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# ACCESS TO EQUITY FINANCING FOR EUROPEAN DEFENCE SMEs

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## ABBREVIATION LIST

| | |
|---|---|
| **DG DEFIS** | Directorate-General for Defence Industry and Space |
| **EC** | European Commission |
| **ECB** | European Central Bank |
| **EDA** | European Defence Agency |
| **EDF** | European Defence Fund |
| **EDTIB** | Europe's Defence Technology and Industrial Base |
| **EIB** | European Investment Bank |
| **EIF** | European Investment Fund |
| **EDIDP** | European Defence Industrial Development Programme |
| **ENDR** | European Network of Defence-related Region |
| **ESG** | Environmental, Social and Governance |
| **ESI** | European Security Initiative |
| **EUDIS** | EU Defence Innovation Scheme |
| **ICT** | Information and Communication Technology |
| **NATO** | North Atlantic Treaty Organization |
| **NDIA** | National Defence Industry Association |
| **PADR** | Preparatory Action on Defence Research |
| **PE** | Private Equity |
| **R&D** | Research and Development |
| **SAFE** | Survey on the access to finance of enterprises |
| **SIPRI** | Stockholm International Peace Research Institute |
| **SMEs** | Small and medium-sized enterprises |
| **UK** | United Kingdom |
| **US** | United States of America |
| **VC** | Venture capital |

# EXECUTIVE SUMMARY

## Study context

**The resurgence of war in Europe and rising tensions have created a new urgency for the European Union (EU) to better address existing and foreseeable security and defence challenges**. In the defence sector, three issues stand out as critical: innovating, producing key systems and securing value chains. In particular, the European defence industry is called upon to develop the next generation of operational capabilities and the required technologies to provide additional production capacity and to build up stocks while mitigating critical dependencies along the defence value chains, including the financial and economic stability of the industrial supply network. Increasing European dual-use technologies' shares in global markets is also paramount. At the same time, European small and medium-sized enterprises (SMEs) and mid-sized companies need to translate their innovation potential into viable capabilities for security and defence actors, while improved financial frameworks must support this transition.

## Study objective and methodology

**This study contributes to strengthening European policy actions supporting the defence industry by assessing the current financing needs across the value chain and the main actors in the investment landscape**. It builds on the findings of the Commission's Expert Group on the European Defence Fund's Financial Toolbox report, which offered an initial assessment of how financial instruments could enhance the resilience and innovative potential of the European Defence Technological and Industrial Base (EDTIB). An important observation from this work[1] was that the EDTIB in Europe faces distinct challenges when it comes to obtaining debt and equity financing, particularly to facilitate the expansion of production capabilities.

**This study quantifies and analyses the funding gap affecting SMEs and mid-sized companies in Europe's defence and dual-use technology sectors and delves into the implications for EU strategic autonomy**. It explores the factors inhibiting private capital flow, including loans and equity, and identifies opportunities arising from technological advancements in both civilian and military applications, known as the dual-use sector. Additionally, it makes a comparison between the financing landscape of defence businesses in the EU, the United States (US), and the UK (United Kingdom).

**To this end, the study used a comprehensive approach that combines various data sources to address both supply and demand aspects of funding in the defence sector**. To achieve this, two targeted consultations were conducted through two surveys and 35 interviews with representatives from the defence sector and the financing landscape, including public and private investors. The desk research investigated market and regulatory aspects, while a methodology developed by the EIBG fi-compass was applied to estimate the funding gap, leveraging firm-level survey data. The study's robustness is underscored by this triangulation of data from various sources and perspectives, ensuring objectivity and methodological rigour.

## Europe's defence ecosystem

**There is no clear-cut definition of what constitutes the boundaries of the EDTIB**. The definition adopted by the Commission's Expert Group on the European Defence Fund identifies the EDTIB as a cluster of large prime contractors and subcontractors (midcaps and SMEs) developing and producing advanced technologies and defence capabilities for the Member States' Armed Forces, including sub-sectors like aerospace, land equipment, naval, and defence electronics. The concept is usually employed to embrace the traditional defence industry. In addition, the increasing use of emerging and disruptive technologies, often for civilian and military use, the so-called dual-use technologies, has broadened the scope of industries relevant to the defence sector.

**Recent geopolitical events, such as the Russian invasion of Ukraine, have highlighted the urgency of strengthening Europe's defence capabilities, but years of underinvestment have weakened the**

[1] Secretariat of the Expert Group on the European Defence Fund's Financial Toolbox, (2018). Financial instruments in support of resilient and autonomous European defence sector.

**sector's production capacity**. The circumstances leading to this situation were shaped by post-financial crisis years during which defence budgets across the EU faced constraints as governments reduced military expenditure. Concurrently, unit costs rose, and major defence acquisition programs encountered delays or cancellations. Furthermore, the fragmentation of the European defence industry led to costly duplications.

**Europe's defence industry is expected to provide additional production capacity, develop next-generation technologies, and reduce critical dependencies, but financing this growth is challenging**. Despite renewed attention by the EU and Member States, the EDTIB is still suffering from under-investment and critical security of supply. The industry is struggling to ramp up production capacity and secure financial and economic stability along the entire supply chain.

## SME financing needs

**Companies in the defence sector need financing to compensate for years of underinvestment.** The production capacity of the EU defence industry was initially configured for peacetime needs and not adapted to the new needs of ramping up production capacities. These financing needs arise from the industry's imperative to modernize and incorporate the latest advancements in commercial technologies, including artificial intelligence, robotics, quantum computing, and space imagery.

**SMEs in the defence sector also require financing for research and development (R&D) and the commercialization of innovative products**. Companies participating in the survey and interview programme reported that the defence industry is characterized by a prolonged and costly R&D phase, often lasting 5 to 10 years before yielding any profits. Transitioning technologies developed for civil applications into the military domain also requires patient capital because regulations often impose stringent requirements regarding the handling and use of defence products, making it particularly difficult for small firms to comply.

**Survey data from this study highlights that SMEs operating within the defence sector face higher barriers to accessing credit compared to SMEs in other sectors**. According to the survey conducted in this study, approximately 40% of SMEs reported that they found access to finance to be either difficult or very difficult. This does not compare well to the general SME population, for which this figure stands at 30% (SAFE data). Moreover, a considerable portion of defence SMEs refrained from pursuing either bank loans (44% of SMEs) or equity financing (68%) during 2021-2022, a stark contrast to the 6.6% average among SMEs in the EU during the same period.

## Drivers and barriers to investment

**Increased defence spending, technological advancements and the dual-use nature of technologies drive private investor interest in the defence and dual-use technology sector**. Geopolitical instability and security concerns, particularly in light of events like the war in Ukraine, have increased defence spending in many countries. It has also modified the perception of the defence sector, emphasizing its role in providing safety and security to European citizens. The need for modernizing military capabilities and addressing emerging threats has driven demand for innovative technologies, attracting venture capital (VC) investors interested in early-stage or seed-stage funding rounds as they see the potential for innovation and increasing market potential in this sector. Dual-use technologies are driving growth and diversification within this sector. These technologies are seen as a way to mitigate some of the inherent risks associated with the defence sector. They offer quicker returns on investment and bypass some of the longer developmental and certification processes. The combination of all these factors has created opportunities for private investors.

**However, accessing adequate funding for innovation is a significant challenge for defence SMEs**. Many of them encounter difficulties in securing bank loans or equity financing. This difficulty can be attributed to the oligopolistic market structure, dependency on public procurement, the high costs associated with R&D and manufacturing, ethical concerns and the evolution of the regulatory framework for sustainable and responsible finance. As a result, the availability of external financing for SMEs in this sector has dwindled in recent years, exacerbating the challenges they face.

**Challenges related to defence procurement and the need for caution in military technology investments remain relevant considerations for investors, even when considering dual-use technologies**. The dependency on public contracts or large prime contractors creates barriers to entry for investors not embedded in specific value chains. While dual-use technologies offer advantages because they diversify the sources of income, the complexity of defence procurement remains a challenge, especially for smaller companies and startups. Selling technologies for military purposes still requires navigating lengthy processes and adhering to strict protocols, which can deter some investors. The sensitive and confidential nature of information in the defence sector can also hinder the funding process since national security concerns may prevent potential investors and lenders from accessing critical data about companies and their products.

**Whereas banks and fund's exclusion policies on defence are not a recent phenomenon, they appear to have increased their impact recently.** The development of regulatory measures aimed at enhancing financial accountability, environmental sustainability, and social responsibility has led to increased transparency and scrutiny of companies and investors' activities on Environmental and Social Governance (ESG) aspects. At the same time, these policies encouraged the development of exclusion policies on activities considered by investors as potentially bearing sustainability risks. As a result, the defence sector has been subject to increased difficulties in accessing finance.

Banks and investors have concerns regarding potential reputational risks, as evidenced by instances of banks declining accounts for defence-related firms in France and the UK. Although the EU sustainable finance initiative only deems controversial weapons as unsustainable, financial institutions have responded differently, with some choosing to cautiously exclude the defence sector, while others navigate these challenges by implementing specific policies and conducting thorough due diligence processes. This resulted in over-compliance with forthcoming regulations and contributed to investor reluctance to engage in this sector.

**The defence industry is also inherently characterized by stringent regulations, introducing considerable complexities for potential investors**. Financers and investors are discouraged by the high administrative costs involved in providing finance to companies in the defence sector**.** When financing is available for defence companies, the process involves heavy administrative costs and complex due diligence to ensure compliance with various national and international treaty regulations, including export controls and sanctions regimes. These complexities not only raise operational expenses but also extend the time it takes to approve and disburse funds, affecting the agility and responsiveness of financial institutions.

**Moreover, Foreign Direct Investment (FDI) control regulations and national security considerations significantly deter equity investors from investing in the defence sector since they impact company valuation**. Whereas governments screen FDIs in a large number of sectors, transactions involving defence-related companies are subject to particularly high scrutiny. Governments have the authority to block transactions involving companies with technologies that have military applications, particularly when foreign entities are part of the deal. This restrictive environment limits exit opportunities for investments in defence-related ventures and poses challenges to these companies' growth potential and valuation, presenting significant hurdles for investors.

## The investors' landscape

**Compared to the US and, to some extent, the UK, EU SMEs in the defence sector have fewer opportunities to attract equity investors**. In particular, the EU lags behind the US in later-stage financing rounds, such as series B and beyond. This finding also applies to other sectors, but data for the defence sector show a significant gap in terms of number of deals and volume of financing. For instance, between January 2022 and July 2023, Crunchbase data shows that there have been only nine deals in the EU against 80 in the US. Additionally, concerns related to national security and strategic interests restrict the availability of finance from investors outside the EU. Data indicates that cross-Atlantic transactions are infrequent and primarily involve US and UK companies. Investors tend to favour domestic markets, further limiting financing opportunities, especially in countries lacking active private investors in this sector.

**Within the EU, France stands out as the sole country with a comprehensive ecosystem encompassing both VC and PE investors, having a portfolio in aerospace, defence and security**. When considering recent VC/PE activities, several countries, including Germany and Spain, demonstrate a notable presence of VC investors actively engaged in the defence sector. However, private equity activities remain limited in this sector across the EU, except for France, which emerges as a leader in the EU in this particular sector.

## Provision of public support

**The US and the UK have extensive programs supporting access to finance for innovative defence companies, which do not compare well with the offers available in the EU**. Within the EU, there is a limited offer of specialised financial instruments. To stimulate the development of an ecosystem of private investors supporting defence innovation, as part of the Defence Innovation Scheme (EUDIS), the European Commission (EC) proposed to launch an equity instrument, the "Defence equity facility", that would be implemented the European Investment Fund under InvestEU. Among EU Member States, France is an exception with a more developed financing ecosystem for the defence sector. French defence SMEs also benefit from public programs that offer tailored loans and equity support, a feature lacking in many other EU countries.

## The financing gap and its consequences

**This study identifies a financing gap for SMEs in the defence sector for equity and debt-based instruments, but its overall quantification is challenging.** The model applied in this study indicates a 60% probability that the debt financing gap in the defence sector is between EUR 1 to 2 billion. The probability of a negative gap, i.e., an excess of loans' supply compared to demand by SMEs and midcaps, is less than 1%. At the same time, the equity financing gap varies from a minimum of EUR 0.2 billion to a maximum of EUR 5 billion, with an average of EUR 2 billion. The scenario analysis indicates the existence of a funding gap in the equity market, with a likelihood of 90% that the gap lies in the range of EUR 1 to 3 billion.

**However, these estimates are conservative and may only partially account for companies engaged in developing dual-use technologies.** First and foremost, the estimation of these gaps relies on the feedback provided by surveyed SMEs and midcaps, which do not comprehensively represent the entire EDTIB. The analysis assumes a conservative range of 2,500 to 3,800 SMEs and midcaps in the defence sector. It might not include all technology companies potentially transitioning to military applications. Finally, while responses from 25 countries enhance geographic representativeness, disparities exist, with some countries, such as Italy, being underrepresented. Different European regions exhibit varying levels of development in the equity market. These disparities imply diverse equity funding gaps and specific needs that should be addressed accordingly.

**Against this backdrop, a sense of urgency is needed.** The inability to secure funding limits companies' growth in the EU. The European defence industry may struggle to meet the growing demand for defence capabilities while coming under pressure from increased imports to meet security needs. The exclusion of the defence industry from private funding opportunities could undermine European defence efforts and threatens to put European companies at a competitive disadvantage while posing a security risk for the EU and its Member States, especially in areas like cybersecurity, artificial intelligence, and space. Access to capital outside the EU is also limited by national restrictions due to national security considerations. As a result, EU governments are turning to imports to make up for the lack of domestic production capacity.

## Suggested action points

This study highlights that swift action is needed to address the financing gap for SMEs and midcaps in the defence sector to ensure that the European defence industry can meet escalating demands, protect national security, and maintain global competitiveness. It also identifies that public sector involvement, through specific programs or national promotional banks, plays a crucial role in signalling to private investors and mitigating investment risks.

### *Provision of funds*

**Public sector financing should be adapted to the different needs of SMEs during their lifecycle and also adapted to the specificities of the sector.** SMEs in the defence sector should have access to diversified and specialised forms of support. Given the substantial financing demands within this industry, grants exhibit certain limitations when compared to financial instruments. Typically, grants provide smaller amounts to individual companies than loans and equity, making them suitable for kickstarting R&D but less conducive for facilitating the substantial investments required for scaling up production. Receiving grants is also more complex as they are often subject to lengthy and competitive application procedures. Ensuring access to other forms of funding, i.e. equity and loans, is also important since SMEs often do not know where to look for financing once they are no longer eligible for grants or they can leverage current contracts to secure a bank loan.

Technologies developed for the defence sector are characterized by long development cycles, often necessitating patient investors. Venture debt and equity investments become the primary recourse, as traditional bank loans are often inaccessible to companies lacking collateral or an established credit history. This is a common situation for newly established companies and undercapitalised SMEs. In particular, the involvement of public entities through equity support becomes increasingly crucial beyond the initial seed funding stage, for which the private VC industry in Europe already offers some viable options, especially for companies developing dual-use technologies. When companies are more mature and have sufficient collateral and credit history, bank loans can support business expansion. For these companies, subsidised credit and public guarantees can help reduce the cost of finance. In Europe, France and the UK's proactive approach to supporting their defence sector through tailored and sector-specific financing mechanisms can serve as a model for other Member States.

**Given the characteristics of the defence sector, which necessitates a deep understanding of the relevant regulatory frameworks, there is a strong case for setting up targeted equity facilities.** A major weakness in the VC and PE industry in Europe is the lack of specialised funds. The US offers a pertinent example, with numerous funds specializing in supporting companies engaged in national security services, encompassing military and counterterrorism operations and including many dual-use capabilities. This underscores the importance of creating a similarly tailored and informed investment framework to foster growth and innovation within the European defence sector. Such an approach would promote the emergence of a group of highly specialized fund managers familiar with the regulatory landscape surrounding companies operating within this sector and capable of attracting sufficient investments.

**A rationale for establishing this facility at the EU level also exists to facilitate cross-national investments and support the emergence of specialised investors throughout the EU**. This study has underscored the highly fragmented and relatively modest nature of the defence financing landscape within the EU. The varying degrees of development in the equity markets across different Member States may not suffice to meet the investment demands. Data demonstrates that such cross-border investments already occur within the EU, serving as a crucial source of financing for companies lacking access to finance domestically. To further streamline this process, the incorporation of a matchmaking platform, similar to the Invest EU Portal, within an EU defence financing facility could effectively connect companies with potential investors, fostering market efficiency.

**Lowering the cost of finance could effectively incentivize defence companies to increase their investments and seek loans.** The expenses associated with adhering to international treaties, regulations and sanctions tend to be significantly burdensome for both companies, where they escalate disproportionately relative to the company size and financial institutions. These compliance checks are essential and non-negotiable. Nonetheless, public support in the form of subsidized loans or guarantees can be crucial in lowering the cost of finance for defence companies through reduced interest rates, longer maturity and reduced collateral requirements. Guarantee facility also mitigates the risks for financial intermediaries. This support can reduce interest rates and/or lower collateral requirements, ultimately making finance more accessible.

**Implementing sector-specific financing facilities, as seen in France, the UK, and the US, could yield more potent signalling effects and remain immune to potential over-compliance with ESG**

**regulations**. Member States have various schemes in place, such as national guarantee funds and intermediated lending, aimed at facilitating access to finance for SMEs. However, these facilities are frequently unavailable to SMEs operating in the defence sector due to the decisions of financial intermediaries to limit their exposure to this particular industry. Interviews conducted for this study have underscored that public sector financing offers more than just financial support. It serves as a clear signal to private investors, indicating the societal acceptability of investments in the defence sector.

### *Communication actions*

**Addressing ambiguity within the EU sustainable investment framework is of utmost importance**. The prevailing view among defence industry representatives and investors is that this ambiguity should be proactively addressed by the Commission to clarify that investments in the defence industry are compatible with EU ESG criteria and the EU sustainable finance framework. Providing more clarity to the financial sector on how to address sustainability risks could also improve access to finance.

**Finally, support and matchmaking initiatives for investors and defence businesses can foster connections and mutual understanding**. These initiatives could take the form of investor forums or targeted networking events. They can serve to educate investors about the unique features and opportunities within the defence sector while simultaneously enabling defence companies to better understand investor expectations and requirements. These initiatives can also attest to a strategic shift in defence procurement from large private sector defence contractors to entrepreneurial startups with dual-use technology.

# 1. STUDY CONTEXT, OBJECTIVE AND METHODOLOGY

## 1.1. Study context

**A strong Europe Defence Technology and Industrial Base (EDTIB) is considered a necessary condition for the achievement of the sovereign autonomy of Europe[2].** The defence ecosystem includes sectors of strategic importance, such as cutting-edge dual-use technology, cybersecurity, and civilian security. Recently, these sectors have become crucial for the EU's economic and technological resilience. The Russian invasion of Ukraine marked a turning point for the defence and security of the European Union and its Member States. This has created a new sense of urgency that requires the fast mobilisation of additional funding in a way that differs from past instruments.

**However, over the years, many factors have contributed to weakening the European EDITB, including the decline of already low defence investments in Member States, the foreign dependence on military capabilities, the rising costs of state military production, and defence duplicates in a fragmented EU market**. Despite renewed attention by the EU and Member States, the EDTIB is still suffering from under-investment and critical security of supply. The industry is struggling to ramp up production capacity and secure financial and economic stability along the entire supply chain[3].

**The circumstances leading to this situation were shaped by post-financial crisis years during which defence budgets across the EU faced constraints as governments reduced military expenditure**. Concurrently, unit costs rose, and major defence acquisition programs encountered delays or cancellations. In 2013, the EDTIB regained attention when an EU report by High Representative/Vice-President Catherine Ashton highlighted its role as a cornerstone for a successful Common Security and Defence Policy (CSDP). This report led to the publication of "A New Deal for European Defence" (2014), outlining a European industrial policy supporting the competitiveness of the defence sector.

**Despite commendable dedication and policy development, tangible progress in strengthening the EDTIB remained sluggish**. While China's military expenditure doubled between 2008 and 2016, EU Member States' defence spending decreased by nearly 12% in real terms during the same period. Additionally, European defence expenditure suffered from inefficiencies attributed to duplications, interoperability gaps, technological disparities, and insufficient industry and production economies of scale. Without sustained investment, the European defence industry faced the risk of lacking the technological capability to develop the next generation of critical defence capabilities.

**Strategic investments in key technology industries are part of the Chinese portfolio**. With a large number of state-owned enterprises and considerable influence over the private sector, the country is able to target investments of significant interest and establish hidden digital controls in both emerging and established markets[4]. Its rapid advances in new technologies, combined with aggressive market tactics, are also having an impact. Many competitors have suffered intellectual property theft and cyber-attacks[5].

**The changed geopolitical landscape and heightened global instability have spurred urgency and renewed emphasis on supporting Research and Innovation (R&I) within the defence sector to ensure European sovereignty and gain strategic advantages**. Priorities now include increasing military expenditure and harnessing synergies between civilian, defence, and space research, as articulated in the Action Plan on Synergies, the Defence Package[6], and the Strategic Compass[7]. In response to Russia's invasion of Ukraine, EU Heads of State or Government met in Versailles on 11 March 2022 and committed to strengthening European defence capabilities. They agreed to increase defence expenditures, enhance cooperation through joint projects, address shortfalls, boost innovation, and support defence industry

[2] European Parliament, 2020. The EU's Defence Technological and Industrial Base

[3] ASD, August 2022. "Considerations on further initiatives to strengthen the European defence industrial and technological base".

[4] Nouwens, M., & Legarda, H. (2018). China's pursuit of advanced dual-use technologies.

[5] CPPR (2023). China – A Close Look on Industrial Espionage – Intellectual Property Rights.

[6] European Commission (2021). Action Plan on synergies between civil, defence and space industries Brussels, 22.02.2021COM(2021) 70 final

[7] Council of the European Union (2022). A Strategic Compass for Security and Defence for a European Union that protects its citizens, values and interests and contributes to international peace and security. Brussels, 21 March 2022 (OR. en) 7371/22

development, including SMEs. The joint communication[8] emphasizes coordinated spending, avoidance of fragmentation, and the importance of EU defence initiatives like the EDF, Permanent Structured Cooperation (PESCO), the Coordinated Annual Review on Defence (CARD), and the Capability Development Plan (CDP).

**EU and Member States' commitment to the defence sector aims to ramp up production capacity and attain technological sovereignty through comprehensive financial support across the entire industrial cycle**. Following the Joint Declaration, in 2022, the Commission presented the European Defence Industry Reinforcement through common Procurement Regulation (EDIRPA)[9], aiming at reinforcing defence industrial capabilities by supporting Member States cooperation on common procurement of the most urgent and critical defence products. Moreover, in 2023, the European Parliament and the Council of the European Union reached an agreement on supporting ammunition production (ASAP)[10] with a budget of €500 million to increase the production capacity of ammunition and missiles in the EU.

**Public intervention becomes vital to prevent the EU defence companies from being marginalized in accessing the added value in advanced dual-use technologies (e.g., AI, IoT, quantum computing, biotech)**. Europe's defence industry has been called to provide additional production capacity, build up stocks, and develop the next generation of operational capabilities and required technologies. Additionally, there's a parallel focus on mitigating crucial dependencies along the defence value chains, encompassing the financial and economic stability of the industrial supply network[11]. As a result, there is a requirement to enhance the financial frameworks supporting these companies. To address the investment gap in EU defence innovation and production capacity, the Commission is committed to reinforcing the European Defence Fund (EDF) and accelerating the establishment of a defence equity facility as part of the EU Defence Innovation Scheme (EUDIS)[12]. By deploying grants and financial instruments, the Commission can de-risk industrial investments, leading to a faster adaptation to ongoing structural market change and removing existing bottlenecks in production capacity[13].

**Nevertheless, the realignment of investment priorities and the newfound focus on the defence sector have already triggered ethical discussions**. The shift in investment perspective towards defence and dual-use technology enterprises brings a mix of positive and negative aspects. This shows that the EU understands the need to invest in defence technology to keep Europe safe and its people protected. But, at the same time, this new direction is likely to bring up discussions in the private sector about whether it is opportune or desirable to finance warfare-related technologies.

In this context, the present study assumes significance by enhancing the comprehension of the financing gap in the defence sector. It achieves this by consolidating data on the overall financing landscape and the nature of demand, including the magnitude of financing needs and the relevance of different financial instruments.

## 1.2. Objective of the study

**The present study aims to contribute to shaping European policy actions to support the defence industry by assessing the current financing needs across the value chain and the main actors in the investment landscape**. The study serves as a continuation of the Commission's Expert Group on the European Defence Fund's Financial Toolbox report[14], which offered an initial assessment of how financial

[8] European Commission (2022). Joint Communication to the European Parliament, the European Council, the Council, the European Economic And Social Committee and the Committee of the Regions on the Defence Investment Gaps Analysis and Way Forward Brussels, 18.5.2022 JOIN(2022) 24 final

[9] European Commission (2022). Proposal on establishing the European defence industry Reinforcement through common Procurement Act Brussels, 19.7.2022 COM(2022) 349 final 2022/0219 (COD)

[10] European Commission, 2023. "Proposal for a Regulation of the European Parliament and of the Council on establishing the Act in Support of Ammunition Production Brussels, 3.5.2023 COM(2023) 237 final 2023/0140 (COD)

[11] ASD, August 2022. "Considerations on further initiatives to strengthen the European defence industrial and technological base".

[12] European Commission (2022). Investment gaps in EU defence. On the Defence Investment Gaps Analysis and Way Forward Brussels, 18.5.2022 JOIN(2022) 24 final

[13] European Commission, 2023. "Proposal for a Regulation of the European Parliament and of the Council on establishing the Act in Support of Ammunition Production Brussels, 3.5.2023 COM(2023) 237 final 2023/0140 (COD)

[14] Financial instruments in support of resilient and autonomous European defence sector", European Commission, 10/10/2018

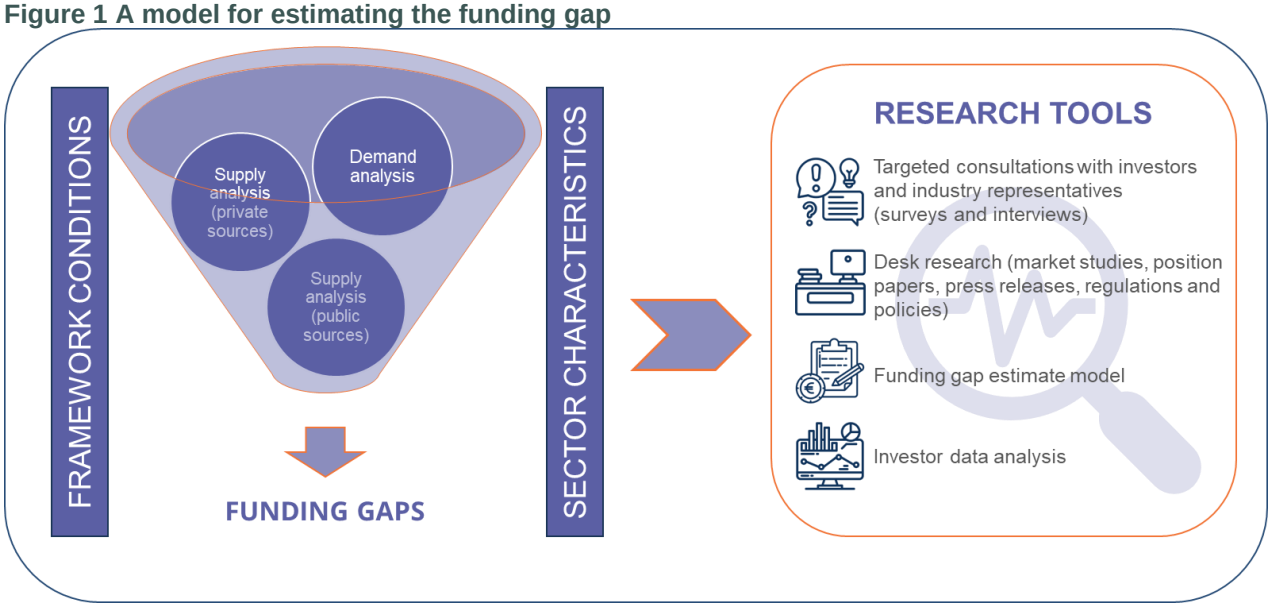
instruments could enhance the resilience and innovative potential of the European Defence Technological and Industrial Base (EDTIB). An important point from this report was that the EDTIB in Europe faces distinct challenges when it comes to obtaining debt and equity financing, particularly to facilitate the expansion of production capabilities.

In this context, the current study takes on the task of quantifying and analysing the funding gap that impacts SMEs as well as mid-sized companies engaged in developing defence and dual-use technologies. The ultimate aim is to gauge the implications of this gap on European enterprises and, consequently, on the European Union's security and strategic autonomy. The study delves into the factors holding back private capital and explores novel opportunities arising from technological advancements in both civil and military applications, commonly referred to as the dual-use sector. Additionally, the study draws a comparison between the growth and access to finance challenges of defence firms in Europe and their counterparts in the US.

