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VC Specialization and Investment Behaviour in the European Space Economy

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Abstract

This thesis examines the investment behaviours and specialization patterns of venture capital (VC) actors allocating resources within the European New Space economy. Addressing the research question of how VC firms invest and specialize in this rapidly expanding sector, the study is structured in two parts. The first provides a general analysis of investment dynamics across the European space ecosystem, while the second focuses specifically on the characterization and implications of financial specialization. To investigate these dimensions, the research defines a set of key variables capturing both investment activity and sectoral focus, and analyses them through descriptive statistics and correlation models. The findings reveal notable relationships between the specialization index and several investment dimensions, suggesting that higher specialization is associated with distinct strategic behaviours within the European New Space market. These results contribute to a deeper understanding of how financial specialization shapes investment strategies in emerging high-technology sectors, and offer insights into the evolving structure and competitiveness of Europe's space innovation landscape.

1 Introduction

This study investigates the behaviour of VC firms operating within the European space economy. The space economy has been increasingly recognised as a key opportunity for future generations, with significant potential economic impacts (Whealan George 2019). The rapid decline in launch costs is reducing barriers to entry and lowering trade frictions to space, transforming it from a domain of scientific exploration into a genuine commercial marketplace. As access to space continues to improve throughout the 2020s and 2030s, Europe stands to capture new sources of value within an economy projected to reach USD 1.8 trillion by 2035 (World Economic Forum 2024; OECD 2023). The strategic role of venture capital (VC) as a catalyst for innovation and structural growth has been well established across multiple studies (Madan and Halkias 2020; Kortum and Lerner 2000; Porter 1998). Nonetheless, substantial systemic differences persist between the U.S. and European VC ecosystems, which have been the subject of extensive academic investigation (Hege and Palomino 2009). Despite this, researches explicitly addressing venture capital financing within the European space sector remains limited, leaving a number of conceptual and empirical gaps. Moreover, previous work has demonstrated that industry specialization among VC firms is positively correlated with fund performance and long-term success (P. Gompers, Kovner, and Lerner 2009). However, applications of this framework to the space industry are still scarce. This study aims to address these gaps by analysing the specialization patterns and investment behaviours of VC firms engaged in the European space economy. Section 2 presents an overview of the main characteristics of the space economy and a synthesis of the existing literature. Section 3 details the data sources and methodological framework. Section 4 provides an in-depth empirical analysis and the characterization of space VC investors, with the related specialization investigation. In section 5 and 6 results will be interpreted and discussed, also presenting future research directions.

2 Literature review

Outline

This chapter provides an overview of the current state of the Space Economy. To fully grasp its present configuration, it is first necessary to recall the key historical developments that have shaped its evolution. Accordingly, Section 2.1 presents a historical introduction, followed by an examination of the main trends, data, and economic impacts associated with the sector, together with a discussion of its principal risks and challenges. Section 2.2 offers a comprehensive overview of the core segments of the Space Economy, distinguishing among the primary types of activities and their respective positions within the broader value chain. Subsequently, Section 2.3 focuses on the importance of venture capital dynamics within the New Space domain, analysing major trends, structural drivers, and emerging phenomena, while section 2.4 a dedicated section will deepen the dimension of specialization within the venture capital ecosystem. Finally, a dedicated section addresses the motivation and rationale of this study, grounding its objectives in the existing academic literature, and providing a conceptual framework that justifies the relevance and analytical direction of the research.

2.1 The evolution of the space economy

Since the launch of Sputnik I in 1957, space exploration has emerged as a powerful catalyst for scientific innovation, representing one of the highest expressions of human ingenuity. Initially spurred by geopolitical rivalry, the pursuit of space quickly evolved into a cornerstone of global infrastructure. Today, space technologies underpin a wide range of essential services, including satellite navigation, global telecommunications, meteorology, and Earth observation systems.

To understand the contemporary space economy, it is crucial to begin with a comprehensive review of its historical evolution. The development of this sector can be delineated into three major phases: government-driven, industry-driven, and entrepreneur-driven (Punnala et al. 2024).

The first phase was dominated entirely by national governments and their institutional space agencies, most notably NASA and the Soviet space program. During this era, space activities were tightly controlled and centralized, with the state overseeing nearly all aspects of mission planning, development, and execution. The primary objectives were geopolitical: achieving national prestige, asserting technological supremacy, and establishing international dominance. The symbolic embodiment of this phase was the Cold War-era Space Race between the United

States and the Soviet Union, which not only spurred monumental advancements but also laid the foundation for international space law.

The second phase marked a gradual shift towards the inclusion of private industry, although the state remained the central actor. Government agencies provided sustained public funding and policy support, which enabled the expansion of space activities into new commercial and scientific domains. Public-private partnerships became increasingly common, with private aerospace firms acting as contractors or collaborators on government-led missions. Despite the persistent dominance of state institutions, this period laid the groundwork for a more diverse and robust space economy (Punnala et al. 2024; Emen 2020).

The most recent phase has witnessed a dramatic rise in private entrepreneurial activity, commonly referred to as the *New Space* era. Characterized by the entry of non-traditional actors and the proliferation of disruptive business models, this phase represents a paradigm shift from state monopoly to competitive commercialization. Entrepreneurs and private firms now play a leading role in driving innovation, reducing launch costs, and introducing novel applications, from reusable rockets to satellite constellations and space tourism. This transition has fundamentally altered the landscape of space exploration, blurring the lines between public and private, and paving the way for a new era of global space entrepreneurship.

The *New Space* era

The emergence of the so-called New Space movement, alternatively referred to as "start-up space," "entrepreneurial space," or "Space 4.0", marks a pivotal shift in the structure and logic of the global space economy. Coined in the early 2000s, the term serves to distinguish a new generation of commercially driven actors and activities from the traditional, state-dominated model that prevailed throughout the 20th century (OECD 2023).

In contrast to Old Space, which was primarily defined by long-term, publicly funded programs executed through defense-oriented aerospace contractors, New Space is shaped by market competition, private capital, and entrepreneurial innovation. Historically, traditional space actors operated in close partnership with government agencies on multi-year projects underpinned by state procurement and R&D. Their structure was hierarchical and often slow-moving, prioritizing security, technological sovereignty, and geopolitical objectives over commercial viability.

New Space actors, by comparison, tend to operate under different incentives and business models. Their operations are financed predominantly through private investment rather than public subsidies, and they often leverage lean production techniques and scalable digital platforms. (European Space Policy Institute (ESPI) 2025) This transformation has enabled the commercialization of technologies that blend digital innovation with space capabilities, such as miniaturized satellites and real-time Earth observation platforms, making them viable at lower cost and on shorter development cycles. (OECD 2019)

The New Space era has been driven by several converging technological breakthroughs. Chief among these are the significant reductions in launch costs, particularly for payloads destined for Low Earth Orbit (LEO), and the miniaturization of satellite systems, which has made the deployment of satellite constellations economically feasible for private actors. These developments have been complemented by rapid progress in data storage, onboard processing, and cloud-based analytics, which have radically enhanced the utility and commercial value of satellite services (OECD 2019).

The result has been a sharp rise in the number and diversity of satellite missions. Since 2012, there has been exponential growth in the volume of payloads delivered to orbit, particularly in the form of micro- and nanosatellites (see Figure 1). Commercial entities now dominate satellite deployment, especially in LEO, where they are responsible for approximately 80% of operational satellites, and in geostationary orbit (GEO), where their share approaches 60%. The proliferation of large-scale constellations, such as those planned or launched by SpaceX, OneWeb, and Amazon, epitomizes this shift.

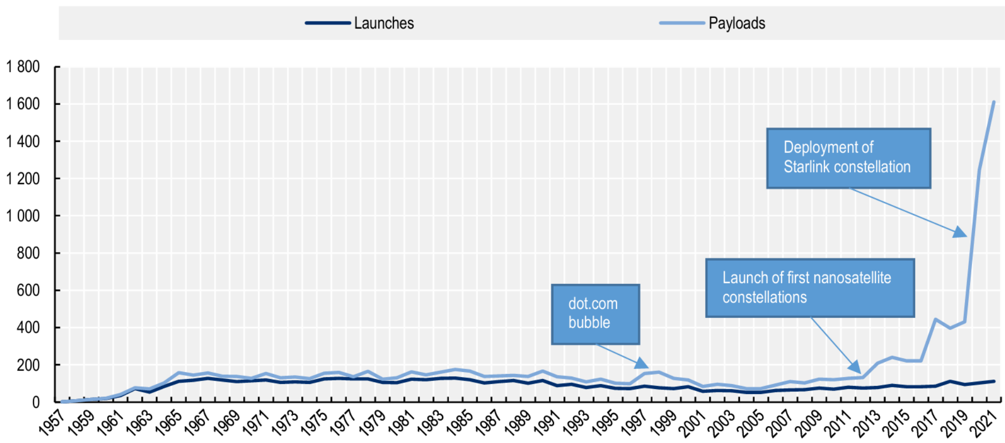

Figure 1: Launches and payloads time series Source: OECD (2023)

Payloads refer to space objects designed to perform specific functions in space, excluding launch functionality.

The economic effect of the space sector

Beyond technological advances, the New Space economy has begun to generate significant macroeconomic effects. Input-output analyses have been used to assess the broader implications of increased investment in Commercial Space Industries (CSI). For instance, Whealan George (2019) developed a model showing that a 7% year-on-year increase in final demand from CSI sectors correlates with a 0.02% rise in total U.S. employment. More strikingly, average labor income in the CSI sector was found to be $102,000. approximately 73% higher than the national average of $58,500 (as of 2016).

The study also revealed that the economic benefits of space investment extend far beyond the immediate sector. Employment growth was observed not only within space-related industries but also across a wide range of downstream sectors, including real estate, hospitality, wholesale trade, healthcare, and corporate management. These spillovers demonstrate the broader embeddedness of space activity in the general economy. (Whealan George 2019)

Further macroeconomic metrics reinforce this argument. According to data from the OECD (2023) and PwC Space Practise (2024) studies, investments in space technologies generate multiplier effects across several dimensions. The "spillover factor", which measures the ratio between revenues generated by secondary applications and the initial funding, ranges between 1.8 and 3.2. Moreover, every €1 million invested in the space industry is estimated to support around 12 full-time jobs annually. The impact on GDP is also substantial, with each unit of spending contributing between 1.4 and 2.2 units of gross value added. In the case of space asset exploitation, this multiplier effect may reach as high as 4 to 8 times the initial investment. This phenomenon is further supported by the findings of Corrado et al. (2023), who measure key economic indicators related to the space sector and define a spillover coefficient over time. Their analysis reveals that the period between 1960 and 1980 historically exhibited the highest spillover effects. Nevertheless, the authors emphasize that even in more recent periods, when the spillover coefficient appears lower, the potential economic impact of space-related activities remains significant.

These indicators underscore not only the high productivity and income-generating potential of New Space but also its ability to catalyze economic activity well beyond its immediate domain. One of the most significant implications of this transformation is the so-called "democratisation" of space. As access to space becomes more affordable, a wider array of actors, including universities, research centres, and start-ups, can participate in space-based research, innovation, and commercial exploitation. This broadens the range of stakeholders and introduces a more diverse and resilient innovation ecosystem.

Concerns and risks

Despite these advances, the expansion of the New Space economy is accompanied by significant risks and systemic vulnerabilities. Chief among these is the issue of environmental sustainability in orbit. The exponential increase in satellite deployments, especially in the form of densely populated constellations, raises critical concerns regarding space debris and the long-term viability of orbital pathways. (PwC Space Practise 2024)

The potential for catastrophic collisions is heightened by the absence of universal standards for debris mitigation and satellite end-of-life management (OECD 2023). As illustrated in Figure 2, three major spikes in space debris, resulting from anti-satellite tests and accidental collisions—have already demonstrated the fragility of the orbital environment.

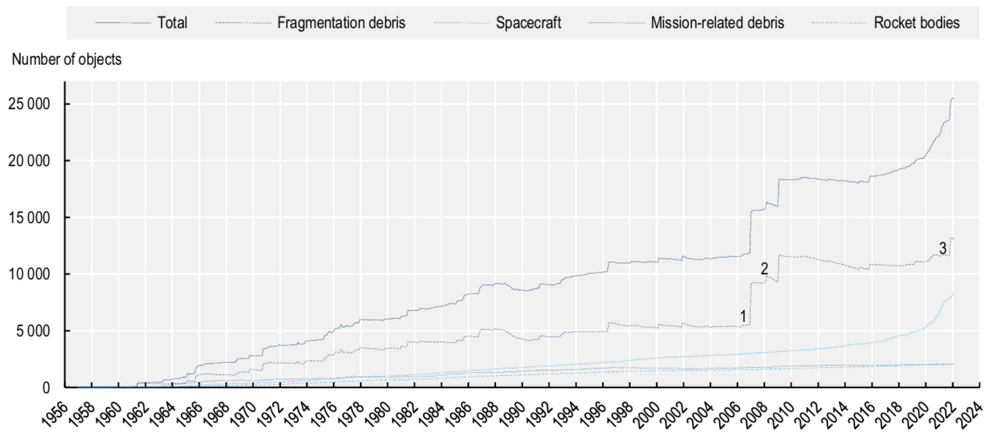

Figure 2: In orbit space debris overtime Source: (OECD 2023)

The three upward jumps in fragmentation debris correspond to: (1) the anti-satellite test conducted by the People's Republic of China in 2007; (2) the accidental collision between Iridium 33 and Cosmos 2251 in 2009; and (3) the anti-satellite test conducted by the Russian Federation in November 2021.

Another source of vulnerability in the New Space sector lies in its industrial structure. Many actors, especially start-ups and small and medium enterprises (SMEs), exhibit a high degree of specialization but low production volumes. While this enables agility and niche innovation, it also exposes them to economic shocks, funding volatility, and supply chain disruptions. The resulting fragmentation creates a fragile value chain, in which failures or delays at one node can propagate across the sector.(OECD 2023)

These challenges are further compounded by growing geopolitical instability. Strategic competition between spacefaring nations, trade tensions, and military conflicts increasingly shape the risk landscape for space ventures. While geopolitical dynamics can also act as catalysts for investment and innovation, they introduce a level of uncertainty that can undermine long-term planning and investor confidence. Managing this duality, between opportunity and risk, will be a central challenge for the future governance of the space economy.

