ASSESSMENT
OF THE FINANCING
NEEDS
OF SPACE SMEs
IN EUROPE

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Disclaimer:
The present paper and the survey underpinning the research are designed to measure and align the interests of European space enterprises, policy makers and investors. The research’s planning, execution and funding are provided by the authors in their personal capacity, pro bono. The results are intended to be shared publicly, without charge or fee. The aggregate analysis presented in this paper are intended for statistical, policy and financial instruments design purposes in order to support European space enterprises.

The authors would like to thank all SMEs who took part of the survey. Your input will help raise awareness of the European space industry financing needs.

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The cover page features Carina Nebula, one of the largest star formation regions known to humanity. Similarly to stars, start-ups and small businesses often evolve from chaotic conditions into one of the brightest objects on the sky...
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Executive summary

The space industries, since their inception in the late 1940s, have been discrete, relatively niche sectors whereby political and military considerations superseded scientific and market rationales. This status quo is changing rapidly in recent years with increased commercialisation of the sector and thus, poses the problem of access to finance, especially for small and medium space enterprises. To date there has not been a comprehensive study with statistically significant data of the economic and financial developments and requirements of the European space industries. There is an expressed need for industry-wide investment research and publications on the subject. Without comprehensive and reliable aggregate economics, business cycle and financial metrics, commercial banks and private equity funds would continue to offer sub-optimal financial products. Ultimately, this results in forgone opportunities for European economies and society in general. Hence, this paper attempts to examine in a systematic way the access to finance challenges faced by European small and medium enterprises active in the space sector, particularly when expanding their business activities.

The conducted research identified market inefficiencies and suboptimal financing conditions for European space SMEs. Significant improvement in the investors’ confidence in the sector along with moderate pace of public investments, mainly in the form of financial instruments, are both simultaneously needed to reduce the perceived market risk.
SECTION 1: Introduction and research objectives

1.1 Introduction

From research and development (“R&D”) to manufacturing supply chains, the space industries were designed first and foremost as a tool to ensure external and internal security along with technological superiority over rivaling political blocks. As a result, the space industries and the budgets supporting R&D have remained relatively intact during economic downturns (OECD, 2014) and periods of social unrest. Progressively with time, the space industries have opened more and more to commercialisation and civilian operations. Nevertheless, they continue to be partially isolated from processes and dynamics typical for the social and economic life of modern societies. The resulting status quo is beneficial only to a certain extent: For example, the space industries did not suffer from significant downscaling during the Great Recession in 2008. Irrespectively, the research underpinning this paper demonstrates that the relative isolation of the space sector is a significant impeding factor to greater commercialization and a higher degree of financial self-sustainability1, especially in Europe.

The paper consists of five sections. The first one presents an introduction to the survey topic, the research questions and the relevant background information. The second section outlines the working definitions and relevant methodology. The third part includes a brief literature review and analyses the knowledge gap expressed in comparative lack of publications and investment research. The fourth section presents detailed results of the undertaken survey and the last part provides recommendations for financial instruments suitable for space enterprises, taking into account the European capital markets specificities.

1.2 Research objectives

The primary objective of this paper is to bridge the aforementioned knowledge gap by analysing the financing needs of space enterprises incorporated in the European Union (EU) and European Economic Area (EEA). To achieve this primary objective, an industry-wide survey assessing the financing needs of European small and medium enterprises active in the space industries was developed. The survey was circulated to a select group of eligible companies in order to produce relevant and meaningful results.

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1 Understood as independence of public funding.
The survey was designed with the specific goal of addressing the following research questions:

- **Research Question (1)**: Are EU space SMEs at a more disadvantaged position when accessing finance as compared to all other European SMEs?

- **Research Question (2)**: Which financial instruments are suitable for European space SMEs?

### 1.3 Industry background

The European space industry, along with its peers across the globe, has shown significant dynamism in the last decade with new business ventures offering innovative downstream and upstream products and services. The commercialisation of space exploration in and beyond Europe is expanding, buoyed by innovative public-private partnerships offered by key stakeholders such as the European Space Agency (ESA) and the National Astronautical and Space Administration (NASA). In 2016, ESA laid out a strategic development plan aimed at increasing cooperation with private space enterprises under its Space 4.0 stage of space exploration. The agency defined Space 4.0 as “a time when space is evolving from being the preserve of the governments of a few spacefaring nations to a situation in which there is an increased number of diverse space actors around the world, including the emergence of private companies, participation with academia, industry and citizens” (ESA, 2016). Thus, ESA’s strategic objective confirms the necessity to examine the financing needs of private space actors.

Taking into account the significant R&D costs and the many technological utilisation limitations stemming from national defence and foreign policy concerns, public-private partnerships are expected to be the dominant form of cooperation between governments, academia, research institutes and space enterprises. This market setting poses several considerations for European space enterprises, affecting the expansion of their operations and the global market share competition. Additionally, it is worth pointing out that EU-based SMEs, from all industry sectors, have struggled more than their United States (US) peers in developing successful R&D intensive business ventures. This is particularly salient for companies based on spin-offs and technology transfer (TT). Market and regulatory analysis attribute the discrepancy to three main reasons:

- **Reason 1. Impaired access to finance for technology and R&D intensive SMEs.**

  Historically, European SMEs have relied more on bank lending than capital markets. Banks finance
predominantly later stage enterprises with stable revenues. Even though, the EU is at par with the US in terms of GDP and its population is greater than that of the US, US venture capital (VC) funds invest 5 times more per year\(^2\) than European VCs and the ratio of US VC to GDP financing is 7.5 times that of EU (Acevado, Adey, Bruno et al 2016). Moreover, growth capital in Europe, known as Series B financing, is significantly undersupplied (CB Insights, 2014). Hence, the shallower capital markets in Europe represent an impeding factor for technology intensive SMEs, including space enterprises, making it difficult to find financial support beyond the seed stages and grants for R&D.

**Reason 2. Higher risk-averseness of the European academic, scientific and engineering communities, described as the European Innovation Paradox.**

Traditionally, Europe has a strong public sector science base whilst in academia. Teachers and researchers have a predetermined, distinctive roles throughout their careers (De Cleyn, Festel 2016). In contrast, in other developed regions of the world, mainly the US, science is funded by private companies or research centres, making academia a competitive environment with higher pay and mobility of staff, thus incentivising business risk taking.

