary Least Squares (OLS) regression with macro-sector-year fixed effects and firm-clustered standard errors. The dependent variable is an Operational Innovation Proxy Index, while the main explanatory variable is a time-invariant dummy identifying whether the firm is Private Equity backed or not. In the model are also included two firm-level controls that are the CEO Age and the logarithm of the number of employees. These two controls are selected because CEO Age is used as a proxy for leadership characteristics and potential attitude toward change, while the number of employees captures firm size. Finally, to assess whether the results depend on a specific element of the baseline index, the thesis also develops robustness specifications.

The empirical results of the model show a positive and statistically significant association between Private Equity backed status and the Operational Innovation Proxy Index and also in the robustness ones. This suggests that, conditional on CEO Age, firm size and macro-sector-year fixed effects, Private Equity backed firms exhibit higher operational innovation proxy scores than non-Private Equity backed firms operating in the same macro-sector-year environment.

The analysis, in the Chapter 3, also extends the research to the Search Fund model that represents an entrepreneurial form of private capital investment in which one or two searchers raise capital to identify, acquire, manage and grow a single private company. Like in the Private Equity model the purpose is to generate returns through value creation of private companies. However, Search Funds investment thesis is concentrated in one company, and the searcher usually becomes the Chief Executive Officer of the acquired firm. During the analysis is also explored the high degree of fit of this model with the characteristics of the Italian SMEs ecosystem, where many small and medium-sized enterprises face generational succession issues, limited managerialisation and unrealised operational potential. They could represent a belt conveyor between private capital and entrepreneurial continuity, creating the conditions for operational improvement and innovation.

1. THE PRIVATE CAPITAL INVESTMENTS AND INNOVATION

In this chapter of the research is introduced the theoretical framework of the private capital investments, with a specific focus on Private Equity. It first defines the main characteristics, structure and investment process of Private Equity funds, then examines their value creation mechanisms and the role of innovation within portfolio companies. It is also given a broad definition of innovation, and it implemented by PE funds.

1.1 THE ALTERNATIVE INVESTMENTS AND THE PRIVATE CAPITAL

To be able to present this research, it is necessary, at this point, to clarify the concepts of private capital investments and alternative investments as the broader contexts in which the Private Equity theme is placed.

The alternative investments are investment strategies that refer to financial assets that differ from the traditional investment categories as listed equities, fixed income securities (i.e. bond) and cash equivalents. The latter ones are generally traded on public markets, for this reason they are characterised by high liquidity, broad accessibility, price transparency. They are usually subject to disclosure requirements and investors can buy or sell these instruments quickly in regulated markets.

Conversely, the alternative investments are typically associated with private markets. They are characterised by longer investment horizons than public ones, higher degree of informational complexity and therefore more complex valuation processes, and a lower liquidity. In these instruments, the investors can't exit their positions when they want, the capital is committed for a defined period and returns are realised over time. Historically, due to their complex features the access to private markets has been mainly reserved for institutional investors (i.e. banks, assets managers, pension funds, insurance companies and so on), high-net-worth individuals (HNWI) and qualified investors (i.e. large companies, experienced private investors and so on). (BlackRock, 2026)

The main categories of alternative investments could be summed up in private capital investments, derivatives contracts, art and antiques and real estates.

1.1.1 THE PRIVATE CAPITAL INVESTMENTS

The private capital investments can be defined as a broad segment of alternative investments through which specialised and experienced investors provide equity or debt

financing to companies that aren't listed on public markets. This segment includes Private Equity, Venture Capital, Private Debt and other specific model declinations such as Search Funds, Club Deals, CVCs and so on. In this research the focus is set on the Private Equity and Search Funds models. (AIFI, 2024; AIFI, Equita and MCP, 2025).

Let's explore a first definition of these private capital investments models, that will be studied in this research.

Private Equity (PE) is a form of professional equity investment of non-listed companies, with the aim to increase their value and to divesting them in the medium-long term. The rationale behind the PE model is that keeping a company private allows to focus on making positive and lasting business improvements, rather than meeting short-term needs of stock markets. PE typically acquire significant or controlling stakes of the companies (target companies) and the managers are actively involved in running the business through strategic, operational, financial and governance-related initiatives. In this model, PE usually invests in multiple companies with the aim to build a diversified investment portfolio in which the assets are represented by the target companies. (AIFI, BIP, 2025)

Venture Capital (VC) is a specific segment of the private capital investments, and it could be defined as an adjacent model of the Private Equity one. VC model is focused on financing young, innovative or high-growth companies usually at their early stages of development. In this case investors provide equity capital to support the growth of the business accepting the high risk and the illiquidity with the possibility to perform a significant capital gain if the company scales successfully. (PwC, 2024)

Search Fund (SF) is an entrepreneurial investment vehicle. At this stage of the research is sufficient to specify that its model logic is raise capital from investors to search, acquire, manage and grow a private company. This kind of private capital investment is a particular declination and hybrid model compared to the Private Equity one, in which the target company to acquire is only one. (Stanford Graduate School of Business)

Private Debt is a segment of the private capital investments in which non-bank investors provide debt financing directly to companies. In this model the investors generate returns through interest payments, fees and repayment of principal. Since private debt investors are creditors rather than shareholders, they usually have priority over equity holders in the capital structure. (KPMG, 2026; AIFI 2024)

Talking about data, recent evidence reports the continued expansion of the private

investments market, with an estimated global private capital asset under management (AUM) of USD 24 trillion reached in 2025. And the forecasts estimate that the total AUM will reach USD 32 trillion by 2030. (McKinsey, 2026; Prequin, 2025)

1.2 THE PRIVATE EQUITY FUNDS

In the previous part has been clarified and explored the broader context in which Private Equity funds work and run their business model as an alternative investment segment. In this part the aim is to delve into the PE theme and to expose all the details on what they are, how they operate, who are the members of the funds, what is their commitment and the economics behind these investments.

Starting from the basic definition of Private Equity, reported before: PE is a risk private capital investment in the equity of non-public listed companies. The goal is increasing of the investments and subsequently exit the participation in the medium-long term horizon. As highlighted in this definition this model is focused on value creation, the investors don't merely buy a financial instrument, they acquire an ownership stake in a company to increase its performance. (AIFI, BIP, 2025; PwC, 2024)

The Private Equity model bear five main characteristics:

- The equity investment: the investor becomes (the fund) a shareholder of the acquired company and participate on the entrepreneurial risk of the business, and the acquisition happens through a private transaction not through a public stock-exchange, because the PE targets are non-listed companies. (AIFI, BIP, 2025)
- The low liquidity of the investment: the PE target companies, as stated before, are non-listed. This characteristic makes them less liquid than the public one. The listed companies have disclosure requirements about their financial data, their price and value are clear and declared, the exchange of their financial instruments is mediated in dedicated platforms (i.e. stock exchanges). Conversely, privately held companies don't have to respect strictly disclosure requirements as the listed ones, their value depends on private and undisclosed data and information, and they are less directly exposed to the short-term pressures of public stock markets, so these make the private firms fewer liquid assets. (Bernstein, 2022; Invest Europe 2025)
- The value creation: the goal of PE investment is to actively create value to the target.

PE grows the value of the portfolio companies pursuing strategic, operational, financial and governance-related initiatives. Instead, a public traded financial asset produces its return (or not) passively, without the direct action of the investor. (AIFI, BIP, 2025; LIUC, AIFI, Mediobanca, 2025; FSI, AIFI, 2024)

- The medium-long time horizon: the Private Equity investment requires several years with a mean of 6,5 years. (McKinsey & Company, 2026)
- The exit: the PE investment cycle ends with a divestment, called exit. It can take different forms, like a trade sale to an industrial buyer, a buyback by the entrepreneur, a management buyout (MBO), an Initial Public Offering (IPO), or other specific forms that will be explored furthermore in the next parts of the research. (Bernstein, 2022; AIFI, BIP, 2025; PwC, 2024; Bain, 2026)

Recent industry evidence confirms the scale reached by Private Equity, with a global total investment equal to USD 2.1 trillion in 2025 and a global AUM that surpass USD 6 trillion, reaching an all-time high. (KPMG, 2026)

1.2.1 HOW DOES THE PRIVATE EQUITY FUND ACT AS AN ACTIVE INVESTOR?

As primary explored in the previous part, Private Equity funds act as an active investor. This is one of the most important characteristics of this model. Private Equity managers are typically involved in the governance and strategic development of the portfolio companies, with the goal of introducing lasting improvements on the business.

In PE transactions is common that the fund's managers participate on the board of directors (BoD) or on other governance bodies of the target companies. The investor's role and influence vary depending on the size of the stake and the agreements with the existing shareholders. The scope is to monitor and support the portfolio companies' management team and to set strategic business priorities to ensure value creation. To be clear, the PE management, thanks to its expertise, introduces structured decision-making, processes, clear reporting systems and more professionalized corporate bodies. At the strategic level, it can support the company in identifying new markets, developing new products, executing acquisitions, strengthening commercial channels or expanding internationally. At the operational level, it can promote efficiency improvements, cost optimization, better working capital management, digital transformation and more disciplined cash generation. At the financial level, it can help the company optimize its capital structure, improve its relationship with banks and lenders, and access additional sources of financing.

This highlights that Private Equity value creation isn't based on financial leverage or multiple arbitrage, but increasingly on operational transformation and industrial development. (Amess, Stiebale and Wright, 2016; AIFI, BIP, 2025; LIUC, AIFI, Mediobanca, 2025)

Empirical evidence from the Italian market reports that in an analysed sample of 64 divested PE transactions, 71% of the total value creation is represented by operational growth. For instance, Amess, Stiebale and Wright (2016) find that Private Equity backed leveraged buyouts have a positive effect on patent stock and quality-adjusted patent stock. Other analysis show that, in 2022, Private Equity and Venture Capital backed companies recorded an average revenue CAGR of 7,5%, compared with 1,9% for Italian GDP and 2,2% for the benchmark of comparable private companies. Moreover, employment growth in PE portfolio companies reached 6,9%, compared with 0,6% at national level and 0,2% for the benchmark, creating around 41.000 new job positions over the previous five years analysed. (PwC, 2024; Amess, Stiebale and Wright, 2016; AIFI, BIP, 2025)

This active approach is closely connected to the preparation of the exit. Since the fund's return depends on the value realized at disinvestment, the investor has to make the portfolio company more attractive to future buyers. This implies improving not only financial performance, but also the quality of management, the credibility of business planning, the reliability of reporting, the strength of governance and the sustainability of growth. (AIFI, BIP, 2025; Bain, 2026)

1.2.2 HOW IS A PRIVATE EQUITY FUND STRUCTURED?

At this point of the research is useful to explore how a Private Equity fund is composed and what's the structure behind this model.

A Private Equity fund can be defined as an investment vehicle that collects capital from investors and allocates it to a portfolio composed by target companies, with the aim to generate a return. The fund is the organizational structure through which the Private Equity investment model is implemented.

The typical PE structure involves three main categories of subjects: the Limited Partners (LPs), the General Partners (GPs) and the portfolio companies.

LPs are the investors that commit capital to the fund. They are usually institutional or qualified investors, such as pension funds, insurance companies, banks, sovereign wealth funds, family offices, fund of funds, HNWI and other professional investors. Their operative role is mainly financial, they provide the capital and expect to receive a return, but they don't

manage the investments directly. (Popov and Roosenboom, 2012)

According to the empirical data the main four categories of LPs recorded in Europe in 2024 were Pension funds (19%), Funds of funds (16%), Asset managers (11%), and Government agencies (9%), as presented in the chart below. (Invest Europe, 2025)

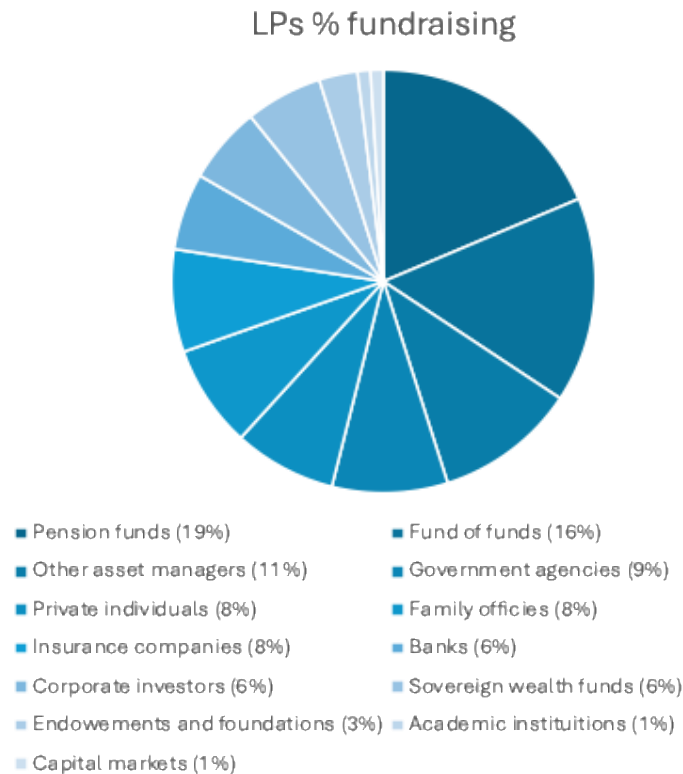


Chart 1.1: The distribution of type of LPs in Europe all PE fundraising 2024 (sample: 817 funds) PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

Another interesting data is related to the country of LPs' origin country, in 2024 32% of the Limited Partners that invested in Europe were from outside the continent. More detail in the table below. (Invest Europe, 2025)

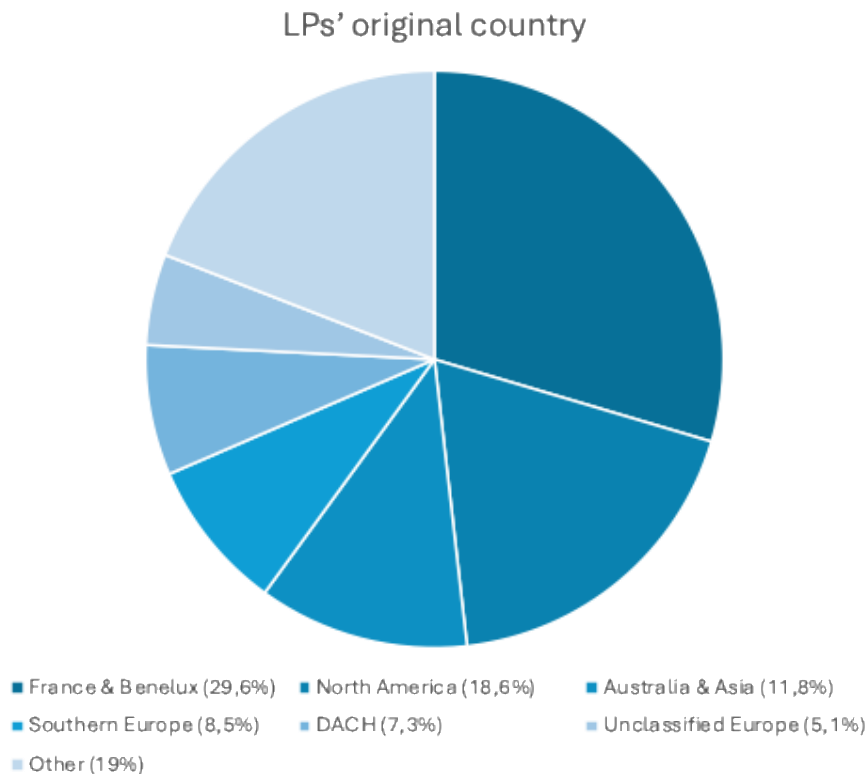


Chart 1.2: LPs' original countries 2024 in Europe (sample: 817 funds)

PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

GPs are the subjects responsible for managing the fund. They raise capital, select the target companies, negotiate the transactions, monitors the portfolio, support the value creation and arrange the exit. The General Partners have a fundamental role because they transform the capital committed by LPs into investments and operational actions. Usually, the investors evaluate the GPs' track record, expertise and ability to create value before investing in a PE fund. As explored before their expertise is increasingly operational rather than merely financial. The LPs nominate a committee of advisors, with the aim to report them and supervise the fund's managers work.

Portfolio companies are the target firms in which the fund invests. They represent the assets of the fund's portfolio. PE build a diversified portfolio of investments and diversification is important because each company-specific investment is risky and illiquid, with this strategy the fund can reduce the impact of the underperformance of a single asset on the overall portfolio. Talking about the industries in which PE target companies operates st

the European level, they are concentrated mainly in ICT, business products and services, consumer goods and services, and biotech and healthcare. In 2024, these four sectors accounted for approximately 84% of the total amount invested and 81% of the number of companies backed by Private Equity in Europe. Here below the table with the data. (Invest Europe, 2025)

Industry	% capital invested	% of tot target companies
ICT	32,0%	32,7%
Business products and services	21,8%	15,7%
Consumer goods and services	15,8%	15,2%
Biotech and healthcare	14,3%	17,1%
Financial and insurance activities	6,6%	4.,%
Energy and environment	3,7%	6,5%
Transportation	2,3%	2,1%
Real estate	1,2%	0,7%
Construction	1,1%	1,8%
Agriculture	0,5%	1,4%
Other	0,4%	0,8%
Chemicals and materials	0,3%	1,8%

Table 1.1: European distribution of the target companies

PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

European data shows that in 2024 that the total amount of fund managers was 1.130, with 10.200 active funds, 83.000 portfolio. (Invest Europe, 2025)

When investors subscribe to the fund, they don't necessarily transfer the full amount of capital immediately. They sign a commitment to provide a certain amount of capital when requested by the GPs of the fund. These requests are called drawdowns or capital calls. So, the capital of a Private Equity fund is called progressively when it identifies investment opportunities or needs resources to cover fund expenses. This mechanism allows the fund to manage capital efficiently and to invest over time according to its investment strategy.

1.2.3 THE LEGAL FRAMEWORK

The Private Equity funds have a closed-end structure with a predetermined life. These two typical characteristics of this kind of funds highlight the illiquidity of the underlying

investments. The logic behind is simple, since the fund invests in non-listed companies, it cannot redeem investors at any time. PE investors cannot request reimbursement of the capital committed before the fund's maturity. (Invest Europe, 2025, Directive 2011/61/EU)

The typical duration of a Private Equity fund is around ten years, but with the possibility of two or three extensions. Technically the starting year of a Private Equity fund is called vintage. This period is divided in two phases: the investment period, in which the fund allocates its capital through the acquisition of the target companies, commonly lasting for five years; the management and divestment period, during which the PE's management create value on the portfolio firms and carry out the exit process. To delve into the first period, GPs are expected to deploy the committed capital according to the fund's strategy. The portion of capital raised not invested yet is called dry powder. Interesting data report that in 2025 the global buyout dry powder was about USD 1,3 trillion from fund's vintage 2022 and 2023. (Bain, 2026)

The commitments presented involve multiples parties and interests, so it's a matter that needs a specific regulation.

In Italy, the Private Equity funds are structured as closed-end alternative investment funds, generally managed by a "Società di Gestione del Risparmio (SGR)" within the Italian framework for collective asset management (Legislative Decree No. 58/1998, TUF). In the Italian legal framework, the fund and the manager must be clearly distinguished. The fund is the pool of capital collected from investors and allocated. The SGR is the regulated entity responsible for establishing and managing the fund in the interest of investors. It's important to clarify that investors don't become shareholders of the fund, they subscribe units of it and become participants. So, the relationship between the investors and the SGR is mainly governed by the fund regulation that defines policy, duration, divestment, valuation rules and so on. (Legislative Decree No. 58/1998, TUF)

In practice, the SGR performs the economic role that the General Partner plays in a limited partnership structure. However, the Italian legal terminology is different: investors are not technically Limited Partners, and the SGR is not technically a General Partner, even if the terms LP and GP are often used functionally in the private equity industry.

A fund manager to be recognised as a SGR must obtain the authorization by Bank of Italy in compliance with the Italian rules on collective asset management (Bank of Italy, Regulation on Collective Asset Management, 2015, as amended).

At European level, PE funds fall within the broader framework of alternative investment funds. The Alternative Investment Fund Managers Directive (AIFMD) applies when managers raise capital from several investors with a view to investing it for the benefit of those investors. The AIFMD framework introduces several technical requirements. First, the manager must be authorized or registered and must comply with organizational and conduct rules. Second, it must implement risk management systems capable of identifying, measuring, managing and monitoring all risks relevant to the investment strategy of each fund. Third, it must adopt valuation procedures to ensure the proper valuation of fund assets and the calculation of the net asset value. Fourth, it must appoint a depositary responsible for safekeeping, cash-flow monitoring and oversight functions. (Directive 2011/61/EU)

In international funds the main documents and agreements between the LPs and the GPs are:

- The Limited Partnership Agreement: it governs the relationship between the General Partners and Limited Partners. It defines all the details of capital commitments, capital calls, management fees, carried interest, preferred return, clawback and other details that rule the relationship. (ILPA Principles 3.0)
- The subscription agreement: it is the document of subscription to the fund of the investors. It usually contains the investor's commitment amount, acceptance of the fund regulation, anti-money laundering documentation and so on. There are also supplemental agreements with specific investors, called side letters. They grant supplemental or preferential rights outside the main fund documentation, such as most-favoured-nation clauses or specific confidentiality provisions. (ILPA Principles 3.0)

1.2.4 THE FUND ECONOMICS

In this part of the analysis are explored the economics of a Private Equity fund. With this term is intended to describe how costs, fee and returns are allocated between Limited Partners and the General Partners. To be precise the concepts that are going to be analysed are management fees, carried interests, preferred return, clawback mechanisms, minimum commitment requirements, diversification rules, investment limits and key man clauses.

Firstly, is appropriate to expose what are management fees. They are periodic fees paid to the General Partners with the aim to cover the costs of managing the fund. These operating costs are related to hiring the investment team, carry out due diligence activities, monitoring,

reporting, and cover administrative functions and general operations.

A common compensation model is known in jargon as “2 and 20”: a management fee of around 2% of committed capital and a carried interest of around 20% of profits. In practice, management fees may vary between 1% and 3% and may be calculated on different bases depending on the stage of the fund’s life. For instance, in the early years, they are often based on committed capital, while in later years they may be based on invested capital, cost basis or net asset value. (Metrick and Yasuda, 2010; ILPA, 2019)

Carried interests are intended as the shares of profits allocated to the General Partners. It is a compensation based on their performance, and they are designed to align the interests of GPs with the ones of LPs. But in the case in which the fund doesn’t generate sufficient returns, the General Partners receive no carried interest or a reduced amount. The standard carried interest is often 20% of the profits, although the exact structure depends on the Limited Partnership Agreement. (Metrick and Yasuda, 2010; ILPA, 2019; Carta, 2025)

The preferred return, or also known as hurdle rate, is often included to protect Limited Partners. It is the minimum return that investors must receive before the GPs get the carried interest, it represents a minimum threshold. A common preferred return is around 8% per year. There’re could be included also catch-up provisions, which allow the GPs to recover its share of profits after the preferred return has been paid to Limited Partners. (Metrick and Yasuda, 2010; ILPA, 2019)

The clawback clause allows Limited Partners to recover carried interest that has been overpaid to the General Partner if the overall fund performance doesn’t justify the amount distributed. It represents an instrument of alignment and fairness between investors and managers interests. (ILPA, 2019)

Talking about the distribution of profits of the deals, it can follow different waterfall mechanisms.

- Under a deal-by-deal, also known as American-style waterfall, when the carried interests are paid after each successful exit. (ILPA, 2019)
- Under a whole-fund, or also called European-style waterfall, in which the GPs receive carried interest only after the Limited Partners have recovered their contributed capital and the preferred return. (ILPA, 2019)

Finally, talking about key man clauses, they are designed to protect LPs from the risk of

loss of the essential professionals of the fund. Since Private Equity performance depends heavily on the expertise, the network and the ability of the investment team, the departure of one or more key professionals can affect the fund's ability to execute its strategy. This clause could suspend new investments or impose specific governance protections if the identified key individuals leave the management company. (ILPA, 2019; Invest Europe 2022)

1.3 THE PRIVATE EQUITY CATEGORIES

Private Equity, as reported in previous parts, invests on equity of non-listed companies with the purpose to dispose these assets in the medium-long term to generate a capital gain. Within this broad definition Private Equity funds could be classified into different categories. It depends on their strategy, on the ownership structure, on how they create value on the target companies, on what are their selection parameters for the diversification of their portfolio and on the risk level of their investments. In that sense, in this part of the analysis, are exposed in four main categories of Private Equity: growth capital and expansion financing; buyout and leveraged buyout, replacement capital, turnaround, distressed and special situations. (Invest Europe, 2025; AIFI, BIP, 2025; Ughetto, 2010)

In the Italian market, the buyout strategy represents the dominant category, in 2024 they accounted for 185 out of a sample of 256 PE investments, representing the 72% of the total. Expansion capital represents the 22%, while turnaround 4% and replacement capital 2%. Here below the complete data. (AIFI, BIP, 2025)

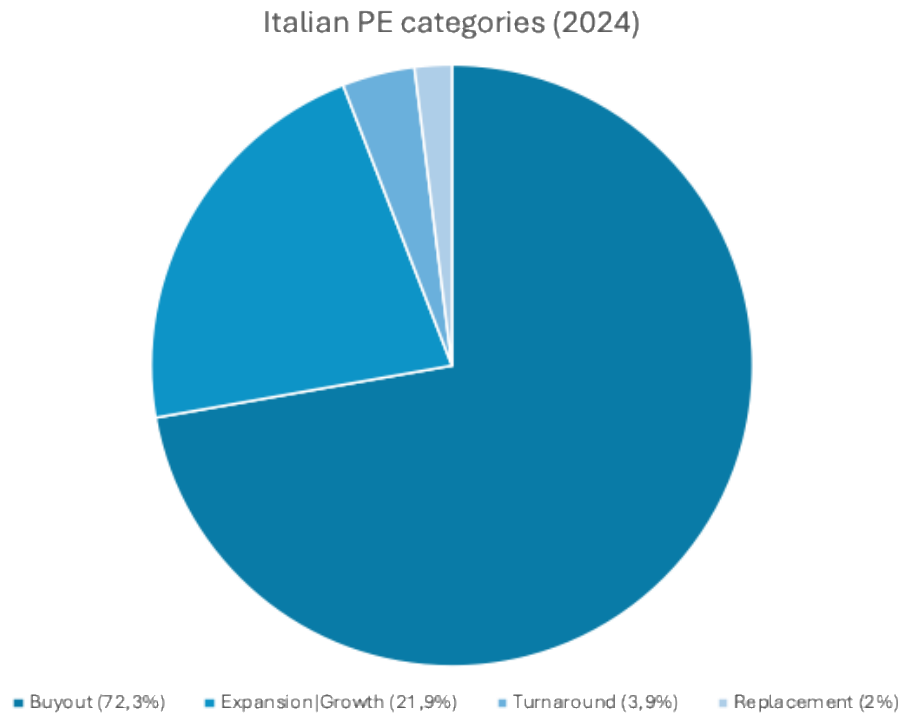


Chart 1.3: Italian PE categories distribution in 2024 (sample: 256 investments)

PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

1.3.1 GROWTH CAPITAL AND EXPANSION FINANCING

Growth capital, also known as expansion capital, is a Private Equity strategy. In this case the target companies are already operating and their business is consolidated. They're typically in a mature stage, so they have already passed the earliest stages of development. The typical characteristics of the growth capital's targets are firms with a validated business model, recurring revenues, an established and diversified customer base and clear opportunities for expansion and scaling. (Invest Europe, 2025)

The strategic objective of growth capital PE is to accelerate the company's development. This goal could be achieved by supporting internationalisation, acquisition of strategic additions, increasing the production capacity, investing in digital transformation, scaling the commercial operations expanding the business in new markets, improving the management team. (AIFI, BIP, 2025; AIFI, GPBL, 2025)

This role of the Private Equity funds is very suitable with the Italian mid-cap firm's environment, in which, in a lot of cases, there are Small Medium Enterprises (SMEs) with a

great potential that they can't develop by themselves. The growth capital strategy, in Italian PE operators, accounted for EUR 695 million in 2024 across 56 deals, with 31 active expansion capital PE funds. (AIFI, PwC, 2025)

Also in Europe, growth capital is a significant segment of PE funds. In 2024 expansion capital investments reached EUR 15.4 billion, involving 2.218 companies. (Invest Europe, 2025)

In this kind of PE strategy, the main source of return is the operational value creation. It means that the capital gain is driven by the revenue growth, margin improvements, scale effects and multiple expansions of the target companies. AIFI and BIP reported that in a sample of 64 Italian exited transactions between 2019 and 2024, the growth PE funds 'portfolio companies increased average revenues from EUR 101 million to EUR 163 million (median revenues rose from EUR 38 million to EUR 82 million), and EBITDA doubled from EUR 13 million to EUR 26 million (median EBITDA rose increased from EUR 6,3 million to EUR 14 million). (AIFI, BIP, 2025; AIFI, PwC, 2025)

Talking about the risk profile of the capital expansion strategy is mainly linked to execution and scalability of the target company. Because despite a valid and consolidated business model there could be a lack in the organizational structure or in financial resources. Therefore, growth investors provide capital, governance support, commercial planning to improve and help the next phases of the company's development. (McKinsey, 2026; Bain, 2026)

1.3.2 BUYOUT AND LEVERAGED BUYOUT

The buyout is the most representative strategy of the Private Equity funds. In this case the PE acquires a significant or controlling stake of the target company with the aim to increase its value and sell it at a higher valuation in the medium-long term. The Leveraged Buyout (LBO) is a declination form of the buyout strategy in which the acquisition is mainly financed by debt. This kind of transaction is the largest category in Private Equity investments, and it is commonly known as the typical fund's acquisition framework. In the LBO the target company's debt and equity (the financial structure) is completely replaced by the acquisition capital structure. The economic rationale of the transaction lies in the use of the target company's operating cashflows to service and repay the debt incurred to finance the acquisition. The return to the investment vehicle that buys the company, known as sponsor, is generated through a combination of EBITDA growth, debt reduction, operational

improvement, governance transformation and, where possible, exit multiple expansion. The typical LBO target is therefore a company with stable and predictable cash flows, positive EBITDA, a strong or defensible competitive positioning and sufficient debt capacity. These characteristics are essential because the company must repay debt while continuing to fund operational growth. These represents, also, the reasons why LBOs aren't suitable for early-stage ventures or not consolidated business models.