2.2 Segments of the space economy

Building upon the conceptual and historical foundations discussed earlier, this Section provides a more structured and quantitative overview of the space economy. As the sector has matured and diversified, the need for clear definitions and segmentations has become increasingly important, both for policy-making and for economic measurement. Unlike the traditional aerospace industry, whose boundaries are relatively well-defined, the space economy encompasses a broad and often overlapping range of upstream and downstream activities. These activities span from satellite manufacturing and launch services to the delivery of digital applications and analytics derived from space infrastructure. (OECD 2012)

To bring clarity to this complex landscape, it is necessary to distinguish between two key concepts: the space industry and the space economy. The former refers narrowly to the set of actors directly involved in the design, engineering, and deployment of space infrastructure. In contrast, the space economy is a broader construct, defined by the OECD as "the full range of activities and the use of resources that create value and benefits to human beings in the course of exploring, researching, understanding, managing, and utilizing space" (OECD 2012). This definition includes not only core industrial capabilities but also service provision, applications, and indirect spillovers that rely on space-based systems.

Given this broader framing, a more accurate assessment of the space economy requires segmenting its activities across several domains. Based on the OECD's taxonomy and recent industry studies, the space economy can be divided into six principal segments: Earth Observation (EO), Satellite Communication, Positioning, Navigation and Timing (PNT), Access to Space, Space Safety, and the so-called Beyond-Earth Economy. These segments can further be organized into two overarching categories: upstream activities, which involve the creation and deployment of space assets; and downstream activities, which refer to the utilisation of space-derived data, services, and applications.

With this context in place, the following section will explore in detail each of the main segments identified within the space economy. This segment-by-segment analysis draws upon the classification developed by the OECD (OECD 2012) and updated through recent industry assessments, offering a detailed examination of both upstream infrastructure and downstream services.

Upstream, downstream and the subdomains

A foundational distinction in the analysis of the space economy lies in the separation between upstream and downstream activities. This classification not only reflects differences in technological capabilities and market structures but also reveals the complementary roles these domains play in the broader value chain of space-enabled services.

Upstream activities comprise the scientific, technological, and industrial processes necessary for the design, development, and deployment of space systems. These include the manufacturing of spacecraft, satellites, and launch vehicles, as well as the construction of ground infrastructure that supports mission control and data transmission. Characterized by high capital intensity, long development cycles, and substantial technological complexity, upstream activities typically involve a small number of specialized firms and are often coordinated in close partnership with national space agencies. Public investment is particularly prominent in this domain, motivated by strategic imperatives such as national security, scientific leadership, and the creation of dual-use technologies with both defense and civilian applications.

In contrast, downstream activities encompass the application of space-based infrastructure to provide services, applications, and data products to end users. This includes satellite communications, Earth observation, and global positioning services, as well as the integration of space-derived data into sectors such as agriculture, insurance, logistics, urban planning, and disaster response. The downstream segment is notably more diverse and dynamic, characterized by lower barriers to entry and a proliferation of private-sector participants. Start-ups, commercial service providers, and non-space industries increasingly play a role, reflecting a shift toward market-oriented innovation and commercial scalability. In this domain, space technologies are translated into tangible economic and social value, facilitating decision-making, operational efficiency, and technological diffusion across the wider economy (PwC Space Practise 2024; OECD 2012; OECD 2019; Punnala et al. 2024).

This upstream-downstream framework provides the foundation for a more detailed categorization of the space economy. Drawing on the classification proposed by the OECD (OECD 2012), the sector can be further disaggregated into six principal domains. Each of these domains represents a key area of economic activity and technological specialization, and their interdependence reflects the complex and integrated nature of the modern space ecosystem. First of all, *Earth Observation* (EO) refers to the collection, processing, and dissemination of information about the Earth's surface through satellite systems. In 2023, the Earth Observation market was valued at approximately $2 billion. (World Economic Forum 2024) However, this figure underestimates the broader value being generated, especially as large datasets are increasingly made available at no cost. The economic value of EO is shifting from raw data provision to data analytics and interpretation, with commercial decision-making applications expected to drive much of the growth in the coming decade. The market is projected to reach $9 billion annually by 2035, yet the sector remains largely dominated by government actors, who account for roughly 50 to 60 percent of current EO service demand. The strategic relevance of Earth Observation for national security and climate monitoring, particularly in the context of shifting geopolitical tensions, makes this government-centric model likely to persist. At the same time, adoption by businesses and non-traditional users remains limited due to several barriers, including a lack of awareness of EO's potential value, insufficient standardization that hinders accessibility, and the high cost per image. National programs such as Italy's IRIDE and Poland's Camilla are illustrative of the public-sector leadership in EO investment. Nonetheless, several emerging applications are particularly promising. These include greenhouse gas monitoring to improve emissions tracking, ocean observation for marine conservation and pollution control, and urban data systems to support the development of climate-resilient and smart cities.(PwC Space Practise 2024)

Satellite communication represents the largest source of commercial revenue within the space economy. Its applications extend across telecommunications, broadcasting, remote sensing, and the Internet of Things. In 2023, the market was estimated at $196 billion and is projected to grow to approximately $218 billion by 2035. This growth is largely driven by the rising demand for broadband connectivity, coupled with a projected reduction in the cost of data. estimated to decline by around 10 percent by 2035, and a simultaneous increase of 60 percent in demand for satellite broadband services. Meanwhile, traditional services such as satellite television are expected to decline due to the widespread adoption of streaming platforms. Despite the strong demand outlook, the market currently faces issues of oversupply. Since 2020, satellite capacity has increased by a factor of 110, yet fill rates remain in the single digits. However, the emergence of device-to-device communication applications is expected to create new opportunities not only for satellite communication operators but also for mobile network providers and hardware manufacturers.

Positioning, Navigation and Timing (PNT) services are essential for a wide range of industries, including aviation, maritime transport, financial services, and defense. Historically rooted in military applications, PNT has gradually expanded into commercial markets and is now one of the most critical infrastructures enabled by space technology. Revenues associated with PNT services are projected to grow from $40 billion to $95 billion annually between 2023 and 2035, with an estimation of up to 3 billions devices manufactured every year that would support GNSS. (World Economic Forum 2024) Traditionally dominated by medium Earth orbit (MEO) and geostationary orbit (GEO) constellations, PNT is now undergoing a transformation with the entry of low Earth orbit (LEO) systems. These LEO constellations, which form part of the broader New Space paradigm, offer advantages in signal strength and accuracy due to their proximity to Earth. Innovative architectures are being explored to combine MEO-based global navigation systems with LEO constellations, thereby enhancing the precision and reliability of positioning services.(World Economic Forum 2024)

Access to space, defined as the set of activities related to launching, enabling, and servicing space infrastructure, is another rapidly evolving domain. Between 2020 and 2023, the number of orbital launches nearly doubled, from 117 to 226. The United States and China are the dominant actors in this field, with 115 and 61 launches respectively in 2023. In contrast, Europe faces significant delays and limitations in its launch capabilities. The European Commission's recent agreement with SpaceX to deploy Galileo satellites underscores Europe's current dependence on non-European launch providers. Launch capacity is increasingly viewed as a strategic asset, critical not only for enabling access to orbit but also for ensuring geopolitical autonomy. In this context, investments in microlaunchers and domestic spaceports represent essential entry points for countries aiming to secure their presence in space. A more speculative but growing component of this domain is space tourism, which has gained traction through the development of high-altitude balloon systems and suborbital flight concepts.

Space safety has emerged as a pressing priority as the number of active satellites continues to grow. As of March 2024, there were approximately 9,180 operational satellites in orbit. The rapid increase in orbital traffic necessitates the establishment of internationally agreed-upon norms and technologies to mitigate the risk of collisions and debris generation. Activities related to space safety include the collection and analysis of orbital data, the management of object tracking databases, and the development of active debris removal technologies. Ensuring a sustainable and secure space environment will require both technological innovation and effective governance frameworks. The creation of binding and enforceable international guidelines is widely recognized as a prerequisite for long-term orbital sustainability.(PwC Space Practise 2024)

The final domain, often referred to as the *beyond-Earth economy*, encompasses activities extending beyond near-Earth operations, including in-orbit servicing, orbital stations, and lunar or cis-lunar exploration. In-orbit servicing refers to the provision of maintenance, refurbishment, refueling, and de-orbiting services to spacecraft already in operation. These services are becoming increasingly important with the growth of satellite constellations, as they offer cost-effective alternatives to replacement. Orbital stations represent another significant opportunity. With the planned retirement of the International Space Station, there is growing interest in the development of new platforms, including commercial stations, which are expected to host both institutional and private-sector astronauts. Finally, the cis-lunar economy, while currently led by government-funded programs, is also expected to open opportunities for private sector participation as technologies mature and the commercial potential of lunar resources becomes clearer.

2.3 The importance of Venture Capital within the space economy

The preceding section offered a systematic overview of the New Space industry, providing the contextual foundations and definitional clarity needed for the subsequent analysis. Building on that groundwork, it is pertinent, given the focus of this study, to ask why venture capital (VC) merits particular attention as a central pillar of the space economy. This section addresses that question in two parts. First, it synthesises the existing literature to articulate the mechanisms through which VC shapes innovation and growth. Second, it outlines the evolution of this financing dimension in the European context, situating recent trends in VC activity within Europe's landscape.

Venture Capital as a catalyst for innovation

Venture Capital (VC) plays a strategic role in fostering and developing innovation ecosystems. Building on existing literature, the following discussion first analyses the direct advantages associated with VC financing and subsequently compares its role with other forms of financing, such as bank lending or non-VC funding. This discussion tries to explain 3 main dimensions: whether VC financing fosters innovation; whether VC funding is better than other types of financing; and finally how VC financing creates more value. The seminal study by Kortum and Lerner (2000) clearly illustrates the impact of VC financing on innovation, measured through patenting activity. Their findings demonstrate that VC funding constitutes a particularly effective mechanism for financing innovation, providing substantial advantages to firms in terms of technological output and performance. Companies that receive VC investment exhibit higher patenting rates, suggesting that VC support enhances both the intensity and quality of innovative activity. Kortum and Lerner develop a model to formalise this relationship, comparing the innovative outcomes of corporate R&D spending with those of VC financing. Their results indicate that one dollar of VC funding generates an innovation output equivalent to three dollars of corporate R&D spending. Moreover, the spillover effects, that is the diffusion of innovation generated by VC-backed firms, are found to be stronger than those of firms financed through other means. Their empirical analysis provides compelling evidence of the pivotal role of VC in driving industrial innovation. Between 1983 and 1992, VC accounted for only 3% of total R&D spending in the United States, yet was responsible for approximately 8% of all industrial innovations. Projections extending this relationship further suggest that, by 1998, assuming a similar level of effectiveness, VC funding could be associated with as much as 14% of total U.S. innovative activity. These findings refer to a period when venture capital represented only a fraction of its current scale. Consequently, from a theoretical perspective, it is reasonable to infer that the contribution of VC to innovation in the present context, where its magnitude and reach have expanded considerably, may be substantially higher. Furthermore, it is reasonable to argue that VC funding may exhibit comparable or superior effectiveness to other financing instruments, or at least that it offers a distinct relative advantage over alternative sources of capital. To address this question, a recent study by Akcigit et al. (2024) develops a comprehensive macroeconomic model linking VC activity to a range of aggregate economic variables. Although broad in scope, the study provides clear evidence of the higher efficiency of VC funding compared to traditional financing mechanisms. Specifically, this superior efficiency manifests across two principal dimensions: Research efficiency, which captures how costly it is to achieve a given level of productivity; Development efficiency, which measures the cost associated with increasing the likelihood of the firm success. By integrating these dimensions into a macroeconomic framework, the study quantifies the aggregate welfare impact of VC financing. The results estimate a 7.58% welfare gain in terms of consumption, representing the additional economic value attributable to the presence and effectiveness of VC funding relative to other financing forms. In addition to its innovation-related advantages, VC financing has been shown to exert a strong influence on firm growth, as documented by several studies (e.g. Davila, Foster, and Gupta (2003), Cavallo et al. (2019), and Akcigit et al. (2024)). Firm growth is typically proxied by the number of employees, and multiple empirical analyses find a positive correlation between VC funding and employment expansion, highlighting the role of venture capital in scaling business operations and accelerating firm development. While the majority of these findings have been empirically validated primarily within the U.S. ecosystem, similar dynamics are beginning to emerge in other regions, suggesting that the growth-enhancing effects of VC financing may be more generalisable than previously assumed (Cavallo et al. 2019). This empirical evidence can also be supported by a theoretical perspective, addressing the question: where does the additional value generated by venture capital originate? Several studies (e.g. Amit, Brander, and Zott (1998), Davila, Foster, and Gupta (2003), P. Gompers, Kovner, and Lerner (2009), and Han (2009)) explore this issue, identifying the core advantages of VC financing and clarifying its functional role within innovation ecosystems. The central mechanism through which VC generates value lies in its capacity to reduce informational asymmetries between entrepreneurs and investors. This reduction occurs through several complementary channels. First, VC firms possess a comparative advantage in environments characterised by high informational uncertainty, as their expertise, screening processes, and monitoring capabilities allow them to evaluate projects more effectively than other financiers. Second, VCs demonstrate superior selection abilities, identifying higher-quality projects and more capable entrepreneurs, thereby generating positive growth dynamics within the broader economy. Consequently, VC participation can be interpreted as a credible market signal, indicating the quality and potential of the funded firm. As argued by Davila, Foster, and Gupta (2003), the involvement of venture capital investors serves as an information signal to other market participants, reducing perceived risk, facilitating additional financing, and enhancing the firm's reputation within innovation-driven industries. P. A. Gompers (1995) investigate possible controlling mechanisms put in place to enhance the advantage of VCs, the study identifies staging as a core control instrument within VC funding. Their findings demonstrate that staging provides a substantial advantage in environments characterised by high informational asymmetry. Drawing on agency theory, the authors hypothesise that VCs concentrate more heavily on early-stage investments, where monitoring yields the greatest marginal benefit. This hypothesis is subsequently validated through empirical evidence. The mechanism seems to operate as follows: venture capitalists monitor a firm's progress at regular intervals and reevaluate its prospects at each financing stage. If new information reveals negative expectations regarding future returns, VCs preserves the option to discontinue the investment. This right to abandon substantially mitigates the risk of inefficient continuation effect, a problem often associated with privately financed entrepreneurial ventures. In addition, staged financing seems to provide a "tight-leash" effect, functionally analogous to the disciplinary role of debt, by disciplining managerial discretion and aligning incentives. Finally, staging also represent an element of intervention, enabling investors to influence strategic positioning, governance structures and corporate development in critical moments. It can be argued that venture capital (VC) activity plays a central role in the development and structuring of innovative industries, representing a significant competitive advantage for the firms and ecosystems it supports. However, research extending the study of VC dynamics specifically into the space economy remains limited and predominantly focused on the U.S. ecosystem. This scarcity of analysis represents a major gap in understanding a financial instrument that is virtually essential to the growth and sustainability of the space sector. Investigating this gap constitutes one of the core motivations and starting points of the present study.