**Reason 3. Incomplete EU Single Market.**

The European Union has gone to a great length to partially harmonise its Member States legislative systems. Additionally, the Capital Market Union (CMU) is envisaged to be completed by 2019 (European Commission, 2017). Until the CMU is actually completed, diverging national regulatory and tax regimes as well as innovation systems will continue to be in place, thus leading to fragmented VC investments and reduced market potential (Acevado, Adey, Bruno et al 2016).

Considering the above, the research objective of this study is to bridge the knowledge gap in understanding the financing needs of space SMEs and propose suitable financial instruments that would strengthen and expand these businesses given the European context. It is beyond the scope of this study to examine factors such as the incomplete CMU or higher risk averseness due to political and cultural factors, but the impact of such factors on market potential for space enterprises is taken into account.

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\(^2\) In 2015 EU based VCs invested USD 13.5 bn, US based VCs invested USD 72.4 bn. Although the investments on both sides of the Atlantic increase steadily in time the nearly 5 times difference is persistent.
SECTION 2: Methodology, research scope and definitions

2.1 Methodology

A combination of quantitative and qualitative methods was employed to provide a systematic overview of the European space enterprises’ access to finance. A structured questionnaire was designed and circulated to a randomly selected sample of eligible EEA based space SMEs. In order to answer Research Questions (1) and (2), the survey was intentionally designed to be identical to the European Central Bank’s Survey on Access to Finance for Enterprises. To estimate the total population of EU and EEA based space SMEs a dedicated 3-step approach along with a data algorithm were developed and a data aggregator service to implement the algorithm was selected. The data algorithm singled out 2,435 space SMEs based in EU and EEA as of April 2018 and this number was assumed to be the total population of European space enterprises. Starting from July 2017 to May 2018, the survey was circulated to circa 300 enterprises using publicly available contacts, various networking and investors’ platforms, as well as personal contacts of the researchers. The response rate was 26% or 76 enterprises, thus achieving confidence level of 80% and a margin of error of 8% with regards to the core research objectives³.

The conducted survey obtained a weight of 33% downstream, 47% upstream, and 20% -both downstream and upstream.

2.2 Research scope and definitions

To ensure methodological consistency, the research used pre-existing definitions and terminology to the extent available, particularly when making industry comparisons. In certain cases, like the notion of space economy, the study attempts to enrich existing conceptual frameworks taking into account the most recent developments in the space sector.

The research unit of analysis is an SME active in the space sector (“space SME”) with country of inception either an EU or an EEA Member State. As outlined in Section 2.1, the study used a 3-step approach to identify the total population of space SMEs in the EU and EEA. Briefly, the 3-step approach combines an exclusively developed for the purposes of this study

³ The survey was composed of 26 questions, results from 25 questions are considered meaningful and reported in the paper. The confidence level and margin of error pointed in the paragraph above are relevant for Question 9, Rejection Rates.
data algorithm that filters in space SMEs based on the European Commission (EC) definition of an SME and a modified version of Bryce Space’s definition of a space company.

**Step 1. SME definition:**

An SME is a company with up to 249 employees, revenues of up to EUR 50m, balance sheet of up to EUR 43m and possessing a certain degree of autonomy (e.g. not being owned by a large enterprise or being linked to a group of small enterprises whose consolidated employment and financial figures exceed the aforementioned thresholds (EC Recommendation 2003/361/EC). Unlike large enterprises, autonomous SMEs do not have the opportunity to finance R&D and business expansion using revenues from multiple activities, hence their easily identifiable business scope. To the extent start-up enterprises fit the SME definition, they were included within the scope of research. Although there is no standard, widely accepted definition of a start-up, a general agreement in the financial industry is formed that a start-up is an enterprise in its initial stages of product and business development, typically with 3-5 years of financial reporting. Within the EU, SMEs make up 99.8% of all enterprises, 57.4% of value added, 66.8% of total employment and 85% of net job creation (SME access to finance conditions 2017 SAFE results – EU, 28/11/2017);

**Step 2. Space enterprise definition:**

A space enterprise is a company active in one or more of the following four space-related business activities: 1) design, manufacturing, testing, launching and maintenance of spacecraft; 2) Satellite operations, satellite communications and streaming services, production of satellite navigation equipment; 3) Earth observation and data analysis from satellites or other spacecraft sources, space educational activities and trainings; 4) Space resources utilisation, space tourism and any other revenue generating downstream or upstream product or service. This broad definition builds on OECD Space Forum and Bryce Space definitions of ‘space economy’ and ‘space enterprise’ proposed in 2014 to include the most recent developments and products offered;

4 One widely used by European VCs typology for start-up development stages is proposed by the European Investment Fund (“EIF”) and defines start-up stages as follows: seed stage, when entrepreneurs have a concept and/or idea without active operations; early stage, when entrepreneurs began product and service testing with preliminary sales activities but the enterprise is not fully operational; growth stage, when commercial revenues are present however the enterprise needs external financing to sustain scaling-up its operations; expansion stage, the enterprise has achieved a certain degree of autonomy and is ready for an initial public offering. Commercial banks in Europe typically consider “a startup” any company with 3-5 years of financial and accounting track records.
**Step 3. Data algorithm:**

A data algorithm was developed with a suit to signal out space SMEs in EU and EEA following the set of rules defined in Steps 1) and 2). The data service provider selected to run the algorithm is BVD Orbis by Moody’s Analytics. The algorithm is composed of seven rules and performs a Boolean data search wherein companies identified in each step are compared with those in the preceding step and only companies’ records satisfying all the rules are filtered in. The seven rules selected for the algorithm encompass geographical, industry classification, trade description, financials, degree of company independence and legal status data references.

The first layer of the search starts by signaling out companies registered in the EEA. The second layer identifies companies with NACE codes potentially related to space activities. The third layer searches for keywords in available trade, product or service descriptions and document filings. The fourth and fifth layers filter in companies based on operating revenue (maximum EUR 50mn) and total assets (maximum EUR 43mn). The sixth layer uses a BVD Orbis Indicator customised for the purposes of this research to filter in independent and autonomous SMEs excluding subsidiaries of large enterprises, foreign owned companies, branches and companies with unknown shareholder structure. The seventh layer uses the legal status to filter in only active companies excluding dormant or insolvent firms, companies in restructuring and other companies unable to have an independent and autonomous decision-making.