## 1.3. Methodology

**The approach adopted in this study integrates a diverse range of data sources, effectively addressing both the supply and demand dynamics of funding within the defence sector**. This analysis is further enriched by a consideration of relevant contextual frameworks (e.g. policy and regulatory frameworks), as illustrated in Figure 1. To ensure robustness of the study's conclusions, the assessment of the financing gap, encompassing loans and equity components, employs a balanced combination of quantitative and qualitative research methodologies. This nuanced approach is designed to quantify funding needs and gaps as precisely as possible while concurrently gaining nuanced insights into the factors that underlie market failures and suboptimal investment outcomes.

**Figure 1 A model for estimating the funding gap**




Source: CSIL

**Two targeted consultations were conducted through dedicated surveys and semi-structured interviews** (Table 1). The surveys were accessible on the EUSurvey platform from 5 May to 30 June 2023. When designing the consultation strategy, several dissemination actions were taken to ensure sufficient responses and balanced geographical coverage. The defence industry survey was distributed through two channels. Firstly, the target was companies that benefitted from the European Defence Fund (EDF) and its two antecedent programs, namely, the Preparatory Action on Defence Research (PADR) and the European Defence Industrial Development Programme (EDIDP)[15]. The second focus group included SMEs and midcap companies that are integral to the EU's defence supply chain but have not benefited yet from the EDF or its predecessors. Expanding the pool of potential respondents was important to achieve more responses, strengthening representativeness. Companies were identified through

[15] The list shared by DG DEFIS comprised 437 EU companies, with 84% being SMEs and 16% midcaps.

relevant NACE codes (Aerospace & Defence Ecosystem), by searching into the list of companies on the European Cluster Collaboration Platform, by considering companies within the European Network of Defence-related Regions, or by accessing company lists provided by National Defence Industry Associations and other national authorities.

The survey to private investors targeted generalist and specialist funds already active in the defence sector, which we identified in the Bureau van Dijk Zephyr database, and funds without an active portfolio in this sector. To encourage widespread participation, the survey received promotion from DG DEFIS, and the European Investment Fund (EIF) facilitated the distribution of the survey link to its partner funds.

Overall, there was good participation from the defence industry side, whereas it was more challenging to involve private investors despite various communication efforts. In some instances, we found that investors were reluctant to be associated with this study as they did not want to be seen as supporting Europe's military industry. Similarly, it has been difficult to engage funds not involved in this sector. The results of the surveys are extensively discussed in this report, while a summary of them is included in Annex IV. The interview programme included 15 representatives from the defence sector and 20 representatives from the public and private financers' landscape (Annex I).

**Table 1 Overview of the targeted consultations**

| TARGETED STAKEHOLDERS | PURPOSE | TARGET ACHIEVED |
|---|---|---|
| **Individual SMEs and midcaps, and defence industry representatives (cluster and defence industry associations)** | To collect information on SMEs and midcaps' funding needs for equity and debt, including projections for the near future, consequences from the lack of finance, barriers to entering the defence and dual-use technology market, and drivers to invest.<br>To collect firm-level data on financing needs to be used in the model for estimating the funding gap. | 143 answers collected from companies representing 25 countries. Answers were received from 124 SMEs, 16 midcaps, and three large companies. Sector-wise, responses have a balanced distribution of companies across the military domains, including land, naval, and aeronautics, while space was less represented. Many companies reported engagement in more than one domain. |
| **Private investors (individual VC/PE funds, investor associations)** | To collect information from the market's supply side to complement the evidence from the consultation with firms and their representative associations. This consultation provided insights into the prevailing sentiments among investors regarding the primary challenges and catalysts influencing investment decisions within the defence and dual-use technology sector. These interactions have also shed light on VC/PE perspectives regarding potential market evolution. | 24 responses from 9 countries. 75% of respondents are VC funds in early-stage companies, particularly pre-seed, seed, and start-ups. Only 13% are PE investors. |
| **Public investors (IFIs, NPBs)** | To complement the findings from the desk research on public programmes providing debt and equity-based financial instruments to defence SMEs and midcaps. These exchanges helped the understanding of the drivers and barriers underlying these initiatives. | 5 interviews. |

Source: CSIL

**To compute the funding gap, we applied the methodology developed by the EIBG fi-compass, which has already been applied in similar studies**[16]. This approach is based on firm-level survey data and can be used to estimate different types of funding needs, including debt and equity-based. To ensure delivering realistic estimates, the model results are triangulated with other data sources, including the EIF market reports, along with qualitative data collected through the interview programme. The model, as well as a discussion of its limitations, are presented in chapter 3.

**To offer an overview of the investor landscape within Europe, our approach encompassed the utilization of market studies with data from Bureau Van Dijk Orbis and Crunchbase.** These data sources facilitated the creation of profiles for a representative selection of investors. Our methodology involved an examination of ownership frameworks and recorded transactions within Orbis Zephir, specifically focusing on both large and small defence enterprises. The identified funds were then profiled for their geographical location, investment stage, defence investment focus, and policy.

**Finally, an important value of our approach is that it is built on triangulating different data sources and stakeholder perspectives to be unbiased and rigorous as much as possible**. By juxtaposing findings from targeted consultations, we identified areas of divergence and convergence. At the same time, the desk review was leveraged to enhance the depth of the analysis of survey responses and provide contextual information on the evolving policy and regulatory landscape, as well as the latest industry advancements.

After having presented the study background, objective and approach, this document is organised as follows:

- **Chapter 2** describes the main features of Europe's Defence Technology and Industrial Base;
- **Chapter 3** describes the financing needs of SMEs and midcaps in the defence sector;
- **Chapter 4** describes the main drivers and barriers in SMEs and midcaps financing in the defence sector, with a focus on the role of regulatory restrictions and the dual-use technology concept;
- **Chapter 5** provides an overview of the private financing landscape for SMEs and midcaps in the defence sector in Europe, the US and the UK;
- **Chapter 6** illustrates the financial instruments developed by public institutions in the EU, Members States, the US and the UK to support SMEs and midcaps in the defence sector;
- **Chapter 7** presents the results of the debt and equity funding gap model and discusses the economic implications of the lack of financing for companies in the defence sector in Europe**;**
- **Chapter 8** concludes and presents some lines of action for public support.

The report is complemented by a set of Annexes:

- Annex I includes the list of stakeholders that contributed to this study,
- Annex II presents the original fi-compass methodology for the quantification of the funding gap based on SAFE data,
- Annex III describes the details of the deals involving defence SMEs in the EU, US and UK (1 January 2022 - 31 July 2023),
- Annex IV Provides a summary of the two surveys' findings and
- Annex V includes the list of bibliographic references.

[16] See, for instance, fi-compass EAFRD (2014), Financial gap in the EU agricultural sector (available at https://www.fi-compass.eu/sites/default/files/publications/Financial%20gap%20in%20the%20EU%20agricultural%20sector.pdf) and the Annex II of fi-compass ERDF (2019), Gap analysis for small and medium-sized enterprises financing in the European Union. Final report (available at https://www.fi-compass.eu/publication/factsheets/gap-analysis-small-and-medium-sized-enterprises-financing-european-union).

# 2. EUROPE'S DEFENCE TECHNOLOGY AND INDUSTRIAL BASE (EDTIB)

This chapter provides a concise overview of the key features of the EDITIB, highlights its primary challenges, and discusses its financial needs with a focus on SMEs and midcap enterprises.

## 2.1. A definition of Defence Technology and Industrial Base

**There is no clear-cut definition of what constitutes the boundaries of the EDBIT.** The definition adopted by the Commission's Expert Group on the European Defence Fund identifies the EDTIB as a cluster of large prime contractors and subcontractors (midcaps and SMEs) developing and producing advanced technologies and defence capabilities for the Member States' Armed Forces, including sub-sectors like aerospace, land equipment, naval, and defence electronics. However, the concept is usually employed to embrace the traditional defence industry (e.g., air, land and naval combat) along with new areas driven by the application of emerging and disruptive technologies to civilian and military use, the so-called dual-use technologies. A definition of the Aerospace and defence Ecosystem (Table 2) using the NACE code[17] has several limitations if used to count the number of companies. On the one hand, it includes companies not involved in defence or dual-use (e.g. transport sector); on the other, it is not broad enough to capture the latest technology advancements.

**Table 2 NACE codes for the Aerospace & Defence Ecosystem**

| NACE code | NACE category |
|---|---|
| C25 | Manufacture of fabricated metal products, except machinery and equipment |
| C26 | Manufacture of computer, electronic and optical products |
| C27 | Manufacture of electrical equipment |
| C30 | Manufacture of other transport equipment |
| C33 | Repair and installation of machinery and equipment |
| H51 | Air transport |
| H52 | Warehousing and support activities for transportation |
| J61 | Telecommunications |
| N80 | Security and investigation activities |

Source: European Commission. (2021). SWD on the Annual Single Market Report, 2021, SWD (2021) 35, final,

Regulation (EU) 2021/821 of 20 May 2021 defines dual-use goods as "*products, including software and technologies, which may have both civilian and military use*". In more practical terms, the dual-use concept can be interpreted in different ways, including technologies that spin in and out[18] of the defence sector. In particular:

- **Defence-to-Commercial**. These are technologies initially developed for defence purposes but have significant potential in the future commercial market. Global Positioning System (GPS) is a clear case of defence-to-commercial dual-use technology, as it was initially designed to enhance navigation and location services for everyday use but is now essential for precise military operations.

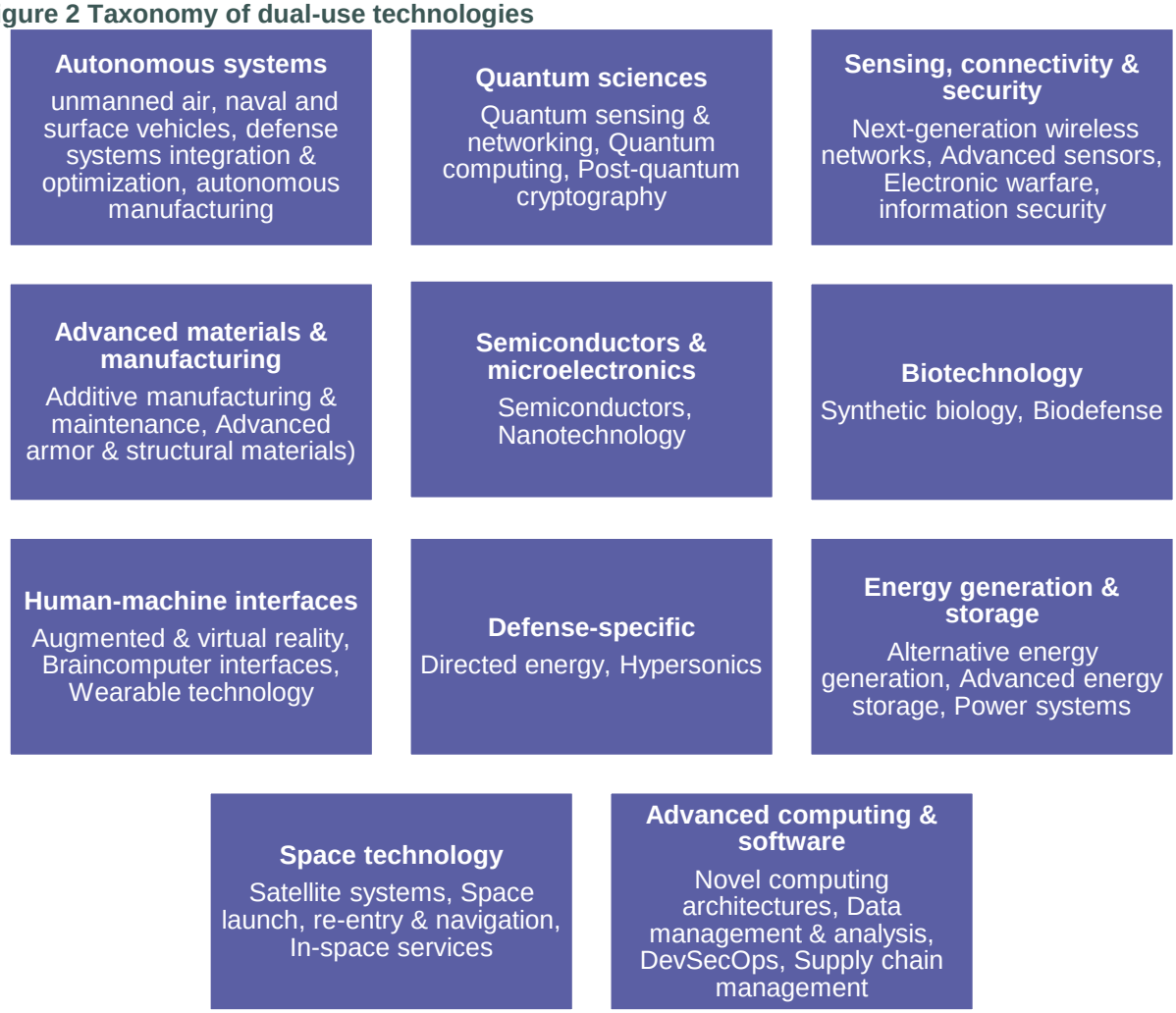
[17] In the traditional defence industry the definition includes: C25.40 Manufacture of weapons and ammunition; C30.40 Manufacture of military fighting vehicles; C30.11 Building of ships and floating structures – This group includes also building of warships; C30.90 Manufacture of transport equipment n.e.c. – This group includes the manufacture of transport equipment other than motor vehicles and rail, water, air or space transport equipment and military vehicles; C33.11 Repair of fabricated metal products – This group includes also repair and maintenance of firearms and ordnance.

[18] European Commission (2021). Action Plan on synergies between civil, defence and space industries. Brussels, 22.02.2021 COM(2021) 70 final.

- **Commercial-to-Defence**. Technologies primarily developed for commercial applications but can be adapted for defence purposes. Cybersecurity software tailored for commercial users to secure their value chains but also applicable to military communication and safeguarding classified information in governmental contexts.

**The categorisation of technologies with the potential for dual-use applications is not straightforward and is constantly evolving, driven by rapid technological advancements and breakthroughs**. To provide a clear illustration, the following figure demonstrates how the definition of a defence ecosystem can be broadened when emerging technologies are integrated into its framework.

**Figure 2 Taxonomy of dual-use technologies**




Source: Pitchbook 2023, Vertical Snapshot: Defence Tech

## 2.2. Europe's Defence Technology and Industrial Base (EDTIB)

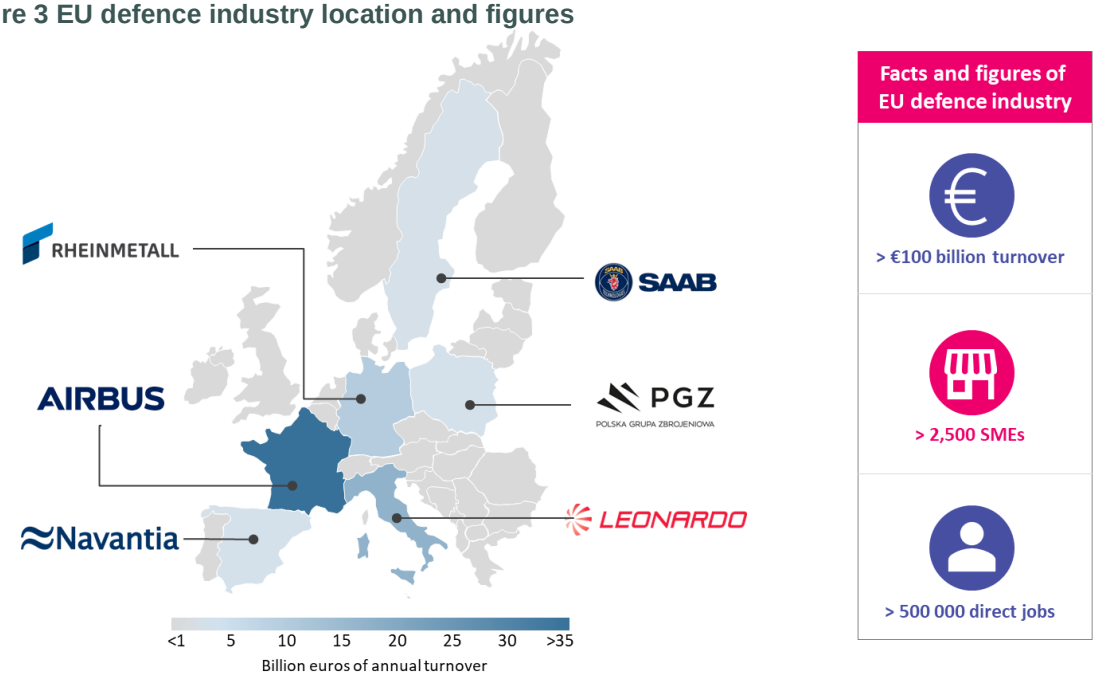
The defence industry consists of a range of companies, including prime contractors and specialised SMEs, with varying ownership structures and degrees of internationalisation. Prime contractors serve as system integrators, establishing direct relationships with military buyers and specialised supplier companies. Some European prime contractors, such as Leonardo, have state participation, while others do not. Companies like Airbus and MBDA have a strong transnational nature, while others may have less international presence[19].

**Five EU countries (Italy, France, Germany, Spain and Sweden) and the United Kingdom account for the bulk of overall European defence expenditures** (See Figure below). All the major European system integrators are headquartered in France, Italy, and Germany, explaining why these states dominate

[19] Osservatorio Politica Internazionale (2023) "La produzione industriale a sostegno della difesa europea e transatlantica"

the industry. Together, they represent more than 50% of total EU defence revenue. Similarly, these countries have the largest defence spending, accounting for almost 60% of all EU defence spending. SMEs, on the other hand, are more evenly distributed, but despite the existence of over 2,500 defence SMEs and the important role that they play in supply chains, their contribution to the overall industry is very small in terms of revenue and employment. For instance, German SMEs employ 3,500 workers of a total of 65,000 defence workers, equating to merely 5.4%. Furthermore, their combined yearly turnovers contribute only 3.4% of the country's total turnover[20]. A similar phenomenon can be seen across all the other EU countries.

**Figure 3 EU defence industry location and figures**




Source: SpaceTec Partners

A strong EDTIB is considered a necessary condition for the achievement of the sovereign autonomy of Europe[21], but many challenges have contributed to weakening the European EDITB, including the decline of already low defence investments in Member States, critical security of supply (e.g. raw materials), defence duplicates in a fragmented EU market, lack of manufacturing capability, increasing competition from Asia, and limited access to finance.

**Defence budgets have faced severe under-investment in most EU countries over the last decade**. While strategic competitors such as Russia and China have significantly increased their defence budgets by approximately 300 % and 600 %, respectively, over the last decade, the collective increase among EU Member States was approximately 20 % in the same period. Furthermore, in recent decades, a significant part of the already comparatively weak EU defence budgets was not invested in the EDTIB. It was estimated that over 60 % of European defence procurement budgets were spent on military imports from third countries[22], thus increasing third-country dependencies.

**Many raw materials and rare earths are imported from third countries, some of which are considered systemic rivals**. The EU's dependency on imports from third countries is between 75 % and 100 %, with 19 of the raw materials the EU defines as critical being mostly Chinese imports (e.g. aluminium and natural graphite)[23]. The EU also imports 'nearly all' microchips – ubiquitous components in defence

[20] Transparency International Defence & Security

[21] European Parliament, 2020. The EU's Defence Technological and Industrial Base

[22] European Commission, 2022. Joint Communication on the Defence Investment Gaps Analysis and Way Forward. Brussels, 18.5.2022

[23] DW News, 2022. Can the EU do without metals from China?

technologies – mostly from Taiwan[24], making the EU vulnerable to supply chain disruption and potentially to trade disputes.

**The European defence industry fragmentation leads, among others, to costly duplication**. European armies use nearly six times as many systems in total compared to the US. For example, 17 different types of main battle tanks are built, procured and operated in Europe, while the US only manufactures one – the M1 Abrams[25]. The US has only one main battle tank producer, while Europe had six in 2016. This complicates logistics and transnational cooperation on maintenance, as well as interoperability[26].

**Russia's war on Ukraine has exposed European armament challenges, primarily due to the low production capacities of the EDTIB, which is primarily geared towards peacetime production[27]**. It has been recently estimated that the maximum production in the EU is approximately 230,000 rounds per annum – an amount that Ukraine consumes almost every month[28]. This challenge is exacerbated by the European defence industry operating on a 'built-to-order' system. Traditionally, defence contractors in Europe avoid producing arms without pre-orders due to the very high cost of manufacturing, which in turn leads to exceedingly long waiting times for advanced defence capabilities[29]. The main issue is that it takes large capital investment and years to create new plants, and for the defence industry to invest such large sums, it would need solid, long-term orders for years to come to make it worthwhile from an economic perspective. However, such long-term contracts are currently lacking[30].

**The EU's main rivals in the field of new, disruptive, dual-use technologies come from the US, Asia and Turkey**. In particular, the Chinese government has adopted a comprehensive 'whole-of-government approach' to achieve civil–military integration and to develop advanced dual-use technologies. Domestic firms have been provided the utmost government financial and regulatory support within a protectionist domestic bubble. Benefiting from international expertise and innovation, whether through legal or illegal means, Chinese industries have been catching up with their Western counterparts[31]. Industrial espionage remains a tool to gain access to cutting-edge technologies and intellectual property[32]. A study by PwC for DG GROW suggests that cyber espionage – generally, not exclusively by China – is estimated to cost Europe up to 60 billion EUR in economic growth and 289,000 jobs in 2018[33].

**The Commission's Expert Group on the European Defence Fund's Financial Toolbox report[34] identified that the EDTIB in Europe faces particular difficulties in securing access to debt and equity financing, in particular, to ensure production scalability**. Under the current geopolitical circumstances and with the prospect of additional military spending in the next military budgets, Europe's defence industry will be called to provide additional production capacity, build up stocks, develop the next generation of operational capabilities and required technologies, and reduce critical dependencies along defence value chains, which also includes the financial and economic stability of the industrial supply chain[35]. Therefore, there is an urgent need to strengthen the financial structures of these companies. The lack of financing for the growth phase is problematic for the EU's strategic autonomy since it increases dependency on non-EU investors.

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[24] European Parliamentary Research Service (EPRS), 2022. Suply of computer chips and semiconductors.

[25] European Defence Agency, 2017. Space& Defence The Sky is not the limit.

[26] War on the Rocks, 2023. Europe at a Strategic Disadvantage: A Fragmented Defense Industry.

[27] European Defence Agency (EDA), 2022. From peacetime production to new capabilities: be smart and strategic, EDA told.

[28] DW News, 2023. Ammunition for Ukraine: Can the EU fast-track bullets?

[29] Financial Times, 2023. Defence industry's business model transformed by war, says German contractor.

[30] Angelet, B. (2022). The War against Ukraine and European Defence: When will we square the circle? Egmont Institute.

[31] Nouwens, M., & Legarda, H. (2018). China's pursuit of advanced dual-use technologies.

[32] Arturo G. Munoz, 'Review: Chinese Industrial Espionage. Technology Acquisition and Military Modernization', *Studies in Intelligence,* Vol. 59, No. 4, December 2015

[33] European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, *The scale and impact of industrial espionage and theft of trade secrets through cyber*, Publications Office, 2018, https://data.europa.eu/doi/10.2873/48055

[34] Financial instruments in support of resilient and autonomous European defence sector", European Commission, 10/10/2018

[35] ASD, August 2022. "Considerations on further initiatives to strengthen the European defence industrial and technological base".

# 3. SME FINANCING NEEDS IN THE DEFENCE SECTOR

This chapter offers an overview of the finance requirements expressed by SMEs in the defence sector within the broader macroeconomic landscape in Europe.

## 3.1. Overview of SME access to finance in Europe

**Geopolitical tensions from Russia's prolonged invasion of Ukraine, ongoing supply chain disruptions, and tightening monetary policy to combat persistent inflation pressures with increasing interest rates are deteriorating SMEs' access to finance, particularly bank financing**[36]. In all sectors, access to finance remains one of the major concerns reported by SMEs participating in the SAFE survey (30% of surveyed firms), along with the insufficient availability of skilled labour and higher production costs. Firms in the euro area pointed to a deterioration of the availability of external financing over the period October 2022 – March 2023 as compared to the previous semester (April - September 2022)[37] across all financing products (bank loans, credit lines, trade credit, and equity and debt securities issuance).[38] According to SAFE, the net percentage of SMEs reporting a widening of the financing gap in external funds increased by 2% in the period October 2022 – March 2023 as compared to the past six months.

**In parallel to the deterioration of access to finance, the SAFE also reveals an increase in the share of discouraged SMEs, which did not even try to apply for bank loans for fear of possible rejection** from 5.4% in 2021 to 6.6% in 2022 (with small firms being those most impacted).[39] Looking ahead, firms expect a decline in the availability of bank loans (17% of surveyed firms) and credit lines (12%) over the last two quarters of 2023.[40]

Across countries, looking at the different components of financing obstacles, the most notable changes were reported in France, where firms rejected banks' offers more often because the costs of bank loans were considered too high, and in Germany and Spain, where the share of discouraged borrowers increased.[41]

At the ecosystem level, the domino effect of the invasion of Ukraine by Russia with subsequent higher input costs, high inflation and tightening of financial conditions has led to severe difficulties for SMEs in accessing finance in specific ecosystems such as energy-intensive industries, agri-food, and construction, while the access to finance of SMEs in the electronics ecosystem has been severely hit by disruption of supply chains caused by the COVID-19 making microelectronics components 20% to 30% more expensive because of the high cost of raw materials. The extent to which these events have impacted the access to finance for European SMEs depended on the ability of firms to pass cost increases onto consumers, on getting credit from suppliers and access to banks' credit lines, on firms' position within the value chain, how sensitive the demand for specific products is to price changes, types of clients, and firm size.

In contrast to SMEs in various other sectors, the financing requirements of SMEs within the aerospace and defence ecosystem are distinct in the current context. Unlike the typical need for working capital and credit lines, these SMEs primarily seek funding to facilitate resource-efficient investments and support research and development (R&D) initiatives[42]. This observation aligns with the outcomes of a survey conducted specifically for this study, whose findings are discussed in the following section.

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[36] European Central Bank (2023). 28th round of the Survey on the Access to Finance of Enterprises (SAFE) in the euro area, conducted between 6 March and 14 April 2023. The survey covered the period from October 2022 to March 2023.

[37] This trend is also corroborated by EIBIS data which contains information on respondents' expectations regarding investment in the current financial year between 2016 and 2022. See also the 2022 EIF SME Access to Finance Index.

[38] European Central Bank (2023). 28th round of the SAFE (Charts 9 and 10 in Section 3.2).

[39] See European Commission (2023). SMEs and high inflation. Draft Final report, Section 4.1. Forthcoming. Percentages are from PPMI and CSIL elaboration on SAFE data.

[40] European Central Bank (2023). 28th round of the SAFE (Chart 15 and Chart 16 in Section 5).

[41] See for detail, European Central Bank (2023). 28th round of the SAFE (Chart 13 in section 4.1. and Chart 28 in Annex 1).

[42] In 2021/2022, SMEs in the aerospace & defence ecosystem recorded the highest share (38%) of resource- efficient/R&D investments as compared to all the other industrial ecosystems in the previous two years. That share accounts for 6-10% of SMEs' annual turnover in the aerospace & defence. See European Commission (2023). SMEs and high inflation. Draft Final report, Section 4.4.2. Forthcoming. Percentages are from PPMI and CSIL elaboration on Flash Eurobarometer 498 data.

## 3.2. An insight into SME equity access

**Equity and quasi-equity instruments typically target a subset of SMEs and mid-caps, which are often young, fast-growing, innovative firms**. They show risk profiles and business models related to innovation, making these firms often unable to obtain financing from the traditional system of financial intermediation. In exchange for the higher risk, these instruments offer higher expected returns – usually beyond the profit-generating capabilities of traditional SMEs. Such firms also tend to rely heavily on intangible assets and, therefore, do not possess sufficient physical capital that they could use as collateral. The lack of sufficient private funding for young, fast-growing or innovative firms gives rise to the equity gap linked to specific types of market failures and barriers (Table 3). [43]

**Table 3 Market failures to access equity-type instruments by SMEs and midcaps in the EU**

| MARKET FAILURE/BARRIER | EXPLANATION |
|---|---|
| **SMEs lack of knowledge and skills to access alternative sources of finance.** | Although there is an increasing range of equity financing options available to SMEs, some of these are accessible only to a small share of SMEs. The lack of awareness and understanding on the part of SMEs, their modalities and operation, and the willingness of SMEs to be invested often due to cultural background has held back their broader use. Improving knowledge of the full range of financing instruments for SMEs and entrepreneurs represents a first step towards broadening access to these finance options. |
| **Asymmetric information and transaction costs** | The often complex, new and risky business models of young, high-growth, innovative firms, sometimes based on undisclosed technology, create information asymmetries between the investors and the entrepreneurs. The availability and quality of available information for smaller and younger companies are even worse than for more mature firms. The costs associated with reducing the information gap may prevent investors from engaging in otherwise viable businesses. |
| **Coordination failure** | The institutional building blocks of a venture capital/private equity market infrastructure and the networks necessary to operate this infrastructure cannot develop without a pipeline of successful projects. These, however, cannot materialize without sufficient funding. Public intervention may overcome this chicken-egg problem by acting as a first mover to establish the equity markets for such firms. |
| **Limits to diversification and scale-up** | For high-growth firms at the later stages of maturity, the funding needs are getting larger than for start-ups at an early stage of development. Financing such large tickets does not allow enough diversification for typical, small European investors. This can result in a 'scale-up gap' when financing can dry up for successful start-ups maturing into the growth phase. |

Source: Authors' elaboration on EIB (2022), EIF (2022). OECD (2023).