Investment trends and the European financing gap

This section seeks to identify and discuss the existing gaps within the European space economy ecosystem, with particular attention to the relevance and urgency of examining venture capital

(VC) dynamics in this context. According to Madan and Halkias (2020), four key factors are critical to fostering the emergence of commercial New Space activities in Europe. The *business philosophy* represents a determinant of innovation within the space sector. A significant divergence can be observed between the European and U.S. approaches in this regard. The existing literature suggest a shortage of serial entrepreneurs in Europe (Frischauf et al. 2018), that leads to limiting the diffusion of the entrepreneurial mindset, common in the American model (Madan and Halkias 2020). Moreover, Abifadel and Peeters (2019) highlight that a common risk-averse attitude among young European entrepreneurs remains a substantial obstacle to innovation and new venture formation. *Technology management* in Europe requires redefinition and further development. The focus should not rest solely on technological invention, as innovation in isolation is insufficient; rather, it should also points to the creative application of existing technologies and the development of incremental, value-generating business models. Frischauf et al. (2018) suggest that Europe should promote shorter technology development life cycles by adopting practices from other advanced industries, such as agile software methodologies, rapid prototyping, 3D printing, and Industry 4.0 approaches, as also noted by Madan and Halkias (2020). The *role of institutions* must be clearly defined, placing deregulation and targeted support at the core of governmental strategies. Finally the *Financing* dimension addresses one of the major gaps in insufficient access to private VC and angel investors. Specifically the limited availability of risk capital funds devoted to investing in the commercialization of innovative technologies, scarcity of scale-up funding and the absence of a fast and risk taking decision culture in continental Europe, are addressed as key weaknesses. (EIB 2019) In light of the VC effects highlighted in the previous section, it is reasonable to argue that a VC development could generate significant improvement across all 4 dimensions listed. Thus VC funding could represent genuine innovation driver, providing sensible competitive advantage and development. VC could be addressed as one of the most significant gap in the European framework, this is a further dimension on which the present work will pivot.

Space economy financing

To gain some context regarding VC funding and general investments within the space economy, a comprehensive overview of the main characteristics and aspects of space economy financing is proposed, both in general and in Europe. Historically, the space economy was predominantly financed by governments pursuing technological excellence and geopolitical dominance. Consequently, most investments took the form of public funding and grants within a highly centralized model, where core competencies such as design, engineering, procurement, testing, manufacturing, logistics, training, and operations were concentrated within state-led organizations (Zancan et al. 2024). While elements of this legacy persist in the New Space era, financing structures and governance models have evolved substantially. Traditional, government-oriented organizations now increasingly support collaborative partnerships with New Space actors, adapting to new frameworks and innovation-driven strategies promoted by space agencies (Kim 2023).The financing model of the space sector has evolved from a fully centralized, government-controlled system to a more decentralized and deregulated framework, reshaping the mechanisms of capital allocation in the process. In the United States, public funding now primarily operates as a source of revenue for private companies rather than through direct participation in investment rounds. This contrasts with the European and Asian models, where public institutions continue to play an active role as direct investors in space ventures. The main structural shift from the legacy model lies in the transition from a completely public organizational and governance system to a more distributed, private–public collaborative framework (Zancan et al. 2024; European Space Policy Institute (ESPI) 2025).

European Space Policy Institute (ESPI) (2025) illustrates the principal differences among global financing models. The United States, which remains the most developed and heavily invested ecosystem, is characterized by a predominance of private capital in funding New Space companies. Public institutions there promote innovation indirectly through public–private partnerships and open innovation schemes that externalize core services to stimulate competition and technological advancement. In contrast, in Europe and Asia, where the space sectors are comparatively less mature, public institutions play a more interventionist role, guiding sectoral development through direct funding and strategic investment. Another factor explaining the divergence between the two financing models lies in the differing levels of risk appetite across regions (European Space Policy Institute (ESPI) 2025). A structural weakness of the European space ecosystem lies in the difficulty of scaling up ventures, with later-stage investments remaining less common than in the United States. European institutions have recognized this limitation and are attempting to address it by encouraging greater investment participation in later stages, which typically require higher capital commitments. This approach helps explain why 64% of funding rounds in European scale-ups involve either mixed or public consortia, compared with only 37% for start-ups. A possible hypothesis is that the underdevelopment of the venture capital (VC) sector in Europe is endogenous to specific regions or countries, implying significant cross-national variation in VC performance. However, the literature disproves this assumption: evidence shows that the relatively low internal rates of return (IRR) experienced by European VC investors do not differ significantly across countries, for instance, between the United Kingdom and other European nations. Moreover, it could be argued that differences in investor structure or culture might influence value creation; yet, empirical findings indicate that U.S. venture funds operating in Europe do not generate greater value than their European counterparts (Hege and Palomino 2009). Nevertheless data show a increasing volume of investments in space-related ventures and an increasing value in later stages (European Space Policy Institute (ESPI) 2025) it is reasonable to assume that the European ecosystem appears to be moving toward greater maturity. The rise in later stage investments, although still structurally lower than in the United States, signals progress and supports the effectiveness of the innovation framework currently being implemented.

2.4 VC specialization and New Space

Having established the relevance of examining the European VC ecosystem in earlier sections, the following discussion clarifies the analytical direction and rationale underpinning this work. Since the objective of this thesis is to investigate successful investment strategies and patterns, the analysis will further focus specifically on the role of specialization within venture capital activity. This choice is grounded in established research showing a positive relationship between VC specialization and fund performance. P. Gompers, Kovner, and Lerner (2009) offer one of the most robust empirical contributions on this topic, documenting a significant positive correlation between investment *success*, defined as the probability of exit through acquisition, IPO, or merger, and the degree of VC specialization. Their study distinguishes two complementary dimensions of specialization. The first is firm-level specialization, referring to the extent to which a VC fund concentrates its investments within a specific sector. The second is individual-level specialization, which captures the propensity of individual venture capitalists within a fund to invest in a particular industry. This distinction acknowledges that even a generalist VC firm may be composed of highly specialized investors operating within defined domains. By isolating these two dimensions, the authors are able to test theoretical claims that had previously lacked quantitative validation. Earlier literature was divided: some scholars argued that generalist VCs benefit from a wider perspective and can allocate capital more efficiently across industries, whereas others contended that industry-specialized firms possess superior capabilities in identifying and evaluating high-potential opportunities within their domain. The empirical evidence reveals a more nuanced pattern. Both individual-level specialization and firm-level specialization, measured through a Herfindahl–Hirschman Index (HHI) based on the distribution of investments across industries, are positively associated with investment success. However, the interaction between the two exerts a negative effect. In other words, when a highly specialized VC firm employs venture capitalists who themselves are highly specialized, the performance gains attributable to firm-level specialization tend to weaken. This result lends support to the hypothesis that, in sectors with a limited pool of high-quality investment opportunities, specialized firms may face pressure to deploy capital and thus invest in projects with negative expected value in order to maintain target investment levels. This evidence reinforces the relevance of examining specialization within the European New Space investment landscape, where the structure of opportunities may differ markedly from more mature ecosystems. Han (2009) develops a theoretical framework to analyse fund specialization across multiple dimensions and complements it with empirical evidence. Consistent with P. Gompers, Kovner, and

Lerner (2009), specialization is measured using a Herfindahl–Hirschman Index (HHI)–based indicator that captures the concentration of investments across sectors. The study investigates both the determinants and the consequences of specialization by integrating these relationships into a principal–agent model aimed at explaining why funds specialise. The model yields several notable predictions. First, fund size is negatively associated with specialization: larger funds tend to adopt broader investment scopes, reflecting the need to deploy greater amounts of capital across a wider opportunity set. Second, fund age is also negatively related to specialization, as more established funds exhibit greater diversification over time. Third, higher risk within a fund's focal industry reduces the propensity to specialise, since concentration in highly volatile domains increases overall portfolio risk. Finally, the model predicts a positive relationship between specialization and the level of specialised human capital within the VC firm. This implies that venture capitalists tend to select portfolio companies aligned with their domain-specific expertise. The empirical analysis strongly corroborates the theoretical predictions, confirming that these structural and behavioural factors shape observed specialization patterns in the VC industry. This evidence underscores a central theme in the study of specialization: human capital is a critical driver of the advantages associated with specialised investment strategies, suggesting that expertise-based selection mechanisms are fundamental to the performance outcomes linked to specialization. On the other hand, while the paper advances a theoretical explanation of how specialization mitigates informational asymmetries, it does not provide an empirical framework capable of quantifying the degree of such asymmetries as a function of the capital invested. In this sense, the informational channel remains only indirectly inferred, rather than being explicitly measured and tested. Building on this literature, Nörthemann (2023) examine several key dimensions of specialization. In their introduction, the authors state that the core mechanism underlying specialization is the accumulation and deployment of investors' experiential knowledge across four principal domains: (i) industry-specific knowledge; (ii) learning effects, whereby repeated investments in the same industry or in firms with similar business models enhance investors' understanding of market characteristics and actor behaviour; (iii) value-enhancement, referring to industry or product specific support and strategic guidance enabled by prior experience; and (iv) tacit knowledge. These dimensions are subsequently incorporated into an empirical investigation demonstrating how specialization can serve as a competitive advantage under conditions of elevated information asymmetry, most notably in cross-border transactions. In such settings, specialized investors are shown to mitigate the "liability of foreignness," thereby improving their capacity to evaluate opportunities and support portfolio firms in unfamiliar markets.

2.5 Research gaps and motivation from literature

This section will summarise the most important gap found in the literature, providing a comprehensive motivation base for this study. The characterisation of venture capital (VC) behaviours and outcomes has been the subject of extensive academic research. Numerous studies have examined the relationship between fund performance and various fund characteristics (e.g. Davila, Foster, and Gupta (2003) and Cavallo et al. (2019)). However, only a limited strand of literature addresses these dynamics within the space economy, resulting in a reduced understanding of VC determinants and behaviour in this emerging and strategically relevant sector.

First gap: there is few literature applied specifically to the space economy investigating VC fund performance and other VC fund characteristics.

Furthermore, specialization tend to be investigated across multiple dimensions, such as stage (i.e. Yao et al. (2024)), geography (i.e. Bertoni et al. (2024)) or cross-sectorial diversification (i.e. P. Gompers, Kovner, and Lerner (2009) and Nörthemann (2023)). Few tries to apply the specialization framework on the specific space industry, resulting in a possible lack of perspective of specific peculiarities associated with this industry.

Second gap: existing specialization frameworks are developed with a wide scope, resulting in lacking of clarity for peculiarities associated with specific industries (i.e. space sector).

Additionally, specialization is always defined based on metrics relating the number of deals (i.e. P. Gompers, Kovner, and Lerner (2009), Bertoni et al. (2024), Han (2009), and Nörthemann (2023)) focusing on the direct fixed costs of deals, rather than the information asymmetries costs. While information asymmetry based on specialization is defined and investigated (Han 2009), very few studies studying the effects carried by the specialization on the capital.

Third gap: specialization metrics usually capture to number of deals, overlooking capital specialization itself and the implication of informational asymmetries associated.

Finally, investment strategy and behaviors are studied considering specialization metrics (i.e. Bertoni et al. (2024)), but this framework lacks of application in specific segments or industries (i.e. space economy).

Forth gap: frameworks investigating VC funds' behaviours and strategies in relation to specialization have not been extended to space economy.

Considering all these gaps, we then identify our research question as *investment behaviours and specialization patterns of venture capital actors allocating resources within the European New Space economy analysis and characterization.*

3 Methodology and data

Outline

This section presents the dataset employed in this study, defined with the goal of filling the gap highlighted in the previous discussion. The first part outlines the process of dataset construction and preparation, detailing the methodologies and parameters adopted to ensure the most effective use of the available data.