However, in the current market environment, the traditional reliance on cheap debt and multiple expansion has weakened, consequently, LBO returns increasingly depend on operational value creation and the sponsor's ability to accelerate EBITDA growth during the holding period. (McKinsey, 2026; Ughetto, 2010)

In the European market buyout investments reached EUR 87 billion in 2024, 42% above the previous year data. Also, this strategy represents around the 69% of the total European PE investments in the same year. The European buyout deals accounted by deal size are mainly concentrated to mega buyout (45%), referring to equity brackets higher than EUR 300 million with total investments equal to EUR 39 billion, and mid-market buyout (31%), with an equity bracket between EUR from 15 to 150 million and total investments of EUR 27 billion. The other brackets are large buyout (18%), EUR 150-300 million with total investments accounting for EUR 15 billion, and small buyout (7%), referring to the equity bracket lower than EUR 15 million with a total amount invested of EUR 6 billion. (Invest Europe, 2025)

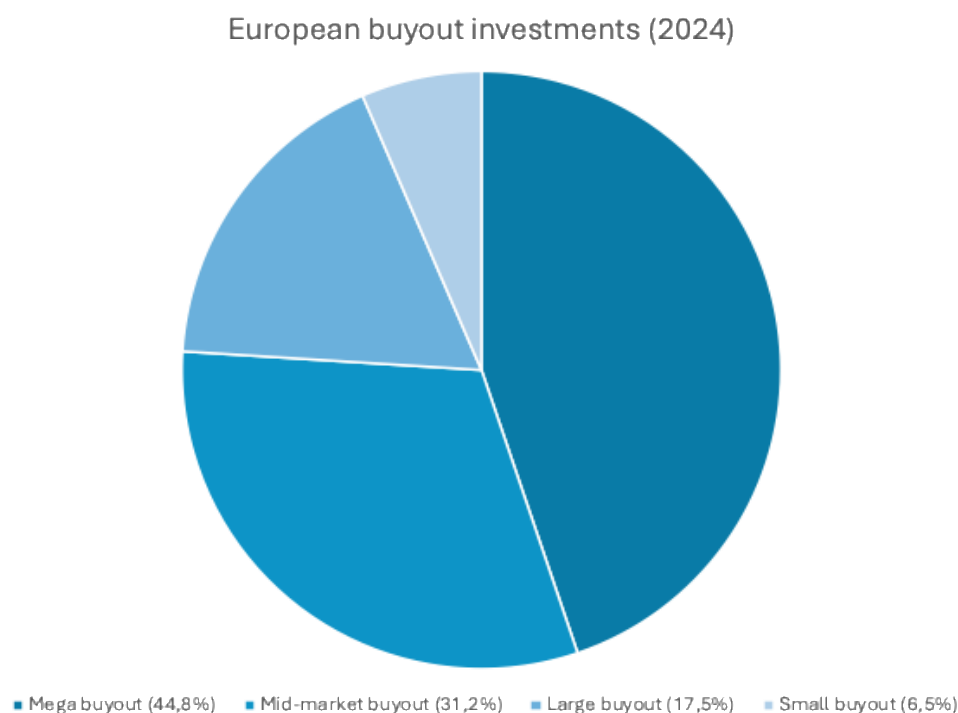


Chart 1.4: European 2024 buyout investments by deal size

PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

The Italian market is also buyout centred. In 2024 the buyout transactions accounted around EUR 7 billion invested, across 185 deals. This strategy also accounts for the largest share of divestments (41% of the total). Also, the same year's data reported an average holding period of the portfolio company of five years. This sample is also characterised by strong operational improvement, with average employees increased from 716 to 1.092 (median from 165 to 300), revenues and EBITDA increased substantially and also an EBITDA margin improved on average from around 16,8% to 18,1% (median from 15,6% to 17,2%). (AIFI, BIP, 2025)

The risk profile of the buyout strategy, and especially of LBO, is characterised by a lower operational risk linked to the business model of the portfolio company but an higher financial structure risk. Nevertheless, the LBO's targets are mature companies with predictable cash flows, the introduction of leverage increases the sensitivity of the equity returns to EBITDA, interest rates, and exit multiples changes. (McKinsey, 2026; Bain, 2026)

1.3.3 REPLACEMENT CAPITAL

Replacement capital refers to Private Equity transactions in which the investors replace one or more existing shareholders. In this case the main scope is an ownership reorganisation. So, this strategy is very different from the objective to inject to capital with the aim to the business expansion or obtain the stake control of the firm. (Invest Europe, 2025; AIFI, PwC, 2025)

This strategy is typically carried out in companies with complex shareholder structures, family ownership, generational transitions or when there are diverging objectives among shareholders. In fact, in this cases PE fund acquire the stake of the shareholders who want to exit. It facilitates the transition from the founder-led or family-led ownership to a more institutional governance. (Invest Europe, 2025)

The replacement capital strategy is a small but recognised PE strategy at European level. The empirical data recorded that this strategy represented approximately 1% of total amount invested in 2024, confirming that is a niche model. (Invest Europe, 2025)

In Italy the PE fund that operate with this strategy shifted from 7 to 10 from 2023 to 2024.

(AIFI, PwC, 2024)

The returns in the replacement capital derive from the same value creation levers as other PE strategies. But the first issue that this PE funds must face is to resolve the ownership misalignment.

The risk profile in this strategy is represented by the governance, because if the transaction doesn't create a stable decision-making structure or the remaining shareholders aren't aligned with the fund's operating strategy, the value creation may be constrained. (McKinsey, 2026; Bain, 2026)

1.3.4 TURNAROUND, DISTRESSED AND SPECIAL SITUATIONS

Turnaround, distressed and special situations represent the categories in which Private Equity funds are focused on target companies affected by financial stress, operational underperformance and event-driven complexity. Unlike traditional buyout transactions, in this strategy, the target company may be overleveraged, liquidity-constrained, loss-making, covenant-breaching, affected by declining margins or exposed to a specific corporate event that has created a mispricing of its securities. The investment thesis is based on restructuring the special situation capturing value from the current market price and the recoverable value of the business. (Invest Europe, 2025; Bain, 2026)

The Private Equity funds that pursue this strategy have different declinations, here explored:

- Distressed-for-control: it consists of purchasing, at a discount value, the debt securities of a financially distressed company in the secondary market. The objective is to gain the control of the target company through a restructuring process. So, the PE doesn't acquire common equity, but enters in the capital structure as a creditor. The economic rationale is that, in distress, the value of equity may be impaired, and the layer of debt may become the instrument through which control is obtained. (Bain, 2026)
- Loan-to-own: in this case PE investor provides new money to a distressed company, usually in the form of rescue financing or bridge financing, so the fund doesn't buy the debt in the secondary market. The loan is often granted under restrictive and expensive terms, and these features are accepted because typically the borrower has limited access to alternative capital. In this case the Private Equity's objective isn't only to earn a high contractual yield, but to position itself to obtain ownership or

control if the company fails to repay, breaches covenants or requires a restructuring. (Bain, 2026)

- Special situations: they involve PE investments in securities or companies whose current price doesn't reflect the expected impact of a specific event such as restructurings, recapitalisations, litigation outcomes, regulatory changes, asset disposals, spin-offs, corporate carve-outs, shareholder disputes, balance sheet repairs, covenant waivers, refinancing processes or bankruptcy exits. So, the returns, in this strategy, depend on legal analysis, capital structure analysis, negotiation dynamics, information asymmetry and event timing. (Bain, 2026)
- Turnaround investing: the PE investor acquires debt or equity exposure to a struggling company on the assumption that its performance can be turned around through managerial, operational and financial intervention. For instance, the target company may suffer from weak profitability, inefficient cost structure, poor working capital management, inadequate governance but the key is that the underlying business must still have recoverable value. (Bain, 2026)

In these strategies the potential return can be substantial, but the downside risk is also materially high. The Private Equity may face liquidity risk, litigation risk, insolvency risk, valuation uncertainty, creditor coordination risk, operational execution risk and reputational risk and in the worst case, the company may enter in liquidation. Recording a loss in the portfolio. For this reason, distressed and turnaround strategies require specialised capabilities and expertise of the funds because it's all linked to their ability to influence the restructuring the process. (Bain, 2026)

In the European Private Equity market turnaround and distressed situations represent a small size. In 2024 turnaround represented around 1% of the total amount invested and 1% of the number of companies backed by PE funds. So, it is smaller than buyout and growth capital strategies. (Invest Europe, 2025)

1.3.5 RISK AND EXPECTED RETURN DIFFERENCES AMONG THE STRATEGIES

Comparing all these strategies explored in the previous parts carried out by Private Equity funds we could extent that the risk-return profile is very different among them. The differences reflect the diversity of target companies' maturity, financial leverage, operational uncertainty, restructuring complexity and exit risk. To sum up all these characteristics is presented below a dedicated chart. (Bain, 2026)

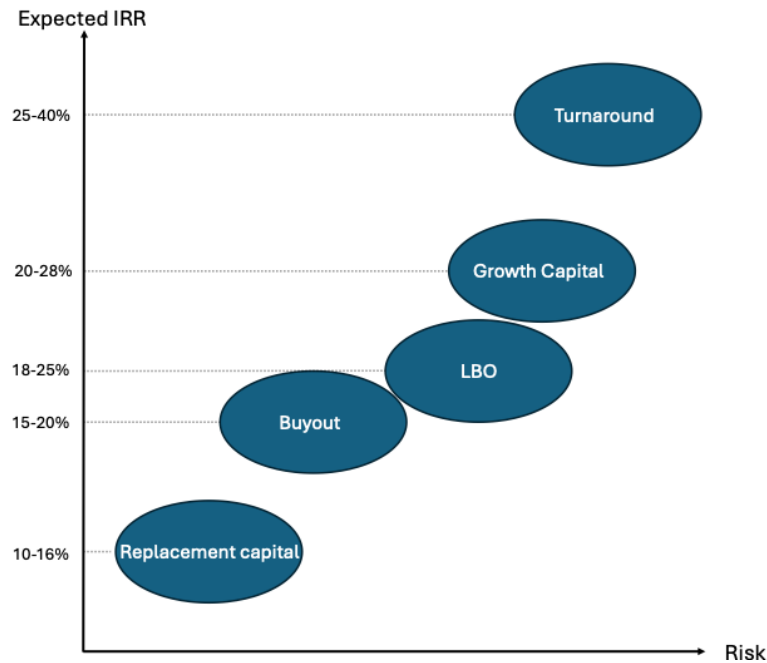


Chart 1.5: Risk-return chart of the different Private Equity strategies

In the vertical axis are reported expected gross Internal Rate of Return (IRR; this concept will be explained in the next parts of the research) ranges, while the horizontal axis are represented the relative risk profile of each strategy. These ranges should not be interpreted as realised historical returns, but as indicative target-return intervals consistent with the risk premium required by investors for each type of transaction.

The replacement capital strategy is less risky one with an indicative gross IRR range of 10–16%, because it mainly concerns ownership reorganisation. The buyout is placed in the 15–20% IRR range, it targets mature, cash-generative companies and it is the dominant PE strategy by capital deployed. LBOs are positioned above traditional buyouts, with an indicative range of IRR 18–25%, because leverage increases both expected equity returns and downside risk. The growth capital strategy is placed in the 20–28% IRR range, as it finances companies with validated business models but significant scaling risk. The riskiest strategy is turnaround and distressed situations, consistently its IRR 25–40% range is the highest one, because they involve liquidity stress, restructuring, creditor negotiation and operational recovery. (AIFI, 2024; McKinsey, 2026; Ughetto, 2010; Invest Europe, 2025; Bain, 2026)

1.4 THE PRIVATE EQUITY INVESTMENT PROCESS

The Private Equity investment process follows a structured sequence starting from the capital raising, moving to the identification of the investment opportunities, acquiring the target companies, holding and managing them up to the exit. So, as exposed the process is both financial and industrial. (Gompers et al., 2013; Kaplan & Stromberg, 2009)

The Private Equity investment process could be divided into four main phases that are fundraising, target selection, holding period and exit. (Cumming et al., 2013)

The entire process doesn't have a single standardized duration, at the fund level, the PE vehicle is typically structured as closed-end funds with an average finite duration of 10 years, as explored in the previous parts. The fundraising phase, in which the fund raises the capital, may require from 18 to 24 months. At the investment level, the relevant measure is the holding period; that's the time between the acquisition and the exit of the portfolio company. In the recent years, this period has lengthened, on average it is equal to six and half years. With respect to exit execution, timing varies depending on the selected route and it may require at least six months. (Cumming et al., 2013; McKinsey, 2026; PwC, 2024)

1.4.1 FUNDRAISING

The fundraising is the first phase of the Private Equity investment process, in which the capital raised from investors is committed. As explored, the investors who commit the capital are known as Limited Partners and they are typically pension funds, funds of funds, family offices, insurance companies, banks, HNWI. The LPs don't usually pay the full amount of capital committed at the beginning of the fund's life, but it is drawn down by General Partners through capital calls when the investment opportunities are executed. The fundraising mainly depends on three fundamental elements: the GPs' track record, the fund's strategy and the target size of the fund. (Cumming et al., 2013; Invest Europe, 2024)

The fundraising is directly linked to the track record of the GPs. In fact, this phase is part of a continuous relationship with LPs. The investors analyse the fund's manager performance, assess the quality of the team, the strategy of the fund and the expected risk-return profile. Since PE is an illiquid and long-term investment, LPs must verify the ability of the fund's team to generate returns. The track record is commonly assessed through performance indicator such as IRR and cash multiples. In the first-time funds cases, investors focus on the individual expertise of the GPs and their team. (Cumming et al., 2013; Invest Europe, 2024; Kaplan & Schoar, 2005)

The process can be lengthy, data shows that the time range could take from 18 to 24 months.

The Private Equity fund strategy also plays a fundamental role in this phase. The LPs allocate their capital according to the risk-return profile of their investment opportunities, so, it's important for them to understand the strategy of the fund which focus could be a buyout, a growth capital, a turnaround and so on. The fund's strategy must be consistent with the expertise and the skills of the investment team, the target geography, the market environment and also on the size of the transactions. Generally, a PE fund could be generalist, if it pursues different kind of investment strategies, or it could be focused on one of them. The empirical evidence reports that globally generalist fund vintage 2010-2022 generate lower IRRs than buyout ones, 13% versus 17% and slightly lower multiples, 2,1x versus 2,2x. (McKinsey, 2026; Kaplan & Schoar, 2005)

The size of the fund is another fundamental element because it must be consistent with the total number of portfolio companies expected. The capital committed, as explored, is constrained by diversification and an efficient deployment in the portfolio companies. The LPs decide to invest in a certain fund also analysing this characteristic. (Kaplan & Schoar, 2005)

For instance, to connect all these concepts, when a Private Equity fund is created, are declared the target commitment (i.e. EUR 250 million), the minimum commitment (i.e. EUR 1 million), the duration of the fund and a possible extension (i.e. 10 years plus 3 years) and an investment period up to the final closing (i.e. 5 years).

The fundraising phase is supported by a specific legal documentation. The most important one is the Private Placement memorandum, which states the fund's investment proposition, strategy, economics, governance, risk and track record. Other further useful material is made available for potential investors as fund's teaser, a detailed prospectus and a certified data room. LPs conduct their analysis for example through investor meetings and reference calls.

Once the Private Equity fund raises a minimum amount of committed capital it can reach a first closing and begin the operations. There could be also additional closings, also called rounds, until the final one which determines the final size of the fund.

Fundraising has become increasingly competitive and difficult in the recent years. It is linked to LPs' liquidity constraints, for example in 2025, 53% of LPs surveyed by Private Equity International stated that they were limited in making new commitments because

previous ones had not yet been drawn down. Other empirical evidence reports that the global closed-end PE fundraising declined by 17% in 2025, whereas North America increased by 8%, Europe declined by 41% and APAC by 49%. (Bain, 2026; McKinsey, 2026)

1.4.2 ORIGINATION AND DEAL FLOW

After the fundraising phase, the Private Equity fund must generate a sufficient number of investment opportunities. This part of the process is called origination, and it refers to the set of activities through which the fund identifies potential target companies. The aim is to create a deal flow, that's essential to analyse a very large number of opportunities in which are included the targets. The process is set like a funnel, in which many opportunities are evaluated, fewer receive a term sheet, an even smaller number proceed to carry out the due diligence (DD), and at the end a limited set of deals are closed. To clarify this process an example could be exposed: a Private Equity fund could evaluate more than 200 opportunities, around 40 proceed to a term sheet, around 20 enter due diligence and only 10 transactions are completed. (Gompers et al., 2016)

The origination can be generated through different channels.

Firstly, the General Partners' network, including managers, entrepreneurs, financial investors and industrial groups. This kind of origination is known as proprietary or semi-proprietary and it represents a competitive advantage. It highlights the importance of the relationship of the GPs and their team in the Private Equity industry.

A source of potential opportunities is the market screening, through databases, trade associations and conferences in which the fund identifies target sectors, companies and entrepreneurs aligned with its strategy and investment mandate. For instance, a buyout Private Equity fund typically screen mature businesses with stable and predictable cash flows. The screening doesn't concern only the financial statements and the business plans but also an industry and market analysis to assess the opportunity's market position, customer base, profitability and potentials.

Another source of origination is represented by external intermediaries, such as advisors, investment banks, M&A boutiques, accountants, lawyers and corporate finance professionals. They usually introduce potential targets to the funds, arranging auctions or assisting the sellers during the process.

Empirical evidence shows that in the Italian mid-cap environment about 89% of deal origination come from family and private companies. (Gompers et al., 2016; LIUC, AIFI,

Mediobanca, 2025)

Typically, in this phase the Private Equity fund signs the first legal document with a counterparty the Non-Disclosure Agreement (NDA). This document is executed before receiving private and sensitive information about the potential opportunity, such as the Information Memorandum (Info Memo) and Q&A materials. Its purpose is to create a confidential relationship between the parties and to protect the information disclosed by the seller during the process. The NDA defines which information are confidential and restricts disclosure to third parties. (Cumming & Johan, 2013)

1.4.3 DUE DILIGENCE

After the screening and the evaluation of the potential opportunities, and an analysis of the confidential information received, the Private Equity fund could have identified potential target companies. After this preliminary assessment the parties may sign a Letter of Intent (LOI). This legal document outlines the main terms of the potential transaction: the percentage of equity to be acquired, the preliminary purchase price, the procedure for submitting a binding offer and the expected transaction timetable and exclusivity provisions, which prevent the seller from negotiating with other potential buyers. Although, many LOI provisions are intended to be non-binding, even though LOI may generate pre-contractual liability if one party behaves in bad faith during negotiations. After the signing of the LOI starts the Due Diligence (DD) process. (Cumming & Johan, 2013)

The Due Diligence is the process through which the Private Equity fund verifies and assess deeply the quality of the target company, identifies risks and estimates the potential value creation. The aim is to confirm the relevant facts of the company, reviewing financial statements records and exploring all the company available material. It helps the buyer to protect itself from hidden liabilities and general drawbacks and a higher equity valuation. The results have to be consistent with the fund investment thesis consistently with the fund's size, geography and sector. (Gompers et al., 2016)

The whole DD process is divided in 8 main parts in which are carried out in depth analysis of the data room, management interviews, customer analysis, site visits, market in depth analysis, business plan assessment. For this reason, the process is usually performed by external professionals such as consulting firms, lawyers, tax advisors and experts. The parts of the DD involve a dedicated analysis: financial, legal, tax, market, HR, IT, environmental, management. (Rosembaum & Pearl, 2022)

Delving into the financial DD, it is focused on the quality of earnings, revenues, margins, working capital (WC), debt and cash generation. It verifies whether the Profit & Loss (P&L) Earning Before Interests Taxes Depreciation & Amortization (EBITDA) is truly sustainable and whether the company generates sufficient free cash flow. This is a central and important topic for PE funds because they're primarily interested in the target's ability to generate cash not only profits. The instrument to assess these details are explored in the next part of the analysis. (Rosembaum & Pearl, 2022)

The legal DD analyse all the regulated agreements and legal structure of the firm such as shareholder agreements, contracts, litigation, authorizations, intellectual property, employment issues and financing agreements. (Rosembaum & Pearl, 2022)

Tax DD reviews tax periods, tax litigation, transfer pricing, tax losses, deductibility of interest expenses and potential liabilities. (Rosembaum & Pearl, 2022)

Industrial DD assesses the target's market, competitive positioning, products, customers, suppliers, pricing power and the actual scalability opportunity. (Rosembaum & Pearl, 2022)

IT and environmental due diligence analyse technological systems, cybersecurity, environmental risks, plants, land, waste management and regulatory compliance. (Rosembaum & Pearl, 2022)

Human capital due diligence is particularly important in PE transactions because the Human Resources represents a key element in the evaluation of an investment. People enable value creation and affect company performance over the medium to long term. Talking about costs in sectors such as consulting, banking and PE, human capital reach 75–80% of total costs (business also known as human intensive). For this reason, the management team isn't tested only in relation its expertise but also regarding the ability to execute the business plan under Private Equity ownership. (Rosembaum & Pearl, 2022; AIFI, BIP, 2025)

The DD deliverables could lead to valuation adjustments, create negotiation points, impose post-closing adjustments, or in more severe cases it may identify deal breakers, such as liabilities beyond acceptable limits or risks that cannot be covered by seller guarantees. (Rosembaum & Pearl, 2022; Cumming & Johan, 2013)

1.4.4 TARGET VALUATION

The valuation is one of the most important and representative phases in Private Equity industry. During it, the fund estimates the value of the target company and determine the

price it is willing to pay. The value corresponds to the analytical estimates based on assumption regarding the financial statements, risks, growth opportunities and comparable companies. Price, conversely, is the result of the negotiations between the buyer and the seller, it depends on bargaining power, market conditions and strategic interests. (Rosembaum & Pearl, 2022)

The main valuation methods are the income approach, the cost approach and the market approach. They are used to estimate the Enterprise Value and the Equity Value of a company. The first one represents the valuation of the entire operating business independently of the financial structure of the company. The second one is the firm's value attributable to the shareholders. (Rosembaum & Pearl, 2022)

The income approach is based on the future cash-flows generated by the company. The key rationale is to estimate the expected future Free Cash Flow of the firm and to discount them at an appropriate discount rate. The valuation methodology is the Discounted Cash Flow (DCF).

There are mainly two ways to estimate the market value of the Equity with this approach: Discounted Cash Flows to the Firm (DCFF) and the Discounted Cash Flow to Equity (DCFE). The first one measures the cash flows before interests and debt payment, and it's discounted with Weighted Average Cost of Capital (WACC). It services all the capital providers, either bondholder and shareholders and it is used to calculate the Enterprise Value. The second one estimates the cash flows after interests and debt payments, and it's discounted with the Cost of Equity (K_e). It services the risk capital providers, the shareholders and it is used to calculate the Equity Value.

The WACC in Private Equity represents the weighted average minimum required return by investors. It represents the opportunity cost of investing in the company's operating assets. This aggregate is particularly relevant because any improvement of the cash-flow stability, reduction of the firm's risk, and optimization of the capital structure can reduce this discount rate and increase the EV of the company.

The Cost of Equity represents the return required by shareholders to compensate them for the risk of investing in the company's equity. A standard approach to estimate it is the Capital Asset Pricing Model (CAPM), according to which the required return on equity depends on the systemic risk, the equity market risk premium of the company. (Rosembaum & Pearl, 2022; Damodaran, 2012)

Another key metric in PE valuation is the IRR, it represents the discount rate that makes the present value of all expected cash flows of the target company equal to zero. It allows General Partners to assess whether a potential investment is consistent with fund's target return. It evaluates the expected annualized return of the investment over the entire holding period. It represents a connection between valuation, purchase price, leverage, value creation, investing timing and exit. (Kaplan & Schoar, 2005)

The cost approach estimates the EV by assessing the fair market value of a company's assets and liabilities. The key idea is to calculate the fair value of all operating and non-operating assets of the firm. In this case the method is the adjusted net asset method. This method starts from the book value of equity, perform the fair value adjustments to all operating and non-operating assets financial debts of the company reported in the balance sheet. And also add the adjusted fair value of all identifiable assets and liabilities that weren't recognized (i.e. provisions, extra liabilities, internal goodwill). However, this method has important limitations in private equity valuation. Since it may not fully capture the company's future earning capacity, cash-flow generation, growth prospects and strategic intangible value. For this reason, it is generally less used. (Damodaran, 2012)

The market approach calculates the EV or the fair value of Equity of a company via a multiple of financial metrics. It is based on publicly available prices of comparable assets or on recent comparable private transactions. The two methods used with this approach are the market multiples one and the transactions multiple methods. The rationale is to search for comparable companies (peers) choose the multiple and apply it to calculate the EV of the company, adjusting it applying an illiquidity discount. The mostly used multiples are the EV/Sales, EV/EBITDA, EV/EBIT, Price/Earnings. (Damodaran, 2012)

The empirical evidence report that purchase prices have been affected by high competition, higher entry multiples in recent years and less absolute number of deals. The median Private Equity purchase multiple increased from 11,3x EBITDA in 2024 to 11,8x EBITDA in 2025. Moreover, the multiple gaps between the North American and the European is shift from 1.0x in 2024 to 2.0 in 2025. (McKinsey, 2026)

1.4.5 CLOSING AND HOLDING PERIOD

During the investment process a Private Equity fund after the Due Diligence and the valuation of the potential target could close the transaction. At this phase the parties carry out negotiations, financing commitments, prepare the legal documentation and reach an

agreement on the sale price and terms. Typically, the agreement defines the object of the transaction, the purchase price, the payment mechanisms, the warranties, indemnities and possible price adjustment mechanisms. (Rosembaum & Pearl, 2022)

The central binding document of the transaction is the Sale and Purchase Agreement, also known as SPA. It represents the contract through which the seller undertakes to sell, and the buyer undertakes to acquire, the shares, a majority or minority participation, or a business unit. This document, also, regulates the mechanics of closing, specifying the sequence of actions to be performed by the parties on the closing date. A fundamental part of the SPA is the representations and warranties package. If the information provided by the seller are false or inaccurate, the buyer may claim indemnification, in this way the transaction risk is allocated between the parties. The SPA may also include post-closing deferred payments, for instance related to the company's performance but in this case, it could be the object of the escrow agreement. (Rosembaum & Pearl, 2022)

If the seller or the management team remains as a shareholder after closing, the parties usually sign a Shareholders' Agreement. It typically contains governance clauses and shares transfer clauses and veto rights on reserved matters. (Cumming & Johan, 2013)

After closing, the fund enters on the ownership phase. In this period the Private Equity fund holds and manages the purchased company and transform the investment thesis into actual value creation. Primarily the fund makes a "100-day plan", which defines priorities, governance mechanisms, reporting requirements, operational initiatives and management responsibilities. (AIFI, BIP, 2025)

The Private Equity fund, as an active investor, doesn't only monitor the portfolio company's performance but support directly it, executing strategic and operational improvements. The fund often introduces stronger board members, a clearer accountability system and strong decision-making culture. Reporting is crucial, usually the fund prepares monthly or quarterly reports to keep the investors updated. This monitoring framework is also crucial to evaluate the strategic deliverables and the overall investment performance. With this aim key performance indicators (KPIs) are used, linking strategic decisions to measurable results. Usually, the introduced managers are awarded with substantial performance incentives, such as stock options and exit ratchets, to improve their commitment. (AIFI, BIP, 2025)

Quantitative evidence reports that the average global holding period at exit is 7 years, and

6 years in Italy. Data also shows a concentration on non-divested assets and a 2025 Italian PE industry survey reports that 21% of the operators expect a confirmation of this trend. (Bain, 2026; PwC, 2024; Deloitte, 2025)

1.4.6 EXIT

The final stage of the Private Equity investment process is represented by the exit. As exposed in the previous parts, the fund has a limited and finite life within must return capital to its investors. In this phase it realizes the return on its investment transforming the value created during the holding period into liquidity, generating capital gains and contributing to the fund's track record. (Kaplan & Schoar, 2005)

The timing of the exit depends on several factors in which the fund evaluates whether the portfolio company has achieved the strategic objectives of the business plan and a sufficient IRR. However, the exit doesn't depend only on company's performance and ability to create value but also on external factors such as stock market conditions and interest rates. (Bain, 2026; McKinsey, 2026)

There are many ways to carry out the exit, the main routes are trade sale, initial public offering (IPO), secondary buyout, buyback, refinancing and, in negative cases, liquidation or write-off.

The trade sale consists of selling the company to an industrial buyer or strategic acquirer. It happens when an industrial buyer recognizes synergies, such as access to new markets, production integration, cost savings or product expansion. It's the second main exit route in Europe accounting for the 24% in 2024.

The IPO is the process in which the company is listed on a stock exchange. It requires strictly good and growth-potential performances and also a long and expensive process. It may be suitable for companies with sufficient size, good governance, reporting quality and scaling prospects.

The secondary buyout occurs when the company is sold to another private equity fund, usually this kind of exit happens when the target has completed one development phase but still has additional growth potential. In 2024 it represented the main European exit route (43%).

The buyback is the exit process in which the entrepreneur, the management team (MBO) or existing shareholders repurchase the fund's stake. This route is more common in minority

PE investments or situations where the original owner wishes to regain the control of the firm.