## 3.3. Access to finance for SMEs in the defence sector

**On top of the challenges identified for all SMEs, companies active in the defence sector face additional difficulties.** Based on the sample of firms surveyed in this study, it is evident that defence SMEs primarily require financial support for their R&D activities and the subsequent commercialization of new products and services.[44] This underscores their high level of innovativeness compared to their

[43] EIB (2022). Evaluation of EIB Group equity and quasi-equity support for SMEs and midcaps. Final Report, December 2022.
EIF (2022). The European Small Business Finance Outlook 2022. EIF Research and Market Analysis. Working Paper 2022/84.
OECD (2023) OECD SME & Entrepreneurship Ministerial Meeting 27-28 June 2023. Managing Shocks and Transitions Future-Proofing SME and Entrepreneurship Policies.

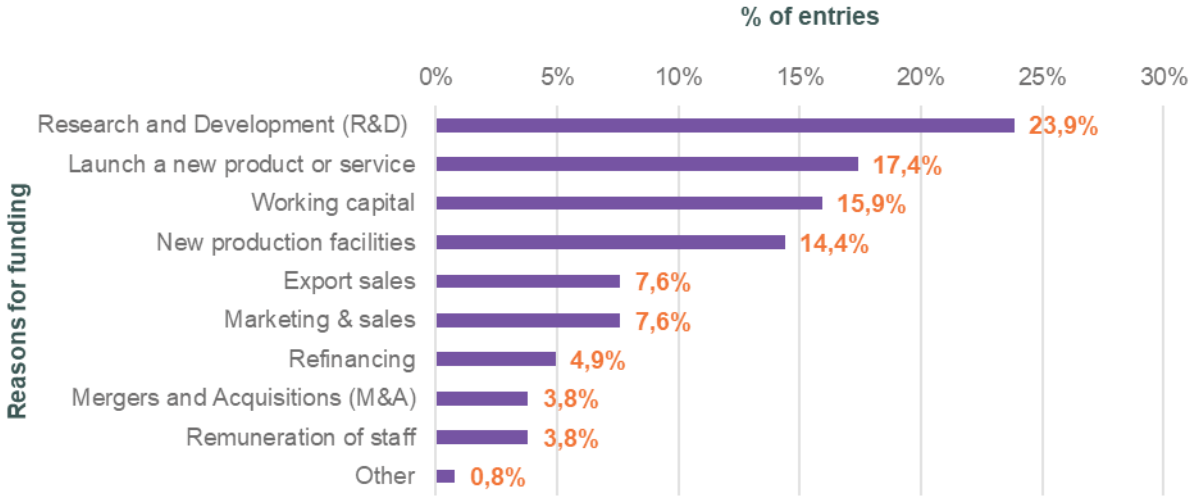
[44] Under the EDF (2021-2027), the DEFIS is providing financial support to SMEs and Midcaps, mainly through grants, to collaborative R&D projects in the field of defence. The EDF can support 100 % of the total eligible costs of a research action, while the EDF

*"The deep-tech nature of the business, 5 -10 years for profit, and the high capital investment scares investors away from the sector"*

**Interviewed association representative**

counterparts in other sectors. In contrast, financial needs related to working capital, refinancing, and staff remuneration are of secondary importance to these SMEs (as depicted in Figure 4). Interviews conducted as part of this study further validate these findings, highlighting that the defence industry is characterized by a prolonged and costly R&D phase, often lasting 5 to 10 years before yielding any profits. Additionally, it was noted that the substantial expenses associated with manufacturing setup serve as a significant deterrent for potential investors.

**Figure 4 Companies' main needs and reasons to look for funding (2021 – 2022)**




Source: CSIL / SpaceTec Partners

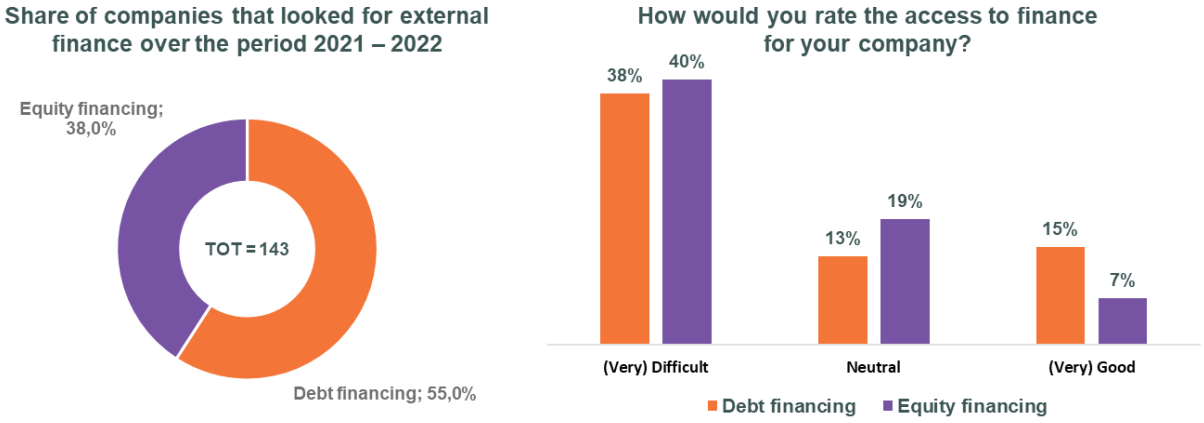
**In addition to the points highlighted above, it is widely acknowledged in the industry that securing financing is imperative to compensate for years of underinvestment**. The production capacity of the EU defence industry was initially configured for peacetime needs and not adapted to the new needs of ramping up production capacities [45]. Financing needs also arise from the industry's imperative to modernize and incorporate the latest advancements in commercial technologies, including artificial intelligence, robotics, quantum computing, and space imagery. However, transitioning technologies developed for civil applications into the military domain requires patient capital because regulations often impose stringent requirements on companies regarding their handling and use of defence products, making it particularly difficult for smaller firms to comply.

**According to the survey conducted in this study, approximately 40% of SMEs reported that they found access to finance to be either difficult or very difficult**. According to the survey conducted for this study, access to finance remains one of the major concerns for about 40% of defence SMEs, whereas the SAFE SME population stood at 30%. Examining the sources of external financing most relevant and frequently used by defence SMEs over the last two years, it is evident that debt financing, primarily in bank loans, constituted the leading choice for 55% of the surveyed sample. In contrast, 38% of respondents sought equity financing (as illustrated in Figure 5). Notably, of those who sought external funding, only a small share of them successfully secured loans, accounting for 32.9% of the respondents, while equity financing was obtained by 13.3% (Figure 5).

support to a development action may vary between 20% and 100% of its total eligible costs depending on the activities covered (e.g., design, prototyping, testing, qualification, certification). Only collaborative projects involving at least three eligible entities from at least three Member States or associated countries may be eligible for EDF funding (or two eligible entities from at least two Member States in the case of disruptive technologies) limiting the financing of single entities.

[45] ASD, August 2022. "Considerations on further initiatives to strengthen the European defence industrial and technological base".

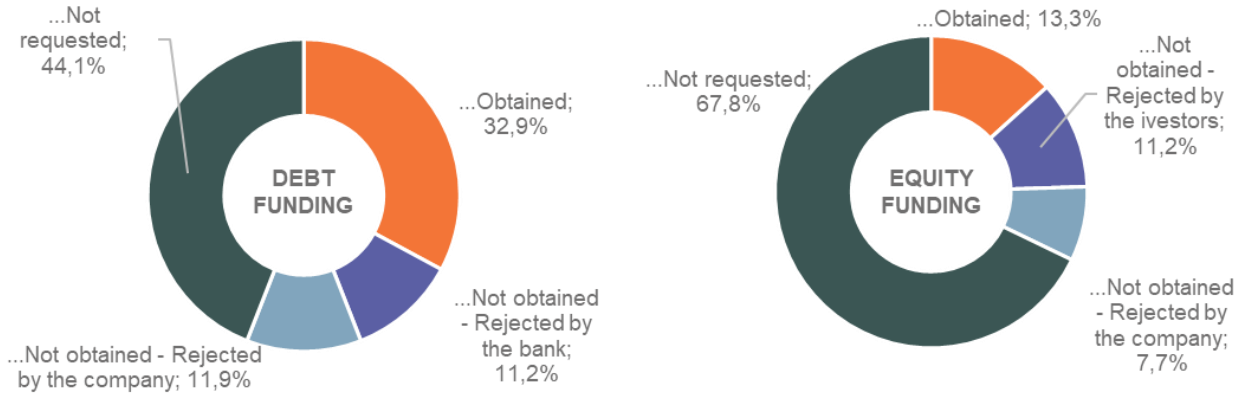
**Figure 5 Demand for external financing**




Source: CSIL / SpaceTec Partners

**Moreover, the analysis reveals a significant portion of SMEs that, during the 2021-2022 period, refrained from seeking either bank loans or equity** (Figure 6). These amount to 44% of SMEs for loans and 68% for equity, a figure that does not compare well with the EU average, which stood at 6.6% in the same period. While some of these enterprises may possess sufficient internal funds to meet their financial requirements, it is also plausible that this observation points towards the existence of high barriers for SMEs in this sector (Chapter 4).

**Figure 6 Access to external finance**




Source: CSIL/SpaceTec Partners

Finally, grant funding is acknowledged as a crucial source of finance for supporting early-stage innovation and basic research when investments are not yet capable of generating sufficient economic returns, but its accessibility is often hindered by its complex application process. The exhaustive paperwork and protracted bureaucratic procedures make the pursuit of these grants a challenging endeavour. Despite their potential benefits, these administrative challenges often make grants an unpredictable and hard-to-get source of funding.

*"Midcaps and large companies are advantaged; they have entire teams dedicated to answers tenders for grants [often complex]"*

**Interviewed SME's representative.**

Moreover, given the substantial financing demands within this industry, grants exhibit certain limitations when compared to financial instruments. Typically, grants provide smaller amounts to individual companies than loans and equity, making them suitable for kickstarting R&D but less conducive for facilitating the substantial investments required for scaling up production. Ensuring access to other forms of funding, i.e. equity and loans, is also important since SMEs often do not know where to look for financing once they are no longer eligible for grants and need to scale up their production. Technologies developed for the defence sector are characterized by long development cycles, often necessitating patient investors. Venture debt and equity investments become the primary recourse, as traditional bank loans are often

inaccessible to companies lacking collateral or an established credit history. This is a common situation for newly established companies and undercapitalised SMEs. For these entities, the provision of public support through equity and quasi equity programmes can play a crucial role beyond the initial seed funding stage. When companies are more mature and have sufficient collateral and credit history, bank loans can support business expansion. For these companies, subsidised credit and public guarantees can help reduce the cost of finance.

# 4. DRIVERS AND BOTTLENECKS IN ACCESSING FINANCE

This chapter thoroughly examines the primary factors that impede investment by various entities, including banks and equity providers, in defence sector companies and the sale of dual-use technologies for military applications. At the same time, it sheds light on the key recent drivers that have emerged and could potentially stimulate increased investments in this sector.

## 4.1. Barriers for investors

Market studies commissioned by the InnovFin Advisory[46] services to explore the financing needs of the European deep tech companies (companies, including start-ups, whose technologies are based on tangible engineering innovation or scientific advances and discoveries) revealed a significant financing gap in several sectors that are strategic for the competitiveness and the strategic autonomy of the European economy. In the initial stages, capital accessibility is primarily facilitated by public funds, complemented by instruments within the public sector, as well as contributions from business angels. As companies progress into the startup phase, the funding mix often comprises a blend of public grants, venture capital, and venture debt. The European landscape has a decent availability of such instruments, partially attributable to public support initiatives for innovation at the European and member-state levels. Nevertheless, the market gaps in financing provision predominantly manifest during the growth phase, leading to what is commonly referred to as the "multiple valleys of death." This phase is marked by the transition to large-scale industrialization and commercialization, necessitating substantial investments while retaining a backdrop of heightened risks.

*"Obtaining debt funding is so unlikely that might not even be worth trying"*

**Interviewed SME's representative**

**This paradigm is equally applicable within the defence sector, where similar barriers are amplified by the specific dynamics of the market structure and the inherently sensitive political nature of this policy domain, which polarise opinions and market sentiment**. Interviews with SMEs and their associations confirmed that they face considerable obstacles when trying to access financial services. Survey data show that a considerable share of SMEs are not asking for a bank loan (44%). The main reason is to be searched in the difficulty in obtaining such a funding instrument, which discourages companies from trying it.

*"Geopolitical tensions, political interferences, reputational risks, perceived customer concentration and opacity of Business-to-Government go-to-market: investing in the European defence tech industry is not for the faint-hearted."*

**Axa Venture Partners White Paper**

Equity funding presents its own set of challenges and is less pursued in comparison to loans. A significant 67.8% of survey respondents have indicated that they have not contemplated this particular form of financing. Providers of funds for defence and dual-use companies have to consider several variables before making their investment decision, provided that they have not already banned the defence sector from their portfolio for ethical and reputational considerations. In particular, they will look at 1) the technology involved and the potential investment return, 2) its primary users, 3) the exit scenario, 4) whether it deals with weapons or ammunition, 5) if special laws or export regulations apply, and 6) what ESG considerations have to be taken into account[47]. Concurrently, financial support is frequently diverted to other more desirable or urgent sectors, such as green technology businesses.

Overall, responses and interviews indicated two main types of barriers: those related to the market structure and those related to horizontal and sector-specific regulatory frameworks (Figure 7). The following sections elaborate on these elements.

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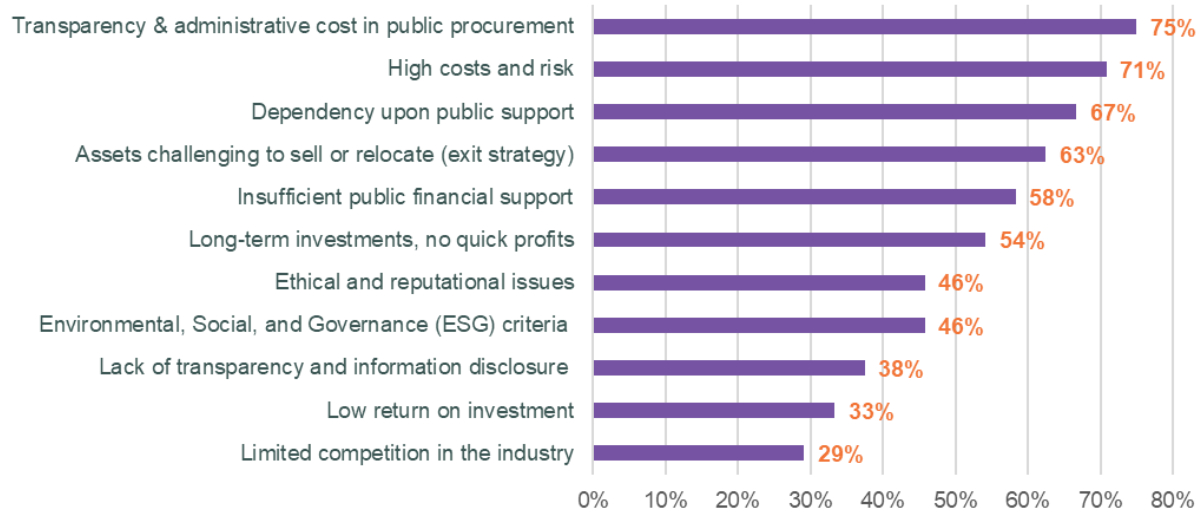
[46] See as an example "Financing the next wave of medical breakthroughs -What works and what needs fixing? Access-to-finance conditions for Life Sciences R&D", "Financing the digital transformation. Unlocking the value of photonics and microelectronics", "The future of the European space sector. How to leverage Europe's technological leadership and boost investments for space ventures".

[47] Project A Insights, 2023. Should VCs stop shunning investments in Defence Technology?

**Figure 7 Factors holding back investments in the defence and dual-use sectors**




Source: CSIL

### 4.1.1. Market structure and dynamics

**Investors consider the dependency on public contracts or large prime contractors as an element of fragility**. The aerospace and defence markets feature an oligopoly in the form of a highly specialized, politically sponsored industry and a monopsony in the form of the government acting as the exclusive buyer. These contractors often have entrenched relationships with government officials and a deep understanding of the acquisition process that companies operating downstream in the supply chain do not have. The importance of accessing public procurement leads to a solidified network of businesses embedded in specific and cohesive value chains, intersectoral in nature, generating a cascade of barriers to market entry for other investors[48]. Moreover, the companies and funds interviews highlighted that each European market has its defence procurement processes, and companies need to understand them individually.

**Unless a technology serves both civilian and military purposes, its potential market is constrained to a select group of government-owned end users**. These potential customers are characterized by intricate procurement processes that can be challenging to navigate. As testified by public programmes in the US and a recent parliamentary enquiry in the UK[49], defence procurement systems are in need of a major overhaul to make them fit for purpose for modern military capabilities. Interviewed SMEs highlighted that they are expected to build trust-based relationships with customers. The customer acquisition process in the defence industry is a multifaceted undertaking involving high costs and extensive negotiations. Businesses need to convince a broad spectrum of stakeholders, from procurement specialists and managers to engineers. Such a configuration restricts market access and hampers the growth prospects of companies.

*"The deep-tech nature of the business, 5-10 years for profit, and the high capital investment scare investors away from the sector"*

**Interviewed association representative**

**High costs and risk of investing capital in large-scale R&D programs generate uncertain returns.** The defence sector is particularly capital-intensive, requiring significant non-recurring investments in infrastructure and physical capital. The last three decades have witnessed a growth in the complexity and costs of advanced weapon systems, such as combat aircraft and naval vessels[50]. The high cost of manufacturing setup is a significant deterrent for investors. Introducing new products often

[48] Osservatorio Politica Internazionale (2023). La produzione industriale a sostegno della difesa europea e transatlantica.
[49] UK Parliament (2023). It is broke — and it's time to fix it: The UK's defence procurement system – Report Summary
[50] Osservatorio Politica Internazionale (2023). La produzione industriale a sostegno della difesa europea e transatlantica.

demands millions in capital expenditure (CAPEX), and investors tend to steer clear of such high initial outlays.

**The investment horizon in the defence sector can be longer than in other sectors, thus making defence investments relatively less attractive**. In defence technology, crafting an innovative product requires tremendous effort. This journey typically stretches over 5 to 10 years and involves meticulous development, rigorous testing, and in-depth validation to meet the high standards necessary for military applications. The military is historically more risk-averse, which is incompatible with the rapid innovation cycles of venture capital. High capital costs and long investment return timelines make the sector unattractive to most VC investing in the early stage that look for quick rewards.

**The sensitivity and confidentiality of information in the defence sector can also significantly hinder the funding process**. Potential investors and lenders may be unable to access critical data about the company and its products due to national security concerns, making it difficult to make informed decisions. Interviews revealed that these difficulties span all considered funding channels (i.e., debt, equity, and grant financing).

**As for equity financing, a unique set of barriers comes into play related to a limited grasp of the sector amongst investors**. Financial institutions tend to tread cautiously in the defence sector due to a combination of investors' internal policies (section 4.1.3) and general unfamiliarity with the sector's unique dynamics. The high-risk nature of the business, the intricate regulatory roadblocks, and the lack of investors focusing specifically on the defence sector. From an investor's standpoint, accurately evaluating the technologies being developed and discerning the potential of their dual applications poses a notable challenge. The prevailing uncertainty surrounding potential growth trajectories and the composition of the customer base further adds to this complexity. Consequently, these combined factors significantly elevate concerns regarding the feasibility of scaling up production and achieving a high return on the investment.

**Compared to the US, Europe has far more limited exit opportunities**. The US has a larger and more decentralised market, including many opportunities for public offerings. By contrast, Europe has fewer players with deep pockets. Within the European Union VC market, the emphasis is on early-stage companies. This focus can be attributed to a combination of factors. First, the presence of late-stage defence technology enterprises is comparatively limited. Second, there's a prevailing concern that such advanced-stage companies might encounter challenges in attracting investors. For investors targeting early-stage ventures, there is a high risk regarding the future presence of Series B investors[51].

### 4.1.2. The role of regulations

**Access to financing within the defence sector has experienced a tightening trend over the years, largely influenced by the implementation of exclusion policies associated with the advancement of environmental and social sustainability in the financial domain.** Within the EU, this trend has been fostered by the introduction of new legislation (as depicted in the figure below). In addition to that general framework that applies horizontally to all companies, defence companies are also under scrutiny to ensure that financial support is not provided to companies involved in purchasing and trading so-called 'controversial' weapons, do not commit human rights violations and do not finance terrorism and the illegal arms trade. For these reasons, the relationship between banks and companies involved in producing and trading weapons has long been under the watchful eyes of investors, customers, non-governmental organisations and society at large.

[51] Axa Venture Partners (2023). Who will fund the next innovation wave in European Defence Technologies?

**Figure 8 Regulatory framework for environmentally and socially responsible investments**


Source: CSIL

**While enforcing the most recent measures related to sustainable finance is vital in upholding the EU's global pledge to attain climate neutrality by 2050 and also fostering social sustainability, their execution is inadvertently impacting defence companies' ability to secure financial support**. Difficulties appear to be linked to the fact that the EU sustainable finance framework only provides a limited definition of what is socially harmful. Technical standards in the SFDR only define "*Exposure to controversial weapons, such as anti-personnel mines, cluster munitions, chemical weapons and biological weapons"* as an adverse sustainability indicator[52] and do not provide any definition of what positively contributes to social sustainability. Another significant issue identified by representatives of the defence industry is the absence of a clear position regarding the defence sector within the EU taxonomy[53].

**Regarding environmental criteria, the defence sector currently finds itself in a state of ambiguity, neither definitively included nor explicitly excluded**. This situation places the onus on investors and financial institutions to independently determine whether defence contractors should be incorporated into their "green" or "responsible" investment portfolios.

**The EU has started to address these ambiguities and clarified the articulation between defence and its ESG Framework**. For example, in 2022 the Commission published a Questions and Answers on the EU Taxonomy in which it clarified the compatibility between the defence industry and the EU sustainable finance[54]. However, despite these clarifications, the perception that defence is incompatible with the ethical criteria encompassed by Environmental, Social, and Governance (ESG) principles defining sustainability remains widely shared among investors[55].

Mistaken interpretations of ESG criteria or the categorization of defence as non-sustainable leads to denying essential financial services to defence companies, even those engaged in dual-use technologies. The logical consequence for many financial institutions has been to opt for the simplest and least risky

[52] European Union (2022b). Regulation (EU) 2022/1288 of 6 April 2022 supplementing Regulation (EU) 2019/2088 with regard to regulatory technical standards.

[53] The EU taxonomy is a classification system for economic activities defining which economic activities are environmentally sustainable. It entered into force in July 2020, but the classification of economic activities is still a work in progress.

[54] European Union (2022a). Questions and Answers on the EU Taxonomy Complementary Climate Delegated Act covering certain nuclear and gas activities.

[55] ASD, October 2022. "A note on access to private funding for the defence industry".

approach – excluding defence stocks from sustainable investment funds. Some investors opt for a stricter approach by entirely excluding the defence sector from all their investments [56].

An investor survey conducted by Deutsche Bank in 2022 showed that 15% of North American investors think defence should be excluded from ESG investments, while this goes up to 57% in Europe[57]. These challenges are not confined solely to major system providers but extend to SMEs along the supply chain. Therefore, the defence industry is concerned that banks and investment funds may proactively anticipate or even go beyond the requirements of forthcoming regulations. This could lead to establishing preventive measures and an inclination towards over-compliance in their financial support for companies within the EDTIB[58].

### 4.1.3. The role of investors' internal policies

#### Overview of European banks' loan policies for the defence and dual-use sector

To further explore this important point, this study reviewed European banks and funds' policies[59], as well as their codes of conduct, to highlight variations in their approaches to the defence sector. The primary findings are outlined in the subsequent paragraphs.

**Banks have crafted distinct policies tailored to the defence sector due to its sensitivity within the ESG framework**. These policies aim to ensure that financers conduct business responsibly and protect themselves from reputational risk. Financial intermediaries generally strive to strike a balance between the prerogatives of sovereign states in safeguarding their internal security and defence[60]and the imperative to prevent harm to civilians. To achieve this, they have established rigorous internal protocols to continue offering financial services to a sector deemed crucial for national security. These policies delve into the principles and criteria governing operations within the defence sector, encompassing i) the nature of defence assets encompassed by the transaction, ii) the recipient of the transaction, iii) the counterparty involved in the operation, and iv) the destination country of the goods subject to the operation.

In particular, three distinct policy frameworks can be identified:

- Restrictions are mainly focused on specific products, such as biological or chemical weapons, rather than the sector as a whole. Some banks confine their financing within the boundaries set by international treaties, conventions[61], sanctions (as stipulated by the EU and US), export control regimes[62], and national legislation. Similar restrictions are extended to dual-use goods when employed for defence-related activities.
- Other banks, beyond abiding by international and national legal restrictions, impose more stringent criteria grounded in an evaluation of the revenue composition of such enterprises (the percentage of revenue derived from "military" sources). An illustration from an Italian commercial bank showcases the application of these criteria. Enterprises predominantly reliant on civilian-origin

[56] Regulatory technical standards in the SFDR define "Exposure to controversial weapons (anti-personnel mines, cluster munitions, chemical weapons and biological weapons)" as an adverse sustainability indicator. European Union (2022b). Regulation (EU) 2022/1288 of 6 April 2022 supplementing Regulation (EU) 2019/2088 with regard to regulatory technical standards.

[57] Axa Venture Partners (2023). Who will fund the next innovation wave in European Defence Technologies?

[58] Amélie Férey, Laure De Roucy-Rochegonde (2022). "Don't Bank on the Bombs". New European Standards Affecting the Defence Industry. Briefing de l'IFRI.

[59] The analysis includes major bank groups based in different EU countries.

[60] Article 51 of the United Nations Charter, embraces the principle that each nation has the right to self-defence, implying the possibility to produce, purchase and possess arms for its own security as well as for participating in international peace keeping.

[61] E.g. Cluster munitions as defined by the 2008 Oslo Convention; Anti-personnel mines as defined by the 1997 Ottawa Convention; Biological or toxin weapons as defined by the 1972 Convention; Chemical weapons as defined by the 1993 Paris Convention; Nuclear weapons programmes of non-nuclear-weapon States under the 1970 Non-Proliferation Treaty; Depleted uranium ammunition, as prohibited by the Belgian law of 1999; Equipment having "no practical use other than the imposition of death penalty, torture or other cruel, inhuman or degrading treatment or punishment", as defined by Regulation (EU) 2019/125 of the European Parliament and of the Council of the European Union.

[62] The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies; the Nuclear Suppliers Group, for the control of nuclear and nuclear-related technology, the Australia Group for the control of chemical and biological technology that could be weaponized, the Missile Technology Control Regime for the control of rockets and other aerial vehicles capable of delivering weapons of mass destruction. While not formally an export control regime, the Zangger Committee has developed guidance on nuclear export restrictions required by the Non-Proliferation Treaty.

revenue (over 60% of total revenue) are generally deemed eligible for financing. Conversely, enterprises yielding substantial revenue from military sources (exceeding 40% of total revenue in the previous fiscal year) are considered inconsistent with the values upheld by the bank if more than 30% of the military-origin revenue is generated from countries deemed high-risk (e.g., marked by political instability, rampant corruption, or terrorism).

- Certain banks entirely preclude financing the defence sector, as well as dual-use goods and services intended for military purposes.

**When financing for a defence company is acceptable, there are heavy administrative costs.** Applying the required controls is complex and costly because of the limited transparency employed by states in arms procurement processes. Banks apply enhanced due diligence to verify that companies are compliant with national law (including export licenses in relevant jurisdictions), national policies established by the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, international humanitarian law, treaties, and conventions. They also have to demonstrate that they do not do business with certain parties considered to have a high inherent level of corruption. Demonstrating compliance with these requirements is a complex task that requires specialised expertise that many SMEs in the supply chain do not possess[63].

*"Bankers have instructions to not finance defence - it's considered a difficult business".*

**Interviewed SME's representative**

In addition, following internal sensitivity analysis, certain clients and transactions may still be refused, even when they do not fall under the exclusion criteria defined in their policy. The policies can also be amended to integrate the ongoing policy development at the EU and national level to protect against reputational risk or a possible downgrading of an institution's ESG score.