Data definition

This section outlines the definition and construction of the dataset employed in the empirical analysis. It establishes the data foundation of the study and connects it to its broader objective: analysing and characterising the investment behaviours and specialization patterns of VC actors allocating resources within the European New Space economy. The dataset delineates the empirical perimeter of the firms and investors considered and serves as the basis for the subsequent examination of their structural and behavioural characteristics. The primary data source is *Dealroom*, an online platform that aggregates firm- and investment-level information on innovative, high-growth companies. The dataset includes firms directly operating in the New Space sector, as well as those linked to it through derived applications or enabling technologies. The dataset was built using a structured process to ensure it accurately represents the European space ecosystem and its interconnected investment networks. First, all companies identified as active in the space sector and headquartered in Europe were selected to form the initial sample. For each of these firms, the list of their investors was compiled, keeping only those cases where at least one venture capital (VC) investor was involved. Next, the investor sample was expanded by identifying all other companies financed by the same investors, regardless of their sector or country. This step was essential to capture the broader cross-sector and cross-border investment linkages that characterize the innovation and financial networks surrounding the European space economy. In order to investigate capital formation and specialization in emerging industries, the study will focus on the pre-exit behaviors. To isolate them, only pre-realisation financing related rounds were retained, while IPOs, acquisitions, and debt transactions were excluded. Key variables of the dataset include round size, round stage, number of rounds, investor specialization index, firm geography, and year of investment. For the purpose of this study, we define a specialization index, in order to investigate investors' behaviors and patterns. The specialization index is defined as the ratio of space-related investments volume over the total investments volume, quantifying the degree of focus each investor maintains on the space sector. Collectively, these variables enable a comprehensive analysis of investment intensity, sectoral specialization, and spatial distribution within the European New Space investment landscape. The resulting dataset comprises approximately 320,000 funding rounds covering the period 2000–2025, encompassing 72,825 distinct firms, of which 1,361 are tagged as space-related. It also includes 43,901 investors, among which 16,091 are identified as VC firms, and only 1,015 of these have participated in the financing of European space companies. While the dataset has global coverage, only European space firms can be regarded as directly representative of their respective national ecosystems, as they are explicitly identified through direct classification. Non-European firms, by contrast, are included in the dataset solely through shared investors with European space firms, thereby reflecting patterns of global engagement rather than local representativeness. Non-space firms, numbering 71,464 entities, are defined in a similar way to space-related firms, as they share financial linkages with the latter through common investors. These firms are included in the analysis to help characterise the broader investment history and behavioural patterns of venture capital actors. Moreover, they serve as a control group, enabling a comparative assessment of investment dynamics, strategic orientation, and performance characteristics between space-related and non-space firms. Fur-

Table 1: Sample overview of firms, investors and funding rounds

Category	Count	Share (%)
Firms		
Total firms in dataset	72,825	100%
Space firms	1,361	1.9%
Non-space firms	71,464	98.1%
Investors		
Total investors	43,901	100%
VC investors	16,091	36.7%
VC investors financing at least one European firm	1,015	2.3%
Funding rounds		
Total financing rounds	319,495	100%

Note: Space firms are defined according to the OECD framework. VC investors financing at least one European firm are those with at least one deal in a company headquartered in Europe. Shares are computed with respect to the total number of firms or investors in each panel.

thermore, since this study focuses on analysing the behaviours and patterns of VC investors active in the European space economy, only this investor category is fully represented within the dataset. This introduces an important limitation: for all other investor types, such as corporate, public, or individual investors, the complete funding history is not available. These actors appear in the dataset solely as co-investors in rounds involving VC firms. Consequently, their role can be examined only within this co-investment dimension, limiting the extent to which their independent investment strategies and behaviours can be systematically analysed. Overall, the dataset captures both the intensity and the structure of VC activity associated with the space economy. By linking firms through shared investors, it uncovers patterns of sectoral specialization, cross-industry diffusion, and geographically distributed clusters of innovation. Its construction provides a coherent and replicable empirical foundation that directly supports the subsequent analyses, enabling a systematic investigation of the economic geography, investment networks, and strategic dynamics underpinning the New Space sector.

Methodological alignment with existing datasets. Our approach is consistent with, but distinct from, established mappings of the space economy. OECD statistical framings typically adopt a broad sectoral perimeter that mixes space *uses* and Earth-based, space-enabled activities (e.g., navigation, earth observation), privileging national accounts compatibility over investor-network resolution (OECD (2019)). BryceTech market audits emphasise company and program inventories by segment (launch, manufacturing, EO, satcom) and revenue shares, but they do not systematically reconstruct cross-sector investor linkages (BryceTech (2025)). WEF schemata differentiate backbone vs. reach layers and highlight ecosystem interdependencies (World Economic Forum (2024)). Relative to these, our dataset is (i) *investor-centric* (linking firms via shared investors to capture capital allocation networks), (ii) *venture-focused* (It is completely characterised the investing history of VCs; exits and debt excluded to study pre-exit behaviour), (iii) *Europe-anchored with global spillovers* (direct representativeness for Europe; extra-European firms appear through investor ties). This design complements OECD/BryceTech/WEF by trading exhaustive sectoral breadth for finer-grained analysis of investment specialisation and network structure.

Variables' definition

In this section we will define all the variables that we used in the analysis. To examine how VC behaviour shapes the structure of the space economy, several key variables are operationalized. The tagging method, implied in the data definition, used to classify firms as New Space companies followed the guidelines proposed by OECD (2012). The classification procedure was conducted manually for each firm. Initially, all companies containing the term "Space" among their tags and launched between 2000 and 2025 (included) were selected to form a preliminary set. Each firm was then individually examined through its official website and other online sources. The final classification was determined based on the company's core activities and alignement with the OECD framework, ensuring a consistent and conceptually robust identification of New Space firms. This classification made possible also to categorize also the segmentation of each company, distinguishing companies related with downstream or upstream applications. The classification process was conducted in two distinct phases. The first phase involved defining the initial set of space-related firms, which served as the foundation for the dataset construction. Subsequently, during the dataset expansion and refinement process, a second set of firms was identified. These additional firms required a further classification step to determine their relevance and association with the space sector, ensuring consistency and accuracy in the final dataset composition. To further characterise investor behaviour, several additional variables were computed. The **number of rounds** represents the total count of investment rounds in which a given investor participated, corresponding to the number of rows in the dataset where the investor appears as a financier. Rounds reporting an investment amount of zero were also included, acknowledging that accelerators and certain investor types may support firms through non-financial contributions such as mentoring, incubation, or network access. Regarding the computation of the **amount invested**, a key assumption was required. The data provider records only the total capital raised in each round, without specifying the individual contribution of each participating investor. Consequently, it is assumed that all investors in a given round contributed equally to the total amount. This simplifying assumption introduces important limitations, as investors can differ substantially in both financial involvement and strategic engagement. Some may act as strategic investors, actively influencing the management and direction of the firm, while others may operate primarily as financial investors, providing capital with limited operational involvement. This heterogeneity must therefore be considered when interpreting results derived from aggregate investment measures. The **number of employees** is used as a proxy for firm size. This choice is supported by evidence in the literature, such as Davila, Foster, and Gupta (2003), who demonstrate that employee growth is positively correlated with firm valuation, thereby validating the use of workforce size as reliable indicator of firm scale. This data is provided by Dealroom as a time series, showing data from 2016 to 2024, only the 2024 data is considered, therefore excluding entities that are not active anymore.

Space-focused investors A key analytical dimension of this study concerns investment specialization within the space economy. To quantify this aspect, a **Space-Specialization Index (SSI)** is constructed, defined as the ratio between the amount invested in space flagged companies and the total amount invested by each investor from 2016 to 2020 (extremes included). This metric allows for a consistent assessment of the degree of investor focus on space-related ventures, while accounting for the temporal relevance of recent strategic and financial decisions. The selection of this metric finds justification in the literature: specialization is proven to provide venture capital funds with a competitive advantage and superior performance outcome. These advantages seems to be attributed to the human capital component embedded in specialization, as sector-specific expertise and learning processes enhance investors' ability to identify, evaluate, and support high-potential ventures (Nörthemann 2023; P. Gompers, Kovner, and Lerner 2009). To capture this dimension, the temporal window for the computation of the index is restricted to 5 years, while the analysis of investment dimensions is conducted in the subsequent 3 years (2021-2024), under the assumption that learning effects and sectoral expertise remain undissipated during this period. Considering an investor's entire historical activity would not accurately represent their current human capital and accumulated experience within a specific industry. Moreover, the choice to define specialization based on the amount of capital invested, rather than the number of deals, reflects an attempt to link the analysis to issues of governance and information asymmetry. While previous studies have developed theoretical models on the information asymmetry mechanisms underpinning specialization (e.g. Han (2009)), empirical evidence connecting these theoretical insights to investment behaviour remains scarce. Based on this index, a corresponding **space-specialization flag (SSF)** is introduced to identify a subset of space-focused investors. The flag assumes the value *True* when an investor satisfies the following conditions:(i) the investor belongs, fully or partially[1], to the VC category; (ii) the investor has completed at least 4 investment deals overall, regardless of sector; (iii) at least 20% of the total capital invested in the window 2016-2020 has been directed toward space-tagged companies; (iv) the investor has participated in at least 1 financing round involving a European space-related firm. The choice of the 20% threshold is empirically motivated. We analyse the distribution of VCs based on the SSI value within the sample, sorting the it according to the value of the index, we then consider approximately the highest 10% of all entities, leading to a 20% SSI threshold. This criterion thus effectively isolates actors with a

[1]The investor type classification provided by *Dealroom* often assigns multiple categories to the same entity. Some investors, therefore, can be identified as both VC firms and other types (i.e. accelerator, corporate venture fund, bank).

meaningful strategic orientation toward the space sector, distinguishing them from those with only occasional or peripheral exposure. Furthermore, the window 2021-2024 has been selected

Quantile	**50%**	**70%**	**90%**	**99%**
Threshold (SSI)	0.00	0.03	0.18	1.00
Cumulated amount invested (space, MUSD)	7,332.05	2,548.89	775.73	131.80
Cumulated amount invested (non-space, MUSD)	135,477.35	37,775.41	1,810.91	371.91

Table 2: Quantile thresholds of specialization index (SSI) and corresponding amounts invested in space and non-space firms

The cumulated amount invested in space and non-space firms, is computed for the upper class (e.g. for 90% quantiles it captures the amount invested by the top 10% funds)

for the analysis as it concentrates most of the investments made in the space sector, providing a valuable and solid perspective across investment dimensions. Table 3 provides a summary of the main variables defined and employed throughout this study.

Linked entity	Variable	Definition
Investor	Number of rounds	Number of row where investor shows
Investor	Amount invested (USD)	Total amount invested in the round divided by the number of investors
Investor (VC)	Space-specialization index (SSI)	Ratio of total amount invested in space-tagged firms and total amount invested in any industry, considering the time window 2016-2020
Investor (VC)	Space-specialization flag (SSF)	*True* if the investor fulfills the requirements i-iv
Firm	Number of employees	2024 data for number of employees
Round	Normalized round type	Defined according to Scheme 1

Table 3: Variable definition summary

Note: The table display all the variables defined and used in the analysis, the first column represent the concept to which the variable is linked to (i.e. Number of employees is linked to Firms), the second column is the name of the variable and the third column shows a summary of the variable definition logic

4 Results

The first part of this section describes the main characteristics of firms, investors, and financing flows emerging from the dataset, providing an overview of their demographic features and a general characterization of the investment dynamics. The second part offers a more in-depth analysis of the VC segment within the dimension of specialization in the New Space industry. In aggregate, the dataset encompasses 72,825 distinct firms, among which 1,361 companies are classified as space-related according to the definition above mentioned in Section 3. Moreover, the dataset captures 43,901 investors, 16,091 are tagged as VC firms and of these only 1,015 participated in funding European space companies. The dataset identifies 319,495 rounds, these represent the complete investment history of VC firms that have participated in at least one funding event involving European start-ups operating in the space sector.

4.0.1 Space-related firms

This section presents the main characteristics of firms operating in the European space economy, we identify 1,361 space-related companies in the dataset. The aim is to describe the structural composition, geographical distribution and maturity of this firms, thereby providing a micro-level perspective that complements the broader investments patterns investigation. The firms represented in the dataset display considerable heterogeneity in both age and function. They include long-established companies as well as newly formed ventures.

Temporal distribution Figure 3 illustrates the number of space-related firms founded annually within this time frame.

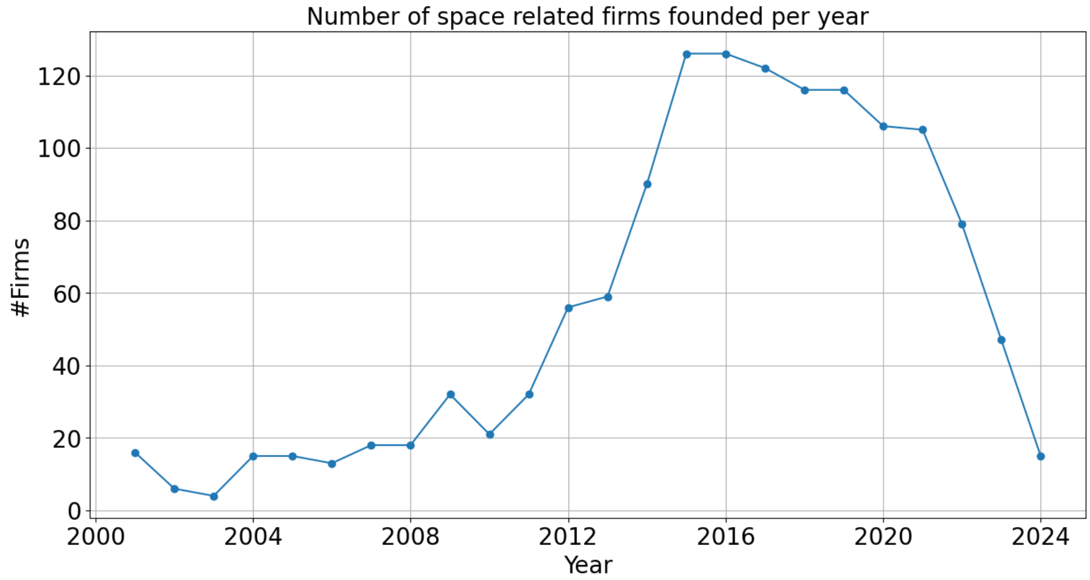

Figure 3: Annual number of firm foundations, 2000–2025.