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5 List of captured NACE codes: C30.3.0 Manufacture of air and spacecraft and related machinery, C33.1.6 Repair and maintenance of aircraft and spacecraft, H51.2.2 Space Transport, J61.3.0 Satellite Telecommunication Activities, J63.1.1 Data processing, hosting and related activities, J58.2.9 - Other software publishing, N80.2.0 - Security systems service activities, M72.1.9 - Other research and experimental development on natural sciences and engineering, M74.9.0 - Other professional, scientific and technical activities n.e.c, M71.1.2 - Engineering activities and related technical consultancy, M71.2.0 - Technical testing and analysis, P85.3.2 - Technical and vocational secondary education, P85.4.2 - Tertiary education, P85.5.9 - Other education nec

Table 1. EEA based SMEs active in the space industry.

<table>
<thead>
<tr>
<th>A. No</th>
<th>B. Rule</th>
<th>C. Step Result</th>
<th>D. Search Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>World region/Country/Region in country: European Union [28], Norway, Iceland</td>
<td>81,072,327</td>
<td>81,072,327</td>
</tr>
<tr>
<td>2.</td>
<td>NACE Rev. 2 (All codes): 303 - Manufacture of air and spacecraft and related machinery, 3030 - Manufacture of air and spacecraft and related machinery, 3316 - Repair and maintenance of aircraft and spacecraft, 512 - Freight air transport and space transport, 5122 - Space transport, 582 - Software publishing, 5829 - Other software publishing, 613 - Satellite telecommunications activities, 6130 - Satellite telecommunications activities, 631 - Data processing, hosting and related activities; web portals, 6311 - Data processing, hosting and related activities, 7112 - Engineering activities and related technical consultancy, 7120 - Technical testing and analysis, 7219 - Other research and experimental development on natural sciences and engineering, 7490 - Other professional, scientific and technical activities nec, 8020 - Security systems service activities, 8532 - Technical and vocational secondary education, 8542 - Tertiary education, 8559 - Other education nec</td>
<td>8,777,022</td>
<td>2,754,091</td>
</tr>
<tr>
<td>3.</td>
<td>Trade description given in English, Description and history, Products and services, Zephyr business description: Any Words (&quot;spacecraft&quot;, &quot;satellite&quot;, &quot;remote sensing&quot;, &quot;launcher&quot;, &quot;rocket&quot;, &quot;spleafight&quot;, &quot;space exploration&quot;, &quot;lunar exploration&quot;, &quot;mars exploration&quot;)</td>
<td>19,564</td>
<td>4,630</td>
</tr>
<tr>
<td>4.</td>
<td>Operating revenue (Turnover), using estimates (th EUR): Last available year, max=50,000, exclusion of companies with no recent financial data and Public authorities/States/Governments</td>
<td>60,344,266</td>
<td>3,642</td>
</tr>
<tr>
<td>5.</td>
<td>Total assets, using estimates (th EUR): Last available year, Last year -1, Last year -2, for at least one of the selected perios with no recent financial data and Public authorities/States/Governments</td>
<td>22,305,260</td>
<td>3,302</td>
</tr>
<tr>
<td>6.</td>
<td>BvD Independence indicator: A+, A, A-, B+, B, B-, C+, C, Add companies for which all shareholders or all shareholders with a stake greater than 25% are individuals or employees</td>
<td>51,891,162</td>
<td>2,436</td>
</tr>
<tr>
<td>7.</td>
<td>Status: Active</td>
<td>192,496,626</td>
<td>2,436</td>
</tr>
</tbody>
</table>

**TOTAL** | **2,436**

*Source: BVD Orbis by Moody’s Analytics, export date 3 April, 2018.*
To confirm the accuracy of the information gathered through BVD Orbis, the outputs were compared with the database of contractors that ESA publishes in EMITS, the agency’s system for publishing invitations to tender and information about the ESA procurement process. If the ESA database is filtered by SMEs\(^7\), the number of EU and EEA registered companies is 2,559. Hence, the developed method could be considered to provide an accurate proxy for the space SMEs segment size in the EU and the EEA.

**Dataset limitations:** It has to be recognized that the undertaken approach has certain intrinsic limitations. First, not all space SMEs that the researchers were familiar with were captured by the algorithm. Newly established companies without years of accounting track-record, document filings and detailed websites are difficult to trace on an aggregate level. Second, it is possible that certain companies active in the space industry were not captured by any of the algorithm data references due to fillings in non-English languages that the data aggregator did not (yet) translate. With regards to ESA’s database, most of the companies working in the European space sector have had or still have a contract with ESA. Nevertheless, some start-ups or newer companies active in the space sector may not feature in the ESA database, while other featured may not necessarily provide space related services.

\(^{7}\) ESA’s classification follows the same definition as the European Commission.
SECTION 3. Literature review

This section seeks to examine the existing investment and academic research and publications on SMEs financing in the space sector in Europe. The section starts by presenting an overview of the space economy in order to contextualize the role and direction of space SMEs in Europe. Subsequently, the effect of the risk associated with space projects is addressed, followed by a comparison of the actual space SMEs financing in the United States and Europe. Finally, the number of publications on financing space SMEs available in the literature is analysed in contrast to similar publications for other industry areas, highlighting the scarcity of these in the space industry.

3.1 Market opportunities in emerging space

In recent years the amount of publications targeting the space market has increased considerably. Many space industry trends are mentioned in recognized reports from Morgan Stanley, Northern Sky Research, Space Tec, NASA and also in books and publications (Tkatchova, 2018). A 2017 report by Morgan Stanley expects the space market to grow from EUR 284bn in 2016 to EUR 894bn by 2040. Albeit a myriad of newly promoted space business activities (such as space tourism and space resources utilization) are developing, in 2016, EUR 211bn or 75% of the space economy was dedicated to satellite services (Morgan Stanley, 2017). Northern Sky Research outlines that the space market falls into three broad segments (ranked by revenue generating potential):

- **Space to Earth.** Services delivered from space assets for use on Earth (e.g. Satellite services).

- **Earth to Space.** Infrastructure and services provided on Earth to facilitate the use and exploitation of space (e.g. Launch Manufacturing).

- **Space to Space.** Services delivered in space. (e.g. satellite servicing, space tourism).