**Finally, from EU banks and investors' perspectives, the EDTIB holds limited significance**. The EU-wide annual turnover of the EDTIB stands at a relatively modest EUR 180 billion. This sector sustains around 460,000 jobs, whereas industries like agriculture contribute over EUR 420 billion to the economy and provide employment for 8 million people. This may also explain why banks might hesitate to engage with defence companies, considering the potential trade-off associated with being embroiled in a publicly scrutinized controversy[64].

**In this context, the accessibility to financial resources frequently becomes excessively expensive and intricate.** Examples of companies that were declined the opportunity to establish bank accounts due to their affiliations with the defence sector have been reported in France[65] and the UK[66], where banks face an investigation by the Ministry of Defence after closing the accounts of military contractors to the department. The reluctance of banks to extend financial support to certain industries can be attributed to a mixture of perceived and actual risks. These risks arise from the insufficient mitigation of potential uncertainties, coupled with the substantial possibility of detrimental effects on their reputation.

### Overview of European investment funds' policies for the defence and dual-use sector

**VC and PE investors are also concerned about reputational risks and lean towards a strict interpretation of the ESG and the EU sustainable finance framework**. The survey results indicate that out of 22 venture capital funds actively investing in the defence and dual-use technology sector, 12 have implemented exclusion criteria related to the defence sector. These criteria primarily pertain to producing weapons, especially those considered controversial and lethal, as mandated by legal obligations. Interestingly, only three of the surveyed investors opted for a broader exclusion policy encompassing all

[63] French National Assembly, 2021. Mission « Flash » sur le Financement de l'industrie de Défense.

[64] Amélie Férey, Laure De Roucy-Rochegonde (2022). "Don't Bank on the Bombs". New European Standards Affecting the Defence Industry. Briefing de l'IFRI.

[65] Assemblée nationale, 2021. Mission flash sur le financement de l'industrie de défense.

[66] The Telegraph (2023). Banks are closing down defence companies' accounts, Government warns. MoD claims ethical investing to blame for vital defence contractors being unable to access finance. By Charles Hymas, 9 July 2023

forms of weapons and ammunition. Additionally, some of the surveyed investors have adopted exclusion policies that require investments to be made exclusively in companies or projects based in European Union (EU) or NATO member nations.

Through interviews and desk reviews[67], it was evident that, similarly to debt products, it is not the regulations that block investments. Instead, the challenge lies in the stringent enforcement of these regulations, often compounded by a limited understanding of the sector and concerns about its reliance on less transparent procurement processes compared to the civilian use market. Interviews found that investment funds often operate within specific investment mandates that delineate the sectors, industries, or asset types in which they are permitted to invest. These mandates are typically established by the fund's management team and require approval from their limited partners. As a result, when limited partners express concerns regarding reputational risks associated with investments in defence, the investment fund may encounter limitations in its ability to allocate capital to the defence sector or dual-use assets.

### Overview of European national promotional banks for the defence and dual-use sector

**In the eyes of the defence industry, IFIs and NPBs carry significant influence in the banking sector.** When these organizations show a willingness to provide loans and invest in defence companies, it sends a powerful signal that the private sector is likely to echo[68]. At the EU level, the EIB is only allowed to financially support dual-use ("dual-use") projects. The bank's Strategic European Security Initiative (SESI) aims to provide more flexibility, but eligible projects must remain dual-use and predominantly civilian. While the EIB plans to increase its financing of dual-use projects to reach EUR 8 billion up to 2027, it will not change its policy to finance pure defence activities, such as weaponry[69]. Defence industry representatives view the approach taken by the EIB as inappropriate, as it sends conflicting signals to private investors[70]. Interviews conducted with private funds for this study have further corroborated this observation.

**France is the only Member State where SMEs in the defence sector can access generic and tailored financial instruments.** BpiFrance allows the financing of pure defence companies and has deployed three types of financial products to support the sector: the investment fund Definvest, the equity fund Fonds Innovation Defence, and the loans DEF'FI (see Chapter 7 for a description of these initiatives).

**Other Member States have adopted different approaches, often influenced by the relative importance of the defence sector for their economy**. In Italy, *Cassa Depositi e Prestiti* released its policy for financing companies in the sector of defence and security in December 2022[71], acknowledging that this sector is strategic for ensuring the security of countries and is, at the same time, one of the most debated sectors in terms of compatibility with ESG criteria. The policy does not differentiate between pure defence and dual-use and pursues the objective of supporting a critical sector in the Italian economy and security while guaranteeing CDP economic, financial and reputational sustainability. In Germany, Kreditanstalt für Wiederaufbau (KfW) does not have a specific mandate for the defence industry. However, companies in the sector can apply for subsidised loans, provided that the company is not engaged in activities on the exclusion list to all KfW programs, such as producing controversial weapons.

In Greece, although a relatively substantial defence budget exists, a significant portion of these expenditures is allocated towards procuring pre-manufactured weapon systems from foreign sources rather than investing in domestic defence sector development. This underdevelopment of the Greek defence sector primarily stems from limited financing opportunities. The national promotional bank, Hellenic Development Bank, does not extend its support to companies operating within the defence sector.

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[67] See also the results of the asset managers survey carried out by Redington (UK) https://redington.co.uk/on-the-defensive-asset-managers-fail-to-reconsider-exposure-to-defence-stocks-following-the-war-in-ukraine/

[68] Aurélie Pugnet (2023). EU defence industry pressures Commission, EU countries to step up financing, EURACTIV.com 27June 2023.

[69] EIB website "Strategic European Security Initiative"

[70] ASD, October 2022. "A note on access to private funding for the defence industry".

[71] Cassa depositi e prestiti, 2022. Politica del Settore Difesa e Sicurezza. 14 December 2022

Currently, the available financial instruments primarily rely on funding from structural EU funds, which come with certain constraints that limit the financing for defence-related enterprises.

### Foreign direct investment control

**Foreign direct investment (FDI) controls limit exit strategy options when a buyer cannot be found in the EU market**. Both FDI Screening[72] and Export Controls[73] are important tools for strategic trade and investment controls to ensure security in the EU, and the Commission's annual reports reveal the usefulness of these regulations. Both regulations function by setting out minimum requirements for EU Member States' screening mechanisms and a mechanism for reporting at the EU level. In particular, amongst other sectors, the FDI regulation looks at the possible impacts on critical infrastructure (including aerospace and defence) and critical technologies and dual-use items (including AI, robotics, semiconductors, cybersecurity, quantum, energy storage, and nuclear technologies, nanotechnologies and biotechnologies). Other sectors are affected as well. For instance, the second annual report[74] issued by the Commission noted that, as a result of the COVID pandemic and recent disruptions in global supply chains, Member States have increased their attention towards critical industries, such as healthcare and energy. Concerning FDI in the defence sector, the Commission report notices that in the manufacturing sector, defence and aerospace account for almost half of the notifications in that sector (45%). A study by Xefri in 2022[75] confirmed that at the global level, governments are reinforcing their regulations and veto rights regarding foreign investments to better protect the assets of strategic sectors such as defence (Table 4).

**Table 4 EU Member States and the UK reinforcing regulations on foreign investments**

| COUNTRY | REGULATION REINFORCEMENT | YEAR | EXAMPLES OF BLOCKED OR ABORTED OPERATIONS |
|---|---|---|---|
| Germany | • Lowering of holding thresholds for foreign investors (from 25% to 10%)<br>• Expansion of the sectors covered by the regulation<br>• Strengthening of supervisory authorities' competences<br>• In the military field, mandatory notification and control of acquisitions made by non-German investors (including from EU countries) if covering at least 10% of the voting rights | 2021 | • Acquisition of IMST (mobile and satellite communications) by CASIC (China)<br>• Acquisition of Siltronic (silicon disks for semiconductors production) by GlobalWafers (Taiwan) |
| Spain | • Mandatory authorisation for extra-EU investors before acquisitions of at least 10% of Spanish companies | 2020 | • Acquisition of ITP Aero (a subsidiary of Rolls Royce) by a consortium led by capital investment fund Bain Capital (United States) |
| France | • Strengthening of the previous law on foreign investment control | 2020 | • Acquisition of Photonis (optics) by Teledyne (United States)<br>• Acquisition of Carrefour (trade and retail) by Couche-Tard (Canada) |
| Italy | • Strengthening of the "Golden Power" act | 2020 | • Acquisition of 70% of LPE's capital (equipment for semiconductors) by |

[72] European Union (2019). Regulation (Eu) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union.

[73] European Union (2021). REGULATION (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast).

[74] European Commission (2022). Report from the Commission to the European Parliament and the Council. Second Annual Report on the screening of foreign direct investments into the Union. Brussels, 1.9.2022 COM(2022) 433 final

[75] Xefri, 2022, Etude prospective et stratégique, Les fonds d'investissements et les entreprises de défense.

| COUNTRY | REGULATION REINFORCEMENT | YEAR | EXAMPLES OF BLOCKED OR ABORTED OPERATIONS |
|---|---|---|---|
| | • Mandatory authorisation before acquisitions of at least 5% of Italian companies<br>• Creation of a government's veto right | | Shenzhen Investment Holdings (China)<br>• Acquisition of Iveco (transport) by FAW Group (China)<br>• Acquisition of the Italian activities of Applied Materials (machines for semiconductors manufacturing and high-tech components) by Zhejiang Jingsheng Mechanical (China) |
| United Kingdom | • National Security and Investment (NSI) Act:<br>• expands the power and scope of the government,<br>• investigations are automatically launched on acquisitions or sales of assets in 17 sectors, including Defence,<br>• mandatory declaration from buyers of at least 25% of the capital or voting rights of British companies | 2022 | • Acquisition of Ultra Electronics (equipment for militaries communication) by Advent International (US) |

Source: Xefri, 2022.

**Investment funds also have to exercise greater prudence due to considerations regarding their exit strategies and the uncertainty of returns on investment**. Private equity funds invest carefully and avoid problems when seeking to exit. Considering the several restrictions applied to the sector, there are few potential acquirers, making it challenging for current investors to exit. When innovative companies develop technologies with military applications, governments can be pressured to protect key strategic assets and block a deal, especially when the buyer is a foreign company. Such limitations could hurt valuation multiples, reducing the return on the investment [76].

**Box 1 Barriers to exit- an example from France**

**Photonis** is a dual-use French company renowned for specialising in photo-sensor imaging and cutting-edge night-vision technologies. In December 2020, the much-anticipated acquisition of Photonis by Teledyne, a prominent US counterpart, encountered an unforeseen obstacle. In a strategic move believed to uphold national sovereignty, the French State exercised its veto power, halting Teledyne's bid. This resulted in a loss of value for HLD, a significant player in the French private equity landscape, since there was no private equity in France that would have matched the proposal from the US.

The French government asked major companies Thales and Safran to consider taking over Photonis. However, this move was seen as a suboptimal solution for several reasons. Firstly, there was no clear industrial synergy between these large companies and Photonis. Secondly, integrating Photonis into a large global corporation may jeopardize its agility, uniqueness, and innovation capacity. Ultimately, the final offer was one-third lower than Teledyne's initial substantial proposition of EUR 510 million.

Source: France Senate (2020) L'industrie de défense dans l'oeil du cyclone. Rapport d'information n° 605 (2019-2020), déposé le 8 juillet 2020

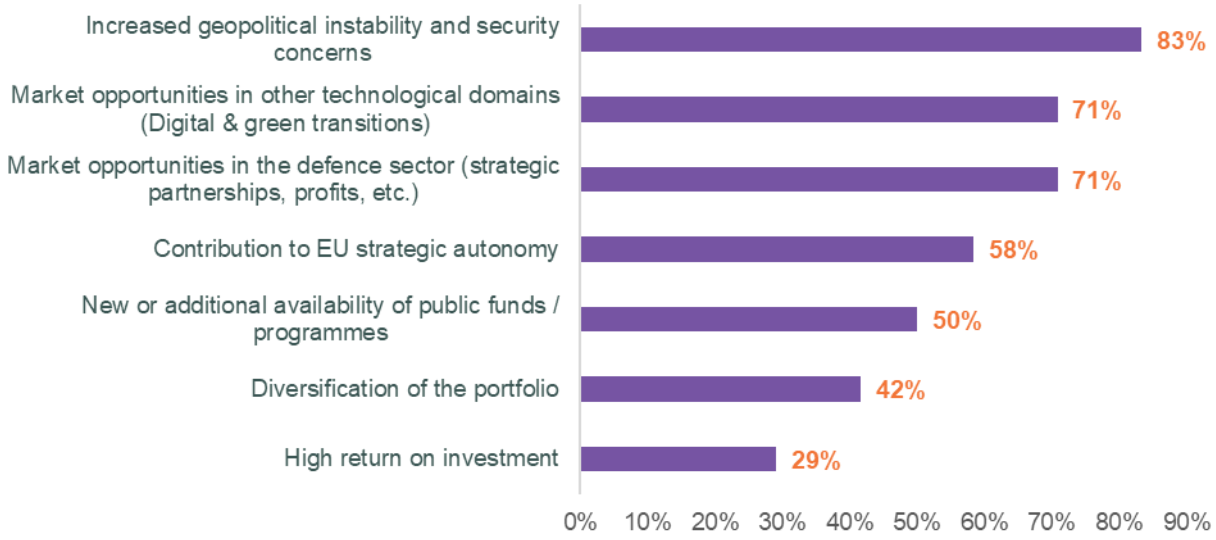
## 4.2. Drivers for investors

The survey of investors investigated the main factors triggering investments in the defence and dual-use technology sector, building upon the opportunities identified in the literature review (Figure below). These drivers act in two directions. Boosting demand from governments increases demand for finance, while sector diversification and technology advancements help to mitigate some of the risks inherent to the

[76] Institut Montaigne, 2023. Innovation de défense, Des instruments à renforcer.

sector. The following paragraphs summarise the main factors that have recently caught the attention of private investors towards the defence sector.

**Figure 9 Opportunities for investors**




Source: CSIL

### 4.2.1. Increased national budget for defence and security

**Even before the war in Ukraine, geopolitical instability and security concerns were driving defence spending due to the growing risks posed by China and Russia, while threats from Iran and North Korea remain a concern, along with a host of other risks, such as terrorism.** The war in Ukraine has accelerated this process, leading to a significant increase in military spending in many countries, including France, Germany, Poland and the UK, which present good opportunities for private investors[77]. The Standard Eurobarometer survey conducted in June 2023[78] shows that EU citizens continue to approve measures taken by the EU to support Ukraine and the Ukrainian people. They also support stronger EU defence cooperation and increased defence spending. This changed perception and increased spending are benefiting traditional defence contractors but are also creating opportunities for technology companies and startups to innovate and compete in the growing defence tech market.

**Countries are compelled to invest in cutting-edge solutions that go beyond traditional warfare technologies**. Emerging challenges posed by the increased dependency of nation-states' infrastructure on the internet also create new front lines for them within their borders, with vital systems vulnerable to hostile attack and malware operations from both state and non-state actors. Governments have started investing more in new capabilities such as drones, sensors, and cyber and artificial intelligence with broader applications. Technology breakthroughs in areas such as artificial intelligence, quantum computing and hypersonic technology are strong motivating factors for VC investors to participate in early-stage or seed-stage funding rounds.

**Growing geopolitical competition in space has sparked new investments for orbital dominance.** Significant investments have been channelled by the US and China into space security, fostering commercial partnerships to develop advanced satellite technologies, surveillance systems, and anti-satellite weapons[79].

**Linked to the heightened geopolitical insecurity and the war in Ukraine is a growing motivation to contribute to EU strategic autonomy**. Investors interviewed for this study emphasized that this policy objective is altering the sector's perception among the general public and investors, much like what is

[77] Financial Times March 26th, 2023. European private equity funds scout for defence deals.
[78] Standard Eurobarometer 99 - Spring 2023
[79] Pitchbook 2023, Vertical Snapshot: Defence Tech

happening in the United States. The Ukraine crisis has influenced public opinion about the defence sector and has underscored the importance of Europe's defence industry and its role in providing safety and security to its citizens. Ultimately, the Ukraine crisis highlights the complexity and nuance of ESG considerations in the context of defence investments [80].

### 4.2.2. Dual-use technologies

**Dual-use technologies, and in particular the Commercial to Defence, have triggered an influx of new players and innovative solutions, driving growth and diversification within the sector through cross-fertilisation of research and innovation between the civil and defence sectors**. In the near future, we can expect to see a potentially explosive and dramatic development of several globally significant dual-use technologies. The simultaneous suitability of technologies for civil and military purposes makes it imperative for governments to seek close interaction with industry and research. In this dynamic landscape, armed forces are compelled to swiftly and efficiently adapt to disruptive civilian technologies to avoid falling behind.

This development has also attracted professionals from various disciplines, including computer science, engineering and data scientists[81]. This progress has been made possible due to an infusion of private capital, which faces fewer constraints when the initial application is in the civilian domain. The significance of high-tech solutions with potential military applications has also drawn the attention of governments, leading to the establishment of new programs that facilitate the transition of civilian applications in the military domain. An example from the US is presented in the box below.

**Box 2 Public programmes for transitioning civil technologies in the military domain (US)**

The two programmes below attest to a strategic shift in the US DoD technology procurement from large private sector defence contractors to entrepreneurial startups with dual-use technology.

US Defence Innovation Unit

Since 2015, the US Department of Defence has a specific programme (Defence Innovation Unit) for assisting companies with transitioning commercial solutions to Defence Department users in six technology domains, including artificial intelligence/machine learning, autonomy, cyber, energy, human systems and space. The programme provides its support by lowering the barriers to entry for small businesses and providing recurring revenue to non-traditional companies. Started as a pilot program, it is now a proven business model for prototyping and acquiring leading-edge technology. To maximise reach out, it operates in five technology ecosystems around the US, including Silicon Valley, Boston, Austin, Washington, DC and Chicago. DIU has directly facilitated the successful transition of 52 prototype contracts into follow-on contracts across DoD, totalling $4.9 billion in contract ceilings awarded across 48 companies backed by $18 billion of private capital.

US Immersive Acquisition Programme

The Immersive Acquisition Programme was set up to train acquisition professionals to help them develop new competencies for bridging the gap between the Department of Defence procurement system and the US commercial tech world. The programme's main objective is to train a cohort of DoD contracting officers to effectively incorporate commercial technology and non-traditional vendors into the DoD acquisition ecosystem. Critical priority projects include future-generation wireless technology, rusted artificial intelligence and autonomy, space technology, renewable energy generation and storage, advanced computing and software, integrated sensing and cyber.

Source: US Department of Defence website

*"Dual use technologies are a great thing; defence funding is hard, they can simplify access to funding".*

**Interviewed SME's representative**

**In dual-use companies, the investment risk is mitigated.** A key insight emerging from the discussions in interviews with defence industry representatives was that dual-use technologies have a unique potential to mitigate some of the risks inherent in the defence sector. This is mainly because these technologies can deliver quicker returns on investment, bypassing some of the longer developmental and certification processes associated with purely defence-focused products. This

[80] Financial Times (2022). Ukraine war prompts investor rethink of ESG and the defence sector. Conflict drives home the importance of industry to provide safety and security. Peggy Hollinger MARCH 9 2022

[81] Pitchbook 2023, Vertical Snapshot: Defence Tech

can facilitate easier access to much-needed funding and investment, offering a more immediate and tangible value proposition to investors who may be deterred by the traditionally long gestation periods in defence sector projects. In addition, companies focused on defence and security technology are considered recession-proof as governments continue to massively invest in modernising their arsenal with satellite imagery, data analytics, artificial intelligence, space technology, cybersecurity and robotics[82].

**Nevertheless, navigating the complexity of defence procurement remains a major obstacle for SMEs seeking to sell their technologies for military purposes**. Although governments increasingly turn to the private sector to develop cutting-edge defence technologies, securing those contracts takes a long time and a lot of resources. It cannot be taken for granted that start-ups are "defence ready" and can adhere to the more rigid protocols applied in the defence sector where national security issues are at stake. Therefore, some investors are more cautious about the opportunities offered by these technologies when transferred to the military domain.

[82] Pitchbook, 2022, VCs go outside their comfort zone with bets on defence tech.

# 5. THE PRIVATE FINANCING LANDSCAPE IN THE DEFENCE SECTOR

This chapter offers an overview of the private financing landscape of the defence sector, featuring comparative analyses between the EU, the US, and the UK. The first part presents the main market trends, whereas the second part focuses on a comparative analysis of selected equity deals in the defence sector.

## 5.1. Main market trends

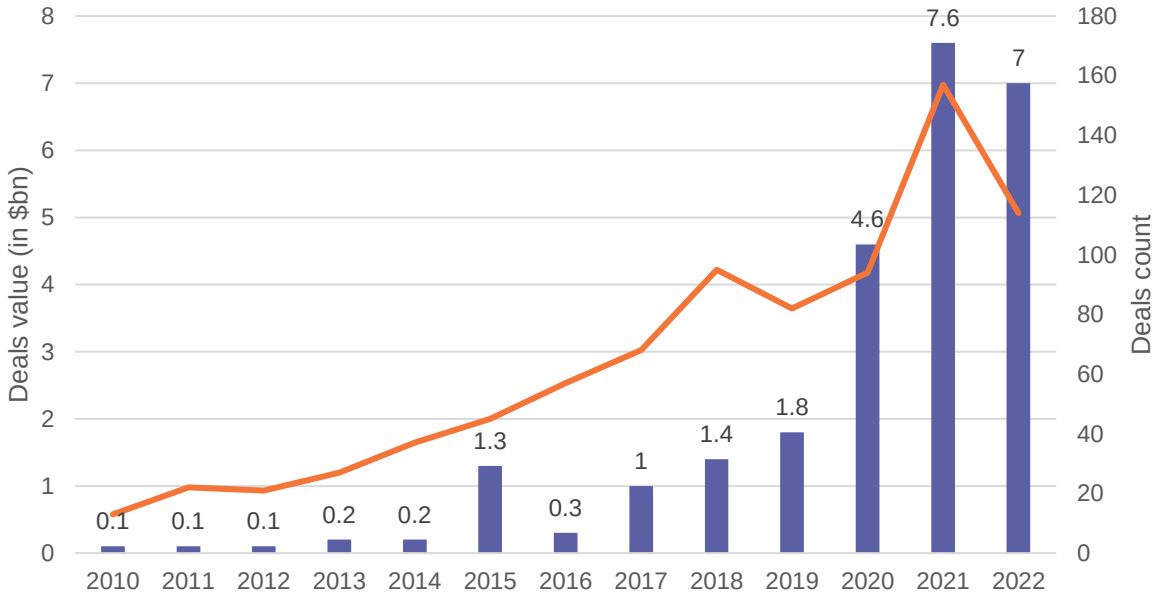
**European private equity deal activity in defence-focused companies has increased in recent years, but it represents less than 20% of a fast-growing market.** According to PitchBook data, global deal activity in aerospace and defence companies by private equity and venture capital investors stood at EUR 18bn in 2022 and EUR 30bn in 2021, a considerable increase from before the pandemic when investments flowing into the sector averaged approximately EUR 9bn annually. European private equity deal activity in defence-focused companies has also increased, reaching EUR 3.8bn in 2021, the second highest over the past decade after EUR 5.3bn in 2019[83].

**In the EU and UK, spurred by Russia's invasion of Ukraine, there is a gradual shift in market sentiment towards the defence sector**. This geopolitical event has sparked heightened interest among private investors who perceive potential growth prospects within the sector. European countries have responded to the conflict by augmenting their military expenditures, encouraging private investors to anticipate future opportunities. In response to the evolving landscape, EU governments have initiated increased investments in cutting-edge capabilities, such as drones, sensors, cybersecurity, and artificial intelligence, which also find broader applications in civilian sectors. This diversification has piqued the interest of investors. Significantly, what sets the current trend apart in the EU defence-related private investment market is its departure from the historical dominance of large funds. Traditionally, this sector was the exclusive domain of well-established funds due to its complexity and high regulation, often involving significant participation from public actors[84].

**In recent years, VC investors in the US have shown a renewed interest in military and security-related technology start-ups** (Figure 10)**.** This shift aligns with the US government's strategy to bolster its defence technological capabilities in response to emerging threats, particularly from China and Russia[85]. Historically, VC investors have hesitated to engage in the defence technology sector due to concerns about profitability and ethical considerations regarding the potential misuse of technology. Some VC and PE firms were legally restricted from investing in this sector. However, the evolving recognition of the critical role of defence technology in safeguarding national security has prompted investors to reconsider their stance, particularly since the Ukraine conflict outbreak. Furthermore, the dual-use nature of defence technologies, with applications beyond weaponry, has become a focal point of interest for many VC investors in the US.

[83] Financial Times March 26th, 2023. European private equity funds scout for defence deals.
[84] Financial Times March 26th, 2023. European private equity funds scout for defence deals.
[85] Pitchbook, 2022, VCs go outside their comfort zone with bets on defence tech.

**Figure 10 US VC deal activity in aerospace and defence tech companies**




Source: Pitchbook, 2022.

## 5.2. Comparative analysis of a sample of deals involving defence SMEs

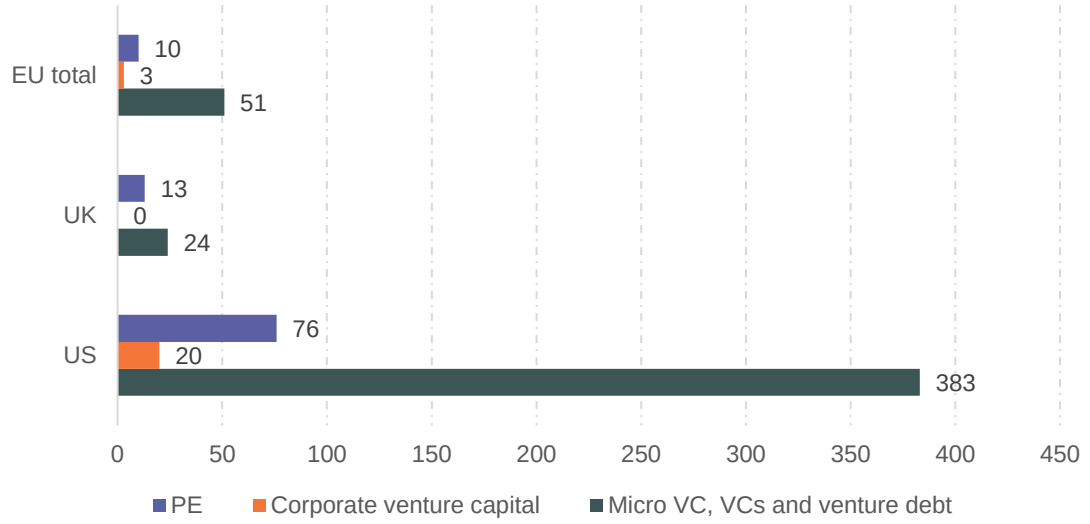
For a comparative analysis of the private investor ecosystem, we looked at the main characteristics of the deals involving SMEs and midcaps in the defence sector between January 2022 and July 2023. The data were retrieved from Crunchbase and focused on three industries: military, national security and law enforcement. A detailed list of these deals is included in Annex III.

Furthermore, to further validate this analysis and gain more insight into VC/PE industry activity within the EU's defence sector, this study looked at the deals that involved a list of 433 EDF/PADR and EDIDP beneficiaries. Out of the 433 companies, 46 (11%) were involved in at least one deal, according to the data available in the Bureau Van Dijk Orbis and Orbis Merger and Acquisition (M&A) databases. A detailed list of these deals is also included in Annex III. It's important to note that the two samples may not be entirely comparable. This discrepancy arises because the companies selected from Crunchbase all share robust connections with the defence sector, either operating exclusively within defence or possessing dual-use capabilities applied to the military domain. Overall, the deals involving EDF beneficiaries included 125 different buyers, including private investment funds (59; 47%), corporates (52; 42%), public funds (10; 8%) as well as corporate funds (4; 3%). The latter are funds established by large defence industrial stakeholders which act like corporate venture capital arms on their behalf, such as Thales Corporate Ventures and Schneider Electric Ventures Capital. The public funds include EU funds (EFSI[86] and the EIT InnoEnergy), national (BPI France, the Danish Growth Fund Vaekstfonden and the Swedish Stiftelsen Industrifonden) and regional (Normandie Participations and the Société Régionale d'Investissement de Wallonie) funds, but also one non-EU sovereign fund. (Oman State General Reserve Fund).

**Data on recent deals involving VC and PE funds in the aerospace, defence, and security sectors reveal a significant disparity between the US and the EU**, as illustrated in Figure 11 and Table 5. The provided data pertains to the count of funds actively participating in the defence sector between January 2022 and July 2023, focusing on categories such as military and government (encompassing legal enforcement, national security, and military applications). Moreover, it is worth noting that the EU, as a collective entity, trails behind the UK regarding private equity investment within this sector.

[86] The European Fund for Strategic Investment (EFSI) had two equity windows. The Expansion and Growth Window focused on later stage and multi-stage financing of SMEs and small mid-caps. The Early Stage Window (InnovFin Equity) focused on early stage financing of SMEs operating in innovative sectors covered by Horizon 2020.