The space sector experienced steady growth in the number of newly established firms until 2016, after which a declining trend became evident. However, this slowdown does not necessarily indicate a real contraction in entrepreneurial activity. Two main explanations may account for this pattern. First, it may result from data collection limitations that are endogenous to the dataset, reflecting the data provider's reduced ability to capture the most recent firm entries. This would point to a structural limitation in data coverage rather than an actual decline in firm creation. Second, the observed trend may suggest that the space innovation ecosystem is entering a more mature phase. In such a phase, established firms tend to consolidate their market positions, strengthen barriers to entry, and attract a disproportionate share of technical talent and investment capital. Consequently, the pace of new firm formation slows, not necessarily because of declining interest in the sector, but due to the increasing difficulty of market entry and differentiation. This evolution may also reflect rising specialization and industrial concentration, where a smaller group of high growth firms increasingly dominates technological innovation and commercial performance within the space industry. (OECD 2019)

Geographical distribution It is also essential to examine the geographical distribution and positioning of New Space firms worldwide, while taking into account the construction logic of the dataset. As stated in Section 3 only European firms can be considered directly representative of their respective countries, as their identification is explicit. Conversely, non-European firms appear in the dataset solely because they share at least one investor with a European company. This methodological structure nonetheless provides meaningful insights into global centres of excellence: given that many investors financing European firms operate at an international scale and exhibit limited regional focus, a high concentration of firms outside Europe can be interpreted as an indicator of regions demonstrating strong capabilities in fostering innovative, space-related start-ups. (EIB 2019) Analyzing the number of start-up per country we find that Europe hosts the majority of firms, with 911 companies, representing 66.8% of the total. The United Kingdom exhibits the highest concentration (183), followed by France (131) and Germany (109). Other notable hubs include Italy (73), Spain (59), Switzerland (62), Belgium (34), and the Netherlands (41), each providing a solid platform for the growth of space enterprises. In particular, Switzerland stands out for the relatively high number of firms considering its small national size, making it one of the most efficient and innovation-oriented environments in the global space sector. Outside of Europe, a significant share of space-related companies is located in the United States (US), which accounts for 338 firms, or 24.1% of the total. This number does not represent the entire population of space-related companies, as previously highlighted, rather it reflects the broader financing interconnection with the European ecosystem. This concentration underscores the strong exposure of investors financing European New Space ventures to the U.S. innovation ecosystem, particularly to California, where 148 firms are based. This pattern likely reflects the high density of space-related firms in that region rather than a specific investor bias. To further investigate the relative strength of innovation ecosystems, the number of firms was normalized by the population of each country. This analysis provides an indicator that can be interpreted as a proxy for the management performance of national innovation systems, the absolute number does not characterize enough the space ecosystem, if not compared with the country (or state) size. The results highlight notable centers of excellence: in the United States, Colorado (with 4.33 firms per million inhabitants), Massachusetts (2.42), and California (3.74) stand out, while in Europe, Estonia (with an impressive 14.27 firms per million inhabitants), Switzerland (7.16), and Luxembourg (18.9) emerge as leading performers. This comparison also reveals a structural challenge for Europe. In the United States, the presence of a single market, unified regulatory standards, and a high degree of interstate mobility of capital and human resources allows high-performing states to attract investment and talent rapidly, fostering the organic and accelerated growth of their ecosystems. In contrast, the European innovation landscape remains more fragmented, as country size and domestic market boundaries still confer substantial advantages to local ecosystems. Consequently, one may hypothesize that the market reward for excellence, that is, the capacity of a region to capitalize on its innovation performance, is significantly higher in the U.S. than in Europe. This structural difference suggests that Europe's innovation ecosystems remain relatively weaker, partly because they have yet to fully develop the competitive market mechanisms that drive ecosystem efficiency and scalability in the United States.

Geographical financing Following the geographical distribution analysis based on the number of firms per country, the next step involves examining and characterising the financial flows directed toward these firms. This analysis provides the empirical foundation for identifying patterns of geographical investment focus and cross-border capital involvement within the New Space ecosystem. Table 4 presents the main financial metrics for the top eight countries ranked by the total investment amount received, offering a comparative overview of national investment dynamics within the European space economy. The United States emerges as the most prominent destination, further analysis confirms the central role of California in the New Space scene, as well as the city of New York. Within Europe, the United Kingdom, Germany, and France represent the main investment hubs, though at considerably lower volumes compared to the U.S. As the previous analysis, it is also informative to examine the amount invested per country (or U.S. state), normalized by population, in order to identify regions that demonstrate particular excellence in innovation management. The results highlight several notable patterns. Within Europe, the analysis confirms the outstanding performance of Estonia, which records the highest level of investment with 204.99 MUSD per millions of inhabitants. This highlight again, the limits in the overall scalability of its innovation ecosystem, constraining the potential for further expansion. The United Kingdom (113.63), Finland (111.19), and Switzerland (69.45) also display high normalized investment values, indicating strong innovation frameworks and effective capital mobilization mechanisms. Conversely, Luxembourg appears as an outlier; given its well-known role as a corporate headquarters destination due to fiscal incentives, the data for this country should be interpreted with caution.

Firm size To better understand and characterise the firms included in the analysis, firm size is examined using the number of employees as a proxy. Understanding firm size and its distribution is essential for interpreting the structural composition and behavioural dynamics of the industry.

Accordingly, the analysis compares space-related firms with non-space firms in the dataset by examining their employee distributions. The results indicate that, on average, space firms tend to be larger than general firms within the bottom 90% of the distribution. However, the overall difference in average size is largely driven by the presence of a small number of very large non-space firms, which reach substantially higher employment levels and dominate the upper tail of the distribution. This phenomenon is further illustrated in Table 5, which shows that while space companies exhibit greater size at lower quantiles, the disparity becomes more pronounced at the top end, where non-space firms overwhelmingly prevail. This finding highlights the predominant tendency of space-related firms to remain medium-sized, rather than evolving into ultra-large corporations, as is more common in other industries. Furthermore, the analysis reveals a highly concentrated investment structure within the space sector: a small subset of firms captures a disproportionate share of funding, with the top 10% of firms attracting approximately 73% of total invested capital. This concentration underscores the presence of dominant players and reflects selective investor behaviour favouring firms with proven technological or commercial potential. The use of employee count as a proxy for firm size is supported by empirical evidence in the literature. For instance, Davila, Foster, and Gupta (2003) demonstrate that employment growth is positively correlated with firm valuation, validating workforce size as a reliable indicator of firm scale and development.

Country	Number of firms	Average amount raised(BUSD[2])	Average number of rounds	Total amount raised(BUSD)	Upstream %	Downstream %	Not defined %
United States	338	0.09	10.5	30.584	0.5	0	99.5
United Kingdom	183	0.018	6.36	3.374	47.9	50.8	1.4
China	19	0.176	6.47	3.35	0	0	100
Germany	109	0.026	6.64	2.787	47.5	33.7	19.2
France	131	0.014	5.21	1.895	39.9	59	1.7
Canada	23	0.029	6.61	0.665	0	0	100
Finland	20	0.031	8.6	0.616	83.2	21.3	0
Switzerland	62	0.01	5.11	0.607	29.5	63.9	12.4

Table 4: Number of firms, Average amount raised, Average number of rounds, Total amount raised, Upstream %, Downstream %, Not defined % for top 8 countries per amount received

[2] Billion US dollars

Category	25%	50%	75%	90%	99%	99.9%	100%
Non-space firms							
#Employees	0.00	6.00	30.00	107.00	1,482.00	12,151.00	746,788.00
Space firms							
#Employees	5.00	18.00	50.00	144.00	1,137.60	5,459.20	16,863.00
Space-firm financials[3]							
Total amount raised (BUSD)	2.87	1.19	3.55	6.70	16.45	8.14	9.41
Number of firms	365.00	317.00	341.00	202.00	122.00	12.00	2.00

Table 5: Quantiles of firm size for non-space and space companies, and (only for space-related firms) total amount raised in BUSD and number of firms

The table aims to investigate the relative size of space firms by comparing them with non-space firms in the dataset. Quantiles are defined based on the distribution of the number of employees, and the results indicate that space firms tend to be larger up to the 90th percentile. For each quantile, the financial values are reported differentially, meaning that the figures exclude firms from the lower quantile groups (e.g., for the 99th percentile, only firms falling within the 90–99% range are considered).

[3] Data displayed differentially, each value is linked to the quantile, excluding the previous one (i.e. for quantile 99% there are displayed the values for the companies belonging to the range 90%–99%).

4.0.2 Space investors' analysis

This section aims to provide a comprehensive perspective of the most active VC in the space economy by examining their geographic distribution, behavior, and investment patterns, focusing on the 1,015 VC funds involved in financing European space-related firms, in order to give context and further characterise them. Tables 6 and 7 present the ten most active investors in the dataset, ranked according to two criteria: total amount invested and number of firms financed, respectively, computed considering exclusively rounds involving space-related companies. These two aggregations provide complementary perspectives on the investment landscape, capturing both the financial magnitude of activity and the breadth of engagement across firms. At the top of the ranking by total amount invested stands Founders Fund, one of the most prominent institutions in global venture capital. Backed by Peter Thiel (co-founder of PayPal and Palantir, and early investor in companies such as Facebook and SpaceX) Founders Fund follows a strategy centered on founding companies directly in partnership with co-founders and subsequently scaling them through its extensive network. This observation leads to a broader question regarding the strategic characteristics of the most active investors in the space economy. A few patterns clearly emerge. First, these top investors are predominantly generalist players, a finding that remains consistent even when extending the analysis to the top 30 investors, with only a few exceptions. In other words, they do not specialize exclusively in the space sector; rather, they operate across a wide range of innovative industries. This is consistent with the behavior of major institutional investors such as BlackRock, which remain key providers of large-scale capital and enablers of mega-rounds across multiple domains. Furthermore, these leading investors show a strong focus on the *satellite communication* segment, underscoring its attractiveness within the broader space economy. Notably, most of these investors either sell directly to or routinely underwrite firms serving government and defense demand, for example, in areas such as secure connectivity, intelligence, surveillance and reconnaissance (ISR), and disaster response. This close link with public sector clients mitigates revenue volatility and supports long term capital expenditure, reinforcing the strategic stability of investments in this segment. On the other hand, the second analysis reveals a markedly different set of actors. While the total amount invested may reflect a combination of risk appetite and sectoral expertise, the number of firms financed by each investor more likely mirrors their underlying investment strategy. In particular, some entities diverge from traditional

VC profiles, including accelerators and public or government-backed institutions[4]. Their higher propensity to participate in numerous funding rounds appears to be endogenous to their respective investment approaches, which emphasize diversification, support for early-stage ventures, and broader ecosystem development rather than financial return maximization alone.

Investor	Amount in B USD
Founders Fund	3.36
Sequoia	1.29
BlackRock	0.71
8VC	0.30
Seraphim Space	0.26
Minden / Millhouse / Abramovich	0.24
Mitsui Global Investment	0.23
Lightspeed Venture Partners	0.22
Insight Partners	0.20
Promus Ventures	0.19

Table 6: Top 10 investor entities in the space economy by total amount invested.

[4]The investor type classification provided by *Dealroom* often assigns multiple categories to the same entity. Some investors, therefore, can be identified as both VC firms and other types (i.e. accelerator, corporate venture fund, bank).

Investor	# of invested firms
Y Combinator	107
Seraphim Space	88
Techstars	60
Bpifrance	47
EIT Urban Mobility	45
Founders Fund	44
Promus Ventures	43
Airbus Ventures	37
Lazio Innova	35
OurCrowd	34

Table 7: Top 10 investor entities in the space economy by number of firms financed.

Geographic distribution Geographic distribution also plays a critical role in shaping the dynamics of the space innovation ecosystem. Table 8 visualize the spread of investors identified in the 8 countries (plus the European Union) with the highest amount invested in space-related firms, based on the investor's headquarter location for a total number of 1,015 VC. The US emerges as a dominant hub, reflecting its leadership in innovation finance, where 159 or 15.66% investors are located. The United Kingdom (UK), Germany, and France also appear as significant investor bases, consistent with their established positions as European space leaders, in total the European ecosystem counts 756 or 74.5% investors. The table reveals an interesting pattern: although the number of VC operating in Europe is substantially higher, the largest investment volumes originate from U.S. VC funds. The average amount invested per VC reaches approximately USD 53 million in the United States, compared to only USD 8 million in Europe, with modest peaks in the United Kingdom and Germany of around USD 11 million and USD 10 million, respectively. This discrepancy can be traced to structural differences between the European and U.S. venture ecosystems. U.S. VC appear to exhibit lower risk aversion, a behaviour likely shaped by the competitive landscape in which they operate. In the United States, VC activity is highly geographically concentrated in regions such as California, Boston, and New York (Florida and Hathaway 2018), creating intense competition that incentivizes funds to differentiate through higher-risk, higher-return investment strategies. In contrast, the European VC landscape remains fragmented across national markets, where regulatory and border-related frictions continue to constrain capital mobility. The lower geographic concentration of VC reduces competitive pressure, which in turn contributes to greater risk aversion and smaller average investment sizes among European funds. A notable observation emerging from this analysis is the clear overlap between the geographical distribution of VC firms and that of space-related companies. This correspondence suggests that regions with a high concentration of VC activity also tend to host a large number of space-sector firms. Such a pattern underscores the importance of geographical clustering and the integration between financial and corporate ecosystems. The presence of VCs in a given region can therefore be interpreted as a driver of innovation, fostering knowledge transfer, entrepreneurial activity, and value creation. This spatial correlation highlights the central role of financial actors in shaping innovation dynamics within the space economy (Kortum and Lerner 2000; Chen et al. 2010). It also raises an important question regarding the direction of causality in this relationship, if firms attract the establishment and growth of VCs in their regions or the presence of VC stimulate the emergence of new, innovation-driven companies.

Co-investment This analysis aims to identify which types of investors most frequently cooperate with VC in financing the New Space sector. We investigate the role and value of specific investor types in the financing activity. The analysis is conducted computing, the number of rounds, the total amount invested, and the average round size across different investor categories, excluding VC firms. The results clearly highlight the central role of angel investors and corporate venture funds, which together account for over 60% of all rounds and 20% of the amount co-invested and also the highest average round size. This pattern can be explained by examining the function and investment process of VC firms. The primary value added by VC lies in its ability to mitigate informational asymmetries in the financing process. Through rigorous due diligence, venture capitalists evaluate technological soundness, managerial capabilities, and strategic viability, thereby reducing uncertainty for other investors. This verification process represents a key source of value creation, benefiting not only the fund's own Limited Partners (LPs) and General Partners (GPs) but also external financial actors who co-invest in the same deals. When a VC firm decides to invest in a company, it sends a credible signal to the market, increasing investor confidence, enhancing access to additional funding, and improving the likelihood of success for the venture. This signalling effect has been widely documented in the literature, including in the work of Davila, Foster, and Gupta (2003), who demonstrates the role of VC in validating the quality and growth potential of early-stage firms.