Refinancing isn't a proper exit process, it allows the fund to recover part of the investment, but it doesn't provide any capital gain. It provides partial new liquidity when the company has improved its cash generation and debt capacity. (Invest Europe, 2024; Rosembaum & Pearl, 2022)

Recent market evidence shows that global PE exit value increased in 2025 and reached USD 1,2 trillion, the second-highest level in more than a decade. The exit volume remained subdued, indicating continued difficulty in returning capital to investors. In Europe the divestments reached EUR 46 billion in 2024, involving 3,517 exited companies. These data show that exit management is not merely a final transaction phase, but a strategic activity that should be planned throughout the holding period. (Invest Europe, 2025; KPMG; 2026)

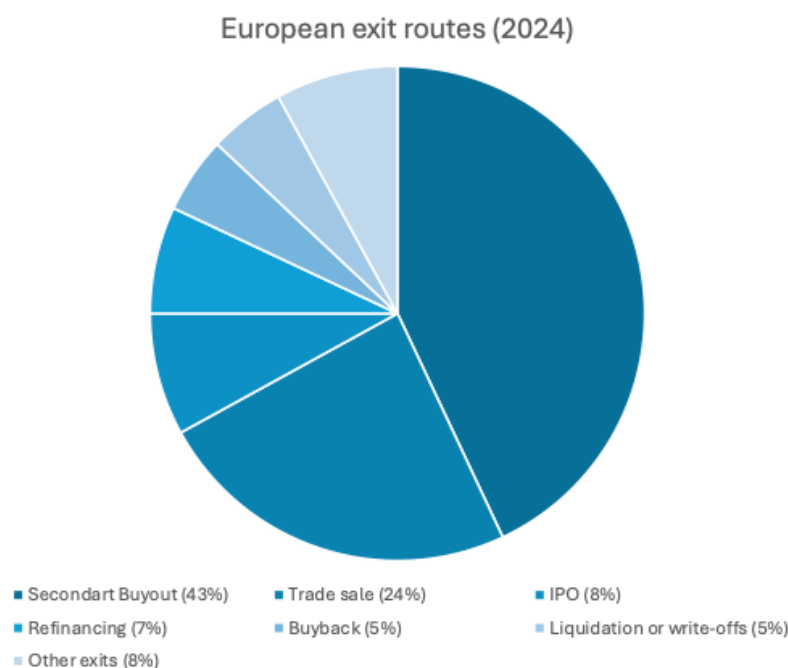


Table 1.2: European 2024 exit routes

PS. The distribution percentage are rounded, therefore the sum of individual categories may not equal exactly 100%.

1.5 THE PRIVATE EQUITY VALUE CREATION

The value creation plays a crucial role in the Private Equity model. As explored in the previous parts of the research it represents one of the fundamental characteristics of this kind of investments in which PE funds act as an active investor. Indeed, they don't only bring capital to the target companies, but they actively try to improve their performance during the holding period. The value that PE fund create in the portfolio companies is converted into cash through the exit process. (AIFI, BIP, 2025)

A Private Equity portfolio company could increase its value in several ways that could be summed up in three main channels: an increase of the operative cash-flows, the cost optimization, the increase of the expected growth rate. In these terms the value creation is driven by the combination of various strategic levers such as financial planning, operating improvements, governance strengthening, management and industrial implementation. An interesting and important evidence reports that, historically the majority of the expected return in PE investments came from the financial lever and the multiple expansion. Conversely, nowadays the funds' returns are related to the industrial transformation and value creation in the portfolio companies. This is a result of a higher competition through the industry operators, higher entry multiples, higher interest rates and a higher cost of capital. Empirical data confirms this evolution: in the Italian Private Equity environment between the 2019 and 2024 about 71% of the value created by the fund in the portfolio companies came from operating levers. More precisely, about 57% of PE value created came from revenues growth, 14% from the EBITDA margin improvements, and the financial leverage reported a negative -11%. (AIFI, BIP, 2025; McKinsey, 2026; Bain, 2026)

1.5.1 FINANCIAL LEVERS

One of the most classic Private Equity value creation levers are the financial ones. Especially in the LBO transactions there is a double effect, the debt improves the investors IRR and the high leverage impose to the company a better cash-flows management to keep the business sustainable. (AIFI, BIP, 2025)

Using the operating cash flow to service the debt, Net Financial Position lowers, because of the debt amount reduction. At the same level of Enterprise Value at the exit, a lower NFP increases the Equity Value of the company and consequently the investors' returns. This process is called deleveraging. However, the portfolio company, in this case, has to be able to generate enough operating cash-flows to service not only the debt but also the operating

investments to allow an organic growth. (AIFI, BIP, 2025)

Another kind of financial lever is the tax shield. In this case the debt generates a tax benefit. Generally, the passive interests are deducted, indeed the EBT is the financial aggregate reported in the P&L usually used to calculate the tax liabilities, and it decrease at the quantity of the passive interests level. So, the debt lowers the tax expenses of the company and increases the cash-flows available to the shareholders. (Damodaran, 2012)

Moreover, the debt reduces the Free Cash Flow to the Firm, reducing the amount of capital that the portfolio company's management could invest. This conceptually decrease the risk of inefficient management investment allocation or discretionary expenses. So, the debt makes the management more careful on Working Capital management, margins generation, and cash-flows generation. (Damodaran, 2012)

However, the leverage and the use of debt generate risks. A big leverage decreases the company strategy flexibility, because the management have to pay attention to make the operating cash-flows sustainable enough, as stated before. The higher probability of default makes the cost of capital costly and makes the long-term financial planning more difficult, it decreases the investment capacity affecting innovation, digitalisation and human capital. For this reason, the empirical data shows that in the Italian PE industry the leverage use is widespread but quite conservative. Data report an average PFN/EBITDA equal to 1,48x at the entry and 1,56x at the exit (median 1,52x and 1,31x) showing a sustainable EBITDA growth when there's a leverage increase. It means that the debt is used mainly for the organic growth of the portfolio companies. (AIFI, BIP, 2025; McKinsey, 2026)

1.5.2 OPERATING LEVERS

The operating levers represent the most important value creation channel in the Private Equity investments. They are the group of operating improvements that the fund, as an active investor, makes to the portfolio company. They are revenue and EBITDA improvement, cost optimization, efficient process improvements, WC optimization, add-ons acquisition and internationalisation. The aim is the operating cash-flows improvement. (AIFI, BIP, 2025; Bain, 2026)

The organic growth is one of the most important Private Equity value creation levers. It is equal to portfolio company's revenues and EBITDA improvements without a process of external acquisition. In this case the PE fund accelerate the company's growth with a structured strategic industrial plan. The SMEs are usually consolidated businesses with an

existing product portfolio, customer base, high and valuable know-how without the internal capacity and competencies to scale up their business. The PE funds bring to these companies expertise, marketing and commercial strategies, structured processes and consolidated monitoring and reporting standards to measure the performances. Empirical evidence reports that the revenue growth contributes, in the Italian environment, to 57% of the total value creation in the portfolio companies. Empirical evidence shows that in the Italian PE industry, the target companies' average revenues increase from EUR 101 million to EUR 163 million (median from EUR 38 million to EUR 82 million), with an average CAGR equal to 19% (median 14,3%).

Private Equity funds usually improve margin with the cost optimization. It is equal to review of the product processes, supply chain optimization, waste reduction, renegotiation of the supply contracts and the scrap of inefficient activities or business units. Therefore, cost optimization isn't equal to an expense or an investment cut. So, the product quality, the innovation and the growth potential of the portfolio company aren't affected.

A consequence to the cost optimization is the margin improvement, so the EBITDA increase. In the Italian PE market, quantitative studies report an average EBITDA increase from EUR 13,3 million at the entry to EUR 25,9 million at the exit (median from EUR 6,3 million to EUR 13,7 million), with an average EBITDA margin increase from 16,8% to 18,1% (median from 15,6% to 17,2%).

Another organic growth lever is the improvement of the companies' processes. In many cases, the SMEs don't have many optimized instruments to make the operating process flow efficient. For this reason, the Private Equity funds usually implement digitalized process inside their portfolio companies such as ERP, CRM, controlling and reporting instruments. It allows to reduce the inefficiencies, improve the productivity and make the firm able to scale up its business. In the Italian environment, quantitative data report that PE portfolio companies record an average revenues per employee from EUR 141.069 to EUR 149.433 (median from EUR 232.424 to EUR 273.989).

Also, a better commercial credits, debts and inventory management increase the cash-flows and lower the financial needs of a company. For this reason, the PE funds usually optimize the Working Capital of the portfolio firms. Especially in the LBOs, the cash cycle improvement is useful to respect covenants and debt's payment dates. (AIFI, BIP, 2025; AIFI, LIUC, 2024; Bain, 2026)

There are also possibilities to increase and create value to the portfolio companies through external ways.

The internationalisation is a commercial, productive and strategic expansion on abroad markets. Especially the Italian SMEs one of the main limits to scale their models is represented by ability to access in a structured way to the international markets. Private Equity funds ease this edge thanks to their international network, the expertise of the management appointed and the bargaining power that they implement on their portfolio companies. Empirical statistics report that in the Italian PE environment, about 95% of the investment cases the fund has implemented the international presence of the companies, and regarding the firms not yet internationalised about 59% has begun this kind of expansion process.

Another operating lever is the add-ons acquisition. It is referred the purchasing transactions of strategic companies able, thanks to their synergies, to unlock portfolio companies' value. This PE strategy is known as buy and build. It allows the portfolio company to scale up its business through external sources strengthening their product portfolio, their know-how, their customer base. The add-ons usually operate in fragmented industries where the PE fund could create a consolidated platform. For instance, Italian data show that 2/3 of the PE portfolio companies has acquired an add-ons during the fund holding period. (AIFI, GPBL, 2025; AIFI, LIUC, 2024; AIFI, BIP, 2025; Bain, 2026)

1.5.3 MANAGERIAL LEVERS

The Private Equity value creation is also based on the strengthening of the portfolio company's governance. Especially in the Italian SMEs environment, the organizational structures, the long-term planning and the controlling system are limited. This is due to the strong belonging on traditions and historical manners in which the entrepreneur represents the center of all the decision-making channels. When a PE fund enters a company with this characteristic is fundamental to introduce the management culture. In this way it spreads the split between owners and management team. The management team is composed by professionals with an historical expertise. (AIFI, BIP, 2025; AIFI, LIUC, 2024)

The Private Equity funds appoint a management team, a Board of Directors (Bod) and Board of Advisor (BoA) with the purpose to improve the quality of the decision making, the strategic processes and the information transparency in the portfolio companies.

In these terms the fund introduces a reporting framework system through monthly reports,

annual budgets, operating and financial KPIs and a controlling system. They are crucial to monitor and conduct in the proper way the value creation in the portfolio companies. They allow to assess the performance of the investment and reach the medium-long term goals. (AIFI, BIP, 2025; AIFI, LIUC, 2024)

The Private Equity funds usually use incentive plans, stock options, and KPIs related bonuses to align the management team interest to the ones of the fund. In this way the PE introduce an ownership mindset linked to the economic performance of the firm. (Bain, 2026)

So, the governance levers don't create value directly, but they introduce the culture that allows to the portfolio companies to carry out a value creation process. Also, a company with good monitoring and reporting standards and a strong management is perceived as more solid by the stakeholders. (AIFI, BIP, 2025; McKinsey, 2026)

Quantitative evidence of the Italian PE portfolio firms in 2024 show a strengthening of the management team during the holding period. (PwC, 2024)

1.5.4 HUMAN CAPITAL LEVERS

The other value creation lever is the human capital, and it affects all the other dimensions previously analysed. Without an adequate management team, skills and a culture consistent with the company the strategic long-term goals and the industrial plan can't be achieved by the Private Equity fund. (AIFI, BIP, 2025)

The human capital plays a crucial role either during the holding period and the DD phase. Indeed, the PE assesses the existing management team to evaluate the company's potential and its actual ability to execute the industrial plan. In this way the fund understands how to strengthen the governance team. Usually Private equity funds introduce CFOs, COOs, commercial directors, to have a clear vision and trust on the strategy and investment thesis execution. The key figures selected usually have a strong experience in more structured organizational contexts and in the industry of the portfolio company. Another purpose to set a trusted and strong human capital has the aim to make the company organic growth possible independently to the know how or the presence of certain key men. (AIFI, BIP, 2025; AIFI, LIUC, 2024)

The entry of a PE fund modifies consolidated organizational equilibria and introduces stronger performance measurement systems that may generate tensions between the entrepreneur, the historical management team and newly appointed managers. So, it's very important for the success of the transaction to mitigate the adaptability risk. (AIFI, LIUC,

2024)

Human capital is also closely connected to innovation because it depends on the ability of the management to select projects and allocate resources and facilitate the transformation of ideas into outputs. Academic literature shows that private ownership may support riskier and longer-term investments compared with public markets. The private firms are often better positioned to pursue long-term innovative projects. Because listed companies are more exposed to short-term pressures. Similarly, Lerner, Sorensen and Strömberg observe that, after the transaction, patents tend to receive more citations and innovation portfolios become more focused on the most relevant technological areas. (Maas et al., 2020; Bernstein, 2022; Lerner et al., 2011)

The empirical evidence of the Italian PE portfolio companies confirms the relevance of this dimension: the average number of employees increases from 716 to 1.092 (median from 165 to 300) in PE-backed companies. In fact, PE created 41.000 new jobs, with a significant acceleration in 2021 and 2022. (AIFI, BIP, 2025; PwC, 2024)

1.6 THE INNOVATION

The innovation is the other main concept analysed in this research. It represents the theoretical bridge between the general analysis of the Private Equity model and the econometric analysis of its outcome in the Italian environment presented in the Chapter II. In this research the innovation concept is intended as a broad process of business transformation through which firms improve their products, organizational structures, processes, strategies and business model.

This interpretation is consistent with the modern definition of innovation provided by OECD and Eurostat: a business innovation is a new or improved product or business process, or a combination of both, that differs significantly from the firm's previous products or business processes. So, innovation is not merely an idea, a patent or a technological discovery, it is an implementation process. Also, the academic literature supports this definition stating that it shouldn't be restricted to the development or the products improvement, it should include process innovation, new approaches, strategies, optimization and the access to new markets. (OECD, 2018; Maas et al., 2020)

In this research, innovation is understood as a multidimensional phenomenon that in Private Equity model is crucial to reach the value creation needed to maximize its returns on

portfolio companies. A fund may not necessarily generate new patents, but it can still introduce substantial innovation by company improvements. (Maas et al., 2020; AIFI, BIP, 2025; Lerner et al., 2011; Amess et al., 2016)

1.6.1 THE BROAD SENSE OF INNOVATION

The innovation concept analysed in this research is intended in a broad sense. It includes several forms of firm-level transformation as defined in the OECD and Eurostat definition consistent with the mature companies' innovation. Specifically, it concerns product innovation, process innovation, organizational innovation, commercial innovation and business model innovation. So, in these terms we are exploring the operational innovation rather than the technological one. The distinction is that the latter one is more directly linked to patent production and new technologies development while the operational is focused on operational improvements. The core purpose isn't equal to invent something radically new but optimize and scale. (OECD, 2018; OECD, 2005; Maas et al., 2020; AIFI, BIP, 2025; Maas et al., 2020; Lerner et al., 2011; Amess et al., 2016)

The first and most traditional category of innovation is the product innovation. It refers to the introduction of a new or significantly improved good or service with new functionalities, higher quality, improved design, better technical performance or the extension of an existing product range. In Private Equity backed firms, product innovation is usually a byproduct of the industrial plan introduced at the fund's entry. The purpose of the PE is improving the portfolio company products' offering, set higher margin, strengthen its market position or reposition itself to serve more attractive and profitable customers. (OECD, 2018; OECD, 2005; AIFI, BIP, 2025; AIFI, FSI, 2024)

Another category is process innovation. It refers to the introduction of new or significantly improved production, logistics, administrative or delivery processes. Process innovation is especially relevant for Private Equity because many buyout targets are mature firms with established products offering but with underdeveloped and inefficient operating systems. This kind of innovation has a direct impact on productivity, margins, cash generation and cost optimization. It is intended for instance as the improvement of procurement procedures, better inventory management, automation of production processes, digital reporting tools, stronger budgeting routines or more efficient supply chain coordination. (OECD, 2018; OECD, 2005; AIFI, BIP, 2025; Maas et al., 2020; Bain, 2026)

The organizational innovation is intended as the changes in governance, organizational

structure that shift how the culture of the portfolio company. Private Equity funds, as explored, strengthen the board, introduce a professional management team, develop structured reporting systems and align management incentives with value creation targets. (OECD, 2005; AIFI, BIP, 2025; Maas et al., 2020)

The fourth category is commercial innovation, that is intended as the processes through which the portfolio companies offer, sell and position their product or services. It is particularly relevant in PE backed companies to support organic growth through internationalization, salesforce strengthening, channel expansion and commercial repositioning. (OECD, 2005; AIFI, BIP, 2025; AIFI, Gatti et al., 2025)

Another category is the business model innovation. It refers to changes in how the firm creates, delivers and captures value. It may include the transition from a product-based model to a service-based model, the development of recurring revenues, the creation of a platform through acquisitions, the outsourcing of non-core activities or the integration of complementary companies through buy-and-build strategies. Business model innovation is particularly important in Private Equity because many funds seek to transform standalone companies into scalable platforms. (OECD, 2018; AIFI, BIP, 2025; Maas et al., 2020; Bain, 2026)

The specific contribution of this research study whether PE backed firms display stronger operational innovation outcomes than comparable non-PE backed ones. It consistent with the Private Equity funds value creation intended as form of efficiency, scalability, managerialization, working capital management and cash conversion discipline.

1.6.2 WHY IS OPERATIONAL INNOVATION COHERENT WITH PRIVATE EQUITY?

As deeply explored through this chapter, the active role of the Private Equity funds in their portfolio companies allow them to conduct and manage directly the medium-long term transformation. Their objective is to increase the value of the portfolio firms over the holding period and make this value liquid at exit to generate a return to their investors. As analysed in the PE value creation part the funds use financial, operating, managerial and human capital levers to create value. So, the Private Equity model can innovate by changing the firms operating processes. (AIFI, BIP, 2025; Maas et al., 2020; AIFI, PwC, 2024)

The empirical evidence highlights that the operating levers are nowadays the dominant source of value creation in the Italian Private Equity market. So, PE added value come

mainly from revenue growth, EBITDA and EBITDA margin improvement and human capital growth. To witness it evidence states that about 71% of PE value creation derives from operational levers instead of financial engineering like multiple expansion or cheap debt. This is driven by an higher borrowing cost and lower leverage in transaction, elevated purchase entry multiples due to the high competition. With this aim PE funds introduce stronger management teams, incentive systems aligned with value creation targets, strategic committees and structured monthly reporting that for SMEs and family-owned businesses, this can represent a massive transformation. (AIFI, BIP, 2025; Bain, 2026; McKinsey, 2026; AIFI, Fondo Italiano, LIUC, 2024)

The empirical model developed in Chapter II follows this logic and the Oslo Manual definition of innovation exposed in this section. The dataset doesn't observe patents, trademarks, R&D expenditures or product launches but it is based on an index that represents an approximate operational innovation. The purpose of the econometric analysis is to estimates a conditional association, not a causal treatment effect, between PE backed status and firm level innovation outcomes, comparing PE backed and non-PE backed firms in the same macro-sector-year environment. (OECD, 2018; Lerner et al., 2011)

2. THE ECONOMETRIC ANALYSIS

This research has the aim to analyse and estimate whether there could be a conditional association between comparable firms with and without Private Equity fund investments, and innovation outcomes characteristics.

The main limitation of this analysis is the impossibility to gather accurate observations, on a statistically meaningful sample, on the entry year of funds in the companies. The entry year is intended as the moment in which the fund purchases an ownership stake of a firm.

Due to the unavailability of these data, the research is unable to investigate a correlation between their innovation proxies' performance pre and post Private Equity investments.

Given the scope of the analysis and its limits the panel analysis is an appropriate econometric tool to be used.

2.1. THE DATASET

As an introduction of the econometric model this section describes the data available and their meaning.

To carry out the Panel Analysis with the aim to observe if there is (or not) a conditional link between Private Equity investments and innovation proxies, data are collected from Italian-registered firms.

For these purposes two sub-datasets are built: the PE backed dataset, dedicated to the companies with a direct or an indirect investment of a Private Equity fund; the non-PE backed dataset, dedicated to companies' data without any investment made by a Private Equity fund.

After being cleaned and analysed, the data from the two sub-datasets are merged and used to build a single dataset to be able to estimate the econometric model.

In the subsequent paragraphs, the datasets, their features and the steps followed to make them clean and ready to the econometric analysis are presented.

2.1.1 PE BACKED COMPANIES DATASET

This section describes the PE backed companies' sub-dataset. It is built with the aim to carry out the econometric model.

The PE backed companies and their data are gathered and downloaded from AIDA without applying any filter. AIDA is a comprehensive database provided by Moody's (formerly Bureau van Dijk) containing detailed financial, marketing, and identifying information on over one million Italian companies (LUISS).

All the PE backed companies found are 4.715 Italian-registered firms, a large enough sample to structure a solid dataset. These firms have a direct or an indirect participation of a PE fund that invested in them, by acquiring majority or minority of their shares or directly or indirectly (for instance, when the acquired company is the parent company of a corporate group).

This dataset is composed of quantitative and qualitative data related to the Financial Years 2015–2024 (10 years' time range) to allow an assessment through multiple years.

More specifically, the quantitative data include 29 variables, which are:

CAGR3Y; REVENUES; EBITDA; EBITDA MARGIN; NET PROFIT; INVESTED CAPITAL; NET FINANCIAL POSITION; WORKING CAPITAL; OPERATING CASH FLOW; INVENTORY; RECEIVABLES; PAYABLES; DEBT; CASH; EMPLOYEES; SALES GROWTH; GROSS MARGIN %; EBIT %; NFP; CAPEX / SALES; ROIC; INVESTED CAPITAL/SALES; COGS/SALES; OTHER OPERATING EXPENSES/SALES; D&A/SALES; NON-CURRENT ASSETS/SALES; NWC/SALES; OTHER CURRENT OPERATING/SALES; CEO AGE.

The qualitative ones are 5 variables, which are:

NAME; VAT NUMBER; FISCAL CODE; DESCRIPTION; OWNERSHIP TYPE.

Analysing these 4.715 companies that compose the PE backed companies' sub-dataset, their core business and their ATECO code (the Italian national version of the EU NACE classification of economic activities (Alonzi, F., & Viviano, C., 2026)), they are grouped into 8 different macro-sectors. The purpose of this classification is to assign each company to a mutually exclusive macro-sector label, suitable for an econometric analysis to capture meaningful within-group homogeneity with the aim of preserving statistical power across groups.

These macro-sectors are:

Industrials & Manufacturing; Business & Financial Services; Healthcare & Life Sciences; Technology & Digital; Infrastructure & Real Assets; Consumer & Retail; Energy & Utilities;

Other Services.

From a theoretical standpoint, the 8 macro-sectors correspond to well-established categories in the Private Equity and corporate finance literature, each characterised by a distinct investment thesis, risk-return profile, and operational leverage structure (Le Nadant et al., 2018; Novy-Marx, R., 2011).

From a statistical standpoint, several granular sectors contain small observations, which may lead to unstable estimates, inflated standard errors, or identification problems in panel-data specifications. Aggregating firms into broader macro-sectors mitigates these issues and increases the number of observations within each category, making cross-sector comparisons more meaningful (Agresti, 2013; Wooldridge, 2010)

PE backed Macro-Sector	N. Companies	% companies
BUSINESS & FINANCIAL SERV.	1.399	29,67%
IND. & MANUFACTURING	1.182	25,07%
HEALTHCARE & LIFE SCIENCES	518	10,99%
CONSUMER & RETAIL	457	9,69%
TECHNOLOGY & DIGITAL	423	8,97%
ENERGY & UTILITIES	405	8,59%
INFRASTR. & REAL ASSETS	200	4,24%
OTHER SERVICES	131	2,78%
Grand Total	4.715	100%

Table 2.1: Private Equity backed companies and their distribution into the 8 macro-sectors.

Now let's break-down the meaning and the kind of companies inside every group mentioned:

1. Business & Financial Services: it captures the scalable, asset-light service companies like consulting, credit management, leasing, HR outsourcing. These businesses are predominantly characterized by fixed costs and human capital intensity. It includes business services, financial services, HR & recruiting and rental & leasing. In the sample this group is the biggest one, composed of 1.399 companies (30%).
2. Industrials & Manufacturing: it embeds physical production, ranging from precision mechanics and metallurgy to defence systems and aerospace components. This group represents the typical PE buyout target as they often focus on mature firms with identifiable operational improvement potential (Cohn, J., & Song, C., 2025). It

contains automotive, components, machineries, metallurgy, plastics & rubber, engineering, naval defence, aerospace and chemicals manufacturers. This group is the second one, composed of 1.182 companies (25%).

3. Healthcare & Life Sciences: it's characterised by inelastic demand, regulatory barriers to entry, and long product cycles. It contains healthcare, medtech & pharma, medical diagnostics, pharmacies and veterinary. This cluster includes 518 firms (11%).
4. Consumer & Retail: it groups businesses whose performance is most directly linked to household disposable income and consumer confidence. In this cluster are included Sports teams because Italian football clubs and sports entities in their revenue model (sponsorships, broadcasting rights, merchandise) are structurally more analogous to luxury goods companies. It includes agri-food, personal & home care, fashion & apparel, luxury fashion, furniture & design and sports. In the sample this group is the fourth one, composed of 457 companies (10%).
5. Technology & Digital: these companies are characterized by intellectual property, lower capital intensity, and faster organic growth than industrials. It includes software & IT, IT automation, electronics & technology, digital & marketing and telecommunications. This cluster is the fifth one with 423 companies (9%).
6. Energy & Utilities: it includes all regulated, or quasi-regulated energy and environmental businesses. The common thread is that cash flows in this group are largely determined by regulatory frameworks, concession agreements, and long-term offtake contracts rather than competitive market dynamics. It contains electric energy, renewable energy, gas & utilities and environment & waste. This group is the sixth one and it includes 405 firms (9%).
7. Infrastructure & Real Assets: these companies' characteristic is their asset values and cash flows are more sensitive to interest rate movements and inflation dynamics than to operating performance. It contains construction, real estate and logistics & transportation. It is composed of 200 companies (4%).
8. Other Services: this cluster collects categories that are either too small for standalone inference or lack a clear mapping to classical PE investment strategies. It includes education & training, hospitality, media & publishing, gaming & gambling and funeral services. It represents only the 3% of the total amount of companies in this dataset.

2.1.2 NON-PE BACKED COMPANIES DATASET

In this part of the research the non-PE backed companies' sub-dataset is described. The companies and their data are gathered and downloaded from AIDA as the PE backed companies' one without applying any filter. This dataset is composed of 29.882 non-PE backed companies' data. They're grouped into the same 8 macro-sectors used for the PE backed firms' dataset, using the same variables and time range 2015-2024, as it's shown in the table below:

1. 4.568 companies operating in the Consumer & Retail cluster (15%)
2. 4.564 firms in Industrials & Manufacturing (15%)
3. 4.560 companies in Technology & Digital (15%)
4. 4.531 firms accounted for Healthcare & Life Sciences (15%)
5. 4.383 companies in Business & Financial Services (15%)
6. 3.579 firms operating in Infrastructure & Real Assets (12%) cluster
7. 2.054 companies in Energy & Utilities (7%)
8. 1.643 firms recognized as Other Services (5%).

Non-PE backed Macro-Sector	N. companies	% companies
CONSUMER & RETAIL	4.568	15,29%
IND. & MANUFACTURING	4.564	15,27%
TECHNOLOGY & DIGITAL	4.560	15,26%
HEALTHCARE & LIFE SCIENCES	4.531	15,16%
BUSINESS & FINANCIAL SERVICES	4.383	14,67%
INFRASTRUCTURE & REAL ASSETS	3.579	11,98%
ENERGY & UTILITIES	2.054	6,87%
OTHER SERVICES	1.643	5,50%
Grand Total	29.882	100%

Table 2.2: non-Private Equity backed companies and their distribution into the 8 macro-sectors.

2.1.3 THE MERGED DATASET

Once the PE backed and non-PE backed companies' sub-datasets are built the total amount of companies is equal to 34.597 (PE backed (14%); non-PE backed (86%)). In this large

sample is necessary to remove and clean the misleading or wrongly reported observations.

Merged Dataset	N. companies	% companies
BUSINESS & FINANCIAL SERVICES	5.782	19,35%
INDUSTRIALS & MANUFACTURING	5.746	19,23%
HEALTHCARE & LIFE SCIENCES	5.049	16,90%
CONSUMER & RETAIL	5.025	16,82%
TECHNOLOGY & DIGITAL	4.983	16,68%
INFRASTRUCTURE & REAL ASSETS	3.779	12,65%
ENERGY & UTILITIES	2.459	8,23%
OTHER SERVICES	1.774	5,94%
Grand Total	34.597	100%

Table 2.3: Merged PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors.

In these terms with the scope to clean all the macro-sector samples are used the “Revenues” variables between 2015 and 2024 for each company.

The method used for the data cleaning is related to how many data are misleading, missing, wrongly reported or not very significant for the purpose of the analysis. With this aim all the firms that reported more than 6 observations less than 5.000 Euros were excluded as they likely reflect errors or economically inactive firms, rather than meaningful firm activity.

The ultimate clean merged dataset reports 20.419 valid single firms, 2.413 (12%) PE backed and 18.006 (88%) non-PE backed. As it’s shown in the table below.

Merged Clean-Dataset	N. companies	% companies
INDUSTRIALS & MANUFACTURING	4.879	23,89%
CONSUMER & RETAIL	4.156	20,35%
BUSINESS & FINANCIAL SERVICES	3.399	16,65%
HEALTHCARE & LIFE SCIENCES	2.976	14,57%
TECHNOLOGY & DIGITAL	1.582	7,75%
INFRASTRUCTURE & REAL ASSETS	1.465	7,17%
ENERGY & UTILITIES	1.156	5,66%
OTHER SERVICES	806	3,95%
Grand Total	20.419	100%

Table 2.4: The Merged clean Dataset with PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors.

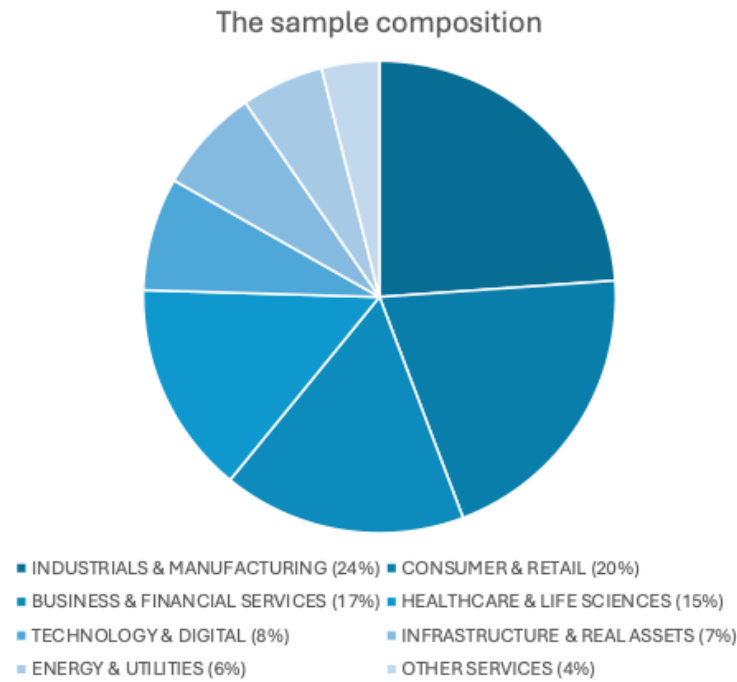


Chart 2.1: The Merged clean Dataset with PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors.