**Figure 11 Funds with a portfolio in aerospace, defence and security (EU, US and UK)**




Source: CSIL elaboration of Crunchbase data (January 2022-July2023)

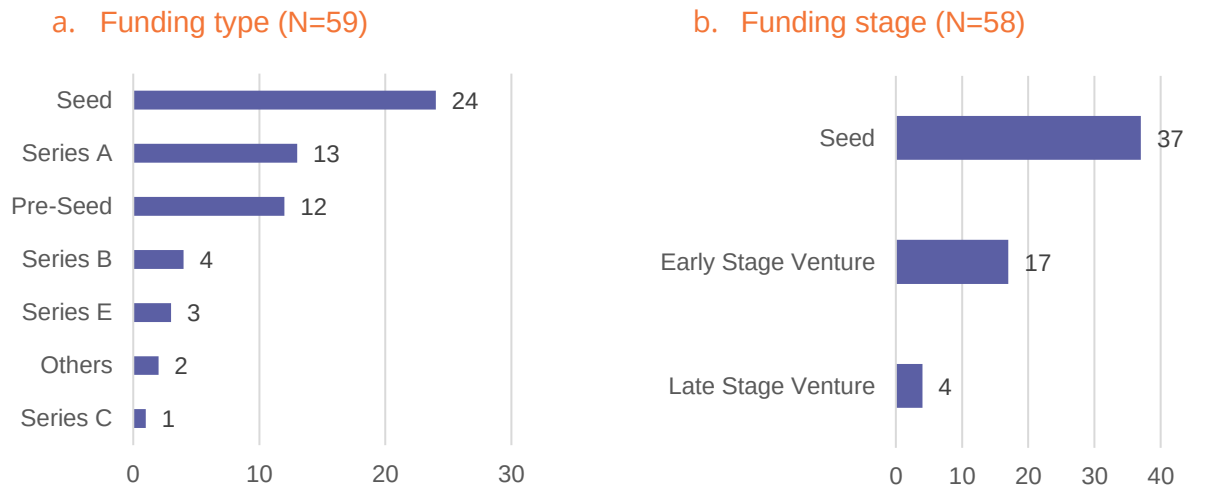
**Table 5 Overview of VC and PE deals in the EU, US and UK (January 2022-July 2023)**

| | NR. OF DEALS | TOTAL DEAL VALUES (EUR THOUSANDS) | AVERAGE SIZE OF THE DEALS (EUR THOUSANDS) | NR. OF INVOLVED INVESTORS |
|---|---|---|---|---|
| EU | 9 | 32,765 | 4,096 | 6 VC, 1 secondary purchaser fund, 1 PE |
| US | 80 | 2,208,541 | 32.206 | 28 VC, 4 VC&PE, 2 PE, 2 corporate VC, 2 corporates, 1 accelerator, 1 investment bank, 1 investment firm |
| UK | 3 | 9,732 | 3.244 | 1 VC |

Note: the amount is not available for all the deals; therefore, the total volume is an underestimated value. The information on the type of investor involved is also missing for some deals.

**The US market demonstrated a higher capacity to provide financing for defence companies across their entire lifecycle, including the critical growth stage** (Figure 12 b). In contrast, PE funds activity has been scarce in the period considered by this analysis, with all transactions involving seed-stage ventures. Conversely, transactions in the US span a broader spectrum, encompassing both early-stage and late-stage ventures. Furthermore, it's important to note that US funds outnumbered their EU counterparts and possessed superior financial resources, enabling them to support more substantial investments.

**Figure 12 Funding provided by funds involved in 2022-2023 US VC & PE deals**




Source: CSIL elaboration from Crunchbase data

**Compared to the US and UK, there are far more limited series B investors in the EU, limiting exit opportunities for investors**. The US has a larger and more decentralised market, including many opportunities for public offerings. By contrast, Europe has fewer players with deep pockets. Within the European Union VC market, the emphasis is on seed investments. This focus can be attributed to a combination of factors. First, the presence of late-stage defence technology enterprises is comparatively limited. Second, there's a prevailing concern that such advanced-stage companies might encounter challenges in attracting investors. For investors targeting early-stage ventures, there is a high risk regarding the future presence of Series B investors[87]. The main issue in the EU remains the limited number of strategic buyers and the absence of a liquid public market for European defence companies.

**A noteworthy observation in the US context is that, in the analysed deals, VC and PE investors frequently have at least one of the participating funds specializing in the defence and aerospace sectors**. This particular trend is not unexpected, given that having a good understanding of the sector and, in particular, of procurement cycles and regulatory frameworks is crucial for investing in this sector. On the other hand, the funds involved in these deals generally lacked such a specialized focus on defence within the EU. However, it's worth noting that three of these funds exhibited expertise in digital technologies, encompassing areas such as Artificial Intelligence and Cybersecurity. These focused domains are also highly relevant, as reflected in the profile of the investee companies, which notably emphasize their expertise in emerging technologies. This finding is validated by the analysis of the deals involving EDF beneficiaries, where none of the funds involved declared specialization in the defence sector, and only a limited number exhibited any specific sector focus. A few focused on deep technologies (4; 7%) and Life sciences (2; 3%), and only one specialised in Aerospace (Seraphim Space Manager).

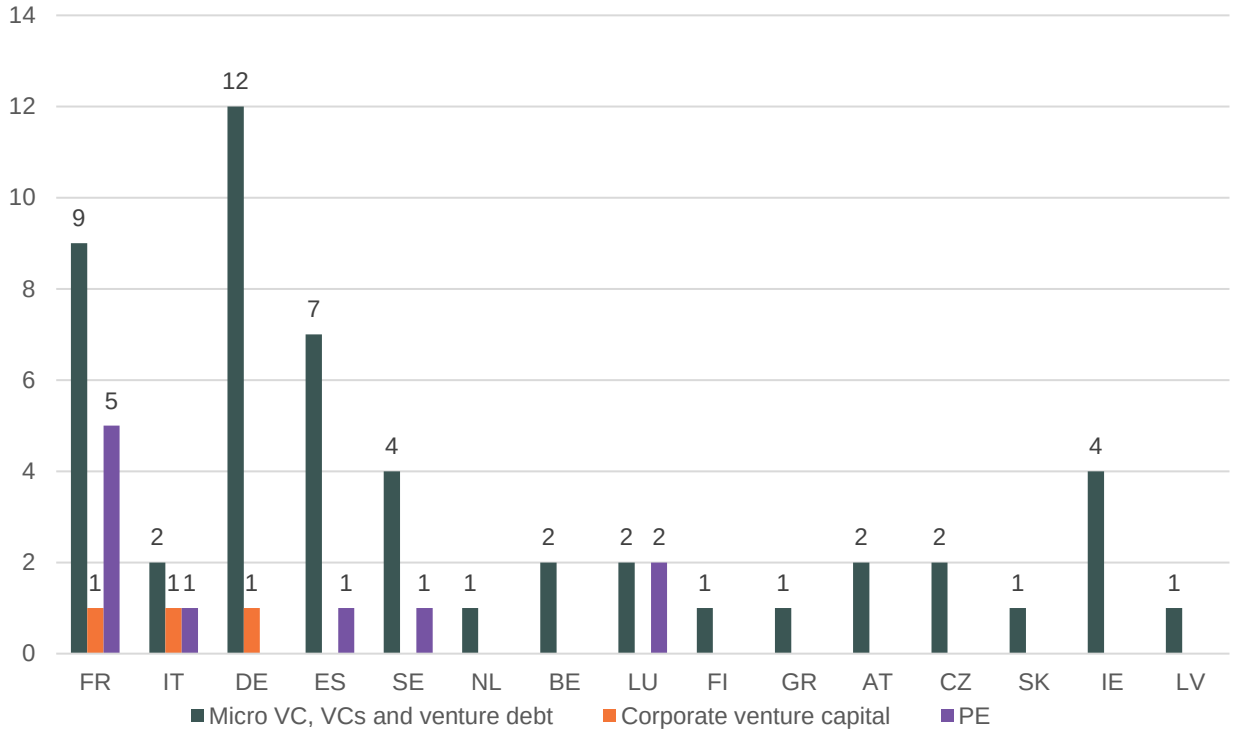
**Companies that have received funding demonstrated a pronounced emphasis on digital technologies, encompassing various domains, including generic ICT software and infrastructure, as well as virtual and augmented reality and artificial intelligence.** This distribution of funding for deals involving defence companies between January 2022 and July 2023 underscores the importance of emerging technologies with dual-use applications for the defence sector and the increasing attention from investors on these companies both in the US and EU.

**When looking at the geographical distributions of deals within the EU in the two data series, France stands out as the sole country with a comprehensive ecosystem encompassing both VC and PE investors, having a portfolio in aerospace, defence and security.** The figure below shows the geographical distribution of deals included in Crunchbase[88] and reveals that within the EU, several countries, including Germany and Spain, demonstrate a notable presence of VC investors actively

[87] Axa Venture Partners (2023). Who will fund the next innovation wave in European Defence Technologies?
[88] For a complete list of funds and deals see Annex III

engaged in the defence sector. However, private equity activities remain limited across the broader EU landscape, except for France. The analysis of the deals involving EDF beneficiaries supports the fact that the VC/PE industry in France emerges as a leader in the defence sector (Figure 11 b). While this geographical distribution reflects the pattern of EDF beneficiaries, it can also be interpreted as indicative of the stage of development within the French fund ecosystem and a demonstration of its propensity and capacity to engage in this highly regulated sector. As an example, Italian companies, which also benefited from the EDF (57 companies), were scarcely involved in these transactions (7 in total, 3 with VC/PE funds, 3 with corporates, 1 with a corporate fund).

**Figure 13 Funds with a portfolio in aerospace, defence and security (EU countries)**




Source: CSIL elaboration of Crunchbase data (January 2022-July2023)

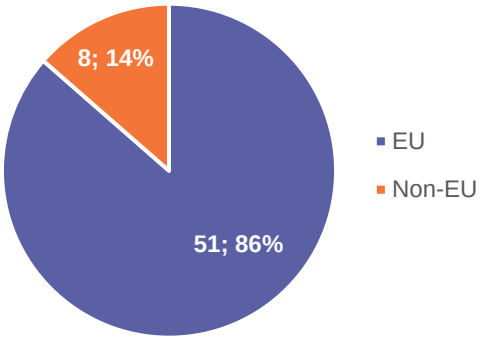
**Most transactions involving defence companies took place domestically with limited involvement of non-EU investors.** In the deals involving EDF beneficiaries, 80% included companies from the same country as the respective fund. Such acquisitions come under intense regulatory scrutiny, driven by concerns that coveted technologies could potentially transition into foreign control, prompting a meticulous evaluation of the transaction's implications. However, it is interesting to note, and a good sign for European investors, that deals also occurred across EU borders[89]. Non-EU investors were a minority, including entities in the US (4), the UK (3), and Malaysia (1). The deals included in Crunchbase also show that transactions were dominated by domestic funds, with funds from EU countries being scarcely involved, with the only exception of a fund in Luxembourg. Another study on larger deals involving defence companies in the EU confirms the infrequency of trans-Atlantic acquisitions, which tend to be unidirectional, predominantly from the US to the UK[90].

[89] These other funds are located in the Netherlands (invested in an Estonian company), France (invested in a Belgian company), Cyprus (invested in a French company) and Luxembourg (invested in an Italian company).

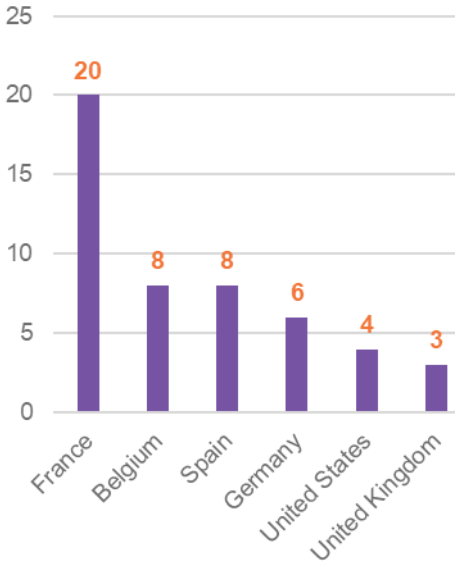
[90] Axa Venture Partners (2023). White Paper.

**Figure 14 Geographical distribution of funds involved in deals with EDF beneficiaries**

a. EU versus non-EU




b. Country of origin of the fund




Source: CSIL elaboration of Orbis Zephyr data

# 6. PUBLIC SUPPORT TO FACILITATE ACCESS TO FINANCE

This chapter delves into public financial support provided to SMEs and midcaps in the defence sector through various financial instruments. It includes key information about support provided within the EU, Member States and two peer countries, notably the UK and the US.

## 6.1. Categorising public interventions using financial instruments

**Public support for innovation is leveraged by companies to facilitate market entry, expedite product development, and mitigate financial risks**. Different types of instruments can be used to support SMEs, including in the defence sector, depending on their stage of development. Grants are generally considered more efficient for supporting early-stage innovation and basic research, whereas financial instruments are better suited for later-stage innovation, further development, and technology commercialisation. Relying solely on grants is not highly effective because it fails to support projects as they progress through the TRLs towards commercialization. Public programs supporting SMEs to access finance beyond grants can assume a generic structure, be tailored to specific sectors, or align with targeted policy objectives. Moreover, they can be delivered directly or indirectly (table below) depending on several factors, including the business model, capacity and resources of the public implementing agency.

**Table 6 Providing SME support through financial instruments**

| DELIVERY MODALITY | DEBT-TYPE OPERATIONS (LOANS AND GUARANTEES) | EQUITY TYPE OPERATIONS (EQUITY AND QUASI-EQUITY) |
|---|---|---|
| **Direct** | The loan and the guarantee are extended directly to SMEs. The loan involves the direct transfer of funds from the public lender to the SME. Guarantees involve a commitment by the public bank to cover the SME's obligations in case it defaults on a loan. | Unilaterally, set up a new fund or programme acting as the general partner (GP) and the sole Limited Partner (LP). In that case, the public actor assumes the full responsibility of investment selection, support and exit. There can be a co-investment requirement by the private sector to complement the public fund. |
| **Indirect/ Intermediated** | In case of indirect debt operations, the financing to final recipients is provided through financial intermediaries who are responsible for the assessment of the credit demand. The contractual arrangements established with these intermediaries frequently incorporate stipulations mandating the transfer of certain financial advantages to the beneficiaries. These benefits may encompass reduced interest rates, extended repayment periods, and eased collateral prerequisites. Such mechanisms have gained popularity and demonstrated efficacy in alleviating the financial constraints SMEs face. | An investment scheme is set up with existing private venture capitalists in the market, creating a hybrid model where private and public parties are involved in raising the supply of equity finance. In the hybrid model, the government provides investment finance on specific terms such that it is expected to attract both private investors to co-invest and incentivise a GP to manage the fund. After setting the fund's investment activities, the public actor is not involved in operational investment decisions. |

Source: CSIL

**The approach of direct financing offers a more effective oversight of the realization of policy objectives, but it necessitates that the public entity possesses the required expertise to function as a banker and/or an investor**. Moreover, in the direct forms of intervention, significant costs are incurred, particularly in cases involving large portfolios and extensive transaction volumes that need to ensure comprehensive nationwide and sector coverage. Such direct strategies are more efficiently applied at regional or local levels. The private sector might exhibit greater agility and efficacy in making investment choices than public entities. They also possess a deeper understanding of specific market niches, which can be more challenging for public investors to engage with directly.

As an example, the recent evaluation of equity support to SMEs by the EIB has highlighted the loss of efficiency in direct investments. The evaluation emphasises significant operational challenges faced by the EIB. Despite direct quasi-equity operations being approved relatively quickly through global authorization, the EIB's average processing time for these transactions, from initiation to signature, exceeds a year and

has been steadily increasing. It is far longer than the eight weeks employed by private operators.[91] The EIC Fund also incurred considerable delays in approving the equity part of the investments, which damaged the Fund's reputation[92] and led to the appointment of an external EIC Fund Manager to make all the investment and divestment decisions on the selected companies and manage the EIC portfolio with the support of the EIB.

**Public investors generally pursue a co-investor strategy along with other private funds, as this is often an eligibility requirement**. This approach serves to create a more conducive investment climate for private investors, thereby mitigating overall risk. At the same time, the participation of private investors sends a signal to the market, signifying that the company is governed and operated with a primary focus on business objectives rather than exclusively public interests[93].

*"The funds allocated by the public sector to the defence and dual-use sectors play a pivotal role in attracting private partners by providing a secure foundation for investments."*

**Interview with an investment fund**

**Public support in the defence sector has a positive impact on attracting other investors**. An Italian venture capital (VC) investor emphasized that without equity investments from National Promotional Banks (NPBs), securing funds from pension funds and insurance companies becomes challenging in the defence sector. When a prominent public institution, such as Cassa Depositi e Prestiti (CDP), makes investments in the defence sector, it has the potential to trigger further investments from other financial entities. This creates a catalytic effect by instilling confidence in private investors.

The following sections provide an overview of public support initiatives, with particular emphasis on loan and equity provisions within and outside the EU, tailored to the context of innovative enterprises, particularly those within the defence sector and dual-use.

## 6.2. EU level support

In the current programming period 2021-2017, **InvestEU** brought all EU financial instruments together under one roof. Under Annex II to the InvestEU regulations[94], defence has been included among the eligible sectors following the sudden deterioration of the geopolitical situation. The regulation establishes that "*financing or investment operations under InvestEU may contribute to activities that are of strategic importance to the Union. Such activities will be considered strategic investments if they concern projects and final recipients associated with risks to the security or public order of the Union and its Member States, in particular, investments in defence and space sectors and cybersecurity*". The InvestEU Fund provides a guarantee for EUR 26.2 billion to support private and public investments in four policy areas: sustainable infrastructure, R&I and digitisation, SMEs and social investment and skills. The Fund is implemented through financial intermediaries and offers portfolio guarantee products and equity investments across five thematic strategies. For the equity window, space and defence have been identified as enabling sectors, i.e. industries operating in critical industries/sectors.

InvestEU is implemented by selected implementing partners[95], including the EIBG, the main partner in the implementation of InvestEU, covering as much as 75% of the EU guarantee, and national promotional banks. Commercial banks and investors are also involved in the implementation of the programme upon signing an agreement with an implementing partner. The allocation of funds, within the parameters set by eligibility conditions, rested with these financial intermediaries, who determined their disbursement strategies in line with their internal policies. Therefore, stringent interpretations of the ESG framework and

[91] EIB (2022). Evaluation of EIB Group equity and quasi-equity support for small businesses and mid-caps.

[92] CSIL (2022): Evaluation of the European Innovation Council Pilot.

[93] CSIL (2022). Evaluation study on the European Innovation Council (EIC) pilot.

[94] Commission Delegated Regulation (EU) 2021/1078 of 14 April 2021 supplementing Regulation (EU) 2021/523 of the European Parliament and of the Council by setting out the investment guidelines for the InvestEU Fund. Official Journal of the European Union, 2.7.2021

[95] The full list of implementing partners that have signed a guarantee agreement with the Commission is available at: https://investeu.europa.eu/investeu-programme/investeu-fund_en#paragraph_170

the exclusion policies implemented by the partner banks and investors can reduce the availability of subsidized financing options for SMEs in the defence sector.

In 2022, the Commission announced the setting up of a “Defence Equity Facility” under the InvestEU Regulation to address the lack of risk capital in the EU for SMEs and mid-sized companies developing innovative defence technologies with dual-use potential. The objective of this facility is to stimulate the development of an ecosystem of specialised funds supporting such companies. This facility draws inspiration from the Cassini initiative (Box below) and is expected to receive EUR 100 million contribution from the EDF between 2022-2027, allowing the EU, through the EIF, to guarantee equity investments made by private funds into innovative and strategically important defence SMEs. The total investment generated is anticipated to reach EUR 500 million, thanks to contributions from the EIF and private funds.

**Box 3 The EU equity facility for the space sector**

**Cassini** is an initiative by the Commission launched in 2020 to support EU start-ups and SMEs involved in space-related endeavours, both in orbit and on Earth. It offers various support mechanisms throughout the business lifecycle, including hackathons, accelerators, matchmaking, and access to funding through the EIF. The initiative covers all aspects of the EU Space Programme, providing a EUR 1 billion EU seeds and growth fund to help space companies secure investment. The CASSINI Facility aims to make it easier for new entrants in the space sector to raise capital by providing funding to venture capital funds. Additionally, InvestEU is providing EU investment guarantees for venture capital funds operating in space investments. An example of how these two instruments can be mobilised together is the EIF EUR 60 million investment in equity to Alpine Space Ventures, a Germany-based venture capital fund focusing on the NewSpace sector, that was backed by InvestEU and the CASSINI investing facility, as well as by the European Recovery Programme of the German government.

Source: https://www.cassini.eu/cassini-initiative

**In March 2022, the European Investment Bank (EIB) introduced the "Strategic European Security Initiative" (SESI) to support dual-use technologies**. Initially, the facility had EUR 6 billion earmarked to mobilise investments strengthening Europe's dual-use security and defence systems by supporting the technology industry and civilian security infrastructure. It ruled out financing core defence investments and applied a narrow definition of dual-use applications primarily driven by civilian needs. Furthermore, in June 2023, the EIB's Board of Directors decided to increase its financing for security and defence up to EUR 8 billion due to the new geopolitical environment and rising financing needs in the sector. The EIB has approved both more financing and a broader range of support for security and defence while maintaining its restrictions on financing weapons, ammunition, and core military and police infrastructure.

## 6.3. Member States

In the EU, France stands out as a country with particularly comprehensive and specialized support programs for its defence sector. While other EU Member States have support mechanisms for their defence industries, the scale and specialization of these programs can vary significantly.

### France

**In France, three programmes deploy financial instruments to support the national defence industry: Definvest, the Fonds Innovation Défense (FID) and the Def’fi loans** (Table 7). All of them are financed by the Ministry of Defence and implemented by BPI France. Moreover, implementing FID’s support also engages major private banks and industrial stakeholders from the defence sector.

**Table 7 French financial instruments dedicated to SMEs from the defence sector**

| | DEFINVEST | FONDS INNOVATION DÉFENSE (FID) | DEF'FI |
|---|---|---|---|
| **Type of financial instrument** | Equity (VC fund) | Equity (VC fund) | State-guaranteed loans |
| **Implementing agency** | BPI France | BPI France, together with major private banks and industrial stakeholders from the defence sector | BPI France, together with the Director General for Armament (DGA) |
| **Creation date** | 2017 | 2021 | 2014 |
| **Main objectives** | Secure capital for national defence-critical SMEs, support innovation, facilitate the growth of defence sector stakeholders, and promote SME internationalization. | Promote dual-use technology, sustain advanced research and innovation, and maximize the benefits of defence research and development for military and civilian applications. | Facilitate SME growth and development in the defence sector, including support for buy-out operations, asset investments, and working capital needs. |
| **Main beneficiaries** | SMEs considered strategic for national defence by the Ministry of Defence. | Innovative SMEs in the growth phase developing dual-use technologies considered of interest for the national defence. Exceptionally start-up. | SMEs considered strategic for the national defence by the Ministry of Defence or belonging to the DITB. |
| **Support size** | Up to €10 million (up to 100% of total project costs) | Co-investment (ratio 1/1) up to €20 million (up to 30% of total project costs) | Co-investment (ratio 1/1) from €30.000 to €1 million (up to 100% of total project costs) |
| **Overall budget** | €100 million (€50 million initially) | €400 million (€200 from the Ministry of Defence and €200 million from institutional and private partners) | €58 million (€45 million initially) |
| **Targeted areas** | All the defence-related areas of activities | Energy, quantum, ICT, AI, Electronics and components, Materials, Human health | All the defence-related areas of activities, particularly those of activities included in the DITB. |
| **Projects duration** | Up to 12 years | Typically 6 years (with possible expansion up to 3 additional years) | Typically 7 years |
| **Selection criteria** | The candidates must be listed in the list of SMEs (around 400) considered strategic for the national defence by the Ministry of Defence. Co-investors from the private sector are needed. | SMEs, midcaps and start-ups developing dual-use technologies have already demonstrated their business model on a primary market other than defence. | SMEs created for at least three years. SMEs performing activities in areas considered as eligible by the Ministry of Defence. Suppliers (direct or indirect) of the Ministry of Defence. |

Source: Ministère des Armées, 2021, Les fonds d'investissement défense and Cour des comptes, 2023, Analyse de l'exécution budgétaire 2022 Mission « Défense »

*"The arrival of a prestigious investor […] will allow the US to further develop these different areas, particularly for export, where MASA has a remarkable reputation."*

**Marc de Fritsch, MASA CEO, 2022**

**The two investment funds knew a high take-up since their beginnings**. In 2022, after five years of implementation, the Ministry of Defence allocated an additional EUR 50 million

to Definvest[96], doubling the initial allocation for an overall budget of EUR 100 million. In February 2023, Definvest invested in 13 enterprises from various activities (AI, space, sensors, etc.). The fund supported SMEs internationalization, investing, for instance, in MASA in 2022, a French SME and global leader specialising in modelling and simulation software for military and civil security commands[97].

Also, Definvest supported the growth of strategic stakeholders from the defence sector. As an illustration, the funds participated in 2020 in a fundraising of EUR 20 million on behalf of Earthcube (now called Prelingens), a French SME developing advanced geo-spatial monitoring solutions which exploit disruptive artificial intelligence technologies, together with two other private investors (ACE Management and 360 Capital). The operation aimed to provide Earthcube with new equity sources to support its growth, both internally and in global markets.

> *"[This fundraising] will enable Earthcube to pursue and accelerate its hypergrowth phase, intensifying the development of cutting-edge technologies […and] rapidly growing its international footprint."*
>
> **Earthcube, Press release, 2020[98]**

In 2023, FID invested in enterprises developing quantum engineering, such as Pasqal and Qandela. The investment in Pasqal, the French leader in the field of quantum computing based on neutral atoms, was part of an equity fundraising of EUR 100 million led by a private investor, Temassek. In total, nine public and private investors engaged in its fundraising with some prestigious institutional bodies such as the EIC[99]. In 2022, EUR 35 million of investments had been programmed, and investment was realised in July 2022 in Outsight[100], a French flagship start-up in 3D spatial intelligence. Another investment was made public in November 2022 with Dust Mobile, the national leading cyber defence operator.

**Regarding Def'fi, there was a notable uptake from 2014 to 2019, primarily driven by its ease of implementation and broad eligibility criteria**[101]. Def'fi support is delivered through participatory, state-guaranteed, co-financing loans with a fixed interest rate, and it doesn't require any initial deposit or collateral. However, it's worth noting that in 2020, 2021, and 2022, Def'fi did not receive any additional budget allocations or see any realized investments. Nonetheless, the Ministry of Defence has indicated that Def'fi is regaining attractiveness for SMEs in the current financial landscape. This resurgence is attributed to the increasing costs of credit and the gradual reduction of public funding facilities available to SMEs during the pandemic. Furthermore, the Ministry underscored the complementarity of Def'fi with Definvest, which focuses on supporting capital investments[102].

### Other Member States

**Lithuania has recently established an equity finance facility to foster its domestic defence and security industry in response to the threat posed by Russia and the ongoing conflict in Ukraine**. This initiative, known as the Defence Investment Fund[103], has been endowed with EUR 13.5 million and is envisioned to potentially include contributions from private investors. Its primary objective is to provide robust support to SMEs, with a specific emphasis on dual-use technologies such as artificial intelligence,

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[96] Assemblée Nationale, 2023, Rapport d'information par la Commission de la défense nationale et des forces armées sur le bilan de la loi de programmation militaire 2019-2025. Available here : https://www.assemblee-nationale.fr/dyn/opendata/RINFANR5L16B0864.html

[97] Press release, 2022, MASA accueille ALBAREST PARTNERS et le fonds Definvest à son capital piur entamer une nouvelle phase de croissance, notamment à l'international. Available here : https://presse.bpifrance.fr/download?id=37154&pn=b888628f2d14b9f4dd7417e9ae401138-pdf

[98] Available here: https://tikehau-ace.capital/usr/documents/pdf/en_cp-fundraising-earthcube.pdf

[99] Press release, 2023, La start-up française PASQAL lève 100 millions d'euros pour faire progresser l'informatique quantique à base d'atomes neutres. Available here : https://presse.bpifrance.fr/la-startup-francaise-pasqal-leve-100-millions-deuros-pour-faire-progresser-linformatique-quantique-a-base-datomes-neutres/

[100] Agence de l'innovation défense, 2022, Le fonds innovation défense investit dans Outsight, fleuron fançais du domaine de l'intelligence spatiale 3D. Available here : https://www.defence.gouv.fr/aid/actualites/fonds-innovation-defence-investit-outsight-fleuron-francais-du-domaine-lintelligence-spatiale-3d

[101] Ministère des Armées, 2023, Soutien financier aux PME/ETI. Available here : https://armement.defence.gouv.fr/soutien-pmeeti/soutien-au-fonctionnement

[102] Cour des comptes, 2023, Analyse de l'exécution budgétaire 2022 Mission « Défense ». Available here : https://www.ccomptes.fr/system/files/2023-04/NEB-2022-Defence.pdf.