Country	Number of VC funds	Average number of deals	Average amount invested BUSD	Total amount invested in space-related firms BUSD	Upstream %	Downstream %	Not defined %
United States	159	5.75	0.053	8.505	3.2	3.4	93.6
United Kingdom	169	4.06	0.011	1.876	24.1	29.2	46.7
Germany	117	3.28	0.01	1.134	31.3	41.4	27.7
France	92	3.04	0.009	0.796	43.9	44	13.4
Luxembourg	18	4.94	0.026	0.463	29.5	12.5	61.6
Japan	13	5.08	0.032	0.415	9.2	4.6	86.2
Switzerland	42	3.36	0.01	0.414	47.9	29.4	25.8
China	8	3.12	0.045	0.358	5.2	1.6	93.7
Europe	756	3.12	0.008	6.329	34.5	33.8	33.6

Table 8: Top 7 countries per amount invested in space-related firms, VC distribution and investment aggregation for each country.

4.0.3 Financial flows analysis

This section will describe and structure aspects linked to deals recorded in the dataset. This investigation try to highlight aspects of maturity and readiness of the space economy. Funding rounds in the dataset exhibit considerable heterogeneity in both size and type. To gain a preliminary understanding of the data distribution and funding magnitudes, the following figures present the number of rounds (Figure 4) and the corresponding total capital invested (Figure 5), segmented by round size. To ensure analytical clarity while maintaining a comprehensive perspective, funding rounds were grouped into eight classes based on the amount (in USD) raised per round: less than $1 million, $1–3 million, $3–5 million, $5–10 million, $10–20 million, $20–50 million, $50–200 million, and greater than $200 million. The distribution of funding rounds across different investment sizes is shown for the entire dataset (left panel) and for space-related firms only (right panel). The two distributions do not differ substantially. In particular, space firms display a pattern that closely mirrors that of general firms, with only a slight difference in the amount based analysis, general firms tend to attract larger investment amounts on average. This difference suggests, at least in part, the higher risk of space-related firms. Nevertheless, as already highlighted in Section 4, a high degree of inequality can be expected among space firms within the dataset, with a relatively small number of large companies capturing the majority of available financial resources. Moreover, this trend may suggest that space-focused ventures typically raise smaller funding amounts compared to the broader start-up ecosystem. This can be explained by the capital-intensive yet narrowly targeted nature of innovation in the space sector, where projects often require significant technological expertise and long development cycles but attract fewer, more specialized investors.

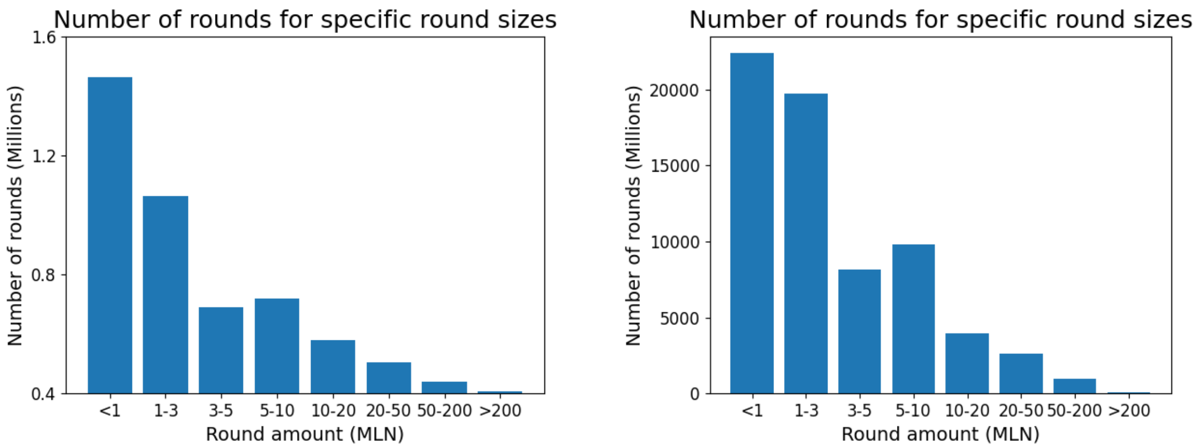

Figure 4: Number of rounds by round size: all firms (left) vs. space firms only (right).

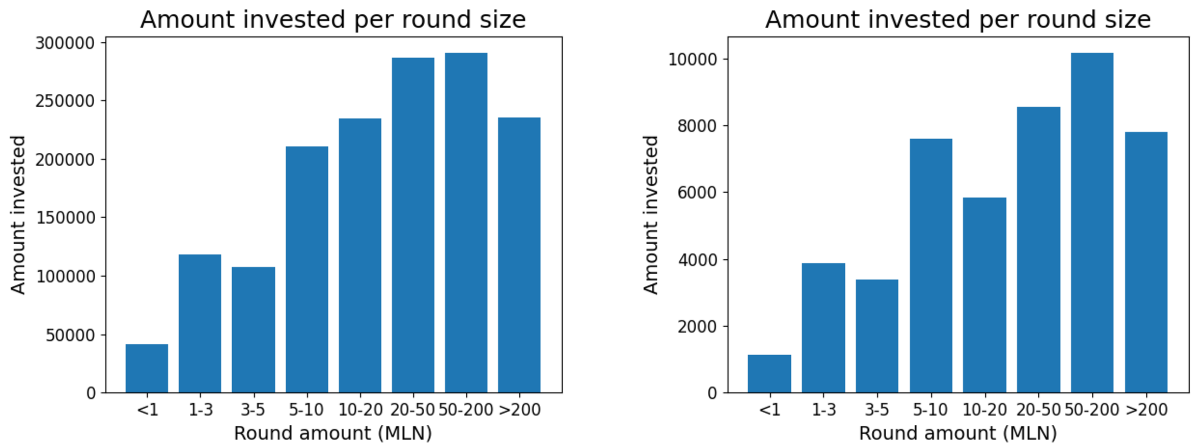

Figure 5: Total amount invested by round size: all firms (left) vs. space firms only (right).

The amount invested is measured in MUSD (Million USD).

In addition to the analysis of round size, the type of funding round provides valuable insights into the dynamics of capital formation within the sector. The analysis encompass the number of rounds and the total amount invested across distinct funding round types, normalized according to Section 3. The focus of the analysis is on space-related companies. This examination offers important clues about the maturity level of the New Space sector. In general, as industries evolve and mature, the proportion of financing allocated to later-stage rounds, tends to increase, reflecting reduced technological uncertainty and greater investor confidence. The results indicate a substantial concentration of investment in later-stage funding rounds, suggesting that the New Space industry is progressively evolving from an early-stage, high-risk environment toward a more structured and mature market. (World Economic Forum 2024; OECD 2019) For each round type, the analysis computes the number of rounds conducted, the total amount invested, and the average round size. The largest share of capital and the highest average round size is deployed through *Later Stage* rounds, accounting for more than 20 BUSD in total investment with an average investment of 24 MUSD. This aligns with the profile of firms financed at this phase, which have generally demonstrated commercial viability, established stable revenue streams, and achieved positive unit economics. At this stage, capital injections are primarily aimed at improving efficiency, consolidating market position, and preparing for potential exit events such as IPOs or acquisitions.

Focus on segmentation: upstream vs downstream Some insights can be highlighted when comparing the upstream and downstream segments of the space economy. The literature consistently identifies a persistent asymmetry in investment patterns, typically showing a clear and sustained investor preference for upstream activities. One plausible explanation lies in the nature of opportunities offered by these ventures: upstream firms, often engaged in manufacturing, launch services, and technological infrastructure, tend to provide more tangible early-stage prospects and clearer technological trajectories. Consequently, they attract more consistent funding during the initial phases of firm development ((European Space Policy Institute (ESPI) 2025; World Economic Forum 2024)). Alternatively, this asymmetry may stem from endogenous structural factors. Upstream firms generally operate within capital-intensive yet highly scalable business models, characterized by stronger technological spillovers, more clearly defined intellectual property boundaries, and a higher probability of achieving economies of scale. To investigate these dynamics, the analysis disaggregates total investments across funding rounds by segment. The results indicate that in *Seed* rounds, downstream firms receive slightly more capital, suggesting a greater investor propensity to allocate early-stage risk toward these firms. However, in *Later Stage* rounds, the analysis suggests a modest predominance of upstream financing. Taken together, this pattern can support the hypothesis that upstream firms exhibit superior scalability and growth potential or, alternatively, that they are more likely to survive and progress through successive financing stages, advancing from seeding to mature growth rounds. Overall, these findings suggest that downstream-oriented firms tend to face higher risk and greater uncertainty. We try to explain this trend considering the business models that often depend on market adoption, integration with non-space sectors, and the development of new service applications, all elements subject to longer commercialization horizons and more volatile demand. By contrast, upstream actors, rooted in established technological domains, benefit from clearer market validation mechanisms and stronger institutional support. This structural divergence reinforces the notion that the spatial distribution of investment reflects not only market preferences but also intrinsic differences in scalability, maturity, and perceived risk across the space value chain. (OECD 2019; European Space Policy Institute (ESPI) 2025; World Economic Forum 2024; BryceTech 2025)

Geography Another dimension explored in this analysis concerns the temporal evolution of capital attraction across different geographical areas. This perspective allows for the identification of spatial and temporal dynamics in investment flows, highlighting how the geography of funding within the New Space ecosystem has evolved over time and how specific regions have emerged, or declined, as focal points of VC activity. Figure 7 illustrates the trajectory of investment volumes from 2010 to 2025 for the five countries with the highest cumulative funding. The United States emerges as the dominant ecosystem, both in terms of absolute investment

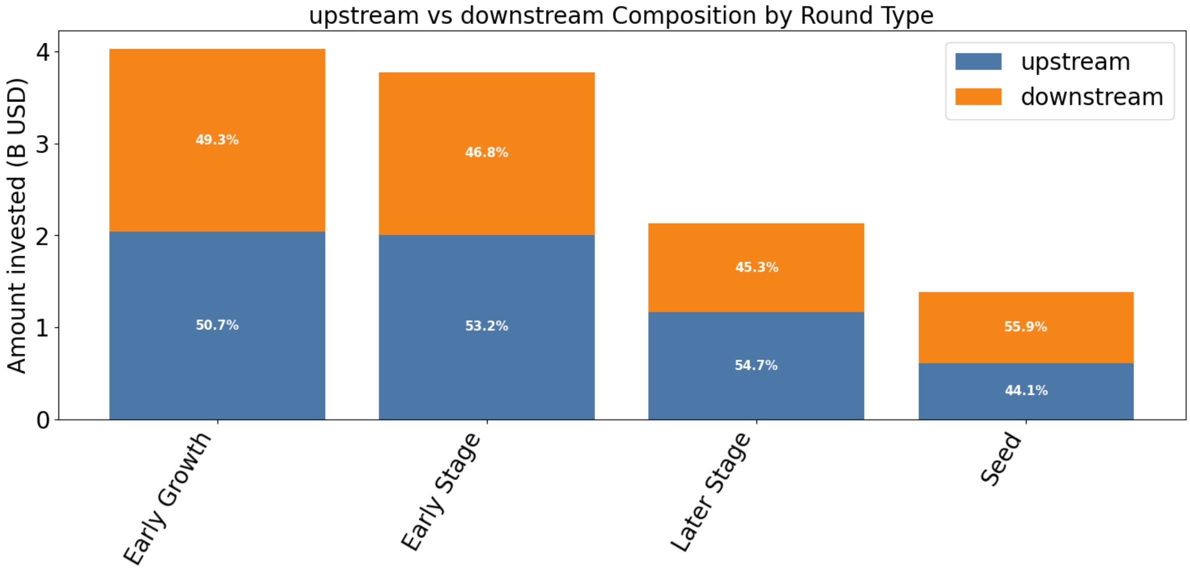

Figure 6: Amount upstream and downstream per round type

Note: the **Round type** has been defined originating from the *round label* provided by *Dealroom*, as the number of labels is too broad and granular for our analysis. In order to preserve the replicability of this work, the normalization is based on the Scheme 1 attached in the appendix.

Furthermore, the analysis only includes investments in firms explicitly classified as upstream or downstream. Firms without a clear classification are excluded from this part of the analysis to ensure the consistency and reliability of the segmentation results.

volume and sustained growth throughout the period. The United Kingdom and China exhibit distinct investment peaks around 2015, followed by phases of decline or heightened volatility. In contrast, the European Union presents a more ambivalent pattern: investment volumes grew steadily until 2022, after which they stabilised at a plateau, showing a slight downward trend in subsequent years. Having identified the origin and destination of capital, it becomes possible

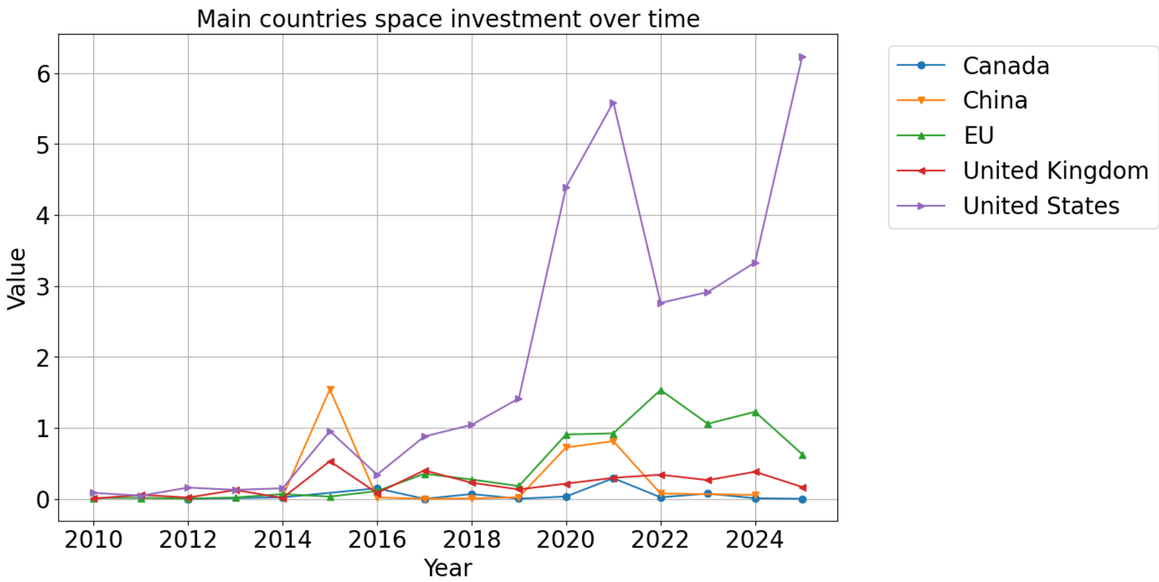

Figure 7: Investment volumes over time in the top five countries by cumulative space-sector funding.