The “Space to Earth” segment is considered the most attractive segment given the potential of small satellite constellations to deliver global coverage. This classification indicates that each segment may have typologies of SMEs with different characteristics, thus impacting their respective financing needs (Belle, 2017).
In 2017 and 2018 two relevant studies were published: Goldman Sachs’s “Space The Next Investment Frontier” (2017) and Bryce Tech’s “Start-up Space - Update on Investment in Commercial Space Ventures” (2018). They analyse the investment opportunities and status of the space industry and space start-ups. In particular, Bryce’s study focuses on private investments in space start-ups between 2000 and 2017. Goldman Sachs envisages a large scale “Creative Disruption” process to unfold in the industry whereby not all existing players would survive and a new generation of space companies would emerge (Goldman Sachs, 2017). Overall, there is a growing interest in the space industry and it is expected that space SMEs will play a key role in disrupting the market.

3.2 Diverging definitions of space SMEs

Defining what constitutes a “Space SME” and using it as a unit of study posed a major challenge for the survey in particular for analysing public registrars and aggregate economic data. In standard industry classifications, such as NACE and GICS, space related activities are usually grouped with other industries. For example, in the case of NACE codes, space components manufacturing and maintenance are grouped with aircraft production and servicing whereas in the GICS, space is grouped with defence. One notable exception in the NACE codes is space transport which has its own code. On the other hand, an industry such as Biotechnology is less ambiguous to study as its R&D and experimental production have a dedicated NACE code. Albeit several reports and studies before the present survey attempted to define what constitutes a space SME, the difficulties of juxtaposing such definitions with the available industry classifications and data aggregators (such as BVD Orbis, Bloomberg Terminal, Thomson Reuters Eikon) so as to derive meaningful and statistically significant data remain high.

The researchers’ 3-step approach presented in Section 2.2 is an attempt to bridge the gap between practically available industry data and the most recent definitions of space companies.

The literature review identified several non-fully compatible definitions of space SMEs and space enterprises in general. For instance, the Eurospace (2015) report mentions that, according to the European Commission SME definition, to qualify as an SME, a large company shall not control its capital. However, significant amount of space companies are subsidiaries or not fully independent of larger groups and therefore are excluded from that definition. Eurospace considers a space enterprise a “corporate entity or business unit or department involved in the design, development and production of space systems”. 
ESA uses the European Commission definition, but when looking at public databases of ESA the number of entities registered as SMEs represents less than 20% of all entities. It is not clear from the information available in the database if all the companies registered have actually implemented a space-related project with ESA or if all registered entities fall under the category “providing space products or services” (e.g. IT companies or facility management).

Bryce Space defines the studied companies as start-up space ventures as follows:

- **Space company**: is a business entity that provides space products or services in the following 4 main areas (upstream and downstream): 1) manufactures satellites, launch vehicles or other space based systems; 2) manufactures satellite ground equipment; 3) provides services that rely on these systems, or 4) provides analytic services based on data collected extensively from space-based systems, alone or in combination with terrestrial systems.

- **Start-up venture**: space firms that have received seed funding or venture capital.

The limitation of Bryce Space’s definition is that it potentially covers large enterprises.

### 3.3 Significance of space SMEs in Europe

In Europe, the space manufacturing industry is considered an infrastructure supplier. The sector operates at higher ends of the space value chain, supplying service providers and public institutions with spacecraft and launchers to meet their requirements (Eurospace, 2015). The space industry in Europe has been on-going a continuous consolidation in the last two decades leading to the creation of big prime companies that play a very important role in terms of production, turnover and employment. Large industrial holdings, such as Airbus Group and Thales, were directly responsible for 53% of the space industry employment in Europe (Eurospace, 2015). Furthermore, SMEs represented less than 10% of the total space industry manufacturing employment. Figure 1 shows the percentage of SMEs employment in Europe.
By comparison, within the EU, SMEs represent the backbone of the economy generating EUR 3.9 trillion value added per year and representing 99.8% of all European non-financial enterprises (SME Envoy Network, 2017; OECD, 2017). The above statistics confirm that the EU SME space segment does not follow similar development trends as the wider economy.

Despite the fact that space SMEs represent a very low fraction of the space manufacturing employment in Europe (Figure 1), they are qualitatively important due to their capacity for innovation and as a part of the knowledge transfer chain (ESPI, 2016).

A report by Northern Sky Research found that although the rate of establishing space start-ups has increase significantly since 2000, around half of these ventures struggle to mature from an R&D stage to a growth and expansion stages where products and services are sold and customer traction is acquired, most specifically having healthy stream of recurrent revenues.
3.4 Challenges in measuring the investment risk of space enterprises

The space industry has been the subject of increased interest from media and private investors in recent years. However, this has not resulted in a thorough industry-wide financial and policy analysis. The main impeding factors which lead to suboptimal decision making or limited market potential are the already pointed out fragmented industry coverage along with significant risk and uncertainty (Morgan Stanley, 2017). Reports and articles published since 1988 until 2017 still qualify space ventures as risky businesses (Gerosa et al., 2001; Beauregard, 2017; Summerer, 2009; Garrick, 1988).

Large part of the risk associated with space activities stems from complicated, multiannual R&D activities and mission planning. This is combined with the general scarcity of aggregated industry-wide data and business case studies, thus leading to information asymmetry and suboptimal investment decision making. Normally, the financial industry relies on corporate loan tapes with hundreds of thousands of data points, historical trends and detailed industry investment research. In the absence of historical data and financial metrics, estimating the risk of investment decisions should be made on a case-by-case. This often necessitates dedicated technical personnel, which makes scaling up investment decisions arduous and expensive. In addition to the scarcity of economic research, historic accidents and failure records combined with the public institutions’ low tolerance for risk, result in a risk-averse culture in the industry and in the researchers’ view represent a clear constraint to access to finance.

3.5 Who is investing in commercial space?

Bryce Space claims that worldwide more than 180 space companies have received angel or venture investment between 2000 and 2017, with a clear increase in the period from 2012 to 2017. The amount of funding raised in the period 2000-2017 is over USD 18.4 bn. The same study from Bryce Space has also identified around 550 investors in space start-ups and this number could even be higher if the undisclosed deals were considered. In its report, Bryce Space identifies an increase of investments in recent years: 75% of the USD 18.4 bn investment in space start-ups has happened in the last 6 years, while 80% of the investment in space start-ups from VC firms occurred in the last 3 years. The report also indicates that 75% of the invested amounts and 60% of the investees and investors where located in the United States. The next country in the list with the most investors in space activities is the United Kingdom, home of 15% of non-US investors, followed by Japan, Israel, Canada, Spain, China and India (Bryce Space and Technology, 2017).
**Angel investors**

Amongst the angel investors indicated by Bryce, there are approximately 141 investors of which 91 or 65% are located in the United States. Japan comes second by hosting 19%, of the space angels, followed by India with 13%. Other countries home of angel investors are Russia, Israel, the United Kingdom and Canada. As evident from the data provided by Bryce, EU or EEA based space angels are not representative.