[103] https://invega.lt/en/financiers/venture-capital/183/milinvest-42

biotechnology, supersonic capabilities, space-related technologies, and other critical defence sectors. The Defence Investment Fund will operate through a three-tier support system:

- Pre-Acceleration Tier: This initial stage will focus on activities like team formation, ideation, product development, and evaluating emerging business models in the market.
- Accelerator Tier: In this phase, the fund will provide small venture capital investments to support product design, development, and marketing efforts, enabling SMEs to move their ideas closer to market readiness.
- Venture Capital Fund Tier: The final tier will concentrate on the growth phase, further facilitating the expansion of promising ventures in the defence and security sector.

**Unlike France and the very recent example in Lithuania, the other EU Member States do not deploy specific financial products to support the defence sector**. Member States have many programmes providing subsidised loans, guarantees and, to a minor extent, equity investments to SMEs. Nevertheless, when SME access to finance support is provided under such facilities, this can be subject to strict interpretation of the ESG framework. Other Member States would rather provide financial instruments to support innovation and growth in SMEs without restricting access to defence companies. This is, for instance, the case in Italy with the "*Fondo per l'Innovazione Tecnologica (FIT*)" and in the Netherlands with the funding programmes provided by the Dutch Innovation Agency (RVO.nl).

## 6.4. Examples outside the EU

In our analysis of defence sector support programs outside the European Union, we concentrated on two significant countries: the United Kingdom and the United States. Both nations are distinguished by their extensive support structures, with the United States notably leading in the magnitude of its initiatives. A noteworthy aspect of this support is its increasing focus on dual-use technologies, enabling the transition of technologies into the military sphere. Additionally, we provide an illustrative overview of recent NATO initiatives aimed at fostering the dual-use sector, enriching the context of our analysis.

### United Kingdom

**The United Kingdom offers extensive support measures for the defence sector**. The landscape of public support for defence covers all stages of innovation and technological projects, from pre-seed and seed funding to commercialisation. Financial support includes both grants and financial instruments such as loans and equity investment facilities. In addition to financial support, some measures provide innovators and businesses with technical and operational facilities that foster innovation projects to succeed, such as accelerators and networking co-creation spaces. A specific Agency, inspired by the US Defence Advanced Research Projects Agency (DARPA), has also been established in 2021, which specialises in supporting RD&I projects that may produce significant technological change for defence.

**Table 8 UK support measures to support access to finance for the defence sector**

| | |
|---|---|
| Defence and Security Accelerator | **The Defence & Security Accelerator (DASA**) is a cross-government organisation created by the Ministry of Defence (MoD). It encourages innovators, small and large. It links directly to the Defence Innovation Accelerator for the North Atlantic (DIANA), a NATO innovation initiative (described below). The organisation is mostly focused on mid-TRL technologies. Funds are allocated through grants and financial instruments using a variety of concepts, including Themed Competitions, Open Calls for Innovation, Defence Innovation Loans, the Defence and Security Seed Fund, and the Defence Technology Exploitation Programme (DTEP). |
| NATIONAL SECURITY STRATEGIC Investment Fund<br>Delivered by British Business Bank | The National Security Strategic Investment Fund (NSSIF) is the UK's Government **corporate venture capital arm for dual-use advanced technologies**. It focuses on 12 key areas, including cybersecurity, data analysis and AI, audio and visual processing, commercial space, platforms and robotics, biological and medical technologies, computational behavioural analysis, financial technologies, identity technologies, novel and data transport, IOT and evolving environment, sensors, novel materials and power sources, and quantum technologies. NSSIF invests alongside other investors, supporting **long-term equity investment**. It works with a select group of leading VC investment funds and financially supports other institutional VC funds. |

The UK Innovation & Science Seed Fund (UKI2S) is a national seed investment fund backed by the UK Research and Innovation (UKRI), Defence Science and Technology Laboratory (DSTL), the Department of Business and other public bodies. They support the most ambitious **UK innovators at seed and beyond to facilitate growth** by nurturing innovative businesses to leverage private investments. In the summer of 2022, UKI2S announced the expansion of its patient capital by £37 million. Its investment strategy focuses on **high-risk businesses proposing innovations that emerge from the UK's publicly funded science and technology base to maximise defence public spending in RD&I.**

The Advanced Research Invention Agency (ARIA) is a UK public body established in 2021 and inspired by the US DARPA. It focuses on high-risk RD&I projects with the potential to produce transformative technological change or a new paradigm shift in an area of science, including the military defence and security sectors. With an overall budget of £50 million, ARIA support is provided through various possibilities, including **inducement prizes, seed grants, equity stakes, Iprivate co-financing and academic fellowships**.

Source: Karve International

Among the variety of supports provided by DASA, the **Defence Innovation Loans** (9) is one of the most successful UK financial instruments supporting SMEs and midcaps from the defence sector.

**Table 9 DASAs Defence Innovation Loans**

| PROGRAMME NAME | DEFENCE INNOVATION LOANS |
|---|---|
| Type of financial instrument | State-guaranteed loans |
| Implementing agency | DASA |
| Creation date | 2016 |
| Main objectives | Support innovation in defence SMEs, including scaling up credit-constrained firms, while fostering international collaboration and promoting their solutions' commercialisation and global expansion. |
| Main beneficiaries | All SMEs from the defence sector based in the UK |
| Support size | From €115.000 to €2.3 million (up to 100% of total project costs) |
| Overall budget | N.A.[104] |
| Targeted areas | No specific targeted areas (however, proposals must be defence/security themed) |
| Projects duration | Typically, three years with extension options |
| Selection criteria | Having a clear route to commercialisation focusing on growth and scale-up within the time scale of the Innovation Loan. Innovations must be fairly mature with TRL 6 or above to ensure that the technology can be commercialised within the time scale of the Innovation Loan. Applications must evidence a defence/security need related to the proposed innovative idea or technology. |

Source: Innovate UK KTN, 2023, Defence Innovation Loans 2023

[104] The Defence Innovation Loans are part of DASA's overall budget which was of an overall amount of €41.7 million over the 2021-2027 period, including all type of supports.

*"This new investment provides the US with the funding to take our game-changing technology to commercialisation, helping deliver the UK government's semiconductor and technology strategy."*
**Francis Neill, Silicon Microgravity CEO, 2023**

**Since its beginning in 2016, the Defence Innovation Loans have been a great success, with additional budget allocated in 2018, 2019, and 2021**. Over 2021-2022, DASA received 761 proposals and funded 165 under the Defence Innovation Loans105. Over the same period, 63% of the funding was allocated to SMEs whose outputs are used or will be used by the Ministry of Defence. In March 2023, for instance, DASA participated along with three other investors in a fundraising of €3.3 million (£2.8 million) on behalf of Silicon Microgravity (SMG), a disruptive technology company developing innovative inertial and gravity microsensors, through a Defence Innovation Loan106. The operation was focused on raising investments to enable the commercialisation of SMG's unique micro-electrical mechanical systems technology. It is also expected to allow SMG to disrupt the microsensors market by developing its ability to manufacture large quantities.

## United States

**Compared to many other countries, the United States offers extensive public funding programs tailored to support the defence industry, including the provision of loans and equity support**. Regarding the use of financial instruments, debt-based support has been provided continuously since 1950, whereas the use of equity instruments is more recent. The two tables below summarise the main features of debt and equity-based programmes for illustrative purposes.

**Table 10 US loan programmes dedicated to SMEs and midcaps from the defence sector**

| PROGRAMME NAME | DEFENCE PRODUCTION ACT (DPA) LOANS | DEFENCE EXPORT LOAN GUARANTEE (DELG) |
|---|---|---|
| **Type of financial instrument** | State-guaranteed loans | State-guaranteed loans (through private lenders) |
| **Implementing agency** | Department of Defence | Department of Defence |
| **Creation date** | 1950 | 1950 |
| **Main objectives** | In defence: supporting the US military needs through loan facilities allocated to the defence, aerospace and security sectors. | Promote internationalization, bolster the defence industrial base, ensure capital access for defence stakeholders, mitigate contract risks, and foster innovation in the national defence sector. |
| **Main beneficiaries** | Though the DoD has been the most active in using the programme, the DPA is also activated in other sectors in cases of emergencies, such as COVID-19. When used in defence, it benefits relevant businesses based in the US and is identified as critical for the defence, aerospace and security sectors. | Any relevant businesses based in the US and involved in defence-related activities (e.g. suppliers or contractors) |
| **Support size** | Case by case | Case by case |
| **Overall budget** | N/a | N/a |
| **Targeted areas** | Any sectors, technologies, or activities identified as critical for the national industrial defence sector | Any sectors, technologies, or activities identified as critical for the national industrial defence sector |
| **Projects duration** | Case by case | Case by case |

[105] Defence and Security Accelerator, 2023, DASA Annual Review 2021-2022. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1122390/DASA_Annual_Review_2021-22_FINAL.pdf.

[106] Press release, 2023, Silicon Microgravity secures first close of its £2.8 million funding round to drive commercialisation of its microsensor technology. Available here: https://www.silicong.com/news.html

| PROGRAMME NAME | DEFENCE PRODUCTION ACT (DPA) LOANS | DEFENCE EXPORT LOAN GUARANTEE (DELG) |
|---|---|---|
| Selection criteria | Companies are selected based on the defence needs. Companies can be directly contacted or selected through restricted calls. | Defence-related activities that contribute to national defence. Companies are financially stable and prove compliance with applicable laws, regulations and security requirements. |

Source: US Federal Emergency Management Agency (FEMA), 2023

**Table 11 AFVentures equity support to defence SMEs and midcaps**

| PROGRAMME NAME | TACTICAL FUNDING INCREASE (TACFI) | STRATEGIC FUNDING INCREASE (STRATFI) |
|---|---|---|
| Type of financial instrument | Equity (VC fund) | Equity (VC fund) |
| Implementing agency | AFVentures | AFVentures |
| Creation date | 2018 | 2018 |
| Main objectives | Supporting SMEs and midcaps developing innovation, technology or research activities identified as crucial for the Air Force. | Facilitate the development of critical innovation, technology, and research activities for the Air Force while assisting in commercialization efforts and fostering strong contractual ties with the DoD. |
| Main beneficiaries | SMEs and midcaps defence sector (and dual-use) | SMEs and midcaps defence sector (and dual-use) |
| Support size | From $375.000 to $1.8 million | From $3 million to $15 million |
| Overall budget | N.A. | N.A. |
| Targeted areas | Any innovation, technology or research area identified as relevant to the Air Force military needs | Any innovation, technology or research area identified as relevant to the Air Force military needs |
| Projects duration | N.A. | N.A. |
| Selection criteria | Developing innovation, technology, or carrying out research activities in an area identified as crucial for the Air Force. Companies must have succeeded under the SBIR or SBTT programme. Private co-investor matching AFVentures funds | Developing innovation, technology, or carrying out research activities in an area identified as crucial for the Air Force. Companies must have succeeded under the SBIR or SBTT programme. Private co-investor matching AFVentures funds |

Source: AFVentures, 2023

### NATO

**NATO's 2022 Strategic Concept acknowledges the dual nature of emerging and disruptive technologies, recognizing their potential for altering the character of conflict and becoming key arenas of global competition**[107]. In response, NATO Member States have committed to promoting innovation, increasing investments in these technologies, and fostering cooperation with the private sector. These disruptive technologies are also identified as areas of common interest for enhanced cooperation between NATO and the European Union.

To this end, NATO launched two specific initiatives: the Defence Innovation Accelerator for the North Atlantic (DIANA) programme, launched during the 2021 Brussels summit[108], and the NATO Innovation Fund (NIF), launched at the 2022 NATO Madrid summit [109]. While DIANA provides acceleration services,

[107] NATO, 2023, Emerging and disruptive technologies. Available here: https://www.nato.int/cps/en/natohq/topics_184303.htm

[108] NATO, 2023, Defence Innovation Accelerator for the North Atlantic (DIANA). Available here: https://www.nato.int/cps/fr/natohq/topics_216199.htm?selectedLocale=kk

[109] Not all NATO Member states participate to the NIF. The 23 NIF participating countries include: Belgium, Bulgaria, Czechia, Denmark, Estonia, Finalnd, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway,

the newly established NATO fund acts as a patient investor, providing equity investments with a long-term approach better suited to the extended time horizon necessary for deep-tech and dual-use defence start-ups. During the last NATO summit in Vilnius held in July 2023[110], the fund rules and modalities were finalized by its participating countries.

**Table 12 NIF's equity support to defence start-ups and SMEs**

| PROGRAMME NAME | NATO INNOVATION FUND (NIF) |
|---|---|
| Type of financial instrument | Equity<br>- Direct investments: investment in companies (80-85%)<br>- Indirect investments: investment in VC funds (10-15%) |
| Implementing agency | NATO |
| Creation date | 2022 |
| Main objectives | Support defence sector businesses in developing critical dual-use technologies for NATO Allies' defence and security.<br>Protect these ecosystems from foreign takeovers while promoting collaboration and the successful commercialization of deep-tech start-ups. |
| Main beneficiaries | Start-ups and SMEs from the defence sector based in the 23 NIF participating countries |
| Support size | Case by case (max. 15 M€) |
| Overall budget | €1 billion |
| Targeted areas | Artificial Intelligence, big-data processing, quantum-enabled technologies, autonomy, biotechnology and human enhancement, novel materials, energy, propulsion and space. |
| Projects duration | Up to 15 years (investment period: 8 years) |
| Selection criteria | Direct:<br>Being a defence deep-tech start-up or SME based in one of the 23 NIF participating countries. Providing deep-tech and dual-use solutions to one of the NATO defence and security challenges: Proving evidence of operational applicability, technological feasibility and commercial viability of the proposed technology or solution. Start-ups producing offensive weapons are not eligible for financing.<br><br>Indirect:<br>Being a VC fund investing 75% in NIF participating Member States. |

Source: NATO, NATO launched Innovation Fund, 2022

*"This fund is unique. With a 15-year timeframe, it will help bring to life those nascent technologies that have the power to transform our security in the decades to come, strengthening the Alliance's innovation ecosystem and bolstering the security of our one billion citizens."*
**Jens Stoltenberg, NATO Secretary General, 2022[1]**

With its first kick-off pilot activities closed in August 2023, NIF's first calls for proposals are expected to be launched by the end of 2023, and its full operating capability to be achieved for 2025. It will financially complement the DIANA programme for those participants who need to secure third-party equity funding for further developments. The NIF is unique because it is the world's first multi-sovereign venture capital fund for the defence sector. In addition to making direct equity investments in deep-tech start-ups and SMEs, the NIF could also consider investing in funds that, in turn, invest in deep-tech projects or companies with a significant impact in NATO member countries and across the Atlantic region. These indirect investments would support innovation and technology development in a broader sense by backing funds that target such projects[111].

Poland, Portugal, Romania, Slovakia, Spain, Turkey and the United Kingdom. Sweden is expected to join NATO and the NIF over the course of 2024.

[110] NATO, 2023, Vilnius Sommut Communiqué. Available here : https://www.nato.int/cps/en/natohq/official_texts_217320.htm

[111] NATO, 2023, NATO Innovation Fund closes on EUR 1bn flagship fund. Available here: https://www.nato.int/cps/en/natohq/news_217864.htm

# 7. THE INVESTMENT GAP

This chapter provides an overview of the outcomes derived from the model used to estimate the funding gap affecting SMEs and midcaps in the defence sector. Additionally, it delves into the implications of this funding gap for EU security and its strategic autonomy.

## 7.1. Overview of the model for estimating the financing gap

This chapter presents a quantification of the financial gap for the defence sector, including, in part, dual-use technologies. The gap is calculated for debt and equity financing using the methodology outlined in the Box below with inputs from the SME and midcap survey conducted in this study's Chapter 2. The model builds on a methodology developed by fi-compass (see the original fi-compass model in Annex II), with some adaptations due to the questionnaire design, which allowed some simplifications.

The purpose is to quantify the funding gap by identifying companies that apply for loans or equity financing but are unsuccessful for various reasons. These companies demand financial support that is unmet by the market. Estimating this amount helps determine the scale of additional financing required by firms and the potential growth of this sector's loan/equity market.

**Box 4 Methodology to assess the loan and equity financing needs in the defence sector**

The assessment of financing needs in the defence sector aims to define the financing that should have been provided to SMEs and midcaps developing defence technologies that are considered viable financially if the market conditions were optimal.[112] In the context of this study, the following formulas will be applied for the debt and equity financing gap, respectively:

**(1)** $$Debt\ financing\ gap\ in\ the\ defence\ sector = N\ of\ SMEs\ and\ midcaps * Financially\ viable\ SMEs\ and\ midcaps * Unsuccessful\ SMEs\ and\ midcaps * Average\ SME\ and\ midcaps\ loan\ size$$

Where

- **N of SMEs and midcaps in the defence sector, including dual-use technology.**
- **Financially viable SMEs and midcaps.** It is the share of SMEs and midcaps experiencing non-negative turnover growth in the past two years.
- **Unsuccessful SMEs and midcaps =** loans relevant * loans not obtained. They are share SMEs and Midcaps that considered bank loans relevant for them but have not obtained them in the past two years.
- **Average SME and midcaps loan size.** This is the average size of loans delivered to or used by SMEs and midcaps.

**(2)** $$Equity\ funding\ gap\ in\ the\ defence\ sector[113] = N\ of\ SMEs\ and\ midcaps * Unsuccessful\ SMEs\ and\ midcaps * Average\ SME\ and\ midcaps\ equity\ size$$

Where

- **N of SMEs and midcaps in the defence sector, including dual-use technology.**
- **Unsuccessful SMEs and midcaps =** equity relevant *equity not obtained. They are the share of SMEs and midcaps that considered equity relevant for them but have not been issued in the past two years.
- **Average SME equity size.** This is the average size of equity issued or used by SMEs and midcaps.

Source: CSIL based on fi-compass, EIF's RMA 2019.

Before presenting the calculation results, it is important to acknowledge that these findings must be interpreted in light of specific assumptions. In particular:

- **Estimating the gaps is based on the SME survey responses and, therefore, only reflects their opinions and financial situations. It cannot be considered as representative of the EDBIT.** Moreover, a large share of surveyed companies came from the European Commission PADR/EDIDP/EDF beneficiaries, meaning that the calculated gaps could suffer from a selection bias when extended to the whole SME population, including those only involved in dual-use technology, without pure defence activities. The surveyed enterprises reported an average

[112] The supply of financing would cover the demand and that these SMEs/midcaps in the defence sector would have been able to reimburse a loan or would have generated value with the equity financing obtained.

[113] Differently from the formula for debt financing, the equity financing formula does not consider the variable "*Financially viable SMEs and midcaps*". Indeed, SMEs may look for equity financing while not being 'financially viable from a turnover point of view', either because they are start-ups with no revenue yet or just created without a financial history. Therefore, the equity formula only considers the unsuccessful SMEs which have looked for equity financing.

percentage of turnover related to the defence sector, including dual-use technology, of approximately 50%. When we segregate this figure, it becomes 75% for pure defence and 40% for dual-use technology. Consequently, it's essential to recognize that the dual-use market is somewhat underrepresented in our dataset. This limitation also stems from the blurred boundaries of the defence ecosystem when dual-use technology is integrated into its definition.

Finally, it is important to note that only companies that have looked for financing are taken into account in this quantification of the funding gap. At the same time, the portion of companies that have refrained from seeking loans or equity is much higher than in other sectors (on average 56% compared to 6,6% for all SMEs in the EU). In that context, the gap is likely to be underestimated.

- **Another critical assumption that the model had to make concerns the total number of SMEs and Midcaps in the EU relevant to the defence sector**. Based on evidence from the interviews,[114] this analysis assumes that the number of SMEs and midcaps in the defence sector has a lower boundary of 2,500 and an upper boundary of 3,800. These figures are conservative. They likely include companies with a high percentage of their turnover originating from defence and those actively developing products and services with proven military applications. The SME survey results indicate that these companies encounter the highest barriers when seeking investment. However, it's worth noting that these figures do not encompass the significant number of technology companies that may possess products with the potential to transition from civilian to military applications.
- **The quantitative assessment of financing gaps remains robust when considering the whole defence sector**. Breaking down these gaps according to individual countries, firm sizes, and life-cycle stages relies on a limited number of responses, making this segmentation less robust. Some qualitative insights on these differences came from the survey, the desk research, and the interview programme.
- **The geographical representativeness of the SME survey is generally robust, with responses covering 25 countries**. However, it's important to acknowledge some disparities in representation, particularly when considering the size of the defence sector in certain regions. Specifically, Italy emerges as an underrepresented country in our dataset, especially when considering its defence sector's significance. Most responses originate from firms based in countries that are important players in the European defence market. Notably, France, Spain, Germany, and Nordic countries like Sweden and Finland collectively constitute over half of our respondent pool.

Despite these challenges, we have taken measures to enhance the robustness of our findings. Results have been cross-referenced with alternative sources to validate the equity and debt gaps identified.

The computation of the debt financial gap in the defence sector builds on the variables in Table 15, while Table 16 reports the procedure for identifying the relevant share of firms to be considered for the estimate. The source of data and the adopted values are further discussed in Section 7.2.

**Table 13 Variable and data sources**

| VARIABLE | UNIT | VALUE | REFERENCE PERIOD | PRIMARY SOURCE |
|---|---|---|---|---|
| **SMEs and midcaps in the defence sector in the EU27, partly including dual-use technology** | Number | • Min: 2,500<br>• Baseline: 3,000<br>• Max: 3, 800 | 2021/22 | • Desk research<br>• Interviews<br>• Statistical analysis of Orbis data |

[114] Interviews indicate that in Germany, 300 companies are operating in the sector. Assuming the same number of firms in Italy and France, the other two most relevant countries for the EU defence market, the number of firms is still below 1,000. The number increases to 1,500 if the same number is assumed also in Spain and Sweden. The remaining share should be distributed in the other EU27 countries. Interviews also indicate that the number of companies in Eastern EU countries such as Bulgaria, Lithuania, and Romania is less than 10 per country if pure defence is considered. On top of that, there are some countries, such as Austria, that are committed to neutrality, in which the defence industry is not very important.

| VARIABLE | UNIT | VALUE | REFERENCE PERIOD | PRIMARY SOURCE |
|---|---|---|---|---|
| **Financially viable SMEs and midcaps** | Percentage | • 85.3% | 2021/22 | • Survey[115] |
| **Unsuccessful SMEs and midcaps** | Percentage | • Loans relevant:<br>• 58.2% | 2021/22 | • Survey[116] |
| | Percentage | • Loans not obtained.<br>• 31.0% | 2021/22 | • Survey[117] |
| **SME and midcaps loan size** | EUR | • Min: 75,000<br>• Median: 600,000<br>• Average: 2,620,114<br>• Max: 25,000,000 | 2021/22 | • Survey[118]<br>• Desk research |

Source: CSIL elaboratio

**Table 14 Procedure to identify the relevant share of surveyed firms to calculate the debt gap**

| ID ACTION | ACTION | VALUE (N OF RESPONDENTS) |
|---|---|---|
| 1 | **Total number of survey respondents** | 143 |
| 2 | *of which financially viable* | 122 |
| 3 | *of which looked for external debt finance over the period 2021-2022* | 71 |
| 4 | *of which did not obtain loans (for investments) over the period 2021-2022* | 22<br>**(= 15.4% of the total)** |

Source: CSIL elaboration on survey data

## 7.2. Debt financing gap: scenarios

The estimated funding gap is subject to various parameters and entails certain assumptions. To address the inherent uncertainty surrounding the values of these parameters, this section examines the funding gap across different potential values of the underlying parameters. Doing so generates a probability distribution for the gap, offering a more comprehensive understanding of its potential range rather than relying solely on its average value. This probabilistic approach is particularly suitable considering the uncertainties surrounding the sector's definition and the growth influenced by the unstable geopolitical context. The following paragraphs delve into the specific values assumed for each parameter in the scenario analysis and the general assumption on the number of SMEs.

- As regards the share of viable SMEs with difficulties in seeking and accessing debt finance, the survey indicates that 15.4% of respondents did not obtain a loan.[119] The 2019 study on the gap

[115] Survey to SMEs and Midcaps. Question in section 2: Have the following company indicators decreased, remained unchanged or increased over the last 2 years (2021- 2022)? Turnover. The share is given by 122 (out of 143) respondents with “increased” and “remained unchanged” turnover.

[116] Survey to SMEs and Midcaps. Question in section 3: Did your company look for external finance over the last 2 years (2021-2022)? With answer: Yes, debt financing (n = 71). The share of 58.2% is given by 71 out of 122 financially viable respondents.

[117] Survey to SMEs and Midcaps. Question in section 4: Has your company tried to access debt funding (loans for investments) over the last 2 years (2021-2022)? With answers: Yes, but my company was rejected (n= 12) and Yes, but the terms and conditions offered by the bank (interest rates, collaterals, etc.) were not acceptable (n = 10). The share of 31.0% is given by 22 out of 71 respondents for which the loans were a relevant source of finance.

[118] Survey to SMEs and Midcaps. Question in section 3: (If you obtained funding) How much debt funding (loans for investments) did your company obtain during the last 2 years (2021-2022)? Outliers excluded: 0, 140, 130,000,000.

[119] In the survey conducted between 2021 and 2022, it was observed that 51 financially viable SMEs did not seek debt financing during this period. Out of this group, 12 SMEs actively sought equity financing, and as such, they have been included in the category of firms contributing to the equity gap. The remaining 38 SMEs may have either possessed adequate internal funds for

analysis for SME financing in the European Union for all sectors[120] shows that the percentage varied between 3% and 10% in the pre-pandemic period, depending on the country. The results of the latest SAFE survey covering the period from October 2022 to March 2023 show that among SMEs that judged bank loans to be relevant for their funding, 9% faced obstacles when seeking to obtain a loan.[121] To take on board the uncertainty surrounding the value of this parameter, the present analysis assumes a range between 10% and 20%.

- When determining the average loan requested for investments by defence SMEs/midcaps, the survey indicates a figure of EUR 2.6 million. This amount surpasses the loan sizes reported in the previous 2019 financial gap study,[122] which ranged from EUR 150,000 to EUR 300,000 and covered SMEs across all sectors of the economy. It should be noted that investments in defence and dual-use technologies often involve R&D activities or frontier technology developments, which typically incur higher costs. Therefore, the higher loan size observed in the survey is expected and plausible. To account for the limited knowledge surrounding this parameter and the absence of other benchmark values, a wide variability range is assumed. This range spans from the lowest value reported in the survey, which is EUR 75,000, to the largest value of EUR 5 million.

**Overall, the analysis indicates a 60% probability that the debt financing gap in the defence sector, partly including dual-use technology, is between EUR 1 to 2 billion.** Identifying the variability range for the critical parameters underlying the debt funding gap formula permits computing the entire probability distribution of the gap via Montecarlo simulations.[123] Figure 15 shows that the debt gap varies from a minimum of EUR -0.5 billion to a maximum of EUR 3.5 billion, with an average of EUR 1.2 billion. The probability of a negative gap, i.e., an excess of loans' supply compared to demand by SMEs and midcaps, is less than 1%, while it increases to 92% for a gap lower than EUR 2 billion (Figure 15, Figure 16, Table 17).

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their projects or opted not to apply for debt financing due to various factors. These factors might include discouragement stemming from exclusion policies in sectors like defence or the anticipation of loan denials based on these policies.

It is important to note that the survey did not investigate the specific reasons behind the decision of these 38 SMEs to abstain from seeking debt financing. Consequently, these firms have been intentionally omitted from the calculation of the financing gap. This decision is based on a conservative approach as the definition of the gap necessitates an unmet demand for funds, a criterion not met by these 38 SMEs.

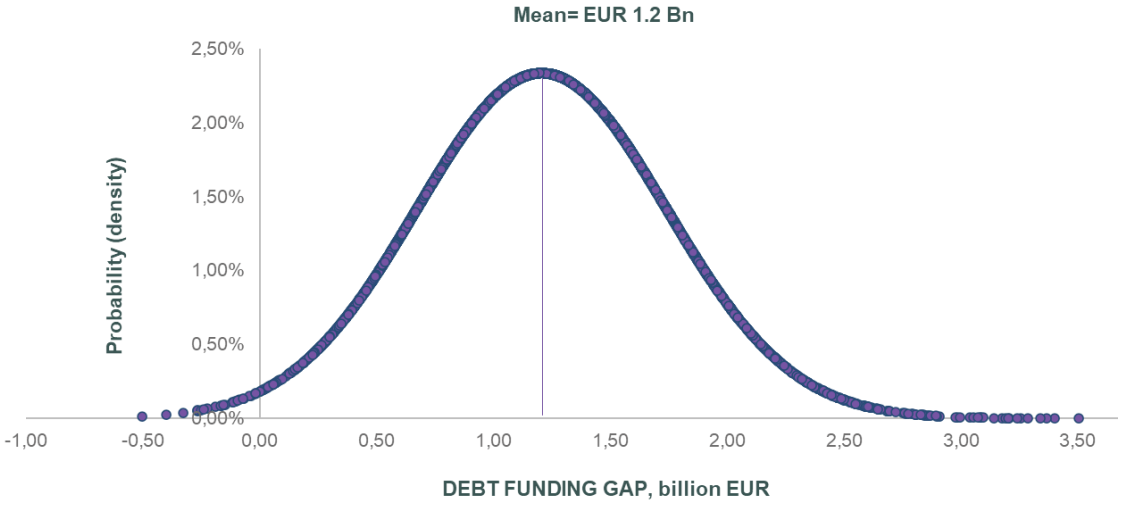
[120] fi-compass (2019), Gap analysis for small and medium-sized enterprises financing in the European Union 2019, Table 4. https://www.fi-compass.eu/publication/factsheets/gap-analysis-small-and-medium-sized-enterprises-financing-european-union Last access on 13/07/2023.