2.2 THE PANEL ANALYSIS AND THE EMPIRICAL QUESTION

The dataset of this research has a panel structure, and the econometric model is carried out using a pooled firm-year OLS regression with macro-sector-year fixed effects and firm-clustered standard errors.

The panel analysis is an econometric methodology used when the dataset contains repeated observations of the same statistics units during multiple year. (Angrist & Pischke, 2014)

In this dataset the statistics units are the single companies, indicated with “ i ”. The time is the year of the observation (among the time range 2016-2024), indicated with “ t ”. Therefore, every firm ($i ; t$) contains multiple data within the time range.

In this dataset the observations aren’t related a single year observation, so they aren’t considered cross-sectional designed. A cross-sectional dataset would compare, for instance PE backed, and non-PE backed companies within only one year.

This kind of analysis is useful to the scope of the research because allows to observe how the companies behave through the time, if any common shock occurs, characteristics and industry differences. Furthermore, the companies are divided and distributed to different macro-sectors, as specified before.

In these terms, in the analysis there isn't a simple comparison between PE backed companies and non-PE backed ones, they are analysed in the same sector-background and time range. This structure allows to exploit either the cross-section variation and the time range variation of the innovation proxies' outcomes and controls. (Angrist & Pischke, 2014)

Given the constraints and the available data, the empirical question of the research is:

Do PE backed companies exhibit higher sector-year-adjusted level of operational innovation proxy scores than comparable non-PE backed firms operating in the same macro-sector-year environment, conditional on observable firm-level characteristics?

So, this thesis estimates the conditional association (not a causal treatment effect) between PE backed status and firm level innovation outcomes, exploiting firm-year panel observations and comparing PE backed and non-PE backed firms operating in the same macro-sector-year environment, conditional on observable firm characteristics.

In the previous chapter the methodology and the constraints were stated. Given and recognized the constraints, difference-in-differences design can't be implemented in this analysis.

Since the Private Equity funds entry years aren't available, the empirical design cannot identify a pre-treatment (before the PE investment) and post-treatment (after the PE investment) period for PE backed firms. Therefore, a difference-in-differences (DD) design cannot be used.

This methodology needs at least four elements: a treated group, in this case the companies with a Private Equity investment; a control group, the non-PE backed companies; a pre-treatment period, the observation related to the time range before the entry year of the PE fund; a post-treatment period, the time range after the entry year. (Angrist & Pischke, 2014)

In this dataset we have the treated group that corresponds to the PE backed firms and the control group that are the non-PE backed ones. The entry year data is missing, so the starting period of the treatment cannot be known. The analysis, therefore, cannot compare changes in innovation-related outcomes before and after PE investment relative to non-PE backed firms.

The empirical strategy relies on a firm-year panel regression framework in which PE backed status is treated as a time-invariant firm-level indicator.

2.2.1 THE MODEL

The baseline model for this analysis is:

$$Y(i; s; t) = \beta PE(i) + X(i; t)' \gamma + \lambda(s; t) + \varepsilon(i; t)$$

It's important to clarify that the firm fixed effects are not used in the baseline model because PE backed status is time-invariant in the available data. Including firm fixed effects would absorb all time-invariant firm-level variation, including the PE backed indicator itself, making the coefficient on PE status unidentified.

Let's breakdown all the components of the model.

1. $Y(i; s; t)$ is the operational innovation proxies index of the firm i in the macro-sector s the year t . This component is explored further in the next section of the research.
2. β measures the average conditional difference in innovation outcomes between PE backed and non-PE backed firms operating in the same macro-sector-year environment, conditional on observable firm-level controls and macro-sector-year fixed effects.
3. $PE(i)$ is the dummy, the status of the company i . It's a binary status, firm-level and time-invariant in which it's equal to 1 if the company i is classified as PE backed, and equal to 0 if i isn't classified as PE backed.

$$PE(i) = \begin{cases} 1 & \text{if the company } i \text{ is classified as PE backed} \\ 0 & \text{if the company } i \text{ isn't classified as PE backed} \end{cases}$$

4. $X(i; t)$ is the vector of the controlled firm-level variables during the time.
5. $\lambda(s; t)$ are the fixed macro-sector effects per year.
6. $\varepsilon(i; t)$ is the error term.

2.2.2 THE OPERATIONAL INNOVATION PROXY INDEX

In this part of the research is explored the operational innovation proxy outcomes that compose the index $Y(i; s; t)$ in the baseline model.

According to the Oslo Manual 2018 made by OECD/Eurostat, a business innovation is a new or improved corporate product or process that's significantly different to the others

launched or already used (OECD, Eurostat, 2018).

In that sense the dataset doesn't gauge number of patents detained or issued by the single firms i during the time t , trademarks or new products launched into the market, that are most common measures of innovation (National Bureau of Economic Research, 1990). But this constraint is bypassed with an innovation indicator. It merges the innovation-related operating performance of every company, taking into account: process innovation, the introduction or implementation of a new or significantly improved business process within the firm (OECD, Eurostat, 2018); efficiency, the ability of a firm to transform inputs into outputs with limited waste (Farrell M., 1957); and scalability, the firm's ability to expand revenues, output or market preserving, or improving, its operating performance (Lund et al., Alborg Universiteit, 2018).

The indicator is:

$$\overline{Innovation Proxy Index (i; s; t)} = \frac{Z(CAGR3Y)(i; s; t) + Z(Gross Margin)(i; s; t) - Z(NWC/Sales)(i; s; t) + Z(OCF/Sales)(i; s; t)}{4}$$

Here a breakdown of the operational innovation proxy index components:

1. $CAGR3Y(i; t)$ is included as a proxy for revenue scalability.

The Compound Annual Growth Rate (CAGR) measures the constant annualized growth rate that links a beginning value to an ending value over a multi-year period (Corporate Finance Institute, 2020).

Although revenue growth is not a direct measure of innovation, it captures the commercial manifestation of innovation-related capabilities, such as product-market expansion, process improvements, organizational upgrading and improved market positioning (OECD, Eurostat, 2005).

To avoid comparing structurally different industries, the variable is winsorized and standardized within macro-sector-year.

The CAGR3Y formula is:

$$CAGR3Y (i; t) = \left(\frac{Revenues (i; t)}{Revenues (i; t-3)} \right)^{\frac{1}{3}} - 1$$

2. $Gross Margin (i; t)$ is used as a proxy for operating efficiency and value-added

generation.

Gross Margin is defined as gross profit divided by revenues. It measures the proportion of sales retained after deducting direct production or service delivery costs (Corporate Finance Institute, 2020).

Improvements in gross margin may reflect process innovation, product differentiation, superior pricing power or a more favourable product mix. The variable is standardized within macro-sector-year cells. (OECD, Eurostat, 2018)

Since gross margins vary substantially across industries, the variable is winsorized and standardized within macro-sector-year.

The Gross Margin formula is:

$$\text{Gross Margin } (i; t) = \frac{\text{Revenues } (i; t) - \text{Cost Of Goods Sold } (i; t)}{\text{Revenues } (i; t)}$$

3. *Net Working Capital / Sales* ($i; t$) is used as a proxy for net working capital efficiency.

Net Working Capital could be defined as a figure that captures net investment in operating liquidity required to sustain ongoing business operations (Zimon G., 2021).

NWC/Sales measures the amount of net working capital required to support one unit of revenue. It captures the extent to which sales are tied up in inventories, receivables and payables.

In this case the component is treated as negative because a lower working-capital requirement per unit of sales indicates that the firm is able to support revenues with lower operating capital absorption, potentially reflecting superior process organization, inventory management, credit collection and supply-chain discipline. The variable is not interpreted as direct innovation, but as an observable manifestation of operational efficiency consistent with process (OECD, Eurostat, 2018).

The NWC/ Sales formula is:

$$- \text{NWC/Sales}(i; t) = - \frac{\text{Current Assets } (i; t) - \text{Current Liabilities } (i; t)}{\text{Revenues } (i; t)}$$

4. *Operating Cash Flow / Sales* ($i; t$) is used as a proxy for the ability of the firm to convert the operating activity into cash.

Operating cash flow represents the cash inflows and outflows arising from a firm's principal revenue-generating activities, as reported in the statement of cash flows (IFRS / IAS

7, 2024).

This ratio measures the amount of operating cash flow generated per unit of revenue and captures the ability of the firm to transform sales into operating cash.

It captures the extent to which operating profitability is transformed into operating cash flow. This dimension is relevant because innovation-related operating improvements should not only increase accounting margins but also translate into financially sustainable cash generation. The ratio is winsorized and standardized within macro-sector-year cells.

The OCF/Sales formula is:

$$OCF/Sales (i; t) = \frac{Operating\ Cash\ Flow (i; t)}{Revenues (i; t)}$$

A zero and distributional diagnostic is conducted for each component of the operational Innovation Proxy Index. The analysis covers the baseline variables reported above (CAGR3Y, Gross Margin, NWC/Sales and OCF/Sales). The purpose of this preliminary step is to assess data availability, detect excessive concentrations of zero values, identify extreme observations and verify whether the variables display sufficient variation before applying winsorization and z-score standardization. (Heckert et al., 2003)

For this reason, the year 2015 is excluded from the panel analysis, its main variables are missing or equal to zero.

The analytical sample includes 20.419 firms observed over nine years, corresponding to 183.771 firm-year observations. The diagnostic shows that zero values don't represent a general issue across the index variables. For most variables, the share of zero observations is negligible. The main issue identified concerns the presence of extreme values. In several macro-sectors, the distance between the 99th percentile and the maximum value is very large, especially for growth ratios, working-capital ratios and cash-flow ratios. This means that these components at the 1st and 99th percentiles within each macro-sector-year have to be winsorized. Look at Appendix for further details on the distributional diagnostic 2016-2024.

Winsorization is applied to fix the influence of extreme observations. Following the standard winsorization approach, values below the 1st percentile are set equal to the 1st percentile, while values above the 99th percentile are set equal to the 99th percentile. This procedure limits the impact of extreme values without deleting observations, thereby preserving the sample size. Without this correction, a small number of extreme observations

could strongly distort the mean, standard deviation, z-scores and the resulting of the operational innovation proxy index. (National Institute of Standards and Technology). Look at Appendix for further details on the winsorization.

$$Z(X)(i; s; t) = \begin{cases} p1(s; t) & \text{if } X(i; s; t) < p1(s; t) \\ X(i; s; t) & \text{if } p1(s; t) \leq X(i; s; t) \leq p99(s; t) \\ p99(s; t) & \text{if } X(i; s; t) > p99(s; t) \end{cases}$$

Every component of the operational innovation proxy index is standardized, so it's reported as a z-score. A z-score is a measure that gauges how many standard deviations (SD measures the distance of an observation from the sample mean) an observation lies from the sample mean (Wooldridge, 2020).

The z-score formula:

$$Z(X)(i; s; t) = \frac{X^{wins.}(i; s; t) - \bar{X}^{wins.}(i; s; t)}{Standard\ Dev.(X^{wins.}(i; s; t))}$$

The standardization is needed because all the variables (explained before) of the operational innovation proxy index have different distributions and volatility within the sample, this solution allows to strike a balance and weight them. Another reason is driven by the differences of the 8 macro-sectors and the possible common shock that could have triggered the firms inside the same batch (i.e. a high Gross Margin in Industrial & Manufacturing could be a low result in the Consumer & Retail one). So, this transformation expresses each firm-year observation relative to its sector-year peer group.

In the outputs of the operational innovation proxy index, split per macro-sector-year relevant sectoral differences emerge. Consumer & Retail and Industrial & Manufacturing display negative medians and strong upper tails, indicating that their averages are driven by a smaller group of high-performing firms. Business & Financial Services, Energy & Utilities and Healthcare & Life Sciences show positive medians, suggesting that the typical firm lies slightly above its sector-year benchmark, while the mean is pulled down by weaker observations. Infrastructure & Real Assets is characterized by the negative first percentile, consistent with the asset-intensive and cyclical nature of the sector.

The strongest upper-tail performance appears in Consumer & Retail, Industrial & Manufacturing, and Business & Financial Services. The strongest downside risk appears in Infrastructure & Real Assets, Energy & Utilities, and Business & Financial

Services. Conversely, Technology & Digital shows a moderate distribution, it isn't evidence of low absolute innovation but a low relative difference between these firms' performance. The outputs are presented below.

Variable	N	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Ind. & Manufact.	43.911	1,6E-17	-0,03	0,55	-2,78	-1,30	-0,83	-0,34	0,30	0,94	1,58	3,68
Consumer & Ret.	37.404	-9,1E-18	-0,08	0,54	-2,63	-1,17	-0,73	-0,32	0,25	0,98	1,75	3,96
Business & Fin.	30.591	-9,3E-18	0,08	0,53	-4,74	-2,01	-0,76	-0,17	0,23	0,60	1,35	3,80
Healthcare & LS	26.784	-1,8E-17	0,06	0,55	-4,90	-1,83	-0,77	-0,26	0,28	0,71	1,44	3,32
Tech. & Digital	14.238	2,7E-17	0,05	0,53	-4,71	-1,76	-0,75	-0,24	0,27	0,72	1,28	3,07
Infrastr. & RA	13.185	6,5E-18	0,05	0,54	-5,29	-2,32	-0,68	-0,13	0,25	0,52	1,26	2,59
Energy & Util.	10.404	-1,4E-18	0,08	0,53	-4,92	-2,06	-0,58	-0,20	0,24	0,53	1,43	3,26
Other Services	7.254	-5,9E-18	0,05	0,54	-3,50	-1,81	-0,96	-0,19	0,25	0,75	1,38	3,15

Table 2.5: The outputs of the operational Innovation Proxy Index per macro-sector.

2.2.3 THE ROBUSTNESS OF THE OPERATIONAL INNOVATION PROXY INDEX

To assess the sensitivity of the operational innovation proxy index baseline, explored in the previous part, is necessary to carry out robustness checks.

The robustness checks don't demonstrate that the operational innovation proxy index is verified in absolute terms, but they assess if a single component of constructed index affect its output (Lu X., White H., 2013). In this case they are applied since innovation is proxied through accounting-based operating measures.

The robustness indexes are five, but here is reported the one that concern all the replaced components. To delve into the other four robustness indexes please check the Appendix.

$$Innovation Index Robustness (i; s; t) =$$

$$\frac{Z(Sales Growth)(i; s; t) + Z(COGS/Sales)(i; s; t) - Z(WC/Sales)(i; s; t) + Z(FCF Proxy)(i; s; t)}{4}$$

Here explained all the components of the robustness of the innovation index:

1. *Sales Growth (i;t)* is included as a proxy for revenue scalability and it replaces the *CAGR3Y (i;t)*.

Sales growth measures the percentage increase in a firm's revenues over a given period and its ability to expand its sales performance (Hamilton & Ng, International Small Business Journal, 2025).

Although revenue growth is not a direct measure of innovation, it captures the commercial improvements, such as product-market expansion, process improvements, organizational upgrading and improved market positioning (OECD, Eurostat, 2018).

To avoid comparing structurally different industries, the variable is winsorized and standardized within macro-sector-year.

The Sales Growth formula is:

$$\boxed{\text{Sales Growth } (i; t) = \frac{\text{Revenues } (i; t) - \text{Revenues } (i; t - 1)}{\text{Revenues } (i; t - 1)}}$$

2. *COGS/Sales* (*i;t*) is used as a proxy for operating efficiency and it replaces *Gross Margin* (*i;t*).

The ratio COGS/Sales measures how much of revenues are absorbed by direct production costs.

A lower COGS/Sales ratio indicates that a firm is able to generate revenues with a relatively lower direct cost base, which may reflect improvements in production processes, technological efficiency, input optimization and supply-chain innovation and they are a proxy of innovation (OECD, Eurostat, 2018).

Since COGS/Sales vary substantially across industries, the variable is winsorized and standardized within macro-sector-year.

The COGS/Sales formula is:

$$\boxed{\text{COGS/Sales } (i; t) = \frac{\text{Cost Of Goods Sold } (i;t)}{\text{Revenues } (i;t)}}$$

3. *Working Capital / Sales* (*i;t*) is used as a proxy for operating capital efficiency and it replaces *NWC / Sales* (*i;t*).

Working Capital/Sales ratio measures how efficiently a company converts operational resources into revenues.

A lower ratio indicates that the firm requires less capital to sustain its level of revenues generation, with an efficient inventory turnover, supply chain management and credit management. So, this is the reason why it is treated as negative. (OECD, Eurostat, 2018).

The WC/ Sales formula is:

$$\boxed{\text{WC/Sales}(i; t) = - \frac{\text{Current Assets } (i;t)}{\text{Revenues } (i;t)}}$$

4. *FCF Proxy (i;t)* is used as a proxy for the ability of the firm to convert the operating activity into cash and it replaces *OCF / Sales (i;t)*.

Free Cash Flow represents the cash generated by a firm after accounting for operating requirements and investment in fixed assets. This measure can be computed as operating cash flows minus capital expenditures (OpenStax, Principles of Finance). A higher value of this proxy indicates greater capital absorption, so a larger share of firm resources is reinvested to sustain operations and growth. However, excessive capital absorption may indicate lower efficiency.

High Capex (Capital Expenditures) may reflect technological investments in production assets and working capital efficiency reflects process innovation.

To ensure consistency with the rest of the index, the variable is winsorized and standardized within macro-sector-year cells.

The FCF Proxy formula is:

$$FCF Proxy (i; t) = \frac{OCF (i; t)}{Revenues (i; t)} - \frac{CapEx (i; t)}{Revenues (i; t)}$$

Baseline Innovation Index	Robustness Innovation Index	Measure
<i>CAGR3Y</i>	<i>Sales Growth</i>	Scalability
<i>Gross Margin</i>	<i>COGS/Sales</i>	Operating efficiency
<i>- NWC/Sales</i>	<i>-WC/Sales</i>	Operating capital efficiency
<i>OCF/Sales</i>	<i>FCF Proxy</i>	Capital Intensity

Table 2.6: The baseline Innovation Index components and the Robustness Innovation Index components.

All the components of the robustness index are assessed by a zero diagnostic. The lowest and highest values are winsorized by p1 and p99 and they are standardized.

The robustness index confirms these broad patterns of the baseline one, indicating that the results are not driven exclusively by the components of baseline index. The outputs are presented below.

Variable	N	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Ind. & Manufact.	43.911	-2,5E-17	-0,03	0,53	-2,92	-1,29	-0,80	-0,32	0,29	0,91	1,48	3,04
Consumer & Ret.	37.404	1,2E-17	-0,05	0,51	-2,69	-1,21	-0,71	-0,29	0,24	0,91	1,58	3,44
Business & Fin.	30.591	3,7E-18	0,10	0,52	-5,28	-1,98	-0,76	-0,15	0,23	0,52	1,31	3,59
Healthcare & LS	26.784	1,4E-17	0,08	0,53	-5,02	-1,86	-0,73	-0,25	0,28	0,62	1,25	2,97
Tech. & Digital	14.238	-3,5E-18	0,06	0,53	-4,91	-1,84	-0,72	-0,22	0,26	0,66	1,29	2,82
Infrastr. & RA	13.185	6,5E-18	0,05	0,52	-5,33	-2,10	-0,70	-0,12	0,24	0,45	1,32	2,88

Energy & Util.	10.404	8,9E-18	0,08	0,52	-5,09	-2,00	-0,55	-0,19	0,24	0,44	1,46	2,98
Other Services	7.254	5,9E-18	0,07	0,53	-3,54	-1,84	-0,96	-0,18	0,25	0,69	1,42	3,14

Table 2.7: The outputs of the Robustness of the operational Innovation Proxy Index per macro-sector.

2.2.4 THE MODEL CONTROLS

In this part of the analysis, we explore the model's controls. They're aimed to improve comparability between PE backed companies and non-PE backed ones.

The controls are selected according to two criteria: they capture observable firm characteristics correlated with both PE backed status and innovation-related operating outcomes; and they must not be direct components of the dependent variable nor variables that could lie on the causal pathway between PE ownership and operating innovation performance.

This is consistent with the bad-control concern discussed by Angrist and Pischke, according to which conditioning on post-treatment outcomes or mediating variables may remove part of the effect of interest and generate misleading estimates (Angrist & Pischke, 2014).

In this model the two variables elected as controls are CEO Age and the number of employees at the firm-level. They capture structural characteristics of the companies, and, at the same time, they aren't involved in the operational innovation proxy index's components nor in the components of the robustness of the operational innovation proxy indexes.

CEO Age is a valid control variable because it's a proxy of the leadership, experience, and the change attitude of the companies' management. This control has the aim to limit the management differences between PE backed firms and non-Pe backed ones.

Number of employees is the other control variable of the model. It measures the companies' size, that could influence either the probability of a firm to be PE backed and to outperform the others in the innovation parameters. For instance, a bigger company could have a stronger organization and higher human capital.

The employee variable is reported as a logarithm $\log(\text{Employees})$ because it could have a skewed distribution on smaller companies. The log reduces the weight of the outliers.

In the empirical specification, the vector of firm-level controls $X'_{it}\gamma$ is replaced by CEO Age and log(employees).

The chosen controls are only two because of the scope to avoid conditioning on variables that may be direct outcomes of PE ownership or mechanical components of the dependent variable. However, the limited set of controls implies that the estimates remain vulnerable to omitted firm-level heterogeneity.

In these terms the model change from:

$$Y(i; s; t) = \beta PE(i) + X(i; t)' \gamma + \lambda(s; t) + \varepsilon(i; t)$$

to

$$Y(i; s; t) = \beta PE(i) + \gamma(1)CEO\ AGE(i) + \gamma(2)\log(Employees(i)) + \lambda(s; t) + \varepsilon(i; t)$$

The descriptive statistics for CEO age reveal a mature managerial population across all macro-sectors. Overall, median CEO age is concentrated between 58 and 62 years in most sectors, suggesting that top executive positions are generally held by individuals with substantial professional experience. The highest average CEO age is observed in Industrial & Manufacturing (mean: 62,6 y.o.) and Consumer & Retail (mean: 62,3 y.o.) so they're characterized by comparatively older leadership teams. Healthcare & Life Sciences shows a wider dispersion (standard deviation: 12,8) that suggests a more heterogeneous age distribution, with both very young and very old CEOs. As expected, Technology & Digital is the sector with the youngest CEOs (mean; 55,9 y.o.) and it's consistent with the idea that technology-oriented industries may be associated with younger leadership profiles also witnessed by the lowest standard deviation (s.d.: 9,6).

From a distributional perspective, the interquartile ranges confirm that most CEOs are concentrated in the later stages of their professional careers. In several sectors, the 25th percentile is around the early fifties, while the 75th percentile is generally between the mid-sixties and early seventies. This indicates that, although younger CEOs are present, most firms are led by executives with considerable age and likely accumulated managerial experience. The data related to the CEO Age variable are presented in the table below.

Macro-Sector	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Ind. & Manufact.	4.870	9	62,6	62	12,0	22	36	43	54	71	83	90	99
Consumer & Ret.	4.146	10	62,3	62	12,2	25	34	42	54	70	83	89	97
Business & Fin.	3.387	12	59,3	59	11,1	23	33	42	52	66	79	86	97
Healthcare & LS	2.972	4	61,6	62	12,8	21	33	40	53	71	83	90	100
Tech. & Digital	1.582	0	55,9	55	9,6	23	35	41	49	62	73	81	94
Infrastr. & RA	1.463	2	60,0	59	13,3	21	30	38	51	69	82	88	96

Energy & Util.	1.151	5	58,8	58	11,5	26	34	41	51	66	79	87	96
Other Services	805	1	58,4	58	11,6	20	33	41	51	65	80	85	90

Table 2.8: The diagnostic of the CEO Age variable.

The descriptive statistics for Employees show that the sample is largely composed of relatively small firms across all macro-sectors and it's consistent on the Italian numerous SMEs environment. Overall, the median number of employees is lower than the mean in every sector and it indicates that most of the companies have limited workforce, while a small number of firms have very large human capital.

The highest average number of employees is observed in Business & Financial Services (mean: 222,7 employees; median: 38 employees) but this macro-sector includes many small firms but also some much larger companies (standard deviation: 1.124,4). Industrial & Manufacturing presents a relatively high and more balanced employment profile compared to other sectors (mean: 181,7 employees; median: 74 employees).

In Consumer & Retail, the mean number of employees is 122,8, with a median of 49. As in other sectors, the mean is well above the median, reflecting the presence of larger firms in the upper tail. However, the distribution is less extreme than in Energy & Utilities or Technology & Digital, as shown by a standard deviation of 403,9 and a maximum of 17.578 employees. Conversely, the lowest average firm size is observed in Infrastructure & Real Assets (mean: 24,9 employees; median: 3 employees).

Macro-Sector	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Ind. & Manufact.	4.867	12	181,7	74	804,4	0	5	13	40	139	560	1.806	31.511
Consumer & Ret.	4.151	5	122,8	49	403,9	0	1	7	23	107	407	1.197	17.578
Business & Fin.	3.300	99	222,7	38	1.124,4	0	0	1	13	112	701	3.496	28.062
Healthcare & LS	2.939	37	98,4	21	411,7	0	0	3	10	56	271	1.718	7.448
Tech. & Digital	1.571	11	127,2	11	1.356,2	0	0	1	5	25	172	2.051	44.649
Infrastr. & RA	1.439	26	24,9	3	178,9	0	0	0	1	9	44	388	4.021
Energy & Util.	1.017	139	185,4	6	2.454,8	0	0	0	1	22	220	1.234	64.396
Other Services	800	6	54,1	11	451,9	0	0	1	5	21	116	736	11.701

Table 2.9: The diagnostic of the Employees variable.

Since the regression needs the completeness of its component's data, the missing observation of CEO Age and Employees aren't considered for the model, so the final number of companies is 20.042.

2.2.5 MACRO-SECTOR-YEAR FIXED EFFECTS AND CLUSTERED STANDARD

ERRORS

In this part of the research the macro-sector-year fixed effects and the clustered standard errors are exhibited.

The macro-sector-year fixed effects have the aim to control the PE backed and non-PE backed companies inside the same sector and time environment (i.e. Business & Financial Services). They are indicated in the model as $\lambda(s ; t)$ and they absorb all the common shocks of the same macro-sector: structural differences between different macro-sectors, macroeconomic shocks, year events.

The clustered standard errors are grouped on a firm level since every company has multiple observations in the time range 2016-2024. The cluster-robust inference is a good practice when the errors could be correlated inside the same cluster (Cameron & Miller, 2015).

2.3 THE BASELINE REGRESSION

In the previous parts the dataset and model are explored, and the methodology of the research is explained.

In this section the results of the regression are presented starting from the main one: the baseline regression.

Before the regression results' presentation is important to sum up the whole regression sample figures. The total amount of firms is 20.042 with yearly observation in the time range 2016-2024 (9 years). They are reported in the table below.

Metric	Value
Total firm-year observations	180.378
Total firms	20.042
PE backed observations	20.835
Non-PE backed observations	159.543
PE backed firms	2.315
Non-PE backed firms	17.727
Number of macro-sector-year fixed effects	72

Table 2.10: The regression sample.

2.3.1 WHAT ARE THE REGRESSION AND THE OLS?

The empirical analysis of this research is based on a regression framework. To be more

precise, it estimates a pooled firm-year OLS panel regression with macro-sector-year fixed effects and firm-clustered standard errors. It is a conditional association regression.

A regression analysis is a statistical and econometric method used to examine the relationship between a dependent variable and another explanatory one (or multiple). The dependent variable is the outcome that the research wants to explain. (Kutner et al.)

In this case the dependent variable is $Y(i; s; t)$, the operational innovation proxy index, and the main explanatory one is the PE dummy ($PE(i)$) that indicates if a company is PE backed or not (Kutner et al.). In this model, as long as, the PE dummy isn't the only explanatory variable but there're also the controls ($\gamma(1)CEO\ AGE(i) + \gamma(2)\log(Employees(i))$) and the macro-sector-year fixed effects ($\lambda(s; t)$) the regression is a multiple linear regression.

The regression is estimated through the Ordinary Least Squares (OLS). This method selects the coefficients (β) estimates that minimize the sum of squared residuals, the difference between the observed value and the value predicted by the model. (Kutner et al.)

The aim is to estimate the average difference of the operational innovation proxy index associated with the PE backed status, at the same CEO age, company dimension and macro-sector-year environment.

2.3.2 INFERENCE AND DIAGNOSTIC STATISTICS IN OLS

In an econometric model the estimation of a linear Ordinary Least Squares (OLS) is not limited to obtain the regression estimates. The main purpose is to get a statistical inference, drawing conclusions about underlying population parameters based on sample data. The scope is to test economic hypotheses regarding the estimated parameters. So, an OLS regression includes several complementary statistics: standard errors, t-statistics, p-values, measures of statistical significance and R squared. (Kutner et al.)

Starting from standard errors (SE), they measure the precision of the OLS estimator ($\hat{\beta}$), capturing its variability across hypothetical repeated samples. Smaller SE indicate more reliable estimates. (Kutner et al.)

The SE formula is:

$$SE(\hat{\beta}) = \sqrt{Var(\hat{\beta})}$$

Delving into t-statistics, it transforms estimation into a testable statement about the coefficient and whether is statistically distinguishable from a hypothesized value. A high

value indicates stronger evidence against the null hypothesis ($\overline{H_0: \hat{\beta}_0 = 0}$) (Kutner et al.)