**Venture capital funds**

VC funds investing in space are also predominantly located in the United States. Out of the 250 VC funds that invested in space, 166 or 66% are located in the United States. From the EU and EEA countries, the UK represents a notable exception by hosting 20% of the VCs that invested in at least one space enterprise. Venture Capital investors closed 44 deals. Interestingly, out of the 87 venture capital firms investing in space, 43 appear to be new to the sector (Bryce Space and Technology, 2017). These statistics point to a growing interest in space ventures.

**Banks and insurance companies**

Banks and insurance companies have been involved in the space industry for the past 30 years, predominantly by financing large satellite launches. These large ticket (EUR 100 mn or more) transactions are usually arranged on a bespoke basis and only several of the largest banking groups, such as Deutsche Bank, ABN AMRO, BNP Paribas or Citigroup are involved (Bryce Space 2018, Goldman Sachs, 2017). Debt financing for start-up space ventures seems to have lost ground in recent years. Out of the total USD 4.5 bn raised in the period 2000-2017, 91% of the value was raised between 2006 and 2011. In 2017 only USD 5 mn in debt financing have been reportedly raised.

**Space SMEs sources of financing**

Sources of investment could be grouped into three broad categories: retained earnings (internal), intra-group financing (internal) or external financing (debt, equity, grants). The scarcity of data suitable for comparisons between different market segments (broad economy versus the space industry) and across geographies (EU versus United States) poses significant challenges in identifying trends and market structure. For the purposes of this survey, the researchers have identified a rare case of a possible comparison, presented in Figure 4, where EIB Group data on external investments used by European SMEs within 12 months is compared to Bryce Space figures on the annual average investments by type financial product. Bryce Space data suggests
that 98% of the investments in space start-ups were provided in the form of equity, grants or prizes. On the other hand, aggregated data for European SMEs (all industries) evidences a diametrically opposed composition of external finance, whereas 95% of the investments come from debt products (loans, leases, credit lines, etc). The difference in the composition could be attributed to:

- Space debt financing appears to be offered predominantly on a bespoke basis for EUR 100 mn or larger projects, hence streamlining and standardising the banking products into smaller amounts, higher frequency transactions is currently not viable;
- Longer, difficult to predict business cycles and technical complexities makes investing in space viable only via equity (i.e. the investors have ability to directly influence decision-making).

**Figure 3.** Composition of external investment finance: Emerging space enterprises versus SMEs (broad economy).

Sources: EIB Group Investment and Investment Needs survey 2016, Bryce Space 2018 Start-up.

**Methodological note:** Bryce Space figures include averaged annual volumes of investments in space enterprises for the period 2012-2017 in USD whilst large enterprises are also included in the data. EIB Group series are based on SME and Large enterprises survey data where
the companies indicated the contribution coming from each financial instrument in covering their annual needs for external finance.

### 3.6 Knowledge gap: the space industry is comparatively understudied

In order to confirm quantitatively that the space industry is comparatively understudied in terms of investment and other social sciences research, a dataset was compiled (Table 2) presenting clearly the gap in amount of publications in online content aggregators and digital libraries.

The search engines considered for Table 2 dataset are JSTOR, SpringerLink, Google Scholar and Bloomberg Terminal. The keywords for the search were carefully selected to include data comparable to the space sector. Three business activities were selected for the comparison: Agriculture, Renewable Energy and Biotechnology.

**Table 2.** Publications volume comparison: Space industry access to finance vs other industries.
Methodological note: The search in JSTOR, SpringerLink, Google Scholar and Bloomberg Terminal was conducted in October and November 2017. If recent studies are conducted the results will likely vary.

Agriculture is a “classical” business activity extensively studied by academia and investment research firms. Renewable energy and biotechnologies are business activities comparable to space in terms of commercialisation occurring in late 20th century as well as in terms of being R&D and capital expenditure intensive. However, neither renewable energy nor biotechnologies were ring-fenced for defence purposes for such a prolonged period of time as space was.

The results of this comparison indicate a lower number of space sector publications (on the right most side of Table 2) versus other industry areas on the same topics. Even if the empirical search produced some results on space surveys related to finance, there was not a single survey published related to financing space SMEs in Europe.

As evident from Table 2, the space industry is significantly understudied when it comes to investment and economics research in comparison with both classical and nascent industries. Moreover, space has been subject to notably less business surveying, which further contributes to the knowledge gap and possibly ineffective management decision-making.
SECTION 4: Survey analysis and results

The survey was conducted between July 2017 and May 2018. A summary of the obtained results is first presented and then comparisons are made regarding geographical distribution of the surveyed SMEs in Europe and the segment they base their work on. The results are expressed in graphs of statistical information.

4.1 Survey summary

From the 300 companies to which the survey was circulated, 90 responded producing entries. However, fewer companies provided valid answers. The method to prove the validation of the answers was based on the level of completion of the survey and the corresponding company background check in order to filter duplicate or fake answers. The researchers filtered out companies that did not satisfy the SME definition criteria, and at the end, the number of valid answers was set to 76.

The survey included 26 questions. For ease of completion, 24 of these questions included already provided answer choices to be simply selected and only 2 questions required an open answer. The results of 25 questions are presented in Section 4; one of the questions did not gather enough meaningful inputs and is omitted.

**Question 1.**

**Information of your company.**

The survey collected basic information about the companies including the registered and official name and the country of registration. For confidentiality purposes, however, granular data will not be displayed.
SECTION 4. Survey analysis and results

Figure 4. Geographical distribution of the space SMEs answers analysed.