[121] Data are from the 28th round of the Survey on the Access to Finance of Enterprises (SAFE) in the euro area, which was conducted between 6 March and 14 April 2023. The survey covered the period from October 2022 to March 2023. The sample comprised 10,983 enterprises in the euro area, of which 10,085 (92%) had fewer than 250 employees. Results are available at https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe202306~58c0da48d6.en.html#toc6 see Chart 13, panel b. Last access on 10/07/2023.

[122] fi-compass (2019), Gap analysis for small and medium-sized enterprises financing in the European Union 2019, Table 4. https://www.fi-compass.eu/publication/factsheets/gap-analysis-small-and-medium-sized-enterprises-financing-european-union Last access on 13/07/2023.

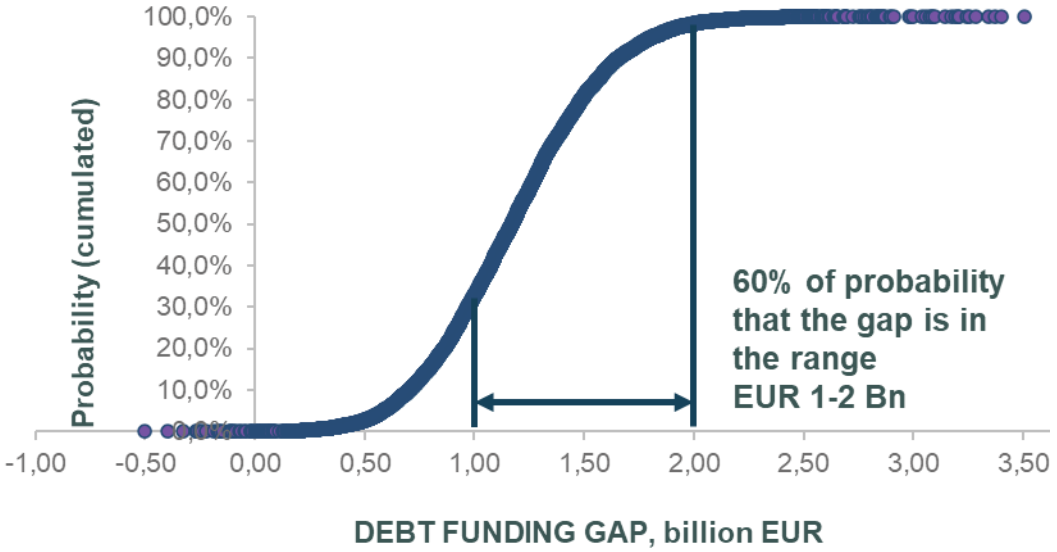
[123] The method randomly extracts values of the parameters within the respective defined intervals (probability distributions) and then, for each extraction, computes a value of the gap associated with the specific extracted values of the parameters. The probability distribution of the debt gap is obtained by repeating the procedure for a large number of extractions. The present study assumes that the parameters are normally distributed with a standard deviation large enough to reach the minimum and the maximum values, respectively. The debt gap distribution builds on 6,000 extractions.

**Figure 15 Debt funding gap: probability distribution**




Source: CSIL

**Figure 16 Debt funding gap: cumulative probability distribution**




Source: CSIL

**Table 15 Debt funding gap: relevant statistics**

| | UNIT OF MEASUREMENT | VALUE |
|---|---|---|
| Mean | EUR (billion) | 1.21 |
| Standard deviation | EUR (billion) | 0.53 |
| Minimum | EUR (billion) | -0.50 |
| Maximum | EUR (billion) | 3.51 |
| Probability of debt funding gap < EUR 0 | % | 0.5% |
| Probability of debt funding gap < EUR 1 billion | % | 36% |
| Probability of debt funding gap < EUR 2 billion | % | 92% |
| Probability of debt funding gap < EUR 3 billion | % | 99% |

Source: CSIL elaboration

## 7.3. Equity financing gap

Calculating the equity funding gap follows the same operational steps as the debt financing gap. Table 18 reports the variables entering the equity gap formula, while Table 17 reports the procedure for identifying the relevant share of firms to be considered for the gap. In addition to the assumptions related to the number of firms, the following assumptions also have to be considered:

- 14.7 % is the share of firms that applied for equity finance unsuccessfully, [124]
- the average deal size is EUR 5.5 billion.

**Table 16 Variable and data sources**

| VARIABLE | UNIT | VALUE | REFERENCE PERIOD | SOURCE |
|---|---|---|---|---|
| **SMEs and midcaps in the defence sector, partly including dual-use technology** | Number | Min: 2,500<br>Baseline: 3,000<br>Max: 3, 800 | 2021/22 | Desk research<br>Interviews<br>Statistical analysis of Orbis data |
| **Unsuccessful SMEs and midcaps** | Percentage | Equity relevant: 38% | 2021/22 | Survey[125] |
| | Percentage | Equity not obtained. 39% | 2021/22 | Survey[126] |
| **SME and midcap equity size** | EUR | Min: 500,000<br>Median: 2,000,000<br>Average: 5,582,308<br>Max: 20,000,000 | 2021/22 | Survey[127]<br>Desk research<br>interviews |

Source: CSIL

**Table 17 Procedure to identify the relevant share of surveyed firms to calculate the equity gap**

| ID ACTION | ACTION | VALUE (N OF RESPONDENTS) |
|---|---|---|
| 1 | **Total number of survey respondents** | 143 |
| 2 | *of which looked for external equity finance over the period 2021-2022* | 54 |
| 3 | *of which did not obtain equity over the period 2021-2022* | 21<br>**(= 14.7% of the total)** |

Source: CSIL elaboration on survey data

The possible range values of (i) the share of firms that looked for equity but could not obtain the deal for various reasons and (ii) the average ticket size are discussed in what follows.

[124] In our survey sample, consisting of respondents from 2021 to 2022, it was observed that 89 SMEs did not pursue equity financing during this period. Among them, 40 actively sought debt financing, and they have been accounted for in the debt gap assessment. The remaining 49 SMEs may have either possessed adequate internal funds for their projects or chose not to apply for equity financing for various reasons. These reasons could include factors such as being deterred by exclusion policies in sectors like defence or having prior knowledge that their loan applications would likely be declined due to such policies. It's important to emphasize that the survey did not delve into the specific reasons behind these 49 SMEs' decision to forgo the pursuit of equity financing. Consequently, these firms have been deliberately excluded from the gap calculation. This exclusion aligns with a conservative approach because the definition of the gap necessitates an unmet demand for funds, which was not demonstrated by these 49 SMEs. As mentioned earlier in the case of debt financing, including these firms in the gap calculation poses challenges, as it contradicts the fundamental definition of the gap, which requires a clear display of an unmet funding need.

[125] Survey to SMEs and Midcaps. Question in section 3: *Did your company look for external finance over the last 2 years (2021-2022)?* With answer: *Yes, equity financing* (n = 54). The share of 38% is given by 54 out of 143.

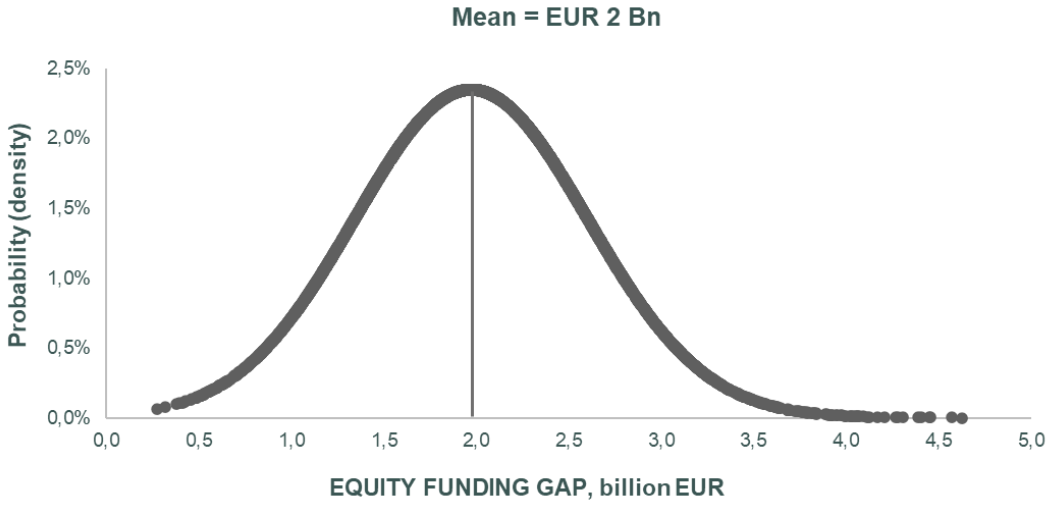
[126] Survey to SMEs and Midcaps. Question in section 5: *Did you try to access equity funding over the last 2 years (2021-2022)?* With answers: *Yes, but my company was rejected* (n= 11) and *Yes, but the terms and conditions offered by the investors were not acceptable* (n = 10). The share of 39.0% is given by 21 out of 54 respondents for which equity was a relevant source of finance.

[127] Survey to SMEs and Midcaps. Question in section 5: *(If yes and I was invested) How much equity funding did your company obtain during the last 2 years (2021- 2022)? Outliers excluded: 110, 800, 25,000,000, 50,000,000, 170,000,000.*

- 14.7% of respondents in the survey asked for equity but did not obtain it. In the 2019 financial gap study mentioned above, that percentage varies between less than 1% in countries where the equity market is not developed to more than 10% in countries with a developed ecosystem. In countries in Western Europe, such as Belgium, France, and Germany, the share is between 3-4%.[128] To address the fact that the survey data might be biased by respondents' interest in equity, leading to an overestimation of this parameter, the scenario analysis considers the share of 14.7% as the maximum possible value while calibrating the minimum value at 3%.
- 12.5% of the survey respondents had equity deals in the period 2021-2022, with an average equity size of EUR 4.5 million.[129] This is in line with the ticket size in other defence-related markets such as cybersecurity and the evidence from interviews with investors who reported that depending on the investment round (e.g., seed, series A, Series B) or the investee life-cycle, the ticket size varies between EUR 0.5 to EUR 8 million.[130] It should also be noted that the 2019 report of the European Court of Auditors (ECA) on centrally-managed EU interventions for VC shows that EU-backed VC funds have invested, on average, between EUR 1.4 and EUR 2.6 million per SME in the seed and start-up stages respectively, while the average investment in the growth and buy-out stages per SME were EUR 4.9 and EUR 7.2 million respectively.[131] For the scenario analysis, the average equity size is assumed to be in the range of EUR 0.5 to 8 million.

**The equity financing gap varies from a minimum of EUR 0.2 billion to a maximum of EUR 5 billion, with an average of EUR 2 billion. The scenario analysis indicates the existence of a funding gap in the equity market (there is zero probability of a negative gap), with a likelihood of 90% that the gap lies in the range of EUR 1 to 3 billion** (**Error! Reference source not found.**).

**Figure 17 Equity funding gap - probability distribution**




[128] fi-compass (2019), Gap analysis for small and medium-sized enterprises financing in the European Union 2019, Table 4. https://www.fi-compass.eu/publication/factsheets/gap-analysis-small-and-medium-sized-enterprises-financing-european-union Last access on 13/07/2023.

[129] The share refers to the percentage of respondents (18/143) that obtained equity. The share is quite in line with the percentage of 11% (=46/433) of EDF, PADR, and EDIDP beneficiaries that obtained an equity deal during the period 2018-2022. The percentage of 11% was obtained by associating the list of beneficiaries received by DEFIS with the equity deals reported in the ORBIS M&A database.

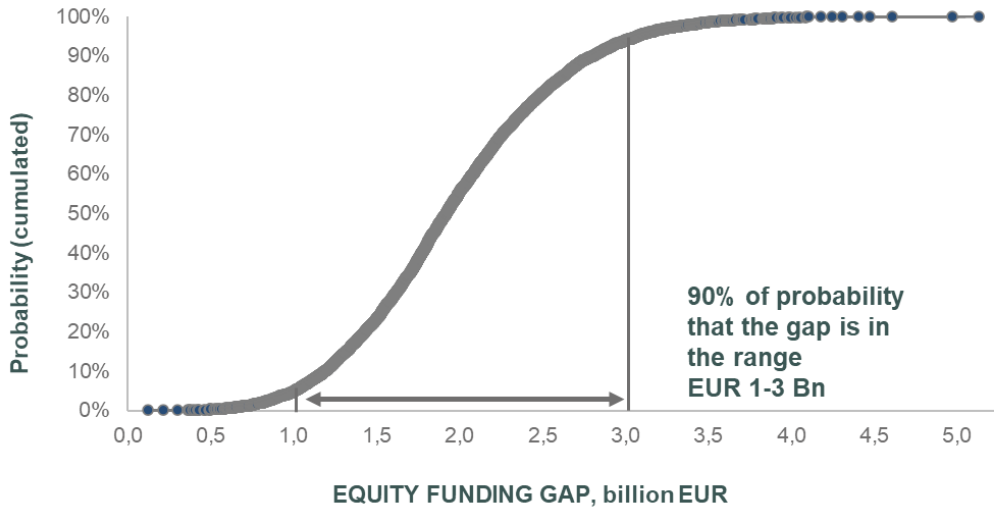
[130] For the cybersecurity market, the EIB shows the following ticket sizes. Seed: up to €500 000; Series A: from €500 000 to €5 million; Series B: from €5 million to €15 million; Series C: €15 million and above. See European Investment Bank (2022). European Cybersecurity Investment Platform. Available at https://www.eib.org/en/publications/20220206-european-cybersecurity-investment-platform Last access on 07/09/2023 .

[131] Number refers to a period over the 20 years the Commission has been supporting venture capital funds through its various centrally managed interventions. See ECA (2019) Centrally managed EU interventions for venture capital: in need of more direction, Special report. https://www.eca.europa.eu/Lists/ECADocuments/SR19_17/SR_Venture_capital_EN.pdf Last access n 11/07/2023.

The average equity financing size is between EUR 0.3 and 4.6 million in the 2019 study on the Gap analysis for small and medium-sized enterprises financing in the European Union (Table 4).

Source: CSIL

**Figure 18 Equity funding gap - cumulative probability distribution**




Source: CSIL

**Table 18 Debt funding gap - relevant statistics**

| | UNIT OF MEASUREMENT | VALUE |
|---|---|---|
| Mean | EUR (billion) | 2.0 |
| Standard deviation | EUR (billion) | 0.64 |
| Minimum | EUR (billion) | 0.05 |
| Maximum | EUR (billion) | 5.2 |
| Probability of an equity funding gap < EUR 0 | % | 0% |
| Probability of an equity funding gap < EUR 1 billion | % | 4.5% |
| Probability of an equity funding gap < EUR 3 billion | % | 93.3% |
| Probability of an equity funding gap < EUR 5 billion | % | 99.5% |

Source: CSIL elaboration

## 7.4. Interpretation of the funding gap

This section offers an interpretation of the financing gaps beyond the pure quantitative aspect by taking on board insights from the interview programme and desk research. The limitations of the gaps' estimation are discussed as well.

**Whether related to debt or equity financing, the financing gaps identified in this study should be treated as distinct gaps that reflect separate financial channels**. However, it is important to acknowledge that these markets intersect and have areas of overlap in the real world. The choice of funding sources for firms is influenced by various factors, including their balance sheet characteristics, financial literacy and cultural norms, the structure of capital markets in their operating regions, and the costs and terms associated with different funding options.

For instance, considering the unique characteristics of SMEs, it's generally easier for financially stable SMEs with adequate collateral and a trackable financial history to access bank credit. Conversely, access to loans is more challenging for start-ups since they do not have a credit history. Equity financing, such as venture debt, often becomes the preferred option, provided the SME is culturally prepared to welcome external stakeholders. At the market level, a debt financing gap may signal difficult conditions for accessing credit, such as high-interest rates or a risk-averse banking system in a particular region, which might

require substantial collateral from new or riskier clients. In contrast, accessing equity financing requires a well-established ecosystem of funds and investors[132].

Midcaps are often in a different situation than SMEs, as they are mostly industrial and export-oriented. In the EU context, they are largely family-owned and driven by long-term investment. While midcaps do not benefit from the support available to SMEs, the European level's lack of a recognised midcap category has left these companies to comply with rules and regulations typically designed for very large and complex companies. This situation highlights the need for tailored financial support for these companies.

**The estimated financial gaps presented in this study represent the private sector's perspective, including firms and investors**. It is important to note that the perceived gaps from the public standpoint may differ and could be even greater. This discrepancy may arise due to the capital required to fulfil politically set goals and military expenditure targets. In reality, SMEs may have limited interest in expanding their production capacity to meet politically desired production volumes in the short term. This reluctance stems from higher operating costs and increased reliance on external financing, which introduce additional risks for SMEs[133]. As a result, SMEs may choose to operate within their current capacity rather than pursue expansion. For example, in the case of Germany, only a fraction of the allocated EUR 100 billion for the military "Bundeswehr Special Fund" (specifically, EUR 1.1 billion) has been utilised despite a planned annual budget of EUR 20 billion. This situation can be attributed not only to procurement challenges but also to the limited production capacity.[134]

**The estimated financial gaps presented in this study, covering the period 2021-2022, can be considered a reasonable approximation of the financial needs of European defence SMEs for the next two to three years**. Interviewees concur that the defence sector is a rapidly growing market, particularly when opportunities for dual-use technologies are taken into account, which are still in their infancy. To illustrate, the cybersecurity market, both globally and in Europe, is currently underserved, with a VC financial gap in the range of € 1.3-1.9 billion per year[135] and with the total addressable market estimated to be approximately ten times larger than the actual market size[136]. Furthermore, European military expenditures have consistently grown over the years, with an unprecedented increase projected for the coming years. Military expenditures are expected to reach EUR 530 billion in 2022, reflecting a 13% increase compared to 2021. Importantly, the defence sector has proven resilient to financial crises, such as the one in 2008/09, as well as the challenges posed by the Covid-19 pandemic[137]. Considering these trends, it is reasonable to anticipate an expanding financial gap in the short term. However, it is essential to take into account the following additional considerations.

**A growing defence market may lead to increased demand for finance, both from private and public sources**. However, this may not necessarily result in significant variations in the financing gaps. Findings from the latest round of the SAFE survey indicate that the financing gap across all financial instruments only saw a slight increase for firms in 2022 compared to 2021, particularly for SMEs. Furthermore, the net percentage of firms reporting a widening financing gap in external funds decreased to 6% in the second half of 2022 from 9% in the first half of the year, mainly due to a reduction in the net percentage of large firms reporting such gaps[138].

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[133] Interviews with investors indicate, for instance, that firms prefer a full order book in the long term rather than focusing on short-term revenue growth. They expand their capacity only to the extent required to secure orders.

[134] See https://www.deutschlandfunk.de/erst-1-1-milliarden-euro-aus-bundeswehr-sondervermoegen-abgeflossen-100.html https://www.dw.com/en/what-happened-to-the-german-militarys-100-billion-fund/a-64846571 Last access on 12/07/2023.

[135] European Investment Bank (2022). European Cybersecurity Investment Platform. Available at https://www.eib.org/en/publications/20220206-european-cybersecurity-investment-platform Last access on 07/09/2023.

[136] McKinsey Cyber Market Map (2022). https://www.mckinsey.com/capabilities/risk-and-resilience/our-insights/cybersecurity/new-survey-reveals-2-trillion-dollar-market-opportunity-for-cybersecurity-technology-and-service-providers#/ Last access on 12/07/2023.

[137] Source: Courtesy of PARALOS partners. Slides presented at the EDF Info Days 2023 on 29 June. Numbers are net of inflation.

[138] Financial instruments include bank loans, credit lines, trade credit, and equity and debt securities issuance. The reduction of the share of firms reporting a reducing gap was mainly because of a reduction in the net percentage of large firms reporting a widening of the financing gap (to a net 6%, down from 11% in the previous round). See: 28th round of the Survey on the Access

**The equity market tends to be more volatile than the debt market, both over time and across different geographic regions**. The estimated defence equity gap can indicate either a growing market with active equity funds and increasing demand for such financing or a high demand that the market currently cannot meet due to various reasons, such as heavy regulations, ethical concerns, or a monopolistic/oligopolistic market structure. The former situation presents a positive aspect of the equity market, while the latter presents challenges and highlights the need for public support. Furthermore, the equity market conditions vary across each country and EU territory, leading to substantial differences in its evolution. While the equity market is well developed in countries such as France, Benelux, the DACH region (Austria and Germany), and the Nordics (Denmark, Sweden, and Finland), it lags in South and Eastern Europe[139]. This suggests that there may be different equity funding gaps and specific needs that must be addressed accordingly. In contrast, the debt financing gaps are less influenced by these factors, as the banking sector, despite some variations between countries in the EU, is more homogeneous in terms of market approaches towards SMEs.

## 7.5. Implications for EU strategic autonomy

**The inability to secure funding can seriously affect SMEs and midcaps in the defence sector**. According to the companies surveyed for this study, the primary consequences of missing funding are limited business growth, downsizing of operations, and resorting to seeking funding from outside the European Union. In a sector defined by long development cycles and large capital requirements, a lack of funding can hamper a company's ability to innovate, expand, or even maintain its current operations. Public support and self-financing can help mitigate the consequences of limited finance access but are often insufficient to sustain rapid growth trajectories.

> *"The continued exclusion of the defence industry from private funding opportunities endangers the creation of any credible European defence."*
>
> **Defence industry representative**

**The lack of investment in R&D is likely to lead to a technology disadvantage and put European companies at a competitive disadvantage**. The inherent risks associated with insufficient R&D for defence purposes extend well beyond industrial competitiveness. They involve the EU and Member States' security and prosperity. Defence R&D is a crucial element of the future capabilities of armed forces to effectively counter existing and emerging threats. Moreover, the rapidly growing hybrid threat scenario will require improved military capabilities and, more generally, the ability to protect society, critical infrastructure and overall economic performance. These security implications are perceived as of strategic importance, especially in the evolving landscape of areas like cybersecurity, artificial intelligence, and space[140].

**Reduced access to the capital market hurts defence companies' valuation and capacity to grow**. According to defence industry representatives, the lack of European investors implies lower market valuations and lower larger defence companies' capacity to buy smaller start-ups[141]. The lack of financing opportunities in the EU is turning EU defence companies towards asset managers outside the EU. For example, between 2017 and 2021, the proportion of publicly traded Thales shares held by investors from continental Europe (excluding France) fell from 20% to 8% of the free float[142].

**Finally, in the face of a growing demand for defence capabilities, the European defence industry may struggle to keep pace, leading to an inevitable increase in imports to meet security needs**. When the German government announced a substantial EUR 100 billion fund earmarked for the modernization of the Bundeswehr, part of this budget was set for acquiring American military hardware.

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to Finance of Enterprises (SAFE) in the euro area, which was conducted between 6 March and 14 April 2023. The survey covered the period from October 2022 to March 2023.

https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/ecb.safe202306~58c0da48d6.en.html Last access on 12/07/2023.

[139] European Investment Bank (2023). Evaluation of EIB Group equity and quasi-equity support for SMEs and mid-caps. https://www.eib.org/en/publications/20220197-evaluation-of-eib-group-equity-and-quasi-equity-support-for-smes-and-mid-caps Last access on 12/07/2023.

[140] Portugal Government (2021). The future of European Defence Economy and the role of defence industries.PT Non-paper February 2021.

[141] ASD, October 2022. "A note on access to private funding for the defence industry".

[142] Thales, 2022. Defence and Sustainable Finance: Europe's Strangely Split Personality. 29 SEP 2022.

This shift towards foreign suppliers contradicts the objectives outlined in the Strategic Compass, where one of the primary priorities is to invest in defence to "reduce technological and industrial dependencies. Moreover, these suppliers may not be subject to the financial sustainability regulations of the EU, which increases the risk of increasing dependency on suppliers subject to fewer environmental and ethical checks[143].

[143] Amélie FÉREY, Laure DE ROUCY-ROCHEGONDE (2022). “Don’t Bank on the Bombs” . New European Standards Affecting the Defence Industry. Briefing de l’IFRI

# 8. CONCLUSIONS AND SUGGESTIONS FOR PUBLIC SECTOR ACTIONS

## 8.1. Conclusions

**This study highlights the significant challenges faced by EU SMEs involved in developing products and services for the defence sector in accessing financing.** These obstacles arise from many factors, including the structure of the market, such as the challenge to access procurement, or the overly stringent interpretation of ESG criteria, and ethical considerations. These barriers to access finance hold considerable significance as they can impede investments in the defence sector, including in emerging technologies with dual-use applications, which are critical for maintaining the EU's competitive edge. They also contribute to reducing the market value of European defence companies in comparison to their global counterparts.

**Compared to similar companies in the US and UK, SMEs and midcaps operating in the EU defence sector encounter significant challenges seeking access to financial resources, encompassing both traditional bank loans and equity investment.** In the US and UK, the public sector has taken proactive measures to foster a robust and supportive environment for defence companies, irrespective of their size. Moreover, the two countries have increasingly emphasised the promotion of dual-use technologies, which have applications both in the civilian and defence domains. One key distinguishing feature is the size and maturity of the VC and PE markets in the US, which are considerably larger and more developed than their European counterparts. Furthermore, within the US, a cohort of specialized investors possess a profound understanding of the complexity associated with defence public procurement contracts and the stringent security regulations inherent to the sector.

**The severe consequences of inadequate funding are endangering the EU's security capabilities, technological competitiveness, and sovereignty**. While quantifying the funding gap in the sector is complex, conservative estimates indicate significant shortfalls in both equity and debt funding, with geographic disparities further complicating the issue. National security considerations further limit access to capital outside the EU, compounding the problem. To counteract this, governments in the EU are increasingly resorting to imports, which is far from an ideal solution.

**Among EU Member States, France stands out as the sole nation with a sufficiently matured ecosystem for financing SMEs and innovation within the defence sector**. This ecosystem encompasses VC and PE investors, although they do not achieve the same degree of specialisation as in the US. France's supportive framework is further strengthened by dedicated financial instruments, targeted loans and equity facilities facilitated through its national promotional bank. In stark contrast, other EU countries lag significantly behind France, both in terms of the availability of private financing and the provision of public support.

**Within Europe, the UK is the sole exception, boasting a public and private financing landscape that closely resembles that of the US.** Companies in the UK also frequently engage in transatlantic transactions, a phenomenon that is less prevalent within the European Union. This discrepancy highlights the UK's proximity to the US financing model and the limited alignment of other EU nations with these robust systems.

**In the EU, increased defence spending, including in dual-use technologies, drives private investor interest in this sector but is insufficient to address the main barriers, including coming from a strict interpretation of the ESG regulatory framework.** Geopolitical instability and security concerns have led to increased defence spending and changed the perception of the defence sector amongst investors and society, emphasizing its role in providing safety and security to European citizens. The need to modernise military capabilities and address emerging threats has driven demand for innovative technologies that can mitigate some of the inherent risks associated with the defence sector. In particular, they offer quicker returns on equity investment and bypass some of the longer developmental and certification processes. Yet, important regulatory barriers come into play when technology transitions from the civilian to the military domain.

**Without a clear definition of what is a socially acceptable investment, investors and financial institutions in the EU are very cautious about compliance with the ESG frameworks**. They tend to strictly interpret these frameworks to mitigate the risk of reputational damage. The current perceived lack of clarity and ambiguity surrounding the interpretation of the EU's sustainable finance framework on its social criteria further adds to this challenge. Moreover, financial institutions that are open to engaging with companies involved in military-related production face substantial due diligence costs. These costs arise from the rigorous scrutiny required to ensure that a company's activities do not breach international treaties or sanctions and fall within eligible areas. These barriers are particularly significant for SMEs, often deterring them from pursuing loans or financing opportunities.

**For equity investors in the EU, FDI controls and the shortage of domestic late-stage investors impact companies' valuation and influence investment decisions**. In the VC industry, having a clear exit strategy is fundamental. Investors expect to see returns on their investments through exits like initial public offerings or acquisitions. However, deals can be blocked because of national security concerns. When this occurs, it is not uncommon for a national defence company to step in as a solution. However, this alternative often leads to suboptimal returns for investors.