T-statistic formula:

$$t = \frac{\hat{\beta} - \beta_0}{SE(\hat{\beta}_j)}$$

In the model explored in this research the t-statistics is used to test if the estimated association between PE dummy and the operational Innovation Proxy Index (or its robustness indexes) is statistically distinguishable from 0.

$$\overline{H_0 : \beta = 0}$$

There isn't a conditional difference on the operational Innovation Proxy Index between PE backed and non-PE backed companies

$$\overline{H_1 : \beta \neq 0}$$

There is a conditional difference

Talking about p-value, it measures the probability to observe a test statistic at least as extreme as the one obtained, assuming the null hypothesis is true. A small p-value implies that the observed coefficient is unlikely under the null hypothesis. It is useful to gauge if a coefficient is statistically significant. The conventional thresholds are p-value < 0,10; p-value < 0,05; p-value < 0,01. (Kutner et al.)

The statistical significance (α) is a decision framework based on p-values, if they are lower than the level selected, $\overline{H_0}$ is rejected otherwise it isn't. It provides an explanation to the regressors. In this paper the main statistical significance α is equal to 0,01 (1%).

To be more precise, α is the higher limit for Type I error that the model could accept. Error I means to reject $\overline{H_0}$ when $\overline{H_0}$ is true. In plain words, the model accepts the risk of the 1% to infer that the coefficient is statistically different from 0 when the true coefficient is equal to 0. (Kutner et al.)

Confidence interval (*CI*) provides a range in which it could stay the true coefficient of the sample. The $\hat{\beta}$ is a precise estimation but it doesn't represent the exact value of the coefficient because it is related to the sample, so the confidence interval adjust this estimation with the uncertainty of this figure. (Kutner et al.)

The confidence interval formula is:

$$CI(99\%) = \hat{\beta} \pm 2,576 * SE(\hat{\beta})$$

The R squared indicates the variation of the dependent variable explained by the model. It explains how well the model fits the data. A higher R squared indicates a better fit.

The R squared formula is:

$$R^2 = 1 - \frac{\text{unexplained variation}}{\text{total variation}} = 1 - \frac{\sum_i \hat{\varepsilon}^2}{\sum_i (Y_i - \bar{Y})^2}$$

The adjusted R squared adjusts the R squared according to the number of regressors (k) of the model. It is useful because more variables in the model tend to give a higher R squared. (Kutner et al.)

The adjusted R squared formula is:

$$\bar{R}^2 = 1 - (1 - R^2) \frac{N - 1}{N - k - 1}$$

2.3.3 THE BASELINE REGRESSION OUTPUT

The baseline regression results are the output of the main baseline regression.

$$Y(i; s; t) = \beta PE(i) + \gamma(1)CEO AGE(i) + \gamma(2)\log(Employees(i)) + \lambda(s; t) + \varepsilon(i; t)$$

The dependent variable is the operational Index, while the main explanatory variable is the Pe dummy. The model also includes CEO Age and log(Employees) as firm level controls, macro-sector-year fixed effects and firm clustered standard errors.

$$Y(i; s; t) = Innovation Proxy Index(i; s; t) =$$

$$\frac{Z(CAGR3Y)(i; s; t) + Z(Gross Margin)(i; s; t) - Z(NWC/Sales)(i; s; t) + Z(OCF/Sales)(i; s; t)}{4}$$

The coefficient of the PE dummy is positive and statistically significant at the 1% level and the estimated (β) one is equal 0,0443. The corresponding t-statistic is 4,78 and the p-value is below 0,01. Since p-value is lower than the selected threshold ($\alpha = 1\%$), the null hypothesis H_0 that the PE coefficient is equal to zero is rejected.

These results indicate that, conditional on CEO Age, firm size and macro-sector-year fixed effects, PE backed firms exhibit a higher Baseline operational Innovation Proxy Index than non-PE backed firms operating in the same macro-sector-year environment. The coefficient

should be interpreted as a conditional association rather than a causal effect, because as stated before the dataset doesn't contain the PE entry year and therefore and it doesn't allow the identification of a pre-treatment and post-treatment period.

Nevertheless, R-squared values are relatively low. It indicates that most of the variation in the operational innovation proxy indexes remains firm-specific and idiosyncratic, but this is expected given the nature of the dependent variables, which are standardized firm-level operational performance measures. This characteristic is consistent with the scope of the model to estimate the conditional association between PE backed status and innovation-related operating outcomes and not to maximize predictive fit.

The results are reported in the table below.

Variable	Coefficient	Clustered SE	t-statistic	p-value	Significance	N obs	N firms	R-squared	Adj. R-squared
PE Dummy	0,0443	0,0093	4,7765	1,80E-06	p<0,01	180.378	20.042	0,0077	0,0073
CEO Age	-0,0029	0,0002	-12,5044	0,00E+00	p<0,01	180.378	20.042	0,0077	0,0073
log(Employees)	0,0170	0,0023	7,3072	2,83E-13	p<0,01	180.378	20.042	0,0077	0,0073

Table 2.11: the baseline regression output.

2.4 THE ROBUSTNESS REGRESSION OUTPUT

The robustness regression results are the output of the regression with a different dependent variable.

$$Y(i; s; t) = \beta PE(i) + \gamma(1)CEO AGE(i) + \gamma(2)log(Employees(i)) + \lambda(s; t) + \varepsilon(i; t)$$

The dependent variable is the operational Innovation proxy Index robustness, while the main explanatory variable is the Pe dummy. The model also includes CEO Age and log(Employees) as firm level controls, macro-sector-year fixed effects and firm clustered standard errors. This analysis is designed to assess whether the baseline association between the PE backed companies and the operational Innovation Proxy Index depends on the specific components of the index.

$$Y(i; s; t) = Innovation Index Robustness(i; s; t) =$$

$$\frac{Z(Sales Growth)(i; s; t) + Z(COGS/Sales)(i; s; t) - Z(WC/Sales)(i; s; t) + Z(FCF Proxy)(i; s; t)}{4}$$

The coefficient of the PE dummy remains positive and statistically significant at the 1% level and the estimated (β) one is equal 0,0242. The corresponding t-statistic is 2,86 and the

p-value is below 0,01. The clustered SE is equal to 0,0085 and it is lower than the one of the baseline regression (SE = 0,0093). Since p-value is lower than the selected threshold ($\alpha = 1\%$), the null hypothesis H_0 that the PE coefficient is equal to zero is rejected.

These results suggest that the positive association isn't entirely driven by the baseline index components, supporting the baseline findings. It indicates that the PE backed firms are consistently associated with higher operational innovation proxy index.

The explanatory power of the robustness specification is lower than in the baseline one while PE dummy coefficient remains positive and statistically significant. It suggests that the baseline model and results aren't driven by the original construction of the index.

The results are reported in the table below. To delve into the other four robustness indexes, look at the Appendix.

Variable	Coefficient	Clustered SE	t-statistic	p-value	Significance	N obs	N firms	R-squared	Adj. R-squared
PE Dummy	0,0242	0,0085	2,8639	4,19E-03	p<0,01	180.378	20.042	0,0044	0,0040
CEO Age	-0,0021	0,0002	-9,9875	0,00E+00	p<0,01	180.378	20.042	0,0044	0,0040
log(Employees)	0,0137	0,0022	6,2374	4,54E-10	p<0,01	180.378	20.042	0,0044	0,0040

Table 2.12: the robustness regression output.

Here below a graphical representation of the stability of the estimated PE Dummy coefficient across the baseline and robustness specifications.

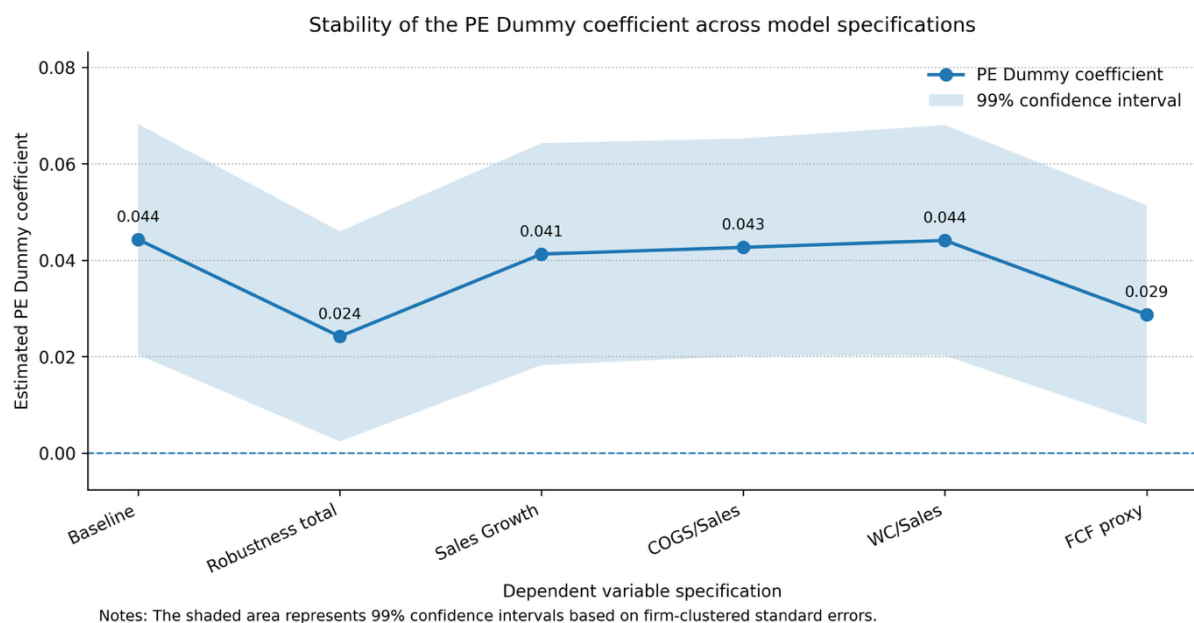


Chart 2.2: the stability of the PE Dummy coefficient across the different model specifications

As reported in the chart the coefficient remains positive across alternative constructions of the dependent variable, suggesting that the positive association between PE backed status and operational innovation proxy scores isn't mechanically driven by the specific composition of the baseline index. While the magnitude of the PE Dummy coefficient is lower in the robustness total specification than in the baseline model, it remains positive and statistically significant at the 1% level. Therefore, the baseline result appears robust to alternative constructions of the operational innovation proxy index.

2.4.1 CORRELATION BETWEEN THE OPERATIONAL INNOVATION PROXY INDEXES

In this section is explored the correlation between the operational innovation proxy indexes: the baseline operational innovation proxy index, the total robustness of the operational innovation proxy index, the Sales Growth robustness one, the COGS/Sales robustness one, the WC/Sales robustness one and the FCF proxy robustness one.

The correlation between the operational Innovation proxy Index and the Robustness one is pretty high and equal to 0,86, so the Robustness Index moves in a similar mode as the Baseline one. The extent is that the companies that record good performance in the baseline index tend to have good values also in the robustness index, conversely the firms that record low performance they have consistently low values in both indexes. This data suggests that the robustness index is like the baseline one to gauge the same dimension but, in the same time, is different enough to be a robustness check.

The lowest correlation is the one recorded between the baseline index and one of the component specific robustness checks, the COGS/Sales one that is equal to 0,56. It is still positive and it suggests that replacing Gross Margin with COGS/Sales is a strong robustness check given that also in this case the PE coefficient is positive and also statistically significant.

Further details on unconditional indexes outputs on the Appendix. All the results are reported in the table below.

	Baseline	Robustness tot.	Rob. Sales Growth	Rob. Cogs/Sales	Rob. WC/Sales	Rob. FCF proxy
Baseline	1	0,860	0,905	0,560	0,999	0,959
Robustness tot.	0,860	1	0,956	0,449	0,860	0,898
Rob. Sales Growth	0,905	0,956	1	0,456	0,904	0,860
Rob. Cogs/Sales	0,560	0,449	0,456	1	0,558	0,558

Rob. WC/Sales	0,999	0,860	0,904	0,558	1	0,958
Rob. FCF proxy	0,959	0,898	0,860	0,558	0,958	1

Table 2.13: the correlation between all the innovation indexes.

2.5 THE CONDITIONAL ASSOCIATION

The empirical question of this research is:

Do PE backed companies exhibit higher sector-year-adjusted level of operational innovation proxy scores than comparable non-PE backed firms operating in the same macro-sector-year environment, conditional on observable firm-level characteristics?

To assess and carry out an inference an operational innovation proxy index is built, and a baseline model is run. As demonstrated in the previous parts, the outputs of the regression show that PE dummy is positive and statistically significant with a p-value lower than the 1%. To support the analysis are also built robustness checks indexes that show consistent outputs with positive PE dummy and statistically significant p-values. So, PE backed firms are consistently associated with higher operational innovation proxy scores than non-PE backed ones. The results, also, report that they aren't driven by one single index component.

As stated, in the regression carried out is demonstrated a conditional association on PE backed status of the companies and their operational innovation proxy performance. This result is controlled by two variables that are CEO Age and log(Employees) at the firm level and also by macro-sector-year fixed effects.

The results don't indicate a causal effect between PE investments and innovation because in the model aren't observed the entry year of the Private Equity funds. For this reason, the pre and post investment period can't be identified, and a Difference-in-Differences estimation can't be carried out. Is also important to state that the PE dummy is time-invariant and the PE backed firms and non-PE backed ones could differ due to other non-observable characteristics. In addition, Pe backed firms may differ systematically from non-PE backed firms before receiving PE investment. Therefore, the estimated coefficient may partly reflect selection into PE backing rather than the effect of PE ownership itself. So, the β coefficient isn't a treatment effect but a conditional mean difference.

3. THE SEARCH FUND MODEL AND ITS IMPACT ON THE ITALIAN SMEs ENVIRONMENT

This chapter explores the Search Fund model as an entrepreneurial form of private capital investment, highlighting its hybrid nature between buyout, growth capital and replacement capital. It also examines its relevance for the Italian SMEs environment and how it works in the Italian regulatory framework. The aim is to analyse a new model that could contribute to the operational value creation into its investments.

3.1 THE SEARCH FUNDS, PRIVATE CAPITAL INVESTMENTS

As discussed in Chapter 1, private capital investments represent a segment of alternative investments through which specialized investors provide equity or debt financing to non-listed companies. The Search Fund (SF) model is located within this perimeter alongside other models such as Private Equity, Venture Capital, Private Debt and more. The main element that differentiates them is the way in which capital, ownership and governance are organized.

The Search Fund model represents a distinctive entrepreneurial declination of private capital in which the investment is carried out with the purpose of becoming the entrepreneur of the target company through its acquisition. So, unlike other private capital models, the SF has only one target company and the purpose isn't to build a diversified portfolio of firms. (Stanford GSB, 2024)

3.1.1 FROM PRIVATE EQUITY TO SEARCH FUNDS

The Search Fund model was born in Stanford Graduate School of Business in 1984, created by H. Irving Grousbeck. It could be interpreted as a hybrid Private Equity model because both targets privately held companies that represent illiquid investments, both require a medium-long term horizon, both act as active investors seeking to generate returns through value creation before exit.

Nevertheless, Search Funds differ materially from Private Equity funds. The main difference is represented by the structure of the investment portfolio. Private Equity funds seek to build a diversified portfolio that generates an aggregate return allocated to their Limited Partners. Conversely, Search Funds are a vehicle created to finance a few searchers, usually one or two, that have the mandate to acquire one target company. (Stanford GSB,

2024; Stanford, 2026; IESE, 2024)

Empirical evidence reports that by 2023, 681 cumulative first-time search funds had been identified in the United States and Canada. The model has also expanded, and studies report 320 SFs outside North America in 2024, across 40 countries. Among concluded international SFs, about 79% had led to an acquisition, compared with 63% in the U.S. and Canada benchmark. The historical global aggregate return is about 35% IRR. Overall, international SFs had delivered 2,0x ROI and 18% IRR. (Stanford GSB, 2024; IESE, 2024)

Another key difference between the Search Fund model and the Private Equity model is the organizational and investment team. In PE, it is represented by General Partners and their selected team who usually have a deep track record and well-known expertise. In Search Funds the central operating man is the searcher, who usually is a talented young MBA graduate who wants to become CEO and entrepreneur. Usually, the searcher's team is composed by the SF investors who provide not only capital but also advisory support and mentorship. (Stanford GSB, 2024; IESE, 2024)

The incentive system is also different, the searcher's compensation isn't equivalent to the management fee and carried interest structure of Private Equity. He typically receives a compensation during the searching and the holding period and earns equity of the target company through vesting, usually 25 – 30%. The equity stakes are commonly unlocked over time, 1/3 at acquisition, 1/3 during the holding time, and 1/3 linked to exit results. In this way the searcher and investors' interests are aligned. (Goel et al., 2023; Vernizzi, 2026)

The Search Fund model is growing and spreading rapidly around the world but still emerging. The most mature market is the North American one while the international market shows a strong growth. In this context the model is under development also in Italy, but the empirical sample remains small. (IESE, 2024; Osservatorio PoliMi, 2026)

3.1.2 SEARCH FUNDS AS ENTREPRENEURSHIP THROUGH ACQUISITION

Search Fund model is a specific form of Entrepreneurship Through Acquisition (ETA). ETA refers to the process through which an entrepreneur seeks to acquire a company, own it, manage it and potentially sell it at a later stage. This model begins from the acquisition of a solid and existing business. This characteristic is very important for the SF's investment thesis. The target must be a stable business operating in a sector with moderate growth, low technological disruption, defensible positioning and positive cash generation. So, the model doesn't concern speculative opportunities or distressed assets. (Hoffmann et al., 2023; IESE,

2024; Osservatorio PoliMi, 2026)

The ETA embeds a three-side opportunity for searches, investors and the exiting entrepreneurs. The model offers a path to become CEOs and entrepreneurs without initially owning the capital required to acquire a company for the first ones. It creates an investment opportunity for investors. It provides a solution to succession and business continuity issues to the old entrepreneurs. (IESE, 2024; Osservatorio PoliMi, 2026)

Search Funds aren't simply a financing instrument, they represent a mechanism for entrepreneurial succession and managerial renewal. They can be interpreted as a private capital response to a structural entrepreneurial problem. (Hoffmann et al., 2023; Osservatorio PoliMi, 2026)

In the Italian environment, where there is a large population of family-owned SMEs with significant succession needs and unexpressed potentials, the SF model may be especially valuable. In such a context, the Search Fund can act as a bridge between private capital and entrepreneurial continuity. Mobilizing investor capital, transferring managerial talent into SMEs, offering succession liquidity to founders, and creating the conditions for operational innovation. (Osservatorio PoliMi, 2026; Intermonte, PoliMi, AIPB, 2025)

3.1.3 THE SEARCH FUNDS AS A HYBRID MODEL BETWEEN BUYOUT, GROWTH CAPITAL AND REPLACEMENT CAPITAL

Search Funds, as anticipated, can be considered a hybrid model between buyout, growth capital and replacement capital transactions. The model the uses a buyout transaction mechanism, pursuing a growth capital value creation, often solving a replacement capital succession problem. (Osservatorio PoliMi, 2026; Stanford GSB, 2024)

Like in a buyout transaction, the Search Fund targets the acquisition of a controlling stake of a profitable private company, usually at least the 70%. As in the Private Equity buyout transactions, the target is expected to have stable cash flows, positive EBITDA and sufficient debt capacity. The rationale resembles the Leveraged Buyout framework described in the Chapter 1, where returns are generated through EBITDA growth, debt reduction, operational improvements, governance transformation and potentially exit multiple expansion. But in the SF model, the searcher becomes the CEO and assumes the operating responsibility as an entrepreneur. (Osservatorio PoliMi, 2026; Stanford GSB, 2024)

The Search Fund model also targets companies with unrealized growth potential as in growth capital PE transactions. The target growth may derive from commercial expansion,

internationalization, add-on acquisitions, management team strengthening or operational efficiency. (Osservatorio PoliMi, 2026; Lazier et al., 2026)

There is also the replacement capital component in the SFs transactions, addressing ownership transition problems in family-owned or founder-led companies. In this case the entrepreneur or the founder has the opportunity to preserve the company's continuity and culture under a new leader. This is similar to the replacement capital concept in which shareholders are replaced by the PE fund. (Osservatorio PoliMi, 2026; Vernizzi, 2026)

However, in Search Fund model there is a different execution risk than in the Private Equity one. Compared with it, SF aligns capital, ownership and management, but its success depends heavily on disciplined acquisition criteria, appropriate valuation, prudent leverage, board quality, managerial execution and realistic growth plans. In Private Equity this risk is lowered by diversification and a lower dependence on one individual or a small team. Furthermore, SF faces succession, integration and professionalization risk. (Stanford GSB, 2026; Osservatorio PoliMi, 2026; IESE, 2024)

3.2 THE SEARCH FUND LIFECYCLE, RISKS AND RETURNS

The Search Fund has a precise lifecycle composed by generally four main phases. The path of this model is narrow because the target company is only one. The phases correspond to: capital raising, that has an average duration of 5 months (3,5 in Italy); the searching, identification operations and acquisition of the target within 12 and 24 months. The operating holding period in which the searcher becomes an entrepreneur and creates value, in approximately 4 and 7 years. The final exit of the investment. (IESE, 2024; Osservatorio PoliMi, 2026; Stanford GSB, 2026)

3.2.1 THE SEARCH CAPITAL RAISING

The first phase of the Search Fund lifecycle corresponds to the raising of search capital. This is structurally different from traditional Private Equity fundraising in which investors commit capital to a vehicle managed by experienced General Partners. In a Search Fund, investors finance one or two searchers who want to become the top executives and bear the risk of managing and owning a company. The investors trust is based on searcher's credibility, discipline and coachability.

The empirical evidence about the international SFs show that the average age of the

searchers is 33, the 71% of them completed an executive master's in business and administration (MBA). The background is usually from management consulting, investment banking and Private Equity, and general management. (IESE, 2024; Stanford GSB, 2026)

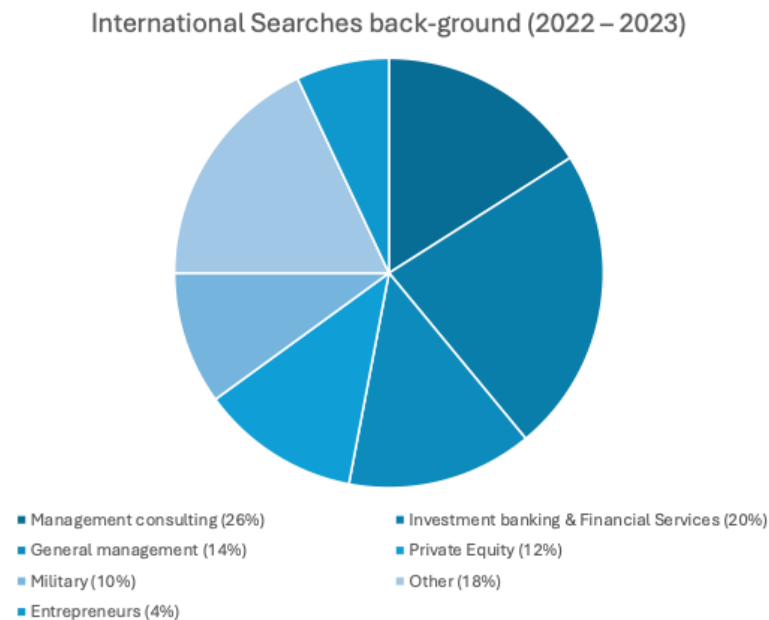


Chart 3.1: The international Searches back-ground (2022-2023)

The initial sum raised is named search capital and its use is aimed to cover the costs of the searching. It usually includes the searcher's salary, the general administrative expenses, the legal costs and deal-related expenses (such as the Due Diligence). (IESE, 2024; Stanford GSB, 2026)

In the U.S. the search capital is commonly around USD 400.000 and 500.000 with a median number of investors of 12 and a median fundraising time approximately about three months.

In Italy the average budget raised for the search phase is EUR 562.000, with an average of 18 investors. (Stanford GSB, 2024; Stanford GSB, 2026)

The investors play a very crucial role in the Search Funds, especially in this phase. Their contribution is broad including capital and mentorship. Investors provide deal evaluation support, introductions to sellers, intermediaries and professionals, and guide the searcher during both the acquisition and operating phases. (Stanford GSB, 2026)

The empirical data report that Italian investors composition are institutional investors (46%), individuals, business angels and personal holdings (32%), and family offices (22%). Geographically, about 28% of them are Italian, meanwhile about 57% come from other European countries and about 14% from the Americas. So international investors still play a major role in the SF environment. (Osservatorio PoliMi, 2026)

The main risk of this phase is represented by a possible adverse selection of both searchers and investors. This because, as exposed, in the SF model is crucial a good collaboration between them for the success of the investment. A searcher who could be able to raise capital but could lack the ability to reject poor targets. Conversely, investors who provide capital but could lack the willingness to coach and support the searcher. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

3.2.2 SEARCH, ORIGINATION, TARGET IDENTIFICATION AND TRANSACTION CLOSING

Once the search capital has been raised, the searcher begins origination and target identification phase. He/she must create the origination pipeline almost from zero, usually by combining proprietary outreach, market screening, intermediary relationships and investor networks. The process is highly selective given that the target company is only one and similarly as the Private Equity process it looks like a funnel. Many firms are contacted, a fewer number is analysed, only a very limited number reaches the LOI stage, and normally one is acquired. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

The search phase is more time-consuming than the capital raising. The empirical data report that the median duration was about 23 months in 2024. Typically, the funnel is structured by thousands of companies contacted, 50 visited, 10 LOI submitted and 1 to 3 Due Diligence conducted before completing the acquisition. The Italian data confirm this pattern, each Italian Search Fund contacts on average more than 1.700 companies, and only approximately 5 LOI are signed and only one acquisition is usually completed. This long and demanding process is due to the complexity of the context. The searcher has to carry out a very careful exploration of the markets to identify a stable small-to-mid sized company, family-owned or founder-owned, with growth potential and good financial records. Furthermore he/she has to convince the entrepreneur to sell the company to a young professional assuring the company culture continuity. (Stanford GSB, 2024; Stanford GSB, 2026; Osservatorio PoliMi, 2026)

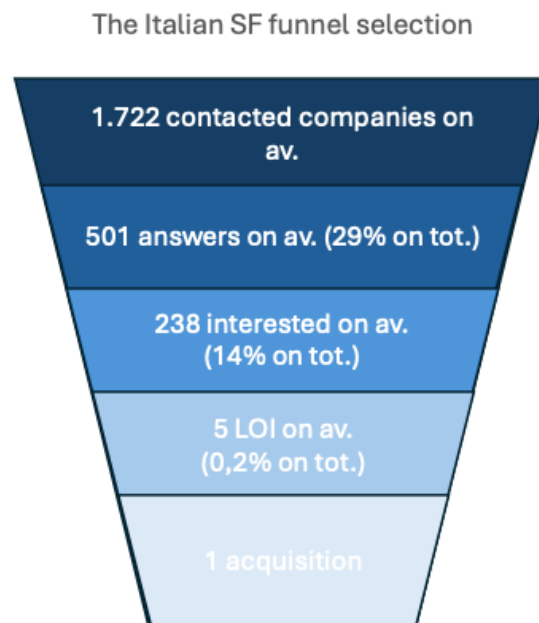


Chart 3.2: The average Italian SF funnel selection

The main risk, at this stage, is the search failure risk, that happens when the searcher runs out of capital without finding out a target company, with a no acquisition rate about 37% in North America, 21% internationally, 6% in Italy. (Stanford GSB, 2024; IESE, 2024; Osservatorio PoliMi, 2026)

Exploring the target selection criteria, Search Funds usually search for specific parameters. The target industry has been preferably fragmented, with consolidation potential, with stable demand and not cyclical, low capital intensive and with a limited technological disruption risk. Talking about the target company, it has to report a defensible business model with solid EBITDA margin, stable and predictable cash flows, recurring revenues avoiding project-based ventures and a low customer concentration. The seller must be willing to transfer the majority of the ownership (more than 70% of the stakes). (Stanford GSB, 2024; IESE, 2024; Osservatorio PoliMi, 2026)

The origination channel typically combines direct proprietary search with intermediated processes. The proprietary one may allow access to less competitive deals, but it requires time, credibility in the pitch with the entrepreneurs and costs. The intermediated deals are conducted by advisors, professionals and son on, they are more competitive and more exposed to valuation pressure and to the overpayment risk. (Stanford GSB, 2026)

The future return of the Search Fund is largely affected by the searching phase. In fact, the

potential loss of the search capital is lower than the potential loss given by the acquisition of a weak target company. (Stanford GSB, 2026)

Once a target has been selected and the seller is willing to negotiate, the Search Fund enters the acquisition capital and closing stage. A Letter of Intent is signed by the parties to collect the first terms and conditions of the potential transaction with a first purchase price proposal. To assess deeply the target company and with the aim to make a precise valuation, the SF carry out the Due Diligence. During the DD the searcher consults the experienced professionals and the investors with a valuable expertise in the target market to carry out a high-quality assessment. In the North American Stanford Search Fund Study was reported a median purchase price of USD 14,4 million and a 7,0x EBITDA multiple for companies with a median EBITDA margin of 27% and 34 employees. (Stanford GSB, 2024; Stanford GSB, 2026)

When all the assessments and the SPA is signed the investor group is usually asked to provide acquisition capital. The search capital that they provided often gives them the right, but not the obligation, to invest in the acquisition. The searcher may, also, raise additional capital from new investors. (Stanford GSB, 2026)

Talking about the transaction structure, the acquisition financing is usually composed mostly by equity, but it also combines debt and seller-related instruments. But compared with the Private Equity buyout transactions, the debt structure is generally smaller and more relationship based. For instance, the Italian evidence confirms that in about 50% of cases, debt represents between 40% and 60% of total capitalization; in 25% of cases, it exceeds 60%; and in the remaining 25% it is below 40%. And vendor loans from the selling entrepreneur are used in 75% of transactions. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

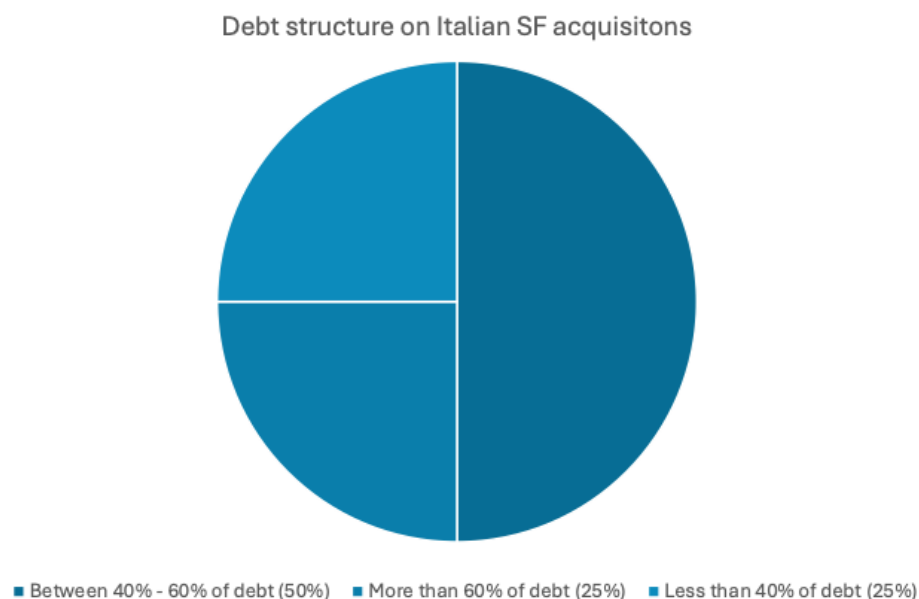


Chart 3.3: The debt structure on Italian SF acquisitions

At this point the risks to mitigate are related to the misalignment on the purchase price and the deal structure that we can group as the seller-conviction risk in which the searcher has to be able to convince the selling-entrepreneur to conclude the transaction. Empirical evidence shows that in Italy the failure of the closing is due in about 36% for the indecision of the seller, about 33% is due to his scepticism about the ability of the searcher and in other cases is due to the unwillingness to provide corporate data and scepticism about the model. (Osservatorio PoliMi, 2026)

3.2.3 OPERATING HOLDING PERIOD

After the transaction closing, the Search Fund enters its longest and most entrepreneurial phase. At the operating holding period, the searcher becomes CEO and entrepreneur of the acquired company. (IESE, 2024; Osservatorio PoliMi, 2026)

In this phase is executed the most important part of the model, represented by the value creation. Rather than the Private Equity investments, in SFs' acquisitions the changes are less radical and more gradual. The first important change in the target company is the replacement of the Board of Directors and Board of Advisors. The searcher becomes the Chief Executive Officer of the firm while the exiting-entrepreneur could choose to be appointed on "honorary role" without a board seat, like the honorary president, or to remain with an operational role or an external consultant to advise the transition. The new BoD and BoA members are accurately selected within the investors and their network, the searcher's network, and the old

board members, considering their strategic role. The gradual transition is crucial because in founder-owned businesses the know-how and the employee loyalty are closely related to the exiting-entrepreneur. Empirical studies report that the seller involvement is particularly important in the Italian context in which about 53% of cases he/she remains with an operational role and stays connected as an external collaborator or advisor in 13% of cases. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

The CEO transition is therefore one of the key risks of the Search Fund model. This creates a managerial execution risk. He/she has to deal with the existing culture of the company and try to make it more effective (if it is necessary) with gradual changes without the company's accumulated routines and relational capital. The risk derives from the possibility to experience change resistance from employees, customers and suppliers.