<table>
<thead>
<tr>
<th>Year of registration</th>
<th>Number of answers</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1990</td>
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<td></td>
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<tr>
<td>1991</td>
<td>0</td>
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<td>1992</td>
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<td>1993</td>
<td>1</td>
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<td>1994</td>
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<td>1998</td>
<td>2</td>
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<td>2000</td>
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<td>2002</td>
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<td>2003</td>
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<td>2004</td>
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<td>2007</td>
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<td>2008</td>
<td>1</td>
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<td>2009</td>
<td>5</td>
<td></td>
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<tr>
<td>2010</td>
<td>3</td>
<td></td>
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<tr>
<td>2011</td>
<td>6</td>
<td></td>
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<tr>
<td>2012</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td></td>
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<tr>
<td>2014</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

It can be noticed that approximately 40% of the surveyed companies were established in the last three years.
**Question 3.**

How many people does your enterprise currently employ either full or part-time at all its locations? [Do not include unpaid family workers and freelancers working regularly for your enterprise. Full-time and part-time employees should each count as one employee. Employees working less than 12 hours per week are to be excluded.]

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>73</td>
<td>96.05%</td>
</tr>
</tbody>
</table>

From the space SMEs surveyed, 56.16% represent companies that have 1 to 9 employees either full or part-time at all their locations; 36.99% are companies that have 10 to 49 employees and the rest 6.85% represent companies that have 50 to 249 employees either full or part-time at all their locations.

**Figure 6.** Number of full-time employees.

1 to 9 employees: 56.16%
10 to 49 employees: 36.99%
50 to 249 employees: 6.58%

---

**Question 4.**

What is the main activity of your enterprise?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure 7.** SMEs surveyed main space activity.

- Downstream: 20%
- Upstream: 33%
- Both: 47%
**Question 5.**

What was the annual turnover of your enterprise in 2016?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>80.26%</td>
</tr>
</tbody>
</table>

Figure 8 displays the annual enterprise turnover; it can be seen that most surveyed companies fall under the definition of micro and small enterprises.

![Figure 8. Space SMEs sample composition by turnover, in %](image)

**Question 6.**

How important have the following problems been for your enterprise in the past twelve months?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>98.60%</td>
</tr>
</tbody>
</table>

Figure 9 shows the cumulative results prioritized by importance to each respondent. The majority of answers highlight that “finding customers” is the main challenge. The second most important challenge is “access to finance” followed closely by lack of skilled workforce. The results are characteristic to a nascent, emerging industry.
An important observation is that the identified challenges vary by company size. Companies with a size of 10 to 49 employees consider “finding customers” and “access to finance” as the most important growth challenge, while medium sized enterprises place more importance on “availability of skilled staff”.

**Figure 9.** Cumulative result for the most important identified challenges for space SMEs.

**Figure 10.** Most important challenges for space SMEs as a function of number of employees.

- Finding customers and/or access to markets
- Access to finance
- Availability of skilled staff or experienced managers
- Costs of production or labour
- Regulations, taxations
- Competition
The replies vary by type of activity whereas “Access to finance” becomes the most important problem alongside “finding customers” for companies involved in upstream space activities. There is a significant difference within the two space activities whilst for downstream space companies the main challenge is “finding customers”.

**Figure 11.** Most important challenges for space SMEs as a function of their business activity.

From a different perspective, “Access to finance” is the main issue for companies with turnover up to EUR 1m. For companies with no revenues (see stage) or more than EUR 1m turnover (growth stage) it appears easier accessing finance. For companies with smaller turnover the results could be explained with the relative availability of start-up and grant funding for seed stages. On the other hand, companies with more than EUR 1m turnover usually capture the attention of conventional VC investors and commercial banks.

From the obtained results, it can be deducted that scaling up from seed to later stages appears to be an issue and the market is clearly inefficient.
**Question 7.**

Have the following company indicators changed over the past twelve months?

<table>
<thead>
<tr>
<th></th>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>71</td>
<td>93.42%</td>
</tr>
</tbody>
</table>

**Figure 12.** Company indicators over the past twelve months.

It is noted that all financial metrics safe for net income after tax showed a positive trend as they mostly improved in the 2016 and 2017. The figures are broadly in line with the results of EU’s moderate pace of economic recovery.

**Question 8.**

Are the following sources of financing relevant to your enterprise, that is, have you used them in the past or considered using them in the future?

<table>
<thead>
<tr>
<th></th>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>67</td>
<td>88.15%</td>
</tr>
</tbody>
</table>

Question 8 is perhaps the most relevant in terms of understanding the type of financial instruments needed to support space SMEs. The respondents were provided with a list of financing sources...
and asked to indicate with ‘yes’ or ‘no’ whether these are relevant to their enterprise. Space SMEs from all categories and sizes showed similar response patterns, listing the most relevant financing sources:

1. Grants, obtaining the highest percentage of positive answers (yes, 82.09%)
2. Equity capital with 62.12%
3. Working capital (Ex: credit lines, bank overdrafts) with 51.52%.

On the other hand, the least relevant financing sources are retained earnings and assets (13.85%), factoring (16.67%) and debt securities (18.46%). This comparison is presented in Figure 13.

**Figure 13.** General financial sources relevant for the surveyed space SMEs.

Despite the broad similarity in replies, certain nuances were identified per size of enterprise, visualized in Figure 14. Smaller companies tend to see grants or equity capital as more important whereas larger enterprises see debt products as the most relevant, including working capital and factoring.
Figure 14. Relevant financial sources according to the number of employees of the company.

Figure 15. Relevant sources of financing by type of activity.
Question 9.

Have you been consistently rejected (i.e. all loan / equity rounds declined) by the financial intermediaries for more than twelve months whilst trying to obtain: Debt Instruments, Equity Instruments.

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>84.21%</td>
</tr>
</tbody>
</table>

Predominantly, space SMEs have not been rejected by financial intermediaries. The data suggests that there is no market failure, rather than market inefficiencies stemming from the knowledge gap and/or the general lack of capital for scaling up seed stage companies.

Space SMEs show higher rejection rates for debt instruments and for equity capital as compared to all other SMEs. The rejection rate in the latest EU SAFE survey for debt financing conducted from October 2017 to March 2018 showed rejection rates of 8% across the EU (14.5% for space SMEs).

**Figure 16.** Acceptance and rejection rates by financial intermediaries for the past twelve months.

It was observed that rejection rates vary significantly by type of space activity and size of the company. Most notably, micro companies (up to 9 employees) in the upstream business have significantly higher probability to be rejected as compared to micro companies in the downstream segment whereas rejection rates are very low for both, debt and equity instruments. The availability of financing for small enterprises (up to 50 employees) is mixed without clear rejection rates patterns. None of the surveyed
SMEs with 50 to 249 employees were rejected while trying to obtain funds for either debt or equity instruments.

**Figure 17.** Rejection rates according to the space activity for micro companies (from 1 to 9 employees).

![Rejection rates graph](image)

**Figure 18.** Rejection rates according to the space activity for small to medium companies.

![Rejection rates graph](image)

**Question 10.**

What is the size of the last bank loan that your enterprise...

- obtained or renegotiated in the past twelve months?
- attempted to obtain but was rejected in the past twelve months?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>61</td>
<td>80.26%</td>
</tr>
</tbody>
</table>
While most of the companies answered both questions as ‘not applicable’, the remaining answers still demonstrate interest in debt financing with range between EUR 25,000 to EUR 100,000.

**Figure 19.** Size of the bank loan obtained and negotiated or attempted but rejected.

By excluding the “non applicable” category to better visualise patterns in debt financing, it becomes clear that upstream companies show much stronger interest in building relationship with lenders and/or seeking bank finance.

By looking at the replies to Question 8 (Sources of Financing) and Question 10 in conjunction, it becomes evident that upstream companies sought frequently working capital loans up to EUR 100,000.
Question 11.

With regards to interest rates what was offered to you versus what you would prefer? For:

- Credit line or bank overdraft
- Investment loans

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>25%</td>
</tr>
</tbody>
</table>

From the collected responses it can be observed a clear mismatch between what banks offer as interest rates and what the space SME are ready to pay. The data shows that 53% of the interest rates offered by the intermediaries are 7% or higher, whereas 100% of the companies prefer up to 5% interest rates.

Additionally, 76% of the space companies prefer working capital loans with fixed interest rates.
Figure 21. Credit line interest rates: Offered vs Preferred.

Question 12.

What is the size of the equity round that your enterprise...
```
• obtained or renegotiated in the past twelve months?
• attempted to obtain but was rejected in the past twelve months?
```

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>38.16%</td>
</tr>
</tbody>
</table>

Significantly higher rejection rates were observed for companies in need of more than EUR 1m, thus evidencing once more the scarcity of follow-on financing as compared to the more abundant seed financing whereat start-up grants from EC and ESA are also available. Most companies seem to need either equity rounds of up to EUR 100,000 or more than EUR 1m.
**Figure 22.** Size of the equity round obtained and rejected in the past twelve months.

Similarly, figure 23 presents the rejection rates for financing as a function of number of employees. Generally, companies with 1 to 9 employees tend to be rejected when applying to equity rounds, while larger companies present very low rejection rates.

**Figure 23.** Total equity rounds attempted but rejected according to company size.
Question 13.

In how many years do the VC and Angel investors, you are in contact with, prefer to divest?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>72.36%</td>
</tr>
</tbody>
</table>

From the answers collected, most VC/Angel investors prefer to divest within 3 or 5 years, as seen in figure 24. A very high percentage of the answers (54.55%) were placed in the “DK/NA” answer choice. Such response pattern indicates that the companies and their respective investors might not have had a detailed discussion on exit strategy.

Figure 24. Time preferred for VC/Angel investors to divest in.
Question 14.

For how long do you expect an equity investor to stay invested in your enterprise (in years)?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>77.63%</td>
</tr>
</tbody>
</table>

Generally, space SMEs expect their investors to stay for a period longer than 5 years which is in contradiction to what the market currently offered, namely 3-5 years (see Question 13). Significant number of respondents, 37.29%, were not able to provide a specific answer which likely suggests that an exit strategy for minority shareholders and investor relationship management scores low on the agenda of space SMEs’ owners and managers. Viewed in a larger context, in order to reduce rejection rates and obtain better conditions on their financing, European space SMEs might consider building up their investor relationship teams and/or dedicate more time in creating awareness on their business cycle and expansion plans.

Figure 25. Expectation towards investors staying invested in the space enterprises.
Question 15.

For what purpose will financing be used by your enterprise during the next twelve months?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 26. Investments distribution.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Percentage [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing or launching of new products or services</td>
<td>34.84</td>
</tr>
<tr>
<td>Hiring and training of employees</td>
<td>30.97</td>
</tr>
<tr>
<td>Investments in property, plant or equipment</td>
<td>17.42</td>
</tr>
<tr>
<td>Inventory or other working capital</td>
<td>12.90</td>
</tr>
<tr>
<td>Refinancing or paying off obligations</td>
<td>1.94</td>
</tr>
<tr>
<td>Other</td>
<td>1.94</td>
</tr>
</tbody>
</table>

Question 16.

For each of the following types of financing, would you say that their availability has improved, remained unchanged or deteriorated for your enterprise over the last twelve months?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>67.10%</td>
</tr>
</tbody>
</table>

From the collected answers, space SMEs consider that the availability of debt instruments and equity instruments has mainly increased or remained unchanged which proves that between 2016 and 2017 there is no market failure, rather than inefficiencies stemming for the information asymmetry between space SMEs and potential investors.
Figure 27. Financing type availability change in the last twelve months.

Question 17.

During the past twelve months have you introduced...
- a new or significantly improved product or service to the market?
- a new or significantly improved production process or method [not applicable if the enterprise does not produce anything]?
- a new organisation of management?
- a new way of selling your goods or services?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>84.21%</td>
</tr>
</tbody>
</table>
Figure 28. Company’s contribution by the introduction of new products, services, processes, etc.

Some 70.31% of the space SMEs planned to introduce a new or a significantly improved product or service to the market evidencing the high propensity to innovation in the sector. Another important observation is that most respondents do not plan to change their management or review their organisational structure.

Market practice shows that banks rarely ask for changes management as a loan facility covenant, equity financing, in particular for early stage companies, does require significant changes to the management structure.
Question 18.

Over the past three years (2014-2016), how much did your enterprise grow in revenues on average per year?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>85.53%</td>
</tr>
</tbody>
</table>

From the surveyed space SMEs, some 44% grew in revenues by more than 20% over the past three years. A very limited percentage of the enterprises showed no growth or reduced turnover.

Figure 29. SMEs revenue growth over the past three years.

Question 19.

Considering your personal expectations, how much will your enterprise grow in terms of employment over the next three years (2018-2020)?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>85.53%</td>
</tr>
</tbody>
</table>

The space SMEs’T owners and managers expectations’ in terms of employment growth for the period 2017-2019 pointed overwhelmingly to a sizable increase of staff. Over 40% of the respondents expect to hire between 10 and 50 additional employees, while less than 2% do not expect to grow in terms of employment.


**Figure 30.** Expected growth in employment terms in the next three years.

![Chart showing expected growth in employment terms](chart.png)

**Question 20.**

*Considering your personal expectations, how much will your enterprise grow per year in terms of valuation over the next three years (2018-2020)?*

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>85.53%</td>
</tr>
</tbody>
</table>

In line with the results of Question 19, space SMEs expect not only growth in the number of employees, but also increase of the perceived value of their businesses. A considerable 77% of the companies expect a substantial valuation growth (over 20%) while 22% expect a moderate valuation growth.

**Figure 31.** Expected valuation growth over the next three years.

![Chart showing expected valuation growth](chart2.png)
**Question 21.**

**Considering your personal expectations, how much will your enterprise grow per year in terms of revenues over the next three years (2018-2020)?**

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>85.53%</td>
</tr>
</tbody>
</table>

The results obtained are once again suggesting an upbeat, highly positive sentiment with regard to the future. 75.38% of the surveyed companies expect a revenue growth of over 20% in short term.

**Figure 32.** Expected revenue growth over the next three years.
Question 22.

Do you feel confident talking about financing with banks and equity investors that you will obtain the desired results?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
<td>82.89%</td>
</tr>
</tbody>
</table>

Figure 33. Confidence level to approach banks and equity investors for financing.

Most of the respondents expressed high level of confidence in their abilities to negotiate financing, in particular when approaching banks and equity investors. Moreover, no difference in the confidence levels has been observed when approaching banks or equity investors.
**Question 23.**

If you need external financing to realise your growth ambitions over the next three years, how much would that be:

<table>
<thead>
<tr>
<th>Number of answers collected</th>
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</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>84.21%</td>
</tr>
</tbody>
</table>

**Figure 34.** External financing needs for 2017 - 2019.

**Figure 35.** External financing needs for 2017-2019 as a function of the business.
**Question 24.**

**What do you see as the most important limiting factor to get this financing?**

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>84.21%</td>
</tr>
</tbody>
</table>

The limiting factors for obtaining financing according to the surveyed space SMEs is insufficient collateral or guarantee to be supplied to financial intermediaries (24.56%) followed by the general unavailability of financing (21.05%) and the resulting reduced control over the enterprise (19.30%). The difference between the rejection rates 14%-17% and the perceived unavailability of financing 21% is small; nevertheless it is worth pointing out that scepticism in obtaining financing is higher than the reported rejection rates.

**Figure 36. Most limiting factors for space SMEs to get financing.**

The respondents were given the option to explain qualitatively the limiting factors for obtaining financing, which is summarized in a word-cloud.
Figure 37. Open ended answers provided by space SMEs describing the perceived limiting factors in obtaining financing.

Mainstream VCs needed **TIME**
Limited understanding of the business cycle
Market insecurity **Lack of venture capital fund**
Different vision **VC'as capabilities**
**UNCERTAINTY OF SUCCESS** High Technical Risk

Interestingly, most space SMEs reported that lack of understanding by financial intermediaries of their business cycle is an impeding factor to obtain financing. The qualitative results serve as one of the multiple confirmations the research obtained of a widely spread knowledge gap and information asymmetry between space companies and financial intermediaries.

**Question 25.**

Earth is finite, however human exploration and accumulation of knowledge may not be. Do you believe economic growth could be infinite?

<table>
<thead>
<tr>
<th>Number of answers collected</th>
<th>As % of all valid answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>62</td>
<td>81.58%</td>
</tr>
</tbody>
</table>

Figure 38. Companies’ disposition on whether economic growth is infinite or not.
SECTION 5: Conclusions

The main goal of this research was to identify the specific financing needs of European space SMEs and to put these into perspective as compared to all other European SMEs. Enough, statistically significant data was obtained through the survey to answer the Research Questions:

Research Question (1): Are EU space SMEs at a more disadvantaged position when accessing finance as compared to all other European SMEs?

Answer (1): EU space SMEs are at a moderately disadvantaged position in accessing finance as compared to all other European SMEs. The rejection rates for space SMEs is approximately 14% whilst for all other EU SMEs it currently stands at 8% (ECB).

Research Question (2): Which financial instruments are suitable for European space SMEs?

Answer (2): Growth capital equity funds with ticket size of EUR 1m or higher and working capital facilities providing short term liquidity at variable repayment schedule.

On the basis of the undertaken survey, some specific recommendations on the financial instruments suitable for European space SMEs can be devised.

Albeit with noticeable market inefficiencies, the combination of public and private resources, available to space SMEs in Europe ensures a sustained pace of expansion of the industry in the short term. Notably, the information asymmetry between those who own and manage space SMEs and those who are asked to finance them is significant, thus leading to suboptimal industry growth and foregone opportunities.

The authors of this paper can point to the following general recommendations in order to overcome the observed market inefficiencies:

• Set up dedicated equity funds, via public private partnership to reduce market risk and incentivize private investors to support follow-on investments in space SMEs, in particular post-seed phase. The recommended ticket size is EUR 1mn or more;

• Provide guarantees issued via public-private partnerships to financial intermediaries, including crowdfunding platforms, in order to reduce market risk and increase supply of working capital loans with variable repayment schedule and/or convertible debt. Such facilities appear to be the most appropriate for the milestone based business cycle of most space SMEs;
• **Promote regular and easily available industry research and surveys** in order to capture trends and support policymaking, similar to ECB’s SAFE survey. The relative scarcity of industry specific investment research combined with excessive charges on one-off consultant papers reinforces information asymmetry and sub-optimal decision making thus limiting growth for an industry still in its nascent stages;

• **Create awareness about the business cycle specifics and potential return on investment in space SMEs** among financial intermediaries providing loan and equity funding.

The researchers behind this report, Yasen Iliev and Lluc Diaz, intend to continue with the regular survey of the European space industry and share the results, free of charge.


ESA, (2016), What is Space 4.0?, Retrieved from https://www.esa.int/About_Us/Ministerial_Council_2016/What_is_space_4.0


European Commission Recommendation 2003/361/E