Note: the figures shows the investment in the 5 countries with the highest cumulative funding. As the wide majority of the investment in the space industry has been made between 2010 and 2025, the time window has been restricted in order to reduce complexity. Value in BUSD.

to analyse the investment flows between selected countries. Table 9 presents the results of this analysis, where rows indicate the source of capital and columns denote the destination of investment. The results show that 68.78% of funding directed toward space-related companies originates from domestic investors, indicating that most investors allocate the majority of their capital to firms based within their own country. This finding highlights a strong domestic orientation of investment activity in the space sector. Factors such as geographical proximity, familiarity with national regulatory frameworks, and well-established local networks likely play a decisive role in shaping these investment preferences, reinforcing the notion that spatial and institutional proximity remain central to VC dynamics in the New Space economy.

Destination/Origin	United States	UK	China	Germany	France	Others	Row %
United States	24.77	1.73	0.03	0.26	0.20	3.58	63.32%
UK	0.69	1.70	0.00	0.11	0.09	0.80	6.98%
China	1.63	0.00	1.46	0.00	0.00	0.26	6.93%
Germany	0.43	0.23	0.10	1.13	0.12	0.77	5.77%
France	0.26	0.08	0.00	0.05	1.25	0.26	3.92%
Others	1.17	0.51	0.16	0.22	0.13	4.12	13.07%
Column %	59.90 %	8.80 %	3.60 %	3.70 %	3.70 %	20.20 %	100.0%

Table 9: Cross-border investment flows between major investor and recipient countries based on space-related firms, amount expressed in BUSD

Note: the table shows the absolute flows from the column countries to the row countries, it does not show the overall balance of flows, therefore the matrix is not simmetric. *Row%* represent the total share of capital raised by the country, while *Column%* represent the total share of capital invested by the country.

4.1 Space-focused flagged investors analysis

This section aims to analyse and interpret the behaviours and patterns of space-focused investors, describing the main results of this study. As defined in Section 3, space-focused investors are those that meet the following criteria: (i) the investor belongs, fully or partially, to the VC category; (ii) the investor has completed at least 4 investment deals overall, regardless of sector; (iii) at least 20% of the total capital invested in the years 2016-2020 has been directed toward space-tagged companies; (iv) the investor has participated in at least 1 financing round involving a European space-related firm. All the analysis in this section will refer to data in the **time window 2021-2024** (extreme included). We identify a total of 1,015 VCs that funded at least one space-related firm headquartered in Europe, of which 755 participated in at least 4 rounds of investment overall (in any industry) and from this subset we define 84 space-focused flagged investors. Most VC funds with an SSI close to 100% (Table 12) are entities created for and exclusively operating within the space economy. In this group, we identify specialised actors such as Starbridge Venture Capital, Space Angels, and Levitate Capital. It is also noteworthy, however, that the set of highly specialised investors includes several funds that were originally established with a generalist investment mandate, such as MITO Technology, Chroma Impact Investments, or the Beijing Singularity Power Investment Fund. Their presence suggests that some generalist funds develop a strong strategic focus on space over time, reinforcing the idea that specialization can emerge endogenously as investors accumulate expertise and identify sector-specific opportunities.

Analysis of investment dimensions The following analysis focuses on the degree of specialization among all space-focused tagged investors, as defined in Section 3. The analysis examines the distribution of specialization across this subset of investors, with the objective of providing insights into their investment behaviours, strategic orientations, and the extent to which their portfolios reflect a focused commitment to the New Space sector. Figure 8 illustrates the distribution of the specialization index. The presence of several spikes along the distribution suggests the existence of distinct investment strategies. A noticeable concentration of firms appears around the 20% specialization level, indicating a large group of investors with relatively limited exposure to the space sector. However, it is particularly interesting to observe a significant cluster of VC firms with a specialization index close to 100%, implying that certain financial institutions operate exclusively within the space economy. To deepen this analysis, we computed the average number of deals and the average amount invested for each specialization class. The results indicate that investors with near 100% specialization engage in a lower number of transactions, concentrating their resources on a limited set of high-commitment investments. This class also seems to present a relatively high average investment amount, suggesting a deliberate strategy characterised by high specialization, elevated risk exposure, and strong commitment to a few promising ventures. These findings reinforce the idea that a subset of financial actors operates exclusively and proactively within the space economy, distinguishing themselves from more opportunistic or peripheral participants whose exposure to the sector is occasional or secondary. Conversely, the highest average number of deals is observed among firms with an exposure of around 40%-60% to the space sector, suggesting that partially specialized investors may achieve a balance between focused expertise and portfolio diversification.

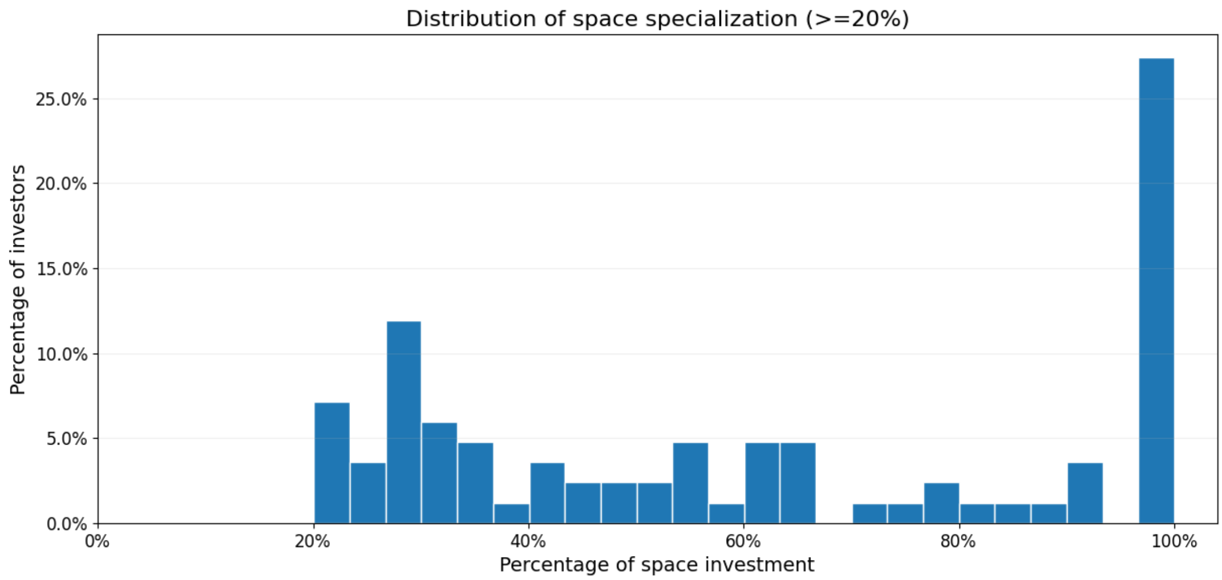

Figure 8: Space-focused investor distribution plot

To further explore investment strategies, Table 10 summarises the main investment characteristics across varying levels of specialization, using data from both space-related and non-space ventures. This analysis tries to investigate, with a clustered approach, the relation between the SSI and specific investment dimensions. For each specialization class (columns), the analysis computes the following: the share of domestic investments, the average round size for space and non-space investments, the average number of rounds, the average time between investments (in months), the segment composition (% Upstream, % Downstream), and the stage distribution (for space and non space companies). Several key insights emerge from this comparison. Within **space-related firms deals**, the average number of rounds seems to increase with the degree of specialization, while the average round size suggests an opposed tendency, although it exhibits substantial variability across groups. Overall, the metrics suggest a differentiation within the investor landscape. As specialization increases, investors tend to invest in a tendentially greater number of firms, with relatively lower amounts, it is reasonable to think that specialized investors seek diversification within the space sector. Besides that, the variability of the metrics across the groups suggests that multiple investment strategies coexist, reflecting heterogeneous approaches to specialization and risk management. In contrast, less specialized VCs exhibit a markedly different pattern: they tend to engage in fewer but larger rounds, implying that they perceive space-related ventures as high-risk, high-reward opportunities. Instead of diversifying within the space industry to reduce sectoral risk, these funds appear to pursue external diversification, concentrating larger investments in a limited number of space firms while allocating additional capital across unrelated industries. This interpretation is reinforced by the patterns observed in **non-space firms deals**. Less specialized investors execute a greater number of deals overall, suggesting a deliberate strategy of cross-sector diversification. Such behaviour indicates that these funds manage their risk-return trade-off by maintaining limited, high-stake exposure to the space sector, while simultaneously balancing their portfolios through broader investments in other technological or industrial domains. Furthermore, the average time between investments seems to be tendentially related to the degree of specialization, likely due to the lower average number of rounds, this suggests that specialized investors spend more time finding deals that fit their competencies.

Table 10: Main characteristics of VC firms according to different levels of specialization.

Specialization %	0–20%	20–40%	40–60%	60–80%	80–100%
General characteristics					
Number of VCs [5]	267	23	13	12	24
Share of VCs	78.76%	6.7%	3.83%	3.54%	7.1%
Domestic investments (%)	64.11	66.74	65.93	40.06	56.93
Deal dimensions (Mean values per investor)					
Average round size (space firms, USD mn)	4.62	3.47	1.97	3.41	2.64
Average number of rounds (space firms)	3.8	3.38	5.14	9.5	5.5
Average round size (non-space firms, USD mn)	5.33	2.71	5.03	2.91	2.8

Average number of rounds (non-space firms)	64.28	12.91	12.31	10.4	7.8
Average time between investments (months)	2.24	4.88	4.47	7.48	6.56
Segment composition					
% Upstream	31.97	51.6	38.3	32.69	39.13
% Downstream	48	46.05	41.2	61.11	30.34
% Others	21.87	11.32	20.5	21.67	34.1
Stage distribution - space firms					
% Seed	27.57	23.36	33.33	15.18	32.28
% Early Stage	33.61	17.43	58.25	33.99	29.1
% Early Growth	28.66	54.93	5.99	29.62	19.7
% Later Stage	10.16	4.28	2.43	21.22	18.91
Stage distribution - non space firms					
% Seed	22.66	33.02	29.6	27.75	43.69
% Early Stage	34.76	39	36.86	35.57	26.1
% Early Growth	28.12	13.14	15.84	31.78	19.81
% Later Stage	14.46	14.84	17.7	4.91	10.4

Note: The analysis presented in the table tries to investigate the average behaviour of investors as a function of their specialization index. Within this conceptual framework, the objective was to identify the typical patterns across the listed dimensions (rows) by first computing the mean values for each investor in the specified time window (2021-2024), and subsequently aggregating these into averages of sample means. This methodological choice also accounts for the endogenous noise inherent in the dataset. Individual venture capital funds may pursue specific investment strategies that diverge from those of their peers; by averaging at the investor level, each fund's strategy influences the behavioural measures equally, ensuring that extreme cases or outliers do not disproportionately affect the overall results. This approach therefore provides a more robust and representative characterization of aggregate investor behaviour across specialization classes.
The **Round type** has been defined originating from the *round label* provided by *Dealroom*, as the number of labels is too broad and granular for our analysis. In order to preverse the replicability of this work, the normalization is based on the Scheme 1 attached in the appendix.

To further characterise investment patterns, the distribution of investments was examined

[5] For the purpose of this analysis all VCs that do not register investing activity between 2021 and 2024 are excluded

across normalised funding round types, considering both space-related and non-space ventures. The patterns emerging from this analysis reveal substantial variability within space-related investments. One of the most notable findings is that specialized investors demonstrate a stronger focus on later-stage rounds compared to generalist investors. This result appears counterintuitive, as the literature commonly associates later-stage financing with lower risk profiles (P. A. Gompers 1995), while it is commonly known the lower risk aversion of specialized VCs (Han 2009). When extending the analysis to non-space investments, a different trend emerges. The data suggest a possible relationship between the specialization index (SSI) and the stage distribution of investments. More specialized investors display a higher concentration of seed and early stage investments. This behaviour may reflect differences in risk management strategies linked to specialization levels: highly specialized VCs may perceive non-space ventures as opportunities to apply their sectoral expertise in high-risk, high-innovation contexts, where their accumulated knowledge and analytical capabilities can be leveraged in novel or unconventional ways. Furthermore, according to the literature, this result can suggest that specialized investors present a greater advantage, compared to generalists, in environments with higher informational asymmetries. (P. A. Gompers 1995) This could explain their higher propensity in focusing in a single sector and earlier round types. Overall, these findings suggest that specialization not only shapes the focus of investment within the space sector but also influences how investors diversify beyond it, balancing exposure through differentiated approaches to risk and opportunity across industries and development stages.

Focus on segmentation: upstream vs downstream. Further insights can be derived from analysing the segmentation of investments across upstream and downstream activities. Previous findings suggest that, while downstream firms tend to attract relatively higher levels of seed-stage funding, they tend to be less successful in securing later-stage investments. This asymmetry may be recognised by specialized investors, who may therefore prefer allocating capital to upstream ventures, typically associated with higher potential returns and lower technological uncertainty once early development milestones have been achieved. The present analysis quantifies the share of capital allocated to upstream and downstream firms, segmented by different levels of investor specialization. Overall the results suggest a tendentially higher propensity for specialized investors towards upstream activities, but, once again, the high variability can be sign of different strategies. For instance investors with 60-80% of SSI show high focus on downstream activities, while not significant difference with generalists on upstream ones. Although the degree of specialization does influence the proportion of capital directed toward upstream activities, the relationship appears rather non monotonic. This pattern likely reflects heterogeneous risk-management strategies across specialization classes.