The Italian evidence confirms the main post-acquisition challenges are resistance to change and personnel management, reported in 57% of cases, followed by managerial complexity at 36% and achieving growth at 29%. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

The Search Fund value creation is mainly operational and managerial. As in Private Equity value creation, it is focused on the improvement of the internal processes, innovation and digitalisation, strengthening the commercial and financial practises and in some cases pursuing external growth acquiring complementary and strategic companies. Another value creation is achieved with the introduction of new reporting systems and managerial professionalization. The main levers are revenue growth, operating efficiency improvement, appropriate leverage, organic expansion, add-on acquisitions and multiple expansion.

Quantitative studies report that value creation is mainly driven by revenue growth, EBITDA multiple expansion and, in many cases, declining EBITDA margins, leading to moderate EBITDA growth. This because the searcher invests in professionalization, systems, people and growth initiatives. (Stanford GSB, 2026; Osservatorio PoliMi, 2026; Lazier et al., 2026)

The incentive structure reinforces the alignment between the searcher and the investors during the operational holding phase. Usually, especially in the Italian SF environment the searcher acquires a progressive equity participation in the acquired target, often up to 25–30% of the share capital, linked to time-based objectives, including operational success and investor ROI. (Goel et al., 2023; Stanford GSB, 2026; Osservatorio PoliMi, 2026)

3.2.4 EXIT

The exit represents the final phase of the Search Fund lifecycle. It is the moment in which value creation is converted into cash and returns are distributed to investors and the searcher. Despite the exit the SF exit routes resemble the Private equity one the rationale between the two model is very different. The SF doesn't necessarily seek the total dispose of the investment as in PE and the time outlook is very different. Searchers could remain into the company in various modality and build a long-term collaboration. Historically Search Funds has a long-term outlook, generally longer than five years.

Nevertheless, since both investors and searchers seek liquidity, the company could be sold in a trade sale or in a secondary buyout, could be taken public (IPO), the investor debt could be repaid, could be sold in a buy back transaction. So, in the Search Fund model the exit could be full, partial or staged. (IESE, 2024; Stanford GSB, 2026; Osservatorio PoliMi, 2026)

U.S. and Canadian's data report that Search Funds' generated about 35,1% IRR and a 4,5x ROI as of 2023, while exited companies generated a 42,9% IRR. The international data recorded an overall international return of 2,0x ROI and 18,1% IRR, but the international dataset remains relatively young, and the number of positive-return exits is limited as of in the Italian environment. In Italy there were only 2 confirmed exits as of 2025. (IESE, 2024; Stanford GSB, 2024; Osservatorio PoliMi, 2026)

The exit phase also determines the final allocation of the economic value in the SF model. As explored before depending on specific indicator such as IRR and Multiple on Invested Capital (MOIC) generated for investors unlock a percentage of stakes for the searchers. (Goel et al., 2023; Stanford GSB, 2026)

In a value creation perspective, the exit represents the output and outcome of the value added provided by the searchers into the target company. Reflecting the governance and management improvements, the operating and commercial expansion and amelioration. The outputs are a higher EBITDA quality, a stronger growth visibility, a lower key-person dependence and a more attractive acquisition profile. (Lazier et al., 2026; Osservatorio PoliMi, 2026)

However, in the Search Fund model the exit risk remains substantial because the investment is concentrated in only one small-mid-sized company and therefore depends heavily on sector conditions and management execution. (IESE, 2024; Stanford GSB, 2026)

Delving into the relation between return and risks in the Search Fund model, it reports a

broader risk despite the traditional Private Equity transactions. As explored, the SF model is a hybrid one blending the risk and return structure of the buyouts, LBOs, growth capital, replacement capital and turnarounds. (Stanford GSB, 2026; Osservatorio PoliMi, 2026)

In the chart below is presented the risk-IRR position in comparison to the other PE transactions. The vertical axis reports the expected gross IRR, while the horizontal axis represents the relative risk profile of each investment strategy.

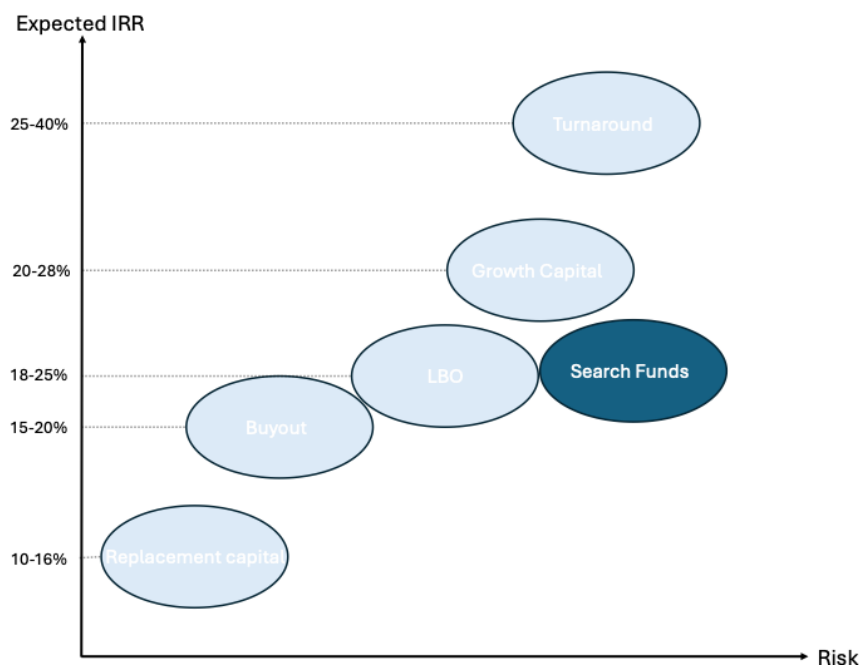


Chart 3.4: The risk and expected IRR position of the Search Fund transactions.

Search Funds are positioned in the 18–25% expected IRR range, close to LBO transactions but slightly more exposed to risk and it reflects the hybrid nature of the model. Their risk position is more than in LBO transactions because of their specific execution risk. Private Equity funds diversify their risk across a portfolio of companies, conversely Search Funds concentrate the entire investment in a single acquisition. (Stanford GSB, 2026; IESE, 2024)

3.3 SEARCH FUNDS IN THE ITALIAN SMEs ENVIRONMENT

This research is focused also on the impact of the Search Fund model in the Italian environment.

Italy is one of the largest Small Medium Enterprises economies in Europe, counting approximately 3,79 million (SMEs) in non-financial business sector in 2024. However, the value added and the number of total employees is lower than the German one highlighting a structural fragmentation and scale gap in the Italian productive system.

These SMEs are characterized by family ownership, strong and resilient traditional culture, old businesses practices scepticist to changes, and an average governance age that is getting older year over year. (AIPB, EY, 2025; Intermonte SIM, PoliMi, AIPB, 2025; Valenti, 2026)

For these reasons the Search Fund models is especially coherent, not only because its target is a small-medium sized business but also because its aim is to bring new life and culture continuity to the acquired company, bring on it value creation opportunities. Furthermore, rather than Private Equity funds, as exposed in the previous parts, SF doesn't represent a financial entity but an entrepreneurial partner. (Osservatorio PoliMi, 2026; Stanford, 2026; Hoffman et al., 2023)

This section is dedicated to the analysis of the Italian Search Fund ecosystem considering why the model is structurally suitable for Italy, why the Italian Search Fund market is growing, and discussing including the legal and regulatory framework.

3.3.1 WHY ITALY IS STRUCTURALLY SUITABLE FOR THE SEARCH FUND MODEL

The structural relevance of the Search Fund model in Italy emerges from the interaction between three macro-features of the Italian economy: the size and fragmentation of the SMEs population, the demographic ageing of entrepreneurs, and the existence of a very large stock of private wealth not used for productivity investments. (AIPB, EY, 2025; Intermonte SIM, PoliMi, AIPB, 2025; Osservatorio PoliMi, 2026)

Italy has the second largest population of SMEs in Europe, and they are responsible for 41% of the country's total turnover. They are characterised by common features such as profitable business models, with specialised know-how, commercial resilience, constrained by limited managerialisation, small scale and underdeveloped governance structures.

So, the Search Fund investment thesis is very suitable for this environment by definition. SF searches for a stable, cash-generative company, operating in a stable sector with low technological disruption, and potential for operational improvement. Furthermore, the Search Fund model seek a gradual transformation and value creation of the target company. (AIPB,

EY, 2025; Valenti, 2026)

Italy is one of the oldest countries in the world and this statistic is destined to get worse in the next years. The ageing of the general population is mirrored in the entrepreneurial population. Empirical data report that, among Italian business owners, 40% are over 65 and 22% are over 70. The most emblematic evidence is that in 73% of cases, business families pursue liquidity events because of generational transition issues. Many entrepreneurs remain active until around 70, and succession becomes a central corporate issue given that about 65% of the SMEs (interviewed in AIPB sample) are family managed. Other studies report that over-70 business owners (owners, directors and shareholders) increased by roughly one quarter over ten years, while the 30–49 age group recorded the strongest percentage decline, equal to -28% between and the 50–69 age group increased by +15% between 2014 and 2023. This evidence is also confirmed by the empirical dataset used in Chapter 2 where CEO age reports a median range between 58 and 62 years in most sectors.

This situation is then reported on the businesses performance and willingness to change and invest on new innovative opportunities.

Another Italian SMEs problem is represented by succession unavailability. This is translated because in many cases heirs may be unwilling or professionally unprepared to be new entrepreneurs. The trade sale to competitors may be perceived by the founders as a threat and a strategical defeat. Finally, the equity opening to a traditional financial buyer may be perceived as too impersonal.

In this complex context the Search Fund model offers a different thesis and a new perspective. The searcher isn't only a financial acquirer, he represents the future entrepreneur, personally responsible for preserving the company's legacy, introducing managerial discipline, growth opportunities and useful experienced partners. These features affect the valuation and deal structure because the seller may accept deferred components, vendor loans or earn-outs if they trust the searcher; conversely, lack of trust can block the transaction. For this reason, Italian SF transactions require deep and extended pre-acquisition interactions through repeated meetings, sensitivity to family dynamics and a careful communication. At the end of all the considerations, the Search Fund model represents for the exiting-entrepreneur an opportunity for firm's history legacy continuity, protection of employees, giving to the business the opportunity to grow and live for furthermore years. (Stanford GSB, 2026; AIPB, EY, 2025; Osservatorio PoliMi, 2026)

The third structural factor is financial because Italy has large a large stock of private wealth, but it suffers of a weak transmission mechanism between private savings and productive investment in SMEs. As stated in the previous parts Search Funds help to transfer existing private wealth toward financing the acquisition and the continuity and managerial development of existing SMEs. (Intermonte SIM, PoliMi, AIPB, 2025; Osservatorio PoliMi, 2026)

Quantitative researchers report that at the end of 2024, Italian households held approximately EUR 5.945 billion in financial assets but with a structural allocation problem, only a limited portion of it supported instruments capable to finance Italian SMEs growth. A very large share was invested in low-risk or indirectly productive forms with the 27% (EUR 1.594 billion) in sight deposits and liquidity. Equity and participations amounted to EUR 1.669 billion, but about the 90% of them (EUR 1.501 billion) were invested in unlisted companies and mainly reflecting ownership stakes in family businesses (only EUR 40 billion were invested in listed Italian non-financial companies and EUR 90 billion in foreign listed companies). (Intermonte SIM, PoliMi, AIPB, 2025)

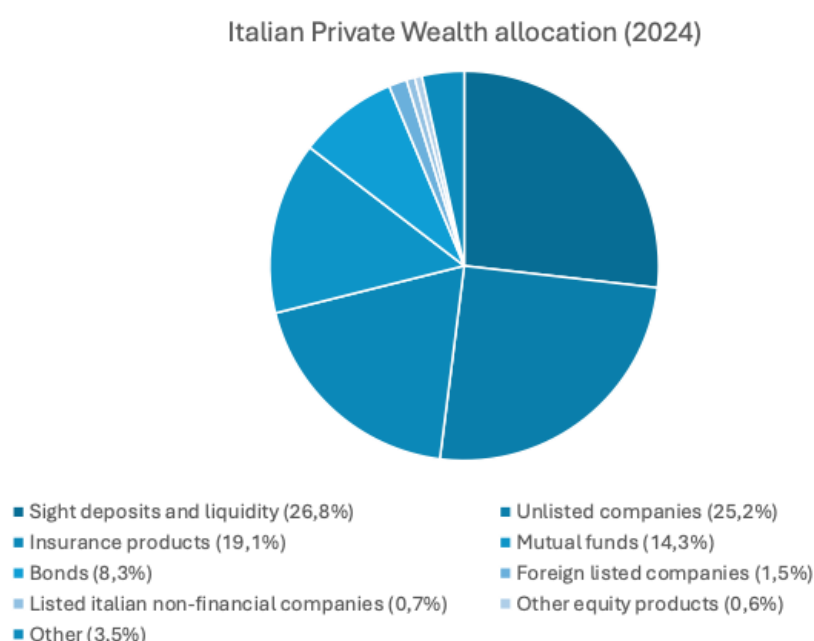


Chart 3.5: Italian Private Wealth allocation (2024)

Bank lending to the real economy also declined, with the stock of loans falling about -12% (from EUR 679 billion to EUR 599 billion). These figures suggest that, despite the abundance of household wealth, the Italian financial system still struggles to channel capital toward

productive SMEs. In that sense Search Funds act as a bridge between under deployed private wealth and the lower mid-market segment of the Italian SME economy.

Search Fund could be also identified as compatible investments for qualified private investors, family offices and entrepreneurial wealth holders who are willing to allocate a limited portion of their portfolio to illiquid, long-term and impact-oriented private capital opportunities. In this context, Private Banking can act as an ecosystem enabler, educating qualified clients about the Search Fund model, supporting the mobilisation of patient capital, identifying entrepreneurs facing generational transition and providing post-transaction wealth planning to sellers. (AIPB, EY, 2025; Intermonte SIM, PoliMi, AIPB, 2025; Osservatorio PoliMi, 2026)

Another relevant data is related to the distribution of this wealth. In 2025 the North-West is expected to hold 44,1% (EUR 670 billion) of affluent-family wealth; the North-East 25,3% (EUR 385 billion); the Centre 18,1% (EUR 275 billion); the South and Islands 12,5% (EUR 191 billion). The first five regions such as Lombardy, Emilia-Romagna, Veneto, Piedmont and Lazio are expected to account for 72,2% of the total affluent-family wealth. The Search Fund model could act as a territorial player connecting local capital with local succession opportunities. (AIPB, Prometeia, 2025; Osservatorio PoliMi, 2025)

Italian geographical distribution of affluent family wealth (2025)

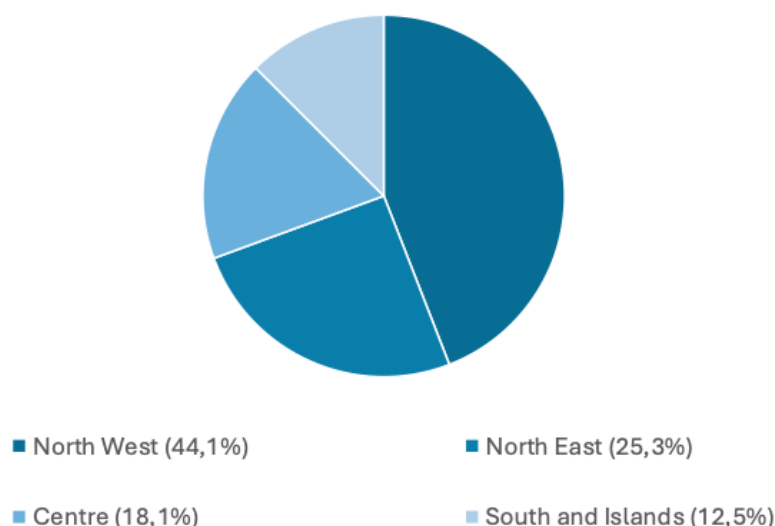


Chart 3.6: Italian geographical distribution of affluent family wealth (2025)

Talking about a Euronext-backed network of private companies named ELITE, confirms that the Italian lower and mid-market remains structurally family-based even when

companies reach meaningful size and growth potential. To be precise, ELITE Italy is designed to connect companies with different sources of capital in order to accelerate their growth. It includes 1.774 companies across all 20 regions, with EUR 205 billion of aggregate revenues and 736.000 employees.

The rationale is that ELITE represents the visible and more structured part of a much larger SME universe, so, there is likely a much larger underlying population of smaller SMEs that have similar needs for capital, governance and managerialisation. This population represents an opportunity for Search Funds. Furthermore, ELITE shows that the SF model could be a belt conveyor for small, profitable, stable, family-owned SMEs to Private Equity and IPO. In this segment, the Search Fund acts as a preparatory mechanism, introducing a new CEO, governance discipline, reporting systems and growth strategy. (AIPB, Prometeia, 2025; Osservatorio PoliMi, 2026; Valenti, 2026, Stanford GSB, 2026)

3.3.2 GROWTH OF THE ITALIAN SEARCH FUND MARKET AND THE ITALIAN SEARCHERS

The Italian Search Fund market still young but it has moved from a pioneering stage to an early ecosystem phase. It is becoming an organised ecosystem supported by business schools, specialised funds, experienced investors and professional advisors. (Osservatorio PoliMi, 2026)

Empirical data report that in 2025 there was the strongest annual increase observed in the country. At the end of the same year the total amount of Italian SFs was 37, including 20 active searches, 17 completed acquisitions and 2 exits. (Osservatorio PoliMi, 2026)

The Italian market growth is pushed by the high search-to-acquisition conversion rate that is about 93–94%, greater than the international benchmark (approximately 79%). However, as stated before, the market still young and the sample data is still small. Nevertheless, as explored in previous part the growth is also helped by the suitable fit between the Italian SMEs environment, the private wealth stock allocation and the SF model. (AIPB, EY, 2025; Osservatorio PoliMi, 2026; IESE, 2024; Intermonte SIB, PoliMi, AIPB, 2025)

Exploring the features of the Italian searchers they are consistent with international benchmarks. The median age at the launch is about 34 years, the majority is between 35 and 45, while only a small minority is above 45. Most of the Italian Search Funds are led by only one searcher but there are also paired SFs. A significant share of Italian searchers is MBA graduated, but often completed abroad, and in many cases, they discovered the model during

their studies. The number of female searchers still small and lower than the international benchmark.

So, these Italian searchers' characteristics communicate that they are often young professionals with enough experience and an executive education to be credible with investors and entrepreneurs. But actually, if the Search Fund model is a strategic player that could act as a gap filler in the Italian SMEs ecosystem it cannot remain confined to a narrow demographic segment of male with the MBA. (Osservatorio PoliMi, 2026; IESE, 2024)

Also talking about the typical target companies, the Italian SF are in line with the international benchmark characteristics. Quantitative reports show that the acquired companies' average revenues is approximately EUR 10 million and an average EBITDA margin of around 23%. (Osservatorio PoliMi, 2026; IESE, 2024)

The Italian Search Fund acquisitions are concentrated in the industrial and entrepreneurial regions of Northern and Central Italy, especially Lombardy, Veneto, Emilia-Romagna and Tuscany. As explored it is consistent with the combination of the large SME populations, entrepreneurial wealth, private investor networks and advisory infrastructure, creating a perfect fit ecosystem (Osservatorio PoliMi, 2026; AIPB, Prometeia, 2025; Valenti, 2026)

3.3.3 ITALIAN REGULATIONS AND LEGAL STRUCTURE FOR THE SEARCH FUNDS

The current Italian legal framework doesn't include a dedicated part to the Search Fund model. But it has to comply with the general rules of corporate law, contract law, tax law and financial-market regulation. The reason is that the Italian ecosystem is still young, and market practice is not yet fully consolidated. Many contractual provisions of the Search Funds are adapted from U.S., Spanish or international templates where the markets are more mature. This practice creates the risk of legal transplantation without full compatibility with Italian law. (Vernizzi, 2026; Osservatorio PoliMi, 2026)

The legal structure of the Search Fund generally follows the economic lifecycle of the model. (Vernizzi, 2026; Stanford GSB, 2026)

The Search Fund is legally known as a vehicle that in the Italian regulation system is often incorporated as a "*società a responsabilità limitata (s.r.l)*". This structure provides limited liability, organisational flexibility and broad contractual autonomy in the design of economic and governance rights. In the search phase, the vehicle raises search capital to finance, and the key documents regulate the initial capital contributions, the rights of the investors, the

searcher's obligations and the conditions that the vehicle has to comply to acquire the target company. These documents are the articles of association of the vehicle, the investment or subscription agreement and, where necessary, a shareholders' agreement.

At this stage is important to specify that the capital must generally be raised through private negotiations with professional, qualified investors avoiding standardised distribution to retail investors, as a public offering, or saving management.

Furthermore, the SF legal structure differs from a typical investment fund because it is normally organised around one acquisition and direct entrepreneurial management by the searcher.

Finally, the model shouldn't be distributed as a standard wealth-management product, but it has to remain within a private and sophisticated investment perimeter because of the concentration and the high illiquidity nature of the investment. (Vernizzi, 2026; Stanford GSB, 2026)

During the acquisition of the target is used a legal package with the aim to protect investors, allow the searcher to preserve flexibility to manage the company. Inside of it there some contractual mechanism. (Vernizzi, 2026; Stanford GSB, 2026)

The first one is the step-up right granted to initial ("seed") investors. They finance the search process with a high level of uncertainty because when they commit capital the target isn't already discovered and the searcher could be not able to convert the search in an acquisition. To remunerate this high degree, risk the seed investors often receive the right to participate in the acquisition financing on favourable terms or with priority. This mechanism compensates the risk assumed during the search phase and encourages investors.

Another mechanism is searcher vesting. It is referred to the possibility of the searcher to earn a progressive equity participation, often up to 25–30%, divided into tranches linked to the completion of the performance, timing and exit. In this case the mechanism is an incentive alignment between the searcher and investors. (Stanford GSB, 2026; Goel et al., 2023)

The governance arrangements are also important to determine the structure and the board decision making framework. The BoD and usually includes investor representatives. Nevertheless, the CEO searcher has to remain flexible, the governance doesn't have to be excessively restrictive otherwise the entrepreneurial nature of the model is weakened. So, the governance system should protect investors without undermining the authority of the searcher

as CEO. (Vernizzi, 2026; Stanford GSB, 2026)

Talking about tax, they represent an open issue in the Italian regulatory framework for the Search Fund model. Searcher vesting, equity incentives, management compensation and exit proceeds may be treated differently depending on the timing and nature of the rights granted. Because labour income, capital income and capital gains may follow different tax regimes, so a careful and detailed tax planning is necessary to avoid inefficient or uncertain outcomes. (Vernizzi, 2026; Goel et al., 2023)

CONCLUSIONS

This research has explored the relationship between Private Equity backing and operational innovation in the Italian SMEs environment. The analysis highlights the strategic role of the Private Equity model as an active investor capable to support operational transformation, managerial professionalisation, efficiency improvement and long-term value creation.

In the first chapter is shown that Private Equity funds create value in the companies in which they invest as a combination of financial, operational, managerial and human capital levers. Historically, financial engineering and leverage have represented the operating nature of the Private Equity model, but recent market dynamics have increased the relevance of operational value creation of the portfolio companies. The main current reasons to push this practice are higher entry multiples, more expensive debt and stronger competition among investors. So, at these conditions is crucial for the Private Equity investments success to implement revenue growth, margin improvement, working-capital efficiency, governance upgrading and scalability, consistently with the investment thesis. For this reason, the concept of innovation adopted in this thesis has been interpreted in a broader operational sense. This interpretation of innovation is particularly consistent with mature private companies and Italian SMEs.

With the purpose to investigate whether Private Equity backed companies exhibit higher operational innovation proxy scores than comparable non-Private Equity backed firms, operating in the same macro-sector-year environment, an empirical analysis has been developed. The model is based on a panel dataset of Italian companies observed over the period 2016–2024. The empirical model uses a pooled firm-year OLS regression with macro-sector-year fixed effects and firm-clustered standard errors. The dependent variable is an Operational Innovation Proxy Index, constructed from financial and operating indicators related to scalability, efficiency, working-capital management and cash-flow generation. The main explanatory variable is a time-invariant dummy identifying whether a firm is Private Equity backed or not, while the model also controls for observable firm-level characteristics such as CEO age and firm size. The main results indicate a positive and statistically significant association between Private Equity backed status and the Operational Innovation Proxy Index. Private Equity backed firms appear to display higher operational innovation proxy scores than non-Private Equity backed ones operating in the same sector-year environment. This evidence is consistent with the interpretation that Private Equity

investments bring into portfolio companies' stronger operational performance, higher scalability, greater efficiency and better cash-generation characteristics.

However, the interpretation of these results must take into account the main limitation of the model: the absence of information on the exact year in which the Private Equity fund invest in each portfolio company. At these conditions isn't possible to carry out a difference-in-differences design and cannot estimate a causal treatment effect of Private Equity ownership on operational innovation. The results should therefore be interpreted as evidence of a conditional association, not as proof that Private Equity causes higher operational innovation. Furthermore, the regression results show us statistically significant results but a limited economic magnitude but it is consistent with the aim of the analysis that doesn't want to create a predictive model.

The final part of the thesis has extended the discussion to the Search Fund model. This entrepreneurial form of private capital investment, in which searchers raise capital to acquire, manage and grow a single private company is increasingly growing and spreading around the world. This model is particularly relevant for the Italian SMEs environment, where many firms face generational succession issues, limited managerialisation and unrealised operational potential. In this sense, Search Funds may represent a bridge between private capital and entrepreneurial continuity, offering a possible solution for companies that require not only financial resources, but also direct managerial involvement.

Both the Private Equity and Search Funds models may represent relevant mechanisms through which private capital can support business continuity, operational improvement and long-term industrial development in the Italian economic environment.

APPENDIX

1.4.2 ORIGINATION AND DEAL FLOW

The Information Memorandum (Info Memo) is a document in which are reported all the important and descriptive features of a company. It is made with the aim to present all primary details of the firm to the seller.

The Q&A materials are a set of questions that the buyer submit to the seller (or its intermediaries) to delve into specific details of the company that could potentially change the assumptions needed to make the valuation.

1.4.3 DUE DILIGENCE

The EBITDA is a financial accounting aggregate of the P&L that represents a proxy of the Free Cash Flow from Operations. It takes into accounts the profitability of the core business of a company without the influence of its financial structure and its quantity of fixed assets.

The EBITDA formula is:

$$EBITDA = \text{Revenues} - \text{Cost of Goods Sold} - \text{Sales, General \& Administrative expenses} \\ \pm \text{Other operating expenses}$$

1.4.4 TARGET VALUATION

Enterprise Value formula:

$$EV = (\text{Financial Debt} - \text{Cash \& Cash equivalents}) + \text{Equity Value}$$

Equity Value formula:

$$EqV = EV - (\text{Financial Debt} - \text{Cash \& Cash equivalents})$$

WACC formula:

$$\overline{WACC} = \overline{K(d) \text{ after tax} \left(\frac{Mkt V. of NFD}{Mkt V. NFD + Mkt V. Equity} \right) + K(e) \left(\frac{Mkt V. of Equity}{Mkt V. NFD + Mkt V. Equity} \right)}$$

Cost of Equity formula:

$$Ke = \text{Risk free rate} + \overline{\beta(\text{levered}) (E[\text{Market rate}] - \text{Risk free rate})} + \text{Small Firm Premium}$$

The DCF formula:

$$1. \quad FCFF = EBIT (1 - \text{tax rate}) + D\&A - \text{Change in NWC} - \text{CapEx}$$

$$2. \quad EV = \sum_{t=1} \frac{FCFF}{(1+WACC)^t} + \frac{\frac{FCFF(1+g)}{(WACC-g)}}{(1+WACC)^n}$$

The DCFE formula:

$$1. \quad FCFE = EBIT (1 - \text{tax rate}) + D\&A - \text{Change in NWC} - \text{CapEx} + \text{Change in Net Financial Debt}$$

$$2. \quad EqV = \sum_{t=1} \frac{FCFE}{(1+Ke)^t} + \frac{\frac{FCFE(1+g)}{(Ke-g)}}{(1+Ke)^n}$$

2.2.2 THE OPERATIONAL INNOVATION PROXY INDEX

Since the 2015 data can't be included into the panel analysis here's reported the population of every macro-sector's observation without this year, accounting the time range 2016-2024.

Macro-Sector	N observations 2016-2024
Industrial & Manufacturing	43.911
Consumer & Retail	37.404
Business & Financial Services	30.591
Healthcare & Life Sciences	26.784
Technology & Digital	14.238
Infrastructure & Real Assets	13.185
Energy & Utilities	10.404
Other Services	7.254

Diagnostic pre-winsorization

The zero diagnostic of macro-sector-year operational innovation proxy index components tables report these outputs:

OUTPUT	MEANING
N	Tot. observations
N non missing	Tot. Non missing observations
N missing	Tot. Missing observations
% missing	% missing
N zero	Tot. 0 observations
% zero observation	% zero observation on total N
% zero non missing	% zero within non missing obs.
N_negative	Number of negative values
min	Minimum observation
p1	Percentile 1%
p5	Percentile 5%
p25	Percentile 25% - First Quartile
median	median
p75	Percentile 75% - Third Quartile

p95	Percentile 95%
p99	Percentile 99%
max	Maximum observation
mean	Mean - Average
sd	Standard deviation
N_unique	Tot. unique observations

The outputs of the diagnostic per macro-sector-year 2016-2024 are:

1) Business & Financial Services

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	30.591	30.591	0	0%	18	0,06%	0,06%	7.214	24%	-1	
Sales Growth	30.591	30.591	0	0%	30	0,10%	0,10%	9.210	30%	-1	
Gross Margin	30.591	30.591	0	0%	2	0,01%	0,01%	45	0%	-421	
COGS/Sales	30.591	30.591	0	0%	3.032	9,91%	9,91%	116	0%	-36	
NWC/Sales	30.591	30.591	0	0%	34	0,11%	0,11%	4.126	13%	-531.762	
WC/Sales	30.591	30.591	0	0%	34	0,11%	0,11%	4.126	13%	-531.762	
OCF/Sales	30.591	30.591	0	0%	1	0,00%	0,00%	8.103	26%	-118.745	
FCF Proxy	30.591	30.591	0	0%	0	0,00%	0,00%	11.556	38%	-1.141.443	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,45	-0,18	0,01	0,09	0,22	0,79	3,54	6.005.451	308	36.947	30.571
Sales Growth	-0,70	-0,33	-0,03	0,09	0,27	1,09	5,46	8.024.624	680	60.277	30.559
Gross Margin	0,09	0,32	0,76	0,96	1,00	1,00	1,00	37	1	3	27.602
COGS/Sales	0,00	0,00	0,00	0,03	0,22	0,67	0,91	422	0	3	27.555
NWC/Sales	-0,57	-0,13	0,09	0,25	0,45	1,75	10,42	4.503.827	305	29.983	30.556
WC/Sales	-0,58	-0,13	0,09	0,25	0,45	1,80	11,30	4.503.827	305	29.983	30.556
OCF/Sales	-3,08	-0,39	-0,01	0,08	0,21	0,68	2,28	74.388	-5	859	30.591
FCF Proxv	-5,64	-0,67	-0,05	0,04	0,14	0,59	2,15	73.888	-43	6.582	30.591

2) HealthCare & Life Sciences

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	26.784	26.784	0	0%	26	0%	0%	5.966	22,27%	-1,00	
Sales Growth	26.784	26.784	0	0%	33	0%	0%	7.997	29,86%	-1,00	
Gross Margin	26.784	26.784	0	0%	0	0%	0%	9	0,03%	-2,18	
COGS/Sales	26.784	26.784	0	0%	911	3%	3%	29	0,11%	-13,01	
NWC/Sales	26.784	26.784	0	0%	18	0%	0%	5.251	19,60%	-59.154,00	
WC/Sales	26.784	26.784	0	0%	18	0%	0%	5.251	19,60%	-59.154,00	
OCF/Sales	26.784	26.784	0	0%	0	0%	0%	5.267	19,66%	-1.103.606,12	
FCF Proxy	26.784	26.784	0	0%	0	0%	0%	9.087	33,93%	-1.103.641,79	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,27	-0,08	0,01	0,06	0,14	0,45	2,06	1.799.154,00	147,48	13.171,61	26.755
Sales Growth	-0,43	-0,18	-0,01	0,05	0,16	0,55	2,25	1.799.154,00	168,00	13.482,24	26.747
Gross Margin	0,21	0,38	0,65	0,86	0,95	1,00	1,00	14,01	0,79	0,22	25.876
COGS/Sales	0,00	0,00	0,05	0,14	0,34	0,62	0,79	3,18	0,21	0,22	25.873
NWC/Sales	-0,38	-0,13	0,03	0,17	0,35	0,90	4,32	8.517.766,00	326,71	52.054,63	26.765
WC/Sales	-0,38	-0,13	0,03	0,17	0,35	0,90	4,35	8.517.766,00	326,71	52.054,63	26.765
OCF/Sales	-1,66	-0,18	0,02	0,09	0,18	0,42	1,14	27.226,91	-54,48	6.969,01	26.784
FCF Proxy	-2,77	-0,33	-0,03	0,04	0,13	0,36	1,02	27.138,82	-55,13	6.968,71	26.784

3) Industrial & Manufacturing

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min
CAGR3Y	43.911	43.911	0	0%	0	0,0%	0,0%	10.163	23,1%	-0,99
Sales Growth	43.911	43.911	0	0%	1	0,0%	0,0%	15.783	35,9%	-1,00
Gross Margin	43.911	43.911	0	0%	0	0,0%	0,0%	50	0,1%	-2,48
COGS/Sales	43.911	43.911	0	0%	222	0,5%	0,5%	16	0,0%	-0,43
NWC/Sales	43.911	43.911	0	0%	1	0,0%	0,0%	2.646	6,0%	-15,12
WC/Sales	43.911	43.911	0	0%	1	0,0%	0,0%	2.646	6,0%	-15,12

OCF/Sales	43.911	43.911	0	0%	0	0,0%	0,0%	8.600	19,6%	-1.861,24	
FCF Proxy	43.911	43.911	0	0%	0	0,0%	0,0%	16.245	37,0%	-1.861,24	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,23	-0,10	0,01	0,07	0,14	0,33	0,79	8.381.190,00	232,31	40.736,50	43.911
Sales Growth	-0,39	-0,23	-0,05	0,06	0,19	0,55	1,17	8.381.190,00	232,24	40.736,50	43.911
Gross Margin	0,06	0,16	0,37	0,50	0,62	0,89	1,00	1,42	0,50	0,20	43.694
COGS/Sales	0,00	0,10	0,37	0,49	0,62	0,83	0,94	3,48	0,49	0,20	43.690
NWC/Sales	-0,18	-0,02	0,14	0,25	0,38	0,65	1,10	3.191,30	0,45	18,77	43.911
WC/Sales	-0,18	-0,02	0,14	0,25	0,38	0,65	1,11	3.191,30	0,45	18,77	43.911
OCF/Sales	-0,32	-0,09	0,02	0,07	0,14	0,29	0,54	82,20	0,02	9,38	43.911
FCF Proxy	-0,47	-0,17	-0,03	0,03	0,09	0,24	0,48	81,98	-0,03	9,38	43.911

4) Infrastructure & Real Assets

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	13.185	13.185	0	0%	24	0,18%	0,18%	4.417	33,50%	-1	
Sales Growth	13.185	13.185	0	0%	31	0,24%	0,24%	5.099	38,67%	-1	
Gross Margin	13.185	13.185	0	0%	7	0,05%	0,05%	129	0,98%	-1.111.818	
COGS/Sales	13.185	13.185	0	0%	2.555	19,38%	19,38%	200	1,52%	-1.033.833	
NWC/Sales	13.185	13.185	0	0%	32	0,24%	0,24%	1.962	14,88%	-278.027	
WC/Sales	13.185	13.185	0	0%	32	0,24%	0,24%	1.962	14,88%	-278.027	
OCF/Sales	13.185	13.185	0	0%	0	0,00%	0,00%	4.099	31,09%	-1.667.073	
FCF Proxy	13.185	13.185	0	0%	0	0,00%	0,00%	5.212	39,53%	-1.667.473	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,71	-0,36	-0,04	0,06	0,24	1,17	7,06	470.909,00	84,02	5.354,64	13.160
Sales Growth	-0,91	-0,59	-0,11	0,05	0,35	2,49	18,90	7.717.829,00	1.004,83	69.393,64	13.149
Gross Margin	0,00	0,18	0,63	0,81	1,00	1,00	1,01	1.033.834,00	-43,80	14.122,20	10.692
COGS/Sales	-0,03	0,00	0,00	0,16	0,32	0,75	1,00	1.111.819,00	44,77	14.122,20	10.625
NWC/Sales	-1,62	-0,22	0,10	0,42	1,27	12,29	84,00	4.297.023,00	1.333,95	54.208,99	13.154
WC/Sales	-1,63	-0,22	0,10	0,43	1,37	13,91	95,48	4.297.023,00	1.335,02	54.208,99	13.154
OCF/Sales	-13,69	-1,11	-0,05	0,12	0,41	1,34	5,66	553.809,00	-293,40	18.321,14	13.185
FCF Proxy	-18,29	-2,00	-0,13	0,06	0,33	1,26	5,76	553.809,00	-294,04	18.326,50	13.185

5) Consumer & Retail

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	37.404	37.404	0	0%	0	0,00%	0,00%	8.340	22,30%	-1,00	
Sales Growth	37.404	37.404	0	0%	0	0,00%	0,00%	12.068	32,26%	-1,00	
Gross Margin	37.404	37.404	0	0%	0	0,00%	0,00%	289	0,77%	-11,98	
COGS/Sales	37.404	37.404	0	0%	191	0,51%	0,51%	21	0,06%	-0,82	
NWC/Sales	37.404	37.404	0	0%	0	0,00%	0,00%	3.872	10,35%	-16,90	
WC/Sales	37.404	37.404	0	0%	0	0,00%	0,00%	3.872	10,35%	-16,90	
OCF/Sales	37.404	37.404	0	0%	0	0,00%	0,00%	9.651	25,80%	-43,80	
FCF Proxy	37.404	37.404	0	0%	0	0,00%	0,00%	14.582	38,99%	-43,80	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,23	-0,10	0,01	0,07	0,16	0,41	1,26	1.169.804,50	48,29	6.283,48	37.404
Sales Growth	-0,41	-0,22	-0,03	0,07	0,20	0,57	1,48	1.464.236,00	88,60	9.841,50	37.403
Gross Margin	0,01	0,06	0,15	0,28	0,51	0,82	1,00	1,82	0,34	0,26	37.213
COGS/Sales	0,00	0,18	0,49	0,72	0,85	0,94	0,99	12,98	0,66	0,26	37.212
NWC/Sales	-0,19	-0,05	0,07	0,17	0,32	0,62	1,02	849.517,00	25,10	4.412,09	37.401
WC/Sales	-0,19	-0,05	0,07	0,17	0,32	0,62	1,03	849.517,00	25,10	4.412,09	37.402
OCF/Sales	-0,23	-0,08	0,00	0,04	0,09	0,22	0,47	128.603,00	4,03	673,12	37.404
FCF Proxy	-0,38	-0,13	-0,02	0,01	0,06	0,18	0,38	128.603,00	3,98	672,72	37.404

6) Energy & Utilities

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	10.404	10.404	0	0%	14	0,13%	0,13%	3.601	34,61%	-1,00	
Sales Growth	10.404	10.404	0	0%	25	0,24%	0,24%	4.287	41,21%	-1,00	
Gross Margin	10.404	10.404	0	0%	0	0,00%	0,00%	34	0,33%	-1.796,00	
COGS/Sales	10.404	10.404	0	0%	1.809	17,39%	17,39%	41	0,39%	-0,22	
NWC/Sales	10.404	10.404	0	0%	16	0,15%	0,15%	1.904	18,30%	-540.544,98	
WC/Sales	10.404	10.404	0	0%	12	0,12%	0,12%	1.905	18,31%	-540.544,98	

OCF/Sales	10.404	10.404	0	0%	0	0,00%	0,00%	2.742	26,36%	-3.344,513,33	
FCF Proxy	10.404	10.404	0	0%	0	0,00%	0,00%	3.851	37,01%	-3.380,311,06	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,70	-0,29	-0,03	0,04	0,20	1,18	9,83	701.669,00	110,78	7.679,00	7.130
Sales Growth	-0,87	-0,51	-0,09	0,04	0,27	1,83	20,31	3.605.752,00	554,24	36.487,97	7.967
Gross Margin	0,05	0,15	0,54	0,90	1,00	1,00	1,00	1,22	0,41	23,51	5.673
COGS/Sales	0,00	0,00	0,00	0,09	0,45	0,85	0,95	1.797,00	0,58	23,51	5.640
NWC/Sales	-1,63	-0,27	0,05	0,23	0,57	4,50	51,56	6.460.583,89	1.058,43	76.201,45	8.347
WC/Sales	-1,63	-0,27	0,05	0,23	0,57	4,56	51,56	6.460.583,89	1.058,44	76.201,45	10.391
OCF/Sales	-13,94	-1,15	-0,01	0,14	0,44	1,11	7,18	1.506.022,65	-162,77	36.344,65	10.404
FCF Proxy	-20,07	-2,10	-0,08	0,06	0,34	1,00	6,64	1.484.306,95	-294,79	37.460,15	10.404

7) Technology & Digital

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	14.238	14.238	0	0%	4	0,03%	0,03%	3.499	24,58%	-1	
Sales Growth	14.238	14.238	0	0%	8	0,06%	0,06%	4.507	31,65%	-1	
Gross Margin	14.238	14.238	0	0%	0	0,00%	0,00%	8	0,06%	-906	
COGS/Sales	14.238	14.238	0	0%	1.009	7,09%	7,09%	46	0,32%	-1	
NWC/Sales	14.238	14.238	0	0%	10	0,07%	0,07%	1.166	8,19%	-65	
WC/Sales	14.238	14.238	0	0%	10	0,07%	0,07%	1.166	8,19%	-65	
OCF/Sales	14.238	14.238	0	0%	1	0,01%	0,01%	4.072	28,60%	-150.099	
FCF Proxy	14.238	14.238	0	0%	0	0,00%	0,00%	5.580	39,19%	-401.130	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,47	-0,18	0,00	0,08	0,20	0,67	2,74	437.737,00	52,98	4.070,94	14.235
Sales Growth	-0,66	-0,31	-0,04	0,08	0,24	0,87	3,54	437.737,00	67,22	4.213,79	14.230
Gross Margin	0,18	0,38	0,73	0,96	0,99	1,00	1,00	1,90	0,74	8,38	13.249
COGS/Sales	0,00	0,00	0,01	0,04	0,27	0,62	0,82	907,00	0,26	8,38	13.229
NWC/Sales	-0,40	-0,06	0,14	0,28	0,44	1,02	4,16	129.102,00	32,63	1.776,95	14.228
WC/Sales	-0,40	-0,06	0,14	0,28	0,44	1,02	4,17	129.102,00	32,63	1.776,95	14.228
OCF/Sales	-1,69	-0,28	-0,01	0,07	0,17	0,48	1,26	23.959,00	-27,01	1.846,93	14.238
FCF Proxy	-2,73	-0,37	-0,05	0,03	0,13	0,42	1,14	22.514,00	-46,62	3.652,46	14.238

8) Other Services

Index Comp.	N	N non missing	N missing	% missing	N zero	% zero total	% zero non missing	N negative	% non missing	min	
CAGR3Y	7.254	7.254	0	0%	6	0,08%	0,08%	1.967	27,12%	-1	
Sales Growth	7.254	7.254	0	0%	10	0,14%	0,14%	2.336	32,20%	-1	
Gross Margin	7.254	7.254	0	0%	0	0,00%	0,00%	6	0,08%	-1	
COGS/Sales	7.254	7.254	0	0%	537	7,40%	7,40%	25	0,34%	-1	
NWC/Sales	7.254	7.254	0	0%	30	0,41%	0,41%	1.675	23,09%	-311	
WC/Sales	7.254	7.254	0	0%	28	0,39%	0,39%	1.676	23,10%	-311	
OCF/Sales	7.254	7.254	0	0%	0	0,00%	0,00%	1.915	26,40%	-844.876	
FCF Proxy	7.254	7.254	0	0%	0	0,00%	0,00%	2.681	36,96%	-844.876	
Index Comp.	p1	p5	p25	median	p75	p95	p99	max	mean	sd	N unique
CAGR3Y	-0,43	-0,19	-0,01	0,08	0,21	0,72	3,02	1.853.792,00	290,22	21.884,82	4.844
Sales Growth	-0,70	-0,36	-0,04	0,08	0,26	1,02	4,10	1.853.792,00	293,40	21.886,18	5.411
Gross Margin	0,24	0,60	0,93	0,98	0,99	1,00	1,00	2,31	0,92	0,15	2.405
COGS/Sales	0,00	0,00	0,01	0,02	0,07	0,40	0,75	1,99	0,08	0,15	2.390
NWC/Sales	-0,54	-0,16	0,01	0,13	0,33	0,86	2,38	1.179.043,00	216,41	14.473,70	5.215
WC/Sales	-0,54	-0,16	0,01	0,13	0,33	0,87	2,41	1.179.043,00	216,41	14.473,70	7.226
OCF/Sales	-1,01	-0,24	-0,01	0,08	0,18	0,50	1,08	344.351,00	-76,16	10.720,75	7.254
FCF Proxy	-1,62	-0,35	-0,04	0,04	0,14	0,44	1,00	344.351,00	-76,51	10.720,96	7.254

Diagnostic post-winsorization

1) Business & Financial Services

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	30.591	0	0,248	0,090	1,515	-0,713	-0,383	-0,178	0,005	0,218	0,789	2,497	38,253
Gross Margin	30.591	0	0,844	0,963	0,227	0,052	0,095	0,320	0,764	0,996	1,000	1,000	1,000
NWC/Sales	30.591	0	0,524	0,245	1,374	-0,639	-0,489	-0,127	0,090	0,446	1,746	8,681	13,952

OCF/Sales	30.591	0	0,090	0,077	0,548	-4,586	-2,221	-0,391	-0,006	0,205	0,680	1,831	3,633
Sales Growth	30.591	0	0,279	0,086	1,570	-0,783	-0,665	-0,334	-0,027	0,265	1,092	3,931	38,253
COGS/Sales	30.591	0	0,150	0,035	0,222	0,000	0,000	0,000	0,004	0,220	0,668	0,897	0,941
WC/Sales	30.591	0	0,540	0,247	1,453	-0,639	-0,512	-0,128	0,091	0,449	1,800	8,884	15,228
FCF Proxy	30.591	0	-0,030	0,035	0,804	-8,066	-4,196	-0,673	-0,052	0,142	0,588	1,665	3,624

2) Consumer & Retail

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	37.404	0	0,120	0,075	0,302	-0,329	-0,206	-0,101	0,008	0,164	0,410	0,957	5,673
Gross Margin	37.404	0	0,343	0,282	0,242	-0,162	0,018	0,056	0,148	0,508	0,816	0,999	1,000
NWC/Sales	37.404	0	0,216	0,174	0,215	-0,243	-0,164	-0,049	0,069	0,321	0,618	0,942	1,281
OCF/Sales	37.404	0	0,050	0,035	0,100	-0,367	-0,198	-0,079	-0,001	0,089	0,225	0,425	0,556
Sales Growth	37.404	0	0,120	0,067	0,340	-0,705	-0,366	-0,222	-0,031	0,203	0,573	1,278	5,673
COGS/Sales	37.404	0	0,656	0,716	0,243	0,000	0,001	0,182	0,488	0,852	0,944	0,982	1,153
WC/Sales	37.404	0	0,217	0,175	0,216	-0,248	-0,164	-0,049	0,069	0,321	0,620	0,955	1,315
FCF Proxy	37.404	0	0,018	0,014	0,103	-0,607	-0,323	-0,131	-0,023	0,058	0,179	0,357	0,484

3) Energy & Utilities

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	10.404	0	1,601	0,043	32,788	-0,919	-0,598	-0,294	-0,031	0,199	1,178	5,415	913,613
Gross Margin	10.404	0	0,750	0,904	0,294	-0,001	0,058	0,152	0,542	0,998	1,000	1,000	1,000
NWC/Sales	10.404	0	1,465	0,229	6,988	-2,187	-1,274	-0,273	0,047	0,572	4,495	38,648	124,824
OCF/Sales	10.404	0	0,024	0,136	2,255	-23,881	-12,149	-1,150	-0,008	0,439	1,114	5,006	14,469
Sales Growth	10.404	0	1,682	0,040	32,781	-0,919	-0,840	-0,507	-0,092	0,266	1,825	10,051	913,613
COGS/Sales	10.404	0	0,246	0,090	0,292	0,000	0,000	0,000	0,002	0,448	0,846	0,942	1,001
WC/Sales	10.404	0	1,484	0,230	7,047	-2,187	-1,274	-0,274	0,048	0,574	4,556	39,331	124,824
FCF Proxy	10.404	0	-0,319	0,064	3,929	-66,770	-14,692	-2,096	-0,083	0,335	1,000	4,631	11,086

4) HealthCare & Life Sciences

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	26.784	0	0,141	0,056	0,645	-0,474	-0,216	-0,084	0,005	0,136	0,447	1,524	13,617
Gross Margin	26.784	0	0,786	0,857	0,203	0,155	0,233	0,376	0,654	0,954	0,997	1,000	1,000
NWC/Sales	26.784	0	0,277	0,173	0,548	-0,453	-0,351	-0,134	0,032	0,353	0,902	3,324	5,173
OCF/Sales	26.784	0	0,091	0,090	0,291	-2,547	-1,286	-0,181	0,020	0,177	0,425	0,945	1,505
Sales Growth	26.784	0	0,134	0,054	0,615	-0,593	-0,389	-0,177	-0,015	0,159	0,545	1,673	13,617
COGS/Sales	26.784	0	0,213	0,142	0,203	0,000	0,000	0,002	0,045	0,344	0,623	0,765	0,845
WC/Sales	26.784	0	0,279	0,174	0,554	-0,453	-0,351	-0,135	0,032	0,354	0,905	3,324	5,173
FCF Proxy	26.784	0	0,010	0,043	0,409	-3,966	-2,131	-0,333	-0,030	0,125	0,362	0,845	1,375

5) Industrial & Manufacturing

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	43.911	0	0,091	0,068	0,179	-0,414	-0,202	-0,100	0,005	0,143	0,330	0,613	2,553
Gross Margin	43.911	0	0,505	0,503	0,202	0,017	0,067	0,165	0,373	0,625	0,894	0,997	0,999
NWC/Sales	43.911	0	0,275	0,252	0,210	-0,206	-0,156	-0,016	0,144	0,375	0,649	1,042	1,160
OCF/Sales	43.911	0	0,081	0,072	0,124	-0,392	-0,285	-0,093	0,015	0,139	0,288	0,503	0,630
Sales Growth	43.911	0	0,097	0,055	0,262	-0,458	-0,357	-0,233	-0,051	0,191	0,555	1,031	2,553
COGS/Sales	43.911	0	0,491	0,491	0,203	0,001	0,002	0,103	0,369	0,624	0,834	0,929	0,982
WC/Sales	43.911	0	0,277	0,253	0,212	-0,206	-0,158	-0,016	0,145	0,377	0,653	1,054	1,169
FCF Proxy	43.911	0	0,029	0,028	0,134	-0,684	-0,427	-0,171	-0,031	0,091	0,239	0,450	0,567

6) Infrastructure & Real Assets

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	13.185	0	0,412	0,058	4,130	-0,914	-0,631	-0,361	-0,038	0,236	1,165	4,575	105,973
Gross Margin	13.185	0	0,759	0,810	0,267	-1,008	0,010	0,181	0,630	0,998	1,000	1,005	1,134
NWC/Sales	13.185	0	3,092	0,423	12,252	-1,731	-1,302	-0,220	0,102	1,270	12,288	61,640	188,177
OCF/Sales	13.185	0	0,019	0,124	2,030	-26,765	-9,363	-1,108	-0,048	0,414	1,341	4,376	7,924
Sales Growth	13.185	0	0,687	0,052	4,725	-0,955	-0,893	-0,593	-0,111	0,348	2,486	13,024	105,973
COGS/Sales	13.185	0	0,211	0,157	0,249	-0,222	-0,010	0,000	0,001	0,323	0,751	0,983	2,008
WC/Sales	13.185	0	3,689	0,434	18,170	-1,819	-1,369	-0,223	0,104	1,368	13,913	66,650	391,475
FCF Proxy	13.185	0	-0,206	0,060	2,503	-25,425	-14,383	-2,001	-0,131	0,330	1,255	4,551	7,341

7) Technology & Digital

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	14.238	0	0.206	0,084	1,090	-0,609	-0,432	-0,184	0,002	0,204	0,668	2,379	24,697
Gross Margin	14.238	0	0,839	0,957	0,214	0,134	0,195	0,377	0,729	0,994	1,000	1,000	1,000
NWC/Sales	14.238	0	0,381	0,275	0,595	-0,438	-0,346	-0,059	0,140	0,444	1,019	3,496	7,050
OCF/Sales	14.238	0	0,069	0,065	0,336	-2,712	-1,268	-0,277	-0,013	0,167	0,475	1,060	1,725
Sales Growth	14.238	0	0,208	0,081	1,098	-0,782	-0,609	-0,314	-0,037	0,240	0,873	2,515	24,697
COGS/Sales	14.238	0	0,160	0,042	0,213	0,000	0,000	0,000	0,006	0,270	0,619	0,799	0,866
WC/Sales	14.238	0	0,383	0,276	0,602	-0,438	-0,346	-0,059	0,140	0,445	1,022	3,496	7,303
FCF Proxy	14.238	0	0,008	0,031	0,416	-3,886	-1,897	-0,370	-0,049	0,126	0,420	0,940	1,597

8) Other Services

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
CAGR3Y	7.254	0	0,225	0,078	1,421	-0,505	-0,397	-0,186	-0,008	0,209	0,715	2,321	35,246
Gross Margin	7.254	0	0,921	0,977	0,142	0,225	0,286	0,599	0,928	0,994	1,000	1,000	1,000
NWC/Sales	7.254	0	0,219	0,126	0,403	-0,997	-0,467	-0,158	0,006	0,326	0,861	2,038	2,984
OCF/Sales	7.254	0	0,092	0,076	0,260	-1,473	-0,784	-0,238	-0,006	0,184	0,496	0,930	1,250
Sales Growth	7.254	0	0,240	0,083	1,426	-0,865	-0,641	-0,357	-0,042	0,261	1,018	2,712	35,246
COGS/Sales	7.254	0	0,078	0,023	0,142	0,000	0,000	0,000	0,006	0,071	0,398	0,714	0,775
WC/Sales	7.254	0	0,220	0,126	0,405	-0,997	-0,467	-0,158	0,006	0,327	0,870	2,038	3,071
FCF Proxy	7.254	0	0,027	0,038	0,360	-5,260	-1,254	-0,354	-0,043	0,137	0,435	0,895	1,302

2.2.3 THE ROBUSTNESS OF THE OPERATIONAL INNOVATION PROXY INDEX

In this appendix are reported the formulas of the 4 robustness of operational innovation indexes that support the complete one.

$$\overline{\text{Innovation Index Robustness}_{\text{SalesGrowth}}(i; s; t)} = \frac{Z(\text{Sales Growth})(i; s; t) + Z(\text{Gross Margin})(i; s; t) - Z(\text{NWC/Sales})(i; s; t) + Z(\text{OCF/Sales})(i; s; t)}{4}$$

$$\overline{\text{Innovation Index Robustness}_{\text{COGS/Sales}}(i; s; t)} = \frac{Z(\text{CAGR3Y})(i; s; t) + Z(\text{COGS/Sales})(i; s; t) - Z(\text{NWC/Sales})(i; s; t) + Z(\text{OCF/Sales})(i; s; t)}{4}$$

$$\overline{\text{Innovation Index Robustness}_{\text{WC/Sales}}(i; s; t)} = \frac{Z(\text{CAGR3Y})(i; s; t) + Z(\text{Gross Margin})(i; s; t) - Z(\text{WC/Sales})(i; s; t) + Z(\text{OCF/Sales})(i; s; t)}{4}$$

$$\overline{\text{Innovation Index Robustness}_{\text{FCF Proxy}}(i; s; t)} = \frac{Z(\text{CAGR3Y})(i; s; t) + Z(\text{Gross Margin})(i; s; t) - Z(\text{NWC/Sales})(i; s; t) + Z(\text{FCF Proxy})(i; s; t)}{4}$$

Diagnostic of the robustness of operational innovation proxy indexes

1) Business & Financial Services

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	30.591	0	3,7E-18	0,10	0,52	-5,28	-1,98	-0,76	-0,15	0,23	0,52	1,31	3,59
Sales Growth	30.591	0	-7,4E-18	0,08	0,52	-4,84	-1,96	-0,76	-0,16	0,22	0,57	1,35	3,80
COGS/Sales	30.591	0	4,6E-18	-0,04	0,54	-4,56	-2,07	-0,60	-0,18	0,21	0,76	1,43	3,47
WC/Sales	30.591	0	-1,1E-17	0,08	0,53	-4,77	-2,00	-0,76	-0,17	0,23	0,60	1,35	3,80
FCF Proxy	30.591	0	-1,1E-17	0,09	0,53	-5,12	-2,04	-0,75	-0,16	0,23	0,56	1,32	3,59

2) Consumer & Retail

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	37.404	0	1,2E-17	-0,05	0,51	-2,69	-1,21	-0,71	-0,29	0,24	0,91	1,58	3,44
Sales Growth	37.404	0	-1,2E-17	-0,08	0,53	-2,76	-1,16	-0,72	-0,32	0,26	0,97	1,71	3,62
COGS/Sales	37.404	0	-6,6E-18	0,03	0,51	-3,08	-1,36	-0,84	-0,29	0,30	0,73	1,39	3,39
WC/Sales	37.404	0	-3,8E-18	-0,08	0,54	-2,64	-1,18	-0,73	-0,32	0,25	0,98	1,75	3,96
FCF Proxy	37.404	0	-1,1E-17	-0,06	0,51	-2,54	-1,23	-0,72	-0,29	0,24	0,92	1,60	3,77

3) Energy & Utilities

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	10.404	0	8,9E-18	0,08	0,52	-5,09	-2,00	-0,55	-0,19	0,24	0,44	1,46	2,98
Sales Growth	10.404	0	-8,2E-18	0,08	0,52	-4,76	-1,93	-0,56	-0,20	0,24	0,48	1,55	3,26
COGS/Sales	10.404	0	-1,2E-17	-0,04	0,57	-4,54	-2,43	-0,57	-0,17	0,25	0,65	1,44	2,85
WC/Sales	10.404	0	-2,0E-18	0,08	0,53	-4,92	-2,06	-0,58	-0,20	0,24	0,53	1,43	3,26
FCF Proxy	10.404	0	-6,8E-19	0,08	0,53	-5,00	-2,06	-0,56	-0,19	0,24	0,49	1,35	2,99

4) HealthCare & Life Sciences

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	26.784	0	1,4E-17	0,08	0,53	-5,02	-1,86	-0,73	-0,25	0,28	0,62	1,25	2,97
Sales Growth	26.784	0	-1,1E-17	0,07	0,54	-4,87	-1,79	-0,77	-0,26	0,29	0,67	1,37	3,15
COGS/Sales	26.784	0	-1,6E-17	0,00	0,55	-4,77	-2,19	-0,65	-0,20	0,25	0,72	1,36	3,12
WC/Sales	26.784	0	-4,5E-18	0,06	0,55	-4,90	-1,83	-0,77	-0,26	0,28	0,71	1,44	3,32
FCF Proxy	26.784	0	-1,4E-17	0,07	0,54	-5,05	-1,93	-0,73	-0,25	0,28	0,65	1,36	3,13

5) Industrial & Manufacturing

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	43.911	0	-2,5E-17	-0,03	0,53	-2,92	-1,29	-0,80	-0,32	0,29	0,91	1,48	3,04
Sales Growth	43.911	0	2,9E-17	-0,03	0,54	-2,82	-1,26	-0,82	-0,34	0,30	0,93	1,55	3,43
COGS/Sales	43.911	0	6,8E-18	0,01	0,52	-3,02	-1,50	-0,82	-0,27	0,29	0,79	1,36	3,21
WC/Sales	43.911	0	2,9E-18	-0,03	0,55	-2,78	-1,30	-0,83	-0,34	0,30	0,94	1,58	3,68
FCF Proxy	43.911	0	1,8E-17	-0,03	0,53	-2,87	-1,30	-0,81	-0,32	0,29	0,91	1,52	3,61

6) Infrastructure & Real Assets

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	13.185	0	6,5E-18	0,05	0,52	-5,33	-2,10	-0,70	-0,12	0,24	0,45	1,32	2,88
Sales Growth	13.185	0	8,6E-18	0,04	0,53	-5,00	-2,20	-0,66	-0,13	0,25	0,46	1,37	3,66
COGS/Sales	13.185	0	-1,1E-18	0,00	0,58	-4,82	-2,47	-0,63	-0,17	0,21	0,74	1,54	3,05
WC/Sales	13.185	0	4,3E-18	0,06	0,54	-5,27	-2,27	-0,69	-0,13	0,25	0,52	1,25	2,58
FCF Proxy	13.185	0	4,3E-18	0,06	0,53	-5,27	-2,28	-0,68	-0,12	0,25	0,50	1,21	2,60

7) Technology & Digital

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	14.238	0	-3,5E-18	0,06	0,53	-4,91	-1,84	-0,72	-0,22	0,26	0,66	1,29	2,82
Sales Growth	14.238	0	1,9E-17	0,05	0,52	-4,64	-1,75	-0,75	-0,23	0,26	0,71	1,34	2,96
COGS/Sales	14.238	0	-6,0E-18	0,00	0,55	-4,57	-2,02	-0,71	-0,23	0,29	0,77	1,23	2,69
WC/Sales	14.238	0	1,8E-17	0,05	0,53	-4,70	-1,77	-0,75	-0,24	0,27	0,71	1,28	3,07
FCF Proxy	14.238	0	2,0E-17	0,06	0,53	-5,05	-1,92	-0,73	-0,23	0,27	0,67	1,23	3,02

8) Other Services

Variable	N	missing	mean	median	std	min	p01	p05	p25	p75	p95	p99	max
Robustness tot.	7.254	0	5,9E-18	0,07	0,53	-3,54	-1,84	-0,96	-0,18	0,25	0,69	1,42	3,14
Sales Growth	7.254	0	0,0E+00	0,05	0,53	-3,12	-1,79	-0,96	-0,19	0,25	0,72	1,46	3,20
COGS/Sales	7.254	0	-9,8E-19	-0,03	0,53	-3,10	-1,63	-0,75	-0,24	0,22	0,88	1,53	3,04
WC/Sales	7.254	0	-5,9E-18	0,05	0,54	-3,50	-1,81	-0,96	-0,19	0,25	0,75	1,38	3,15
FCF Proxy	7.254	0	-2,0E-18	0,07	0,54	-3,91	-1,86	-0,97	-0,17	0,25	0,71	1,32	3,09

2.4 THE ROBUSTNESS REGRESSION OUTPUT

The four component-specific robustness checks confirm the pattern illustrated in the baseline regression and in the robustness one. When CAGR3Y is replaced by Sales Growth, the PE Dummy coefficient is 0,0413 and statistically significant at the 1% level. When Gross Margin is replaced by COGS/Sales, the coefficient is 0,0427 and remains significant at the 1% level. When NWC/Sales is replaced by WC/Sales, the coefficient is 0,0441, almost identical to the baseline estimate. Finally, when OCF/Sales is replaced by the FCF Proxy, the coefficient decreases to 0,0287 but remains positive and statistically significant at the 1% level.

Robustness Indexes	Variable	Coefficient	Clustered SE	t-statistic	p-value	Significance	N obs	N firms	R-squared	Adj. R-squared
Sales Growth	PE Dummy	0,0413	0,0089	4,6243	3,78E-06	p<0,01	180.378	20.042	0,0053	0,0049
Sales Growth	CEO Age	-0,0021	0,0002	-9,2804	0,00E+00	p<0,01	180.378	20.042	0,0053	0,0049
Sales Growth	log(Employees)	0,0161	0,0022	7,1881	6,80E-13	p<0,01	180.378	20.042	0,0053	0,0049
Cogs/Sales	PE Dummy	0,0427	0,0088	4,8726	1,11E-06	p<0,01	180.378	20.042	0,0118	0,0114
Cogs/Sales	CEO Age	-0,0031	0,0002	-13,7658	0,00E+00	p<0,01	180.378	20.042	0,0118	0,0114
Cogs/Sales	log(Employees)	-0,0288	0,0024	-11,8287	0,00E+00	p<0,01	180.378	20.042	0,0118	0,0114
WC/Sales	PE Dummy	0,0441	0,0093	4,7571	1,98E-06	p<0,01	180.378	20.042	0,0078	0,0074
WC/Sales	CEO Age	-0,0030	0,0002	-12,5136	0,00E+00	p<0,01	180.378	20.042	0,0078	0,0074
WC/Sales	log(Employees)	0,0172	0,0023	7,3599	1,91E-13	p<0,01	180.378	20.042	0,0078	0,0074
FCF proxy	PE Dummy	0,0287	0,0088	3,2616	1,11E-03	p<0,01	180.378	20.042	0,0073	0,0069
FCF proxy	CEO Age	-0,0030	0,0002	-13,5240	0,00E+00	p<0,01	180.378	20.042	0,0073	0,0069
FCF proxy	log(Employees)	0,0153	0,0023	6,6456	3,10E-11	p<0,01	180.378	20.042	0,0073	0,0069

2.4.1 CORRELATION BETWEEN THE OPERATIONAL INNOVATION PROXY INDEXES

Here is presented the descriptive statistics for the baseline and robustness operational innovation indexes by PE backed status. It's clear that the outputs suggest that PE backed and non-PE backed firms differ in their operational innovation proxy outcomes before introducing regression controls and macro-sector-year fixed effects. However, these differences are unconditional and should not be interpreted as regression-adjusted effects. Overall, the results show that PE backed firms exhibit higher operational innovation proxy scores across all dependent variables.

Model	PE Dummy	N obs	N firms	Mean	Median	SD	Min	P25	P75	Max
Baseline Innovation Index	0	159.543	17.727	-0,008	0,014	0,530	-5,288	-0,273	0,251	3,957
Baseline Innovation Index	1	20.835	2.315	0,056	0,069	0,544	-4,899	-0,238	0,307	3,703

Rob. Innovation Index	0	159.543	17.727	-0,004	0,026	0,514	-5,330	-0,250	0,247	3,587
Rob. Innovation Index	1	20.835	2.315	0,035	0,064	0,520	-5,094	-0,240	0,275	3,358
Rob. - Sales Growth	0	159.543	17.727	-0,007	0,015	0,524	-5,004	-0,270	0,250	3,798
Rob. - Sales Growth	1	20.835	2.315	0,050	0,068	0,536	-4,871	-0,239	0,297	3,498
Rob. - COGS/Sales	0	159.543	17.727	0,000	-0,005	0,527	-4,817	-0,220	0,260	3,465
Rob. - COGS/Sales	1	20.835	2.315	0,033	0,031	0,521	-4,567	-0,190	0,321	3,212
Rob. - WC/Sales	0	159.543	17.727	-0,008	0,015	0,530	-5,268	-0,273	0,251	3,957
Rob. - WC/Sales	1	20.835	2.315	0,056	0,069	0,544	-4,898	-0,238	0,307	3,703
Rob. - FCF Proxy	0	159.543	17.727	-0,005	0,025	0,520	-5,271	-0,254	0,248	3,775
Rob. - FCF Proxy	1	20.835	2.315	0,043	0,067	0,529	-5,049	-0,238	0,288	3,359

REFERENCES

CHAPTER 1 - THE PRIVATE CAPITAL INVESTMENTS AND INNOVATION

- AIFI. (2024). *Private Capital e sostenibilità: prassi di mercato, evoluzioni attese*. Associazione Italiana del Private Equity, Venture Capital e Private Debt.
<https://aifi.it/visualizzaallegatodocumenti.aspx?chiave=O4HRMiOt4l28l8lKb3l f6L436oa480>
- AIFI, BIP. (2025). *Private Equity e creazione di valore*. Associazione Italiana del Private Equity, Venture Capital e Private Debt; BIP Corporate Finance & Strategy.
<https://aifi.it/it/tutti-gli-eventi/presentazione-del-libro-private-equity-e-creazione-di-valore>
- AIFI, Equita, & Mindful Capital Partners. (2025). *Private equity: un'industria in evoluzione*. Associazione Italiana del Private Equity, Venture Capital e Private Debt; Equita Mid Cap Advisory; Mindful Capital Partners.
<https://aifi.it/it/tutti-gli-eventi/private-equity-unindustria-in-evoluzione>
- AIFI, Fondo Italiano d'Investimento, & LIUC. (2024). *Private Equity e Aziende Familiari*. Associazione Italiana del Private Equity, Venture Capital e Private Debt; Fondo Italiano d'Investimento; LIUC.
<https://www.liuc.it/wp-content/uploads/Report-definitivo-PE-e-AF.pdf>
- AIFI, Gatti Pavesi Bianchi Ludovici. (2025). *Internazionalizzarsi per crescere: il ruolo del Private Equity a supporto delle imprese italiane*. Associazione Italiana del Private Equity, Venture Capital e Private Debt.
<https://aifi.it/it/tutti-gli-eventi/internazionalizzarsi-per-crescere-il-ruolo-del-private-equity-a-supporto-delle-imprese-italiane>
- AIFI, LIUC, & Mediobanca Area Studi. (2025). *Private Equity e Mid Cap: vent'anni di storia*. LIUC; AIFI; Mediobanca.
<https://www.areastudimediobanca.com/it/product/private-equity-e-mid-cap-ventanni-di-storia>
- AIFI, PwC. (2025). *Il mercato italiano 2024 del Private Equity e Venture Capital*. Associazione Italiana del Private Equity, Venture Capital e Private Debt; PwC.
<https://alumni.pwc.it/news/private-equity-e-venture-capital-in-italia-nel-2024-investimenti-e-raccolta-in-forte-crescita>
- Amess, K., Stiebale, J., & Wright, M. (2016). The impact of private equity on firms' patenting activity. *European Economic Review*, 86, 147–160.

<https://core.ac.uk/download/pdf/162658927.pdf>

Bain & Company. (2026). *Global Private Equity Report 2026*. Bain & Company.
<https://www.bain.com/insights/topics/global-private-equity-report/>

Bank of Italy. (2015, as amended). *Regulation on Collective Asset Management*. Banca d'Italia.
<https://www.bancaditalia.it/compiti/vigilanza/normativa/archivio-norme/regolamenti/20120508/index.html>

Bernstein, S. (2022). The effects of public and private equity markets on firm behavior. *Annual Review of Financial Economics*, 14, 295–318.
<https://www.hbs.edu/faculty/Pages/item.aspx?num=63927>

BlackRock. (2026). *Private Markets Outlook 2026: A New Continuum*. BlackRock.
<https://www.blackrock.com/institutions/en-global/institutional-insights/thought-leadership/private-markets-outlook>

Carta. (2025). *What is carried interest? Definition, taxation & fee structures*. Carta.
<https://carta.com/uk/en/learn/private-funds/management/carried-interest/>

Cumming, D. J., & Johan, S. A. (2013). *Venture Capital and Private Equity Contracting: An International Perspective* (2nd ed.). Elsevier / Academic Press.
https://books.google.com/books/about/Venture_Capital_and_Private_Equity_Contr.html?id=EXWMHie6IxsC

Damodaran, A. (2012). *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset* (3rd ed.). John Wiley & Sons.
https://pages.stern.nyu.edu/~adamodar/New_Home_Page/Inv3ed.htm

Deloitte Private. (2025). *Italy Private Equity Confidence Survey: S1 2025*. Deloitte.
<https://www.deloitte.com/it/it/services/deloitte-private/research/italy-private-equity-survey-2025-1-semester.html>

European Parliament and Council of the European Union. (2011). *Directive 2011/61/EU on Alternative Investment Fund Managers*. Official Journal of the European Union.
<https://eur-lex.europa.eu/eli/dir/2011/61/oj/eng>

Gompers, P. A., Kaplan, S. N., & Mukharlyamov, V. (2016). What do private equity firms say they do? *Journal of Financial Economics*, 121(3), 449–476.
<https://www.nber.org/papers/w21133>

International Limited Partners Association. (2019). *ILPA Principles 3.0: Fostering Transparency, Governance and Alignment of Interests for General and Limited Partners*. ILPA.

<https://ilpa.org/resources-tools/resource-library/ilpa-principles-3-0-english/>

Invest Europe. (2022). *Invest Europe Professional Standards Handbook*. Invest Europe.
<https://www.investeurope.eu/>

Invest Europe. (2024). *Investing in Europe: Private Equity Activity 2023*. Invest Europe.
<https://www.investeurope.eu/publications-policy/publications/2024/investing-in-europe-private-equity-activity-2023/>

Invest Europe. (2025). *Investing in Europe: Private Equity Activity 2024*. Invest Europe.
<https://www.investeurope.eu/publications-policy/publications/2025/investing-in-europe-private-equity-activity-2024/>

Kaplan, S. N., & Schoar, A. (2005). Private equity performance: Returns, persistence, and capital flows. *The Journal of Finance*, 60(4), 1791–1823.
<https://web.mit.edu/aschoar/www/KaplanSchoar2005.pdf>

Kaplan, S. N., & Strömberg, P. (2009). Leveraged buyouts and private equity. *Journal of Economic Perspectives*, 23(1), 121–146.
<https://www.aeaweb.org/articles?id=10.1257/jep.23.1.121>

KPMG. (2026). *Pulse of Private Equity: Q4 '25 Global*. KPMG International.
<https://assets.kpmg.com/content/dam/kpmgsites/xx/pdf/2026/01/pulse-of-private-equity-q4-25.pdf>

Lerner, J., Sorensen, M., & Strömberg, P. (2011). Private equity and long-run investment: The case of innovation. *The Journal of Finance*, 66(2), 445–477.
<https://www.nber.org/papers/w14623>

Maas, C., Steinhagen, P., Proksch, D., & Pinkwart, A. (2020). The role of innovation in venture capital and private equity investments in different investment phases. *Venture Capital*, 22(1), 105–126.
<https://ideas.repec.org/a/taf/veec/v22y2020i1p105-126.html>

McKinsey & Company. (2026). *Global Private Markets Report 2026: Private Equity — Clearer View, Tougher Terrain*. McKinsey & Company.
<https://www.mckinsey.com/~media/mckinsey/industries/private%20equity%20and%20princ>

[ipal%20investors/our%20insights/mckinseys%20global%20private%20markets%20report/2026/private%20equity/gpmr2026-private-equity-clearer-view-tougher-terrain_final_v10.pdf](https://www.mckinsey.com/~/media/mckinsey/our%20investors/our%20insights/mckinseys%20global%20private%20markets%20report/2026/private%20equity/gpmr2026-private-equity-clearer-view-tougher-terrain_final_v10.pdf)

Metrick, A., & Yasuda, A. (2010). The economics of private equity funds. *The Review of Financial Studies*, 23(6), 2303–2341.

<https://academic.oup.com/rfs/article-abstract/23/6/2303/1569783>

OECD/Eurostat. (2005). *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (3rd ed.). OECD Publishing.

https://www.oecd.org/en/publications/oslo-manual_9789264013100-en.html

OECD/Eurostat. (2018). *Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation* (4th ed.). OECD Publishing.

https://www.oecd.org/en/publications/oslo-manual-2018_9789264304604-en.html

Popov, A., & Roosenboom, P. (2012). Venture capital and patented innovation: Evidence from Europe. *Economic Policy*, 27(71), 447–482.

<https://academic.oup.com/economicpolicy/article-abstract/27/71/447/1786176>

Preqin. (2025). *Private Markets in 2030*. Preqin.

<https://www.preqin.com/about/press-release/preqin-releases-private-markets-in-2030-report>

PwC. (2024). *The Economic Impact of Private Equity and Venture Capital in Italy*. PwC Italy.

<https://www.pwc.com/it/it/publications/assets/docs/pwc-economic-impact-25.pdf>

Rosenbaum, J., & Pearl, J. (2022). *Investment Banking: Valuation, LBOs, M&A, and IPOs* (3rd ed.). John Wiley & Sons.

<https://www.wiley.com/en->

[gb/Investment%2BBanking%3A%2BValuation%2C%2BLBOs%2C%2BM%26A%2C%2Band%2BIPOs%2C%2B3rd%2BEdition-p-9781119706588](https://www.wiley.com/en-gb/Investment%2BBanking%3A%2BValuation%2C%2BLBOs%2C%2BM%26A%2C%2Band%2BIPOs%2C%2B3rd%2BEdition-p-9781119706588)

Stanford Graduate School of Business. (n.d.). *Search Funds*. Center for Entrepreneurial Studies, Stanford Graduate School of Business.

<https://www.gsb.stanford.edu/experience/about/centers-institutes/ces/research/search-funds>

Ughetto, E. (2010). Assessing the contribution to innovation of private equity investors: A study on European buyouts. *Research Policy*, 39(1), 126–140.

<https://doi.org/10.1016/j.respol.2009.11.009>

CHAPTER 2 - THE ECONOMETRIC ANALYSIS

LUISS Guido Carli Library. (n.d.). *AIDA: Italian company data*. LUISS Library. Retrieved June 4, 2026, from <https://biblioteca.luiss.it/en/resources/aida-italian-company-data>

Moody's. (n.d.). *AIDA: Orbis for Italy*. Moody's. Retrieved June 4, 2026, from <https://www.moody's.com/web/en/us/capabilities/company-reference-data/orbis/aida-orbis-for-italy.html>

Alonzi, F., & Viviano, C. (2026). The new Italian classification of economic activities ATECO 2025: A focus on individual entrepreneurs. *Rivista Italiana di Economia Demografia e Statistica*, LXXX(2), 451–462. <https://www.rieds-journal.org/rieds/article/download/494/455/4367>

Le Nadant, A.-L., Perdreau, F., & Bruining, H. (2018). Industry specialization of private equity firms: A source of buy-out performance heterogeneity. *Venture Capital*, 20(3), 237–259. <https://doi.org/10.1080/13691066.2018.1459788>

Novy-Marx, R. (2011). Operating leverage. *Review of Finance*, 15(1), 103–134. <https://doi.org/10.1093/rof/rfq019>

Agresti, A. (2013). *Categorical data analysis* (3rd ed.). John Wiley & Sons. <https://onlinelibrary.wiley.com/doi/book/10.1002/9781118710944>

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). MIT Press. <https://mitpress.mit.edu/9780262232197/econometric-analysis-of-cross-section-and-panel-data/>

Cohn, J., & Song, C. (2025). Operating improvements in private equity buyouts. In D. J. Cumming & B. Hammer (Eds.), *The Palgrave Encyclopedia of Private Equity*. Palgrave Macmillan. https://doi.org/10.1007/978-3-031-81653-6_24

OECD/Eurostat. (2018). *Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation* (4th ed.). OECD Publishing/Eurostat. <https://doi.org/10.1787/9789264304604-en>

Griliches, Z. (1990). *Patent statistics as economic indicators: A survey* (NBER Working Paper No. 3301). National Bureau of Economic Research. <https://doi.org/10.3386/w3301>

OECD/Eurostat. (2005). *Oslo Manual: Guidelines for collecting and interpreting innovation data* (3rd ed.). OECD Publishing. <https://doi.org/10.1787/9789264013100-en>

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal*

Statistical Society: Series A, 120(3), 253–290. <https://doi.org/10.2307/2343100>

Lund, M., & Nielsen, C. (2018). The concept of business model scalability. *Journal of Business Models*, 6(1), 1–18. <https://doi.org/10.5278/ojs.jbm.v6i1.2235>

Corporate Finance Institute. (n.d.). *CAGR: Compound annual growth rate*. Corporate Finance Institute. Retrieved June 4, 2026, from <https://corporatefinanceinstitute.com/resources/valuation/what-is-cagr/>

Corporate Finance Institute. (n.d.). *Gross margin ratio*. Corporate Finance Institute. Retrieved June 4, 2026, from <https://corporatefinanceinstitute.com/resources/accounting/gross-margin-ratio/>

Zimon, G. (2021). Working capital. *Encyclopedia*, 1(3), 764–772. <https://doi.org/10.3390/encyclopedia1030058>

IFRS Foundation. (2021). *IAS 7 Statement of Cash Flows*. IFRS Foundation. <https://www.ifrs.org/content/dam/ifrs/publications/pdf-standards/english/2021/issued/part-a/ias-7-statement-of-cash-flows.pdf>

National Institute of Standards and Technology. (n.d.). *NIST/SEMATECH e-Handbook of Statistical Methods: Exploratory data analysis*. NIST. Retrieved June 4, 2026, from <https://www.nist.gov/publications/nistsematech-e-handbook-statistical-methods-chapter-1-exploratory-data-analysis>

National Institute of Standards and Technology. (n.d.). *Winsorize*. NIST/SEMATECH e-Handbook of Statistical Methods. Retrieved June 4, 2026, from <https://www.itl.nist.gov/div898/software/dataplot/refman2/auxillar/winsor.htm>

Wooldridge, J. M. (2020). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.

Lu, X., & White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of Econometrics*, 178(1), 194–206. <https://doi.org/10.1016/j.jeconom.2013.08.016>

OpenStax. (n.d.). *Principles of finance: Operating cash flow and free cash flow to the firm*. OpenStax. Retrieved June 4, 2026, from <https://openstax.org/books/principles-finance/pages/5-6-operating-cash-flow-and-free-cash-flow-to-the-firm-fcff>

Angrist, J. D., & Pischke, J.-S. (2014). *Mastering 'metrics: The path from cause to effect*. Princeton University Press.

Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, 50(2), 317–372. <https://doi.org/10.3368/jhr.50.2.317>

Kutner, M. H., Nachtsheim, C. J., & Neter, J. (2004). *Applied linear regression models* (4th ed.). McGraw-Hill/Irwin.

CHAPTER 3 - THE SEARCH FUND MODEL AND ITS IMPACT ON THE ITALIAN SMEs ENVIRONMENT

AIPB & EY. (2025). *Private Banking e imprese: Un dialogo che crea valore*. <https://www.aipb.it/it/ricerche/private-banking-e-imprese-un-dialogo-che-crea-valore>

AIPB & Prometeia. (2025). *Rapporto sul Private Banking in Italia 2025*. <https://www.aipb.it/it/ricerche/rapporto-sul-private-banking-italia-2025>

AIPB & Prometeia. (2025). *Analisi e prospettive del Private Banking sul territorio italiano 2025*. <https://www.aipb.it/it/ricerche/analisi-e-prospettive-del-private-banking-sul-territorio-italiano-2025>

Goel, N., Wyma, N., Wexler, R., O'Connor, B., & Wasserstein, A. J. (2023). *Exploring Search Fund Entrepreneur Economics*. <https://som.yale.edu/sites/default/files/2025-04/Exploring%20Search%20Fund%20Entrepreneur%20Economics.pdf>

Hoffmann, A., Kanbach, D. K., & Stubner, S. (2023). *Entrepreneurship through acquisition: A scoping review*. <https://doi.org/10.1007/s11301-023-00352-6>

Intermonte SIM, Politecnico di Milano, & AIPB. (2025). *Economia reale e Private Banking: cosa è cambiato in Italia negli ultimi anni*. https://www.intermonte.it/static/upload/qua/quaderno-2025_economia-reale-e-private-banking.pdf

Kowalewski, A.-S., Kelly, P., Simon, J., & Johnson, R. (2024). *International Search Funds—2024: Selected Observations*. <https://www.iese.edu/media/research/pdfs/ST-0658-E>

Lazier, D., Thomas, J., & Wasserstein, A. J. (2026). *A Mathematical Analysis of Value-Creation Attribution in Search Fund Projects*.

<https://som.yale.edu/sites/default/files/2026-01/AMathematicalAnalysisofValue-CreationAttributioninSearchFundProjects.pdf>

Rangone, A., Giudici, G., Guida, P., Peroncini, S., & Moiana, D. (2026). *The Take-off of the Italian Search Fund Ecosystem: Research Report, Full Year 2025*.

<https://www.osservatori.net/progetto/italian-search-fund-observatory/>

Rangone, A., Giudici, G., Guida, P., Peroncini, S., Moiana, D., & Mazzoli, M. (2025). *The Take-off of the Italian Search Fund Ecosystem: 2025 Research Report*.

<https://www.osservatori.net/progetto/italian-search-fund-observatory/>

Stanford Graduate School of Business. (2026). *A Primer on Search Funds*.
<https://www.gsb.stanford.edu/experience/about/centers-institutes/ces/research/search-funds/primer>

Kelly, P., & Heston, S. (2024). *2024 Search Fund Study: Research Overview*.
<https://www.gsb.stanford.edu/faculty-research/case-studies/2024-search-fund-study>

Valenti, F. (2026). *ELITE – Borsa Italiana: Un ecosistema a supporto delle PMI*.

Vernizzi, M. (2026). *Il Search Fund: un possibile strumento per il rilancio delle PMI. Profili legali del Search Fund in Italia*.

CHARTS AND TABLES

Chart 1.1: The distribution of type of LPs in Europe all PE fundraising 2024 (sample: 817 funds)

Chart 1.2: LPs' original countries 2024 in Europe (sample: 817 funds)

Chart 1.3: Italian PE categories distribution in 2024 (sample: 256 investments)

Chart 1.4: European 2024 buyout investments by deal size

Chart 1.5: Risk-return chart of the different Private Equity strategies

Chart 2.1: The Merged clean Dataset with PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors

Chart 2.2: The stability of the PE Dummy coefficient across the different model specifications

Chart 3.1: The international Searches back-ground (2022-2023)

Chart 3.2: The average Italian SF funnel selection

Chart 3.3: The debt structure on Italian SF acquisitions

Chart 3.4: The risk and expected IRR position of the Search Fund transactions

Chart 3.5: Italian Private Wealth allocation (2024)

Chart 3.6: Italian geographical distribution of affluent family wealth (2025)

Table 1.1: European distribution of the target companies

Table 1.2: European 2024 exit routes

Table 2.1: Private Equity backed companies and their distribution into the 8 macro-sectors

Table 2.2: Non-Private Equity backed companies and their distribution into the 8 macro-sectors

Table 2.3: Merged PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors

Table 2.4: The Merged clean Dataset with PE backed companies and non-Private Equity backed companies and their distribution into the 8 macro-sectors

Table 2.5: The outputs of the operational Innovation Proxy Index per macro-sector

Table 2.6: The baseline operational Innovation Proxy Index components and the Robustness Innovation Index components

Table 2.7: The outputs of the Robustness of operational Innovation Proxy Index per macro-sector

Table 2.8: The diagnostic of the CEO Age variable

Table 2.9: The diagnostic of the Employees variable

Table 2.10: The regression sample

Table 2.11: The baseline regression output

Table 2.12: The robustness regression output

Table 2.13: The correlation between all the innovation indexes