**Challenges related to defence procurement and the need for caution in military technology investments remain relevant considerations for investors.** The dependency on public contracts or large prime contractors creates barriers to entry for investors not embedded in specific value chains. While dual-use technologies offer advantages, the complexity of defence procurement remains a challenge, especially for smaller companies and startups. Selling technologies for military purposes still requires navigating lengthy processes and adhering to strict protocols, which can deter some investors. The sensitive and confidential nature of information in the defence sector can also hinder the funding process since national security concerns may prevent potential investors and lenders from accessing critical data about companies and their products. Both the US and the UK have taken measures to reduce barriers to SMEs' access to defence procurement, particularly for those involved in the development of emerging technologies with potential military applications.

**Up to this point, public support initiatives have proven insufficient in addressing the shortfall in private financing within the EU's defence sector**. Among EU Member States, only France has established a comprehensive range of financial instruments designed specifically to provide support to SMEs and midcaps operating within the defence sector. Consequently, the EU has struggled to meet its objectives of bolstering production capacity in this critical industry while military expenses have increased. In-depth interviews conducted as part of this study have underscored the vital role that public support can play. Beyond merely injecting additional financial resources, such support serves as a crucial signal to private investors. It sends a clear message that the government is committed to fostering growth and innovation within the defence sector and that investing in defence is compatible with the ESG, which can, in turn, instil confidence and attract private capital.

## 8.2. Suggestions for public action

This study highlights that swift action is needed to address the financing gap for SMEs and midcaps in the defence sector to ensure that the European defence industry can meet escalating demands, protect national security, and maintain global competitiveness. It also identifies that public sector involvement, through specific programs and national promotional banks, plays a crucial role in signalling to private investors and mitigating investment risks. To mitigate this situation, a few public support actions could be implemented.

### *Provision of funds*

**Public sector financing should be adapted to the different needs of SMEs during their lifecycle and also adapted to the specificities of the sector.** SMEs in the defence sector should have access to diversified and specialised forms of support. Given the substantial financing demands within this industry, grants exhibit certain limitations when compared to financial instruments. Typically, grants provide smaller amounts to individual companies than loans and equity, making them suitable for kickstarting R&D but less conducive for facilitating the substantial investments required for scaling up production. Receiving grants is also more complex as they are often subject to lengthy and competitive application procedures. Ensuring

access to other forms of funding is also important since SMEs often do not know where to look for financing once they are no longer eligible for grants, or they can leverage current contracts to secure a bank loan. Technologies developed for the defence sector are characterized by long development cycles, often necessitating patient investors. Venture debt and equity investments become the primary recourse, as traditional bank loans are often inaccessible to companies lacking collateral or established credit history. This is a common situation for newly established companies and undercapitalised SMEs. The involvement of public entities through equity support becomes increasingly crucial beyond the initial seed funding stage, for which the private VC industry in Europe already offers some viable options, especially for companies developing dual-use technologies. When companies are more mature and have sufficient collateral and credit history, bank loans can support business expansion. For these companies, subsidised credit and public guarantees can help reduce the cost of finance. In Europe, France and the UK's proactive approach to supporting their defence sector through tailored and sector-specific financing mechanisms can serve as a model for other Member States.

**Given the characteristics of the defence sector, which necessitates a deep understanding of the relevant regulatory frameworks, there is a strong case for setting up targeted equity facilities.** The defence industry is inherently characterized by stringent regulations, introducing considerable complexities for potential investors. A major weakness in the VC and PE industry in Europe is the lack of specialised funds. The US offers a pertinent example, with numerous funds specializing in supporting companies engaged in national security services, encompassing military and counterterrorism operations and including many dual-use capabilities. This underscores the importance of creating a similarly tailored and informed investment framework to foster growth and innovation within the European defence sector. Such an approach would promote the emergence of a group of highly specialized fund managers familiar with the regulatory landscape surrounding companies operating within this sector and capable of attracting sufficient investments.

**A rationale for establishing this facility at the EU level also exists to facilitate cross-national investments and support the emergence of specialised investors throughout the EU**. This study has underscored the highly fragmented and relatively modest nature of the defence financing landscape within the EU. The varying degrees of development in the equity markets across different Member States may not suffice to meet the requisite investment demands. Data demonstrates that such cross-border investments already occur within the EU, serving as a crucial source of financing for companies lacking domestic financial access. To further streamline this process, the incorporation of a matchmaking platform within an EU defence financing facility could effectively connect companies with potential investors, fostering market efficiency.

**Lowering the cost of finance could effectively incentivize defence companies to increase their investments and seek loans.** The expenses associated with adhering to international treaties and sanctions tend to be significantly burdensome for both companies, where they escalate disproportionately relative to the company size and financial institutions. These compliance checks are essential and non-negotiable. Nonetheless, public support in the form of subsidized loans or guarantees can be crucial in lowering the cost of finance for defence companies through reduced interest rates, longer maturity and reduced collateral requirements. Guarantee facility also mitigates the risks for financial intermediaries. This support can reduce interest rates and/or lower collateral requirements, ultimately making finance more accessible.

**Implementing sector-specific financing facilities, as seen in France, the UK, and the US, could yield more potent signalling effects and remain immune to potential over-compliance with ESG regulations**. Member States have various schemes in place, such as national guarantee funds and intermediated lending, aimed at facilitating access to finance for SMEs. However, these facilities are frequently unavailable to SMEs operating in the defence sector due to the decisions of financial intermediaries to limit their exposure to this particular industry. Interviews conducted for this study have underscored that public sector financing offers more than just financial support. It serves as a clear signal to private investors, indicating the societal acceptability of investments in the defence sector.

### Communication actions

**Addressing ambiguity within the EU sustainable investment framework is of utmost importance**. The prevailing view among defence industry representatives and investors is that this ambiguity should be proactively addressed by the Commission to clarify that investments in the defence industry are compatible with EU ESG criteria and the EU sustainable finance framework. Providing more clarity to the financial sector on how to address sustainability risks could also improve access to finance.

**Finally, support and matchmaking initiatives for investors and defence businesses can foster connections and mutual understanding**. These initiatives could take the form of investor forums or targeted networking events. They can serve to educate investors about the unique features and opportunities within the defence sector while simultaneously enabling defence companies to better understand investor expectations and requirements. These initiatives can also attest to a strategic shift in defence procurement from large private sector defence contractors to entrepreneurial startups with dual-use technology.

# Annex I. List of contributing stakeholders

## c. Representatives of the defence industry

| | Category | Country | Name |
|---|---|---|---|
| Interviews | Industry Association | Belgium | Belgian Security and Defence Industry |
| | | Sweden | Swedish Security & Defence Industry Association (SOFF) |
| | | France | Aerospace Valley |
| | | Czech Republic | AOBP |
| | | Estonia | Estonian Aviation Cluster |
| | | Netherlands | European Defence Technology Associations (EDTA) |
| | | Poland | Polish Technological Platform on Photonics (PPTF) |
| | Company | Slovenia | AREX d.o.o. |
| | | Finland | NorthBase Oy |
| | | Denmark | Srenula |
| | | Finland | Aufwin Defence Systems Oy |
| | | France | CetraC.io |
| | | Estonia | SensusQ |
| | | Luxembourg | GRADEL Sàrl |
| | | Ireland | Mbryonics Ltd |

## d. Representatives of the investors

| | Category | Country | Name |
|---|---|---|---|
| Interviews | IFIs | Europe | EIF |
| | | Europe | EIB |
| | NPBs | France | Bpifrance |
| | | Italy | Cassa Depositi e Prestiti |
| | | Germany | Kreditanstalt für Wiederaufbau (KfW) |
| | | Greece | Hellenic Development Bank |
| | VC / PE investors' association | Austria | Austrian Association for Private Capital |
| | | Bulgaria | Bulgarian Private Equity and Venture Capital Association |
| | | Lithuania | Lithuanian Private Equity and Venture Capital Association |
| | | Poland | Polish Private Equity and Venture Capital Association |
| | VC / PE investor | France | Défense Angels & Défense Partners |
| | | France | Weinberg Capital Partners |
| | | Germany | Paralos Partners |
| | | Germany | Decisive Point (Europe) |
| | | Italy | STV - Star Tech Ventures |
| | | Lithuania | Baltic Sandbox Ventures |
| | | Lithuania | Open Circle |
| | | Lithuania | Pointman |
| | | Poland | Sunfish Partners |
| | | Portugal | 33N Ventures |

# Annex II. The fi-compass methodology for the quantification of the funding gap based on SAFE data

The assessment of financing needs in the defence sector aims to define the amount of financing that should have been provided to SMEs and midcaps developing defence technologies that are considered viable financially if the market conditions were optimal.[144] In the context of this study, the following formulas will be applied for the debt and equity financing gap, respectively:

**(1)** $$\textit{Debt financing gap in the defence sector} =$$

$$\textit{N of SMEs and midcaps} * \textit{Financially viable SMEs and midcaps} * \textit{Unsuccessful SMEs and midcaps} * \textit{Average SME and midcaps loan size}$$

where

- **N of SMEs and midcaps in the targeted sector.**
- **Financially viable SMEs and midcaps.** It is the share of SMEs and midcaps experiencing non-negative turnover growth in the past two years.
- **Unsuccessful SMEs and midcaps =** loans relevant *(loans not used - loans not needed).
  - "Loans relevant but not used" is the share of SMEs and midcaps that considered bank loans relevant for them but have not obtained them in the past two years.
  - "Loans relevant but not needed" is the share of SMEs and midcaps that considered bank loans relevant for them in two years but have not applied because they have sufficient internal funds or because of other reasons (e.g., discouraged).
- **Average SME and midcaps loan size.** This is the average size of loans granted to or used by SMEs and midcaps.

**(2)** $$\textit{Equity funding gap in the defence sector}^{145} =$$

$$\textit{N of SMEs and midcaps} * \textit{Unsuccessful SMEs and midcaps} * \textit{Average SME and midcaps equity size}$$

where

- **N of SMEs and midcaps in the targeted sector.**
- **Unsuccessful SMEs and midcaps =** equity relevant *(equity not used – equity not needed).
  - "Equity relevant but not used" is the share of SMEs and midcaps that considered equity relevant for them but have not been issued in the past two years.
  - "Equity relevant but not needed" is the share of SMEs and midcaps that did not issue or use equity while relevant to them because they have sufficient internal funds or because of other reasons.
    The SAFE survey does not ask specifically for equity but includes equity in the "other types of external financing".
- **Average SME equity size.** This is the average size of equity issued or used by SMEs and midcaps.

Source: SpaceTec Partners, CSIL, ECB SAFE 2018, fi-compass, EIF's RMA 2019, Gap analysis for small and medium-sized enterprises financing in the European Union 2019

[144] The optimality of the market implies that the supply of financing would cover the demand and that these SMEs/midcaps in the defence sector would have been able to reimburse a loan or would have generated value with the equity financing obtained.

[145] Differently from the formula for the debt financing, the equity financing formula does not consider the variable "*Financially viable SMEs and midcaps*". Indeed, SMEs may look for equity financing while not being 'financially viable from a turnover point of view', either because they are start-ups with no revenue yet or just created without a financial history. Therefore, the equity formula only considers the unsuccessful SMEs which have looked for equity financing.

# Annex III. Details of the deals involving defence SMEs

**Deals involving EU defence companies (1 January 2022-31 July 2023)**

| Company | Deal value (thousands EUR) | Year | Country | Company industry | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | Specialised in aerospace and defence | Sectors of the fund | Nationality of co-investors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Shark Robotics** | 10.000 | 2023 | FR | Aerospace, Military, Public Safety, Robotics | Venture - Series Unknown | N/A | Move Capital | Move Capital | FR | Private equity, venture capital | No | Digital, including AI and cybersecurity | Not relevant |
| **Binalyze** | 9.271 | 2022 | EE | Cyber Security, ICT, Law Enforcement | Seed | Seed | Earlybird Venture Capital, OpenOcean | OpenOcean | FI | Venture capital | No | Digital tecnologies | DE |
| **Optics11** | 5.000 | 2022 | NL | Energy, Military, Sensor | Venture - Series Unknown | — | FORWARD.one, Value Creation Capital | FORWARD.one | NL | Venture capital | No | Digital, including AI and cybersecurity | NL |
| **ComandAI** | 3.000 | 2023 | FR | AI, Military, National Security | Seed | Seed | Frst, Kima Ventures, Tiny VC | Frst | FR | Venture capital | No | Generalist | FR, US |
| **Qanlex** | 2.781 | 2022 | ES | Law Enforcement, Legal, Legal Tech | Seed | Seed | Carao Ventures, FJ Labs, J Ventures, Preface Ventures, The LegalTech Fund | Carao Ventures, FJ Labs, J Ventures, Preface Ventures, The LegalTech Fund | Costa Rica | Venture capital | No | Generalist | US |
| **Airvolute** | 1.100 | 2023 | SK | Aerospace, AI, Drones, ICT, National Security | Seed | Seed | Vision Ventures | Vision Ventures | SK | Venture capital | No | Generalist | Not relevant |
| **Unmanned Defence Systems** | 1.000 | 2022 | LT | Aerospace, Military | Pre-Seed | Seed | — | — | — | — | — | — | — |

| Company | Deal value (thousands EUR) | Year | Country | Company industry | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | Specialised in aerospace and defence | Sectors of the fund | Nationality of co-investors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indemniza.me | 320 | 2022 | ES | Law Enforcement | Venture - Series Unknown | — | Bewater Funds | Bewater Funds | ES | Secondary Purchaser, VC | No | Generalist | Not relevant |
| Lambda Automata | — | 2022 | GR | AI, National Security | Seed | Seed | Marathon Venture Capital | Marathon Venture Capital | GR | VC | No | Generalist | Not relevant |

Source: CSIL based on Crunchbase data

**Deals involving US defence companies (1 January 2022-31 July 2023)**

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Anduril Industries | $1.480.000.000 | 2022 | US | Aerospace, Augmented Reality, National Security, Virtual Reality | Series E | Late Stage Venture | 8VC, Andreessen Horowitz, DFJ Growth, Elad Gil, FJ Labs, Founders Fund, General Catalyst, Human Capital, Lachy Groom, Lightspeed Venture Partners, Lux Capital, Marlinspike Capital, Modern Venture Partners, Moving Capital, Palumni VC, Thrive Capital, Valor Equity Partners, WCM Investment Management | Valor Equity Partners | US | VC&PE | Yes |
| Echodyne | $135.000.000 | 2022 | US | Electronics, National Security, Sensor, ICT | Series C | Late Stage Venture | Baillie Gifford, Bill Gates, Madrona, New Enterprise Associates, Northrop Grumman, Vanedge Capital, Vulcan Capital | Baillie Gifford, Bill Gates | UK | Investment Bank, Venture Capital | Yes |
| Shield AI | $90.000.000 | 2022 | US | AI, Autonomous Vehicles, Drones, National Security | Series E | Late Stage Venture | Andreessen Horowitz, Breyer Capital, Disruptive, Homebrew, Point72 Ventures, Riot Ventures, Snowpoint Ventures, SVB Capital | Snowpoint Ventures | US | VC | Yes |
| Vannevar Labs | $75.000.000 | 2023 | US | Aerospace, AI, ICT, National Security | Series B | Early Stage Venture | Aloft VC, Costanoa Ventures, DFJ Growth, Felicis, General Catalyst, Point72 Ventures, Shield Capital | Felicis | US | VC | Yes |
| Chaos | $70.000.000 | 2023 | US | Aerospace, Military, | Series A | Early Stage Venture | 8VC, Alpha Wave Global, Lerner Enterprises, Liquid 2 Ventures, Silent | 8VC | US | VC | Yes |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | National Security | | | Ventures, Tamarack Global, Valar Ventures | | | | |
| **Shield AI** | $60.000.000 | 2022 | US | AI, Autonomous Vehicles, Drones, National Security | Series E | Late Stage Venture | US Innovative Technology Fund | US Innovative Technology Fund | US | VC | Yes |
| **BRINC** | $55.000.000 | 2022 | US | Aerospace, Drones, Military, Public Safety, Robotics | Series B | Early Stage Venture | Adam Guild, Alameda Research, Dylan Field, Index Ventures, Jack Altman, Next Play Ventures, Ryan Petersen, The Thiel Foundation | Alameda Research | Hong Kong | PE | No |
| **Second Front Systems** | $32.000.000 | 2022 | US | ICT, National Security, SaaS. | Series A | Early Stage Venture | 8VC, Abstract Ventures, AEI Horizon X, Artis Ventures (AV), Gaingels, Gula Tech Adventures, Kleiner Perkins, Moore Strategic Ventures, Pallas Ventures | AEI Horizon X, Moore Strategic Ventures | US | PE | Yes |
| **American Robotics** | $30.000.000 | 2022 | US | AgTech, Computer Vision, Industrial Automation, AI, Military, Mining, Oil and Gas, Railroad, Robotics, Security | Convertible Note | — | — | — | — | — | — |
| **ION Storage Systems** | $30.000.000 | 2022 | US | Aerospace, Battery, Consumer Electronics, Electric Vehicle, Electronics, Energy Storage, Medical | Series A | Early Stage Venture | Alsop Louie Partners, Alumni Ventures, Bangchak, C3, Clear Creek Investments, Tenaska, Toyota Ventures, VoLo Earth Ventures | Alsop Louie Partners, Clear Creek Investments, VoLo Earth Ventures | US | VC | No |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Device, Military | | | | | | | |
| Casetext | $25.000.003 | 2022 | US | AI, Law Enforcement Legal Tech, AI, Publishing, Software | Venture - Series Unknown | — | — | — | — | — | — |
| Fusus | $21.000.000 | 2022 | US | ICT, Law Enforcement Public Safety | Venture - Series Unknown | — | — | — | — | — | — |
| Onebrief | $20.953.306 | 2022 | US | Big Data, Military, ICT | Venture - Series Unknown | — | — | — | — | — | — |
| Adranos Energetics | $20.000.000 | 2022 | US | Aerospace, Military | Series A | Early Stage Venture | Bob Bishop, Elevate Ventures, Explorer 1 Fund, NO/LA Angel Network, Sica Ventures | — | — | — | Yes |
| AKHAN Semiconductor | $20.000.000 | 2022 | US | Automotive, Consumer Electronics, Semiconductor, Telecommunications | Venture - Series Unknown | — | — | — | — | — | — |
| Firehawk Aerospace | $19.000.000 | 2022 | US | 3D Printing, Aerospace, Chemical Engineering, National Security, Space Travel | Series B | Early Stage Venture | Draper Associates, Jackson Moses, Raytheon, Stellar Ventures | — | — | — | Yes |
| CivicEye | $12.400.000 | 2022 | US | GovTech, ICT, Law Enforcement, Public Safety | Series A | Early Stage Venture | Cercano Management, Relevance Ventures (formerly Relevance Capital) | Cercano Management | US | Investment firm | No |
| Equitus | $10.018.443 | 2022 | US | Analytics, AI, ICT, Military | Venture - Series Unknown | — | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ControlRooms.ai | $10.000.000 | 2023 | US | AI, Chemical, CleanTech, Energy, GreenTech, Military, Nuclear, Oil and Gas, SaaS | Series A | Early Stage Venture | Alpha Square Group, Amity Ventures, FJ Labs, GTMfund, Origin Ventures, S3 Ventures, StratMinds, Tokio Marine Future Fund | Origin Ventures | US | VC | No |
| Seasats | $10.000.000 | 2022 | US | AI, Drones, Marine Technology, National Security, Robotics | Seed | Seed | Keith Masback, L3 Harris Technologies, Monozukuri Ventures, Techstars | L3 Harris Technologies | US | Corporate | Yes |
| Solestial | $10.000.000 | 2022 | US | Aerospace, National Security, Renewable Energy, Solar, Space Travel | Seed | Seed | AE Industrial Partners, Airbus Ventures, GPVC, Industrious Ventures, Jackson Moses, Stellar Ventures, Techstars | Airbus Ventures | US | Corporate VC | Yes |
| Street Smarts VR | $10.000.000 | 2023 | US | Law Enforcement Virtual Reality | Venture - Series Unknown | — | — | — | — | — | — |
| STRIVE | $6.000.000 | 2022 | US | Fitness, GovTech, Health Diagnostics, Industrial, Military, AI | Series A | Early Stage Venture | Biosphere Investment Group, fama Ventures, LLC, Founders First, Future Communities Capital, Gaingels, Jas Ventures, Jonathan Taylor, Macnica Investment Partners, SeaChange, SeedToB Capital, The R-Group, LLC, ThinKuvate, Troy Smith | Future Communities Capital | US | VC | No |
| Castelion | $5.415.000 | 2023 | US | Aerospace, Military, National Security | Pre-Seed | Seed | Jackson Moses, Lavrock Ventures | Lavrock Ventures | US | VC | Yes |
| Fenix24 | $5.000.000 | 2023 | US | ICT, National Security, Risk Management | Seed | Seed | Eos Venture Partners | Eos Venture Partners | UK | VC | No |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Accrete AI | $5.00 0.000 | 2022 | US | AI, Military | Venture - Series Unknown | — | — | — | — | — | — |
| Street Smarts VR | $4.30 0.000 | 2022 | US | Law Enforcement Virtual Reality | Venture - Series Unknown | — | — | — | — | — | — |
| Bounce Imaging | $4.20 0.000 | 2022 | US | Consumer Electronics, Hardware, Law Enforcement Robotics, Sensor | Series A | Early Stage Venture | Backstage Capital, Ed Roberts, Good Growth Capital, Helen Greiner, In-Q-Tel, Jack Greco, R42 Group, Tanis ventures | R42 Group | US | VC | No |
| Proteus Space | $4.00 0.000 | 2023 | US | Aerospace, National Security, Space Travel | Seed | Seed | AIN Ventures, Capital Factory, Industrious Ventures, Lavrock Ventures, Mana Ventures, Moonshots Capital, The Veteran Fund | Moonshots Capital | US | VC | Yes |
| CYBERA | $4.00 0.000 | 2022 | US | Banking, Business Intelligence, Cryptocurrency, Cybersec, Law Enforcement | Seed | Seed | Blu Venture Investors, Converge, Correlation Ventures, CV VC, Dreamit Ventures, Founder Collective, K20 Fund, New North Ventures, Serpentine Ventures | Converge, New North Ventures | US | VC | Yes |
| Primordial Labs | $4.00 0.000 | 2022 | US | Aerospace, AI, Autonomous Vehicles, GovTech, National Security | Seed | Seed | Stony Lonesome Group | Stony Lonesome Group | US | VC | Yes |
| Monarc Holdings | $3.70 0.000 | 2023 | US | Advanced Materials, ICT, National Security, Public Safety | Venture - Series Unknown | — | — | — | — | — | — |
| Nemo Arms | $3.50 0.000 | 2023 | US | Law Enforcement Machinery Manufacturin | Venture - Series Unknown | — | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | g, Military, Wholesale | | | | | | | |
| NXT Communications | $3.477.572 | 2023 | US | Communication Hardware, National Security, Product Design | Venture - Series Unknown | — | — | — | — | — | — |
| SingleFile Technologies | $3.200.000 | 2023 | US | ICT, Law Enforcement | Seed | Seed | Foundry Group, PSL Ventures | Foundry Group, PSL Ventures | US | VC | No |
| Fermata Discovery | $3.000.000 | 2022 | US | Law Enforcement SaaS | Seed | Seed | Bonfire Ventures, Good Growth Capital, New North Ventures, Two Lanterns Venture Partners | New North Ventures | US | VC | Yes |
| Blackburn Energy | $2.956.268 | 2022 | US | Electric Vehicle, Energy, Military, Transport | Venture - Series Unknown | — | — | — | — | — | — |
| Cotsworks | $2.939.991 | 2022 | US | Aerospace, Com. Infr. ICT, Manufacturing, Military | Venture - Series Unknown | — | — | — | — | — | — |
| Titan Health & Security Technologies | $2.565.836 | 2022 | US | Enterprise Software, ICT Law Enforcement mHealth, Public Safety, SaaS | Venture - Series Unknown | — | — | — | — | — | — |
| Fitfighter | $2.500.000 | 2022 | US | Fitness, Health Care, Military, Training | Seed | Seed | Abraham Trust, Daniel Lubetzky, Jennus Innovation | Abraham Trust, Jennus Innovation | US | VC&PE | No |
| Eniware | $2.190.000 | 2022 | US | Energy, Health Care, National Security | Venture - Series Unknown | — | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Second Front Systems | $2.000.000 | 2023 | US | ICT, National Security, SaaS, Software | Series A | Early Stage Venture | GALLOS Technologies | GALLOS Technologies | UK | VC | Yes |
| Skylark Labs | $1.760.000 | 2023 | US | AI, Computer Vision, National Security, | Seed | Seed | Kube VC, Millennia Capital, ShockVentures, The Josephine Collective | — | — | — | No |
| Holocron Technologies | $1.500.000 | 2023 | US | AI, Business Intelligence, Data Mining, Enterprise Software, GovTech, ICT, National Security | Pre-Seed | Seed | Bain Capital Ventures, FiDi Ventures, Fulcrum Investment Group, New North Ventures, OneSixOne Ventures, Sica Ventures, Syndicate 708, Winklevoss Capital, WS Investments | New North Ventures | US | VC | Yes |
| Gaize | $1.200.000 | 2022 | US | AI, Hardware, Law Enforcement Public Safety, Virtual Reality | Seed | Seed | Adrian Aoun, Fritz Lanman, Ken Fichtler, Scott Banister | — | — | — | No |
| Biometrica | $1.200.000 | 2022 | US | ICT, Law Enforcement Security | Seed | Seed | StealthPoint | StealthPoint | US | VC | No |
| Valorant Health | $1.098.077 | 2022 | US | GovTech, Health Care, Home Health Care, ICT, mHealth, Military | Venture - Series Unknown | — | — | — | — | — | — |
| Entegrata | $1.000.000 | 2023 | US | Data Integration, Law Enforcement Legal Tech, Software | Seed | Seed | — | — | — | — | — |
| Alpine Advanced Materials | $750.000 | 2023 | US | Aerospace, Manufacturing, Military, | Venture - Series Unknown | — | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Nanotechnology | | | | | | | |
| Skylark Labs | $750.000 | 2023 | US | AI, Computer Vision, National Security, | Seed | Seed | CP Ventures | — | Australia | VC | No |
| LifeSpot | $749.998 | 2023 | US | ICT, Law Enforcement, Mobile Apps | Venture - Series Unknown | — | — | — | — | — | — |
| NUTS Technologies Inc. | $730.000 | 2022 | US | Cybersec, ICT Infrastructure, Military | Seed | Seed | — | — | — | — | — |
| HDO Health | $455.000 | 2022 | US | Healthcare, Law Enforcement Medical Devices, Military | Pre-Seed | Seed | — | — | — | — | — |
| Notoros, Inc. | $300.000 | 2022 | US | Blockchain, Consumer Software, Cybersec, ICT, National Security | Seed | Seed | Motivate Venture Capital | Motivate Venture Capital | US | VC | No |
| ForceField IO | $200.000 | 2022 | US | Cyber Security, InsurTech, Legal Tech, National Security, Public Safety | Angel | Seed | Christian Lyles, Debra Messing, Evan Tripodi, Sophonia Hardaway | — | — | — | No |
| Arcana Recovery | $200.000 | 2022 | US | Health Care, mHealth, Military, Mobile Apps, AI | Pre-Seed | Seed | Ben Franklin Technology Partners | — | US | VC | No |
| ForceField IO | $200.000 | 2023 | US | Cybersec, InsurTech, Legal Tech, | Pre-Seed | Seed | Lightspeed Venture Partners | — | US | VC | No |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | National Security, Public Safety | | | | | | | |
| SecureBox Live | $100.000 | 2023 | US | Manufacturing, Military, Public Safety | Seed | Seed | — | — | — | — | — |
| Notoros, Inc. | $25.000 | 2023 | US | Blockchain, Cyber sec, ICT, National Security, Software Engineering | Seed | Seed | Transform | Transform | US | Accelerator | No |
| Lawyers NEW | $2.000 | 2023 | US | Law Enforcement | Pre-Seed | Seed | — | — | — | — | — |
| SX Lawyers | $1.500 | 2022 | US | Law Enforcement | Seed | Seed | — | — | — | — | — |
| Urban SDK | — | 2023 | US | Analytics, Civil Engineering, Law Enforcement Public Transport, SaaS, Smart Cities, Software, | Seed | Seed | DeepWork Capital, Florida Opportunity Fund, GOVO Venture Partners, Techstars, venVelo | GOVO Venture Partners | US | VC | No |
| Firestorm | — | 2022 | US | 3D Printing, Aerospace, Drones, Military, National Security | Pre-Seed | Seed | Decisive Point, GETTY, Red Cat, Silent Ventures, The Veteran Fund | Decisive Point, Silent Ventures | US | VC | Yes |
| Proteus Space | — | 2022 | US | Aerospace, National Security, Space Travel | Pre-Seed | Seed | AIN Ventures, Capital Factory, Jackson Moses, Starburst Accelerator, Van Espahbodi | — | — | — | Yes |
| Swarm Aero | — | 2022 | US | Drones, Hardware, Military, National | Pre-Seed | Seed | Countdown Capital, Jackson Moses, Josh Manchester, Susa Ventures | Countdown Capital, Jackson Moses | US | VC | Yes |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Security, Software | | | | | | | |
| Forward