Geographic distribution. The geographical distribution of space-focused investors provides additional insights into the underlying behaviours and structural patterns of the New Space investment landscape. The analysis covers the global distribution of VC firms identified as space-focused. A notable concentration is observed in the United States, which hosts 13 out of 84 firms, equivalent to 15.5% of the total, primarily clustered in California and New York. In Europe there are 63 investors (75% of the total), mainly located in France and the United Kingdom. The spatial distribution of space-focus flagged investors does not deviate significantly from that of the broader VC population. However, this alignment suggests that space-focused funds tend to emerge in regions already characterised by a strong VC ecosystem. This pattern may indicate that in highly competitive markets, where investors are pushed to differentiate their strategies, specialization in the space sector can function as a competitive advantage. Consequently, this could imply that targeting space-related ventures offers opportunities for superior performance or enhanced success metrics relative to generalist investors operating within the same innovation hubs. The analysis also explores the domestic dimension of investment activity to assess the geographical specialization of investors. The results suggest that the degree of domestic focus is correlated with the specialization index, displaying a negative relationship. Specifically, the geographical focus percentage decreases as the SSI increases, reaching its minimum at 40.06%. An interpretative hypothesis can be proposed to explain this pattern. At low levels of specialization, funds may use their sectoral focus as a differentiating factor within their local markets, leveraging proximity and contextual knowledge to strengthen their competitive positioning. As their specialization deepens, however, these funds tend to shift their strategic orientation outward, trying to capitalize on their expertise and competitive advantages in foreign markets. In this stage, the accumulation of sector-specific knowledge and reputation enables them to operate more effectively on a global scale, where their specialized capabilities can find more appropriate or scalable applications. This finding is consistent with evidence from previous studies, which identify a positive correlation between the degree of specialization and the level of internationalization of venture capital firms (Nörthemann 2023).

Correlation The previous analysis suggests several patterns and characteristics associated with specialized investors. While these observations provide a theoretical foundation for further investigation, the available evidence does not yet allow for definitive conclusions to be drawn with statistical confidence. Nevertheless, based on the identified trends, it is possible to highlight a set of dimensions that display a stronger directional tendency as the specialization index increases:

1. The share of domestic investments (%) tends to decrease.

2. The average round size (space firms) tends to decrease.

3. The average number of rounds (space firms) tends to increase.

4. The average time between investments (months) tends to increase.

5. The share of Later Stage investments (space firms) tends to increase.

6. The share of Seed investments (non-space firms) tends to increase.

To assess and validate these observed patterns, the subsequent analysis examines the relationship between the specialization index and each of the listed dimensions. For this purpose, each variable is evaluated using an OLS regression model, with the specialization index as the independent variable. This approach enables a clearer identification of whether, and to what extent, these dimensions are statistically associated with investor specialization. The results are reported in Table 11. Overall, the analysis confirms only one of the initial hypotheses:

- Average time between investments is significantly and positively correlated with the specialization index.

This finding reinforces the interpretation that more specialized investors take longer between consecutive investments, likely because their highly concentrated expertise requires greater selectivity in identifying opportunities that align with their specific knowledge. Other dimensions exhibit significant relationships with specialization, though not always in the direction originally hypothesized. Within deal-level characteristics, the average number of rounds in non-space firms shows a strong, significant and negative correlation with the specialization index. Together with the longer investment intervals, this pattern support the idea that highly specialized investors engage in less frequent, but more targeted, deal-making, devoting more effort to identifying opportunities aligned with their competencies rather than broad diversification. Similarly, the average round size in non-space firms is significantly negatively correlated with specialization. This is an interesting result and is likely connected to the stage distribution strategy of specialized funds. When examining stage allocation more closely, the analysis highlights that:

- Early Stage, Early Growth, and Later Stage investments all exhibit negative correlations with specialization, indicating that more specialized investors tend to concentrate on earlier round types overall.

However, Seed rounds do not display a significant relationship, likely due to high variability within the sample, which prevents us from validating the previously suggested hypothesis about seed focus. Finally, although earlier descriptive analyses suggested that highly specialized investors might favour upstream activities, the regression results do not support this hypothesis: the corresponding coefficient is not statistically significant. Taken together, these findings indicate that while specialization clearly shapes some aspects of VC behaviour, particularly investment pacing and selective engagement, other expected relationships appear more nuanced and may require more granular data or alternative empirical strategies to be fully validated.

Table 11: Bivariate regressions of ecosystem variables on the Space Specialization Index

	Coefficient			
Variable	β_0 (Intercept)		β_1 (Slope)	
Domestic investments (%)	0.65	**	−0.09	
Deal dimensions				
Average round size (space firms, USD mn)	2.76	**	−0.08	
Average number of rounds (space firms)	2.86	**	−0.12	
Average round size (non-space firms, USD mn)	3.28	**	−2.11	**
Average number of rounds (non-space firms)	35.91	**	−36.75	**
Average time between investments (months)	1.46	**	2.60	**
Segment composition				
% Upstream	0.32	**	0.10	
% Downstream	0.49	**	−0.12	
% Others	0.05	**	0.07	
Stage distribution – space firms				
% Seed	0.27	**	0.00	
% Early stage	0.33	**	−0.01	
% Early growth	0.30	**	−0.07	
% Later stage	0.00		0.01	
Stage distribution – non-space firms				
% Seed	0.17	**	−0.05	
% Early stage	0.33	**	−0.11	**
% Early growth	0.26	**	−0.22	**
% Later stage	0.10	**	−0.09	**

Notes: Each row reports coefficients from a separate OLS regression model of the indicated variable (rows) on the Space Specialization Index (SSI), defined as Variable = $\beta_0 + \beta_1$SSI. Only the intercept and slope coefficients are shown. Asterisks denote statistical significance: * $p < 0.05$, ** $p < 0.01$.

5 Discussion

In this section, we discuss the main limitations of the study, which originate from the nature and source of the data as well as from the methodological choices applied. We then provide an interpretation of the findings on specialized investors, and conclude by situating the research within the existing literature, outlining directions for future investigation.

Limitations of the analysis The principal limitations of this study arise from the definition and structure of the dataset. As described in Section 3, the dataset was constructed through a procedural approach that captures the entire investment history of venture capital firms; it does not allow for a deep qualitative characterization of the funds included. Consequently, important fund-level variables (such as governance structure, strategic orientation, or innovation capabilities) remain only partially observable. Considering the approach to specialization introduced by P. Gompers, Kovner, and Lerner (2009), this study only consider firm level specialization (of the fund in its entirety), overlooking individual specialization (of a single person). Moreover, the study treats specialization as an exogenous characteristic, without exploring the determinants and strategic motivations behind it. The question *Why are VC funds specialized, and what factors influence their degree of specialization?* remains outside the scope of this analysis. Additionally, the assumption made during data construction, that all investors participating in a given round contribute equally, introduces a significant limitation. The investment amounts derived under this assumption should not be interpreted as accurate representations of the actual capital committed by each VC. Rather, they serve as a normalised proxy, allowing us to approximate an investor's participation in a round by proportionally distributing the total round amount. This approach provides a workable metric but necessarily simplifies the underlying financial reality, which may involve substantial heterogeneity in individual investor contributions. Finally, specialization is analysed primarily along a single dimension, based on the sectoral focus of investments. Other potentially relevant dimensions, such as stage specialization, geographical concentration, or syndication patterns, are not examined in depth. This limits the breadth and interpretative horizon of the results, which could benefit from a more multidimensional understanding of specialization dynamics within the European New Space venture capital ecosystem.

Interpretation of the final results. The final analysis describing the investment behaviours of specialized investors is presented in Section 4.1. **Low-SSI investors** tend to adopt a strategy defined by a limited number of high-value investments within the space sector. This behaviour suggests that they aim to position themselves through selective, high-stakes commitments to a small set of promising ventures while managing overall exposure by diversifying across non-space sectors. Their stage allocation reinforces this interpretation: within space-related firms, they show a greater tendency toward earlier-stage rounds, whereas in non-space investments they exhibit a shift toward later-stage financing, consistent with risk-balancing across sectors. In addition, the specialization index shows significant correlations with several investment dimensions. The results can be interpreted as the effects of two main characteristics related to specialized investors. Firstly, the time elapsed between investments increases with specialization, indicating that highly specialized investors adopt a more deliberate and selective deal selection approach. This behaviour aligns with the idea that sector specific expertise requires more precise matching between investor competencies and target opportunities. Secondly, observed correlations between specialization and stage allocation can be interpreted considering the agency theory and the literature (P. A. Gompers 1995): specialized investors may have a competitive advantage in environments with higher informational asymmetries compared to generalist VCs, enabling them to operate more effectively in early-stage or technologically uncertain contexts. Moreover, we are unable to replicate the results of Nörthemann (2023) on cross-border investments, this may be due to relevant dimensions that are not captured in our analysis. In particular, the study identifies several moderating factors, among which it is reasonable to consider fund size as a probable driver for our results, therefore, also based on Han (2009), we hypothesize that specialized funds may, on average, be smaller compared to generalists, and that this effect could be especially pronounced in the space economy sector. However, this falls outside the scope of the empirical analysis and could only represent a starting point for future researches.

Connection to theory and existing literature Building on these characteristics, this study positions itself by emphasizing several distinct features that contribute original value to the existing research: (i) Specialization is defined on an amount basis, allowing for the examination of asymmetric information effects and the financial depth of specialization rather than its frequency; (ii) The study does not investigate the determinants or causes of specialization, treating it as an exogenous attribute and focusing instead on the investment behaviours and strategic outcomes associated with different levels of specialization; (iii) The analysis is industry-specific, concentrating on the space economy and exploring multiple dimensions within this sectoral context.

While these features are specific to this work, the study remains conceptually aligned with and extends existing research directions. Bertoni et al. (2024) proposes a framework for analysing and describing behavioural dimensions of venture capital built upon specialization measures. Building on this foundation, the present study reverses the analytical perspective: rather than explaining specialization through external determinants, it examines how exogenous investment behaviours and strategic patterns vary according to specialization levels. Furthermore, we are unable to replicate the findings of Nörthemann (2023); our results do not show a statistically significant relationship between the level of specialization and the degree of internationalization. This is an interesting outcome that may open avenues for further research on the role of moderating factors affecting cross-border activity among space-economy investors. Finally, building on the insights of P. A. Gompers (1995), our study examines the relationship between stage distribution and specialization, suggesting a potential link between agency theory mechanisms and specialization dynamics within venture capital investment in the space sector.

6 Conclusion and future research

This thesis sets out to investigate the investment behaviours and specialization patterns of VC firms allocating resources within the European New Space economy. The results indicate that different degrees of specialization are associated with distinct investment strategies, revealing systematic variations in risk profiles, investment focus, and strategic orientation across multiple dimensions of VC activity. In particular, the findings suggest that as specialization increases, the structure and logic of investment decisions change significantly compared to those of less specialized investors. This study contributes to opening the discussion on the strategic behaviours and positioning of VCs within the space economy. Whereas previous research has examined specialization through a broad, cross-industry perspective, the present work focuses on a single high-technology sector, allowing for the identification of sector-specific dynamics that may differ from patterns observed in other industries. This represents an initial step toward a comparative understanding of specialization across industries, aimed at uncovering the unique mechanisms and strategic behaviours that shape investment practices in distinct technological domains. Nonetheless, the research acknowledges several limitations arising from both methodological choices and data constraints. In particular, the study does not incorporate macro-level datasets (e.g., WEF 2024 estimates, EU economic forecasts), which could provide broader economic and policy context. Integrating such information would help determine whether the observed patterns are specific to the space economy or whether they may be generalised across other high-technology sectors. Moreover, the findings related to stage distribution across specialization levels suggest promising directions for future theoretical development. These patterns could motivate the formulation of a theoretical model explaining how specialization shapes stage preferences, potentially grounded in agency theory, informational asymmetries, or sector, specific learning dynamics, thereby offering a stronger conceptual foundation for the empirical results. By tracing how specialization influences the flow of venture capital within the New Space sector, this thesis provides insights into the mechanisms through which financial behaviour can either accelerate or constrain technological progress. As space activities become increasingly intertwined with the global economy, understanding these investment dynamics will be crucial for guiding both private strategic decisions and public policy interventions toward the development of a sustainable, competitive, and inclusive space economy.

7 Appendix

Listing 1: Round normalization scheme

```
{
  "Seed": ["seed", "angel", "convertible", "support program", "spinout
     "],
  "Early Stage": ["series a", "early vc", "media for equity"],
  "Early Growth": ["series b", "series c", "growth equity vc"],
  "Later Stage": ["series d", "series e", "series f", "series g", "
     series h", "late vc","private placement vc", "0"]
}
```

Table 12: List of Top 30 Specialized Investors (by SSI) and Their Location

Investor Name	**Country**	**City**
Rymdkapital	Sweden	Stockholms kommun
Beijing Singularity Power Investment Fund	China	Dongcheng District
Chroma Impact Investment	Belgium	
E2MC Ventures	United States	Orlando
Ersel Asset Management	Italy	Turin
NewSpace Capital	Luxembourg	Schuttrange
Levitate Capital	United States	San Francisco
MITO Technology	Italy	Milan
BACS-Innov	France	Lyon
Diaspora Ventures	United States	San Francisco
Furthr VC	Ireland	Dublin
MCJ Collective	United States	Boston
SpaceFund	United States	Houston
The Footprint Firm	Denmark	Copenhagen
Deeptech Ventures	Switzerland	Zurich
TECHFUND	Japan	Tokyo
Kozo Keikaku Engineering	Japan	Tokyo

(Continued) List of Specialized Investors and Their Location

Investor Name	**Country**	**City**
Minden / Millhouse / Abramovich	United Kingdom	London
Seed4Equity	Switzerland	
Helvetica Capital	Switzerland	Zurich
Starbridge Venture Capital	United States	New York City
Swarraton Partners	United Kingdom	London
Space Angels	United States	New York City
Frontier Development Capital	United Kingdom	Birmingham
Space Capital	United States	New York City
Freigeist Capital	Germany	Bonn
Business Finland Venture Capital	Finland	Helsinki
StartLabs	Serbia	Belgrade
Cats.vc	Lithuania	Vilnius

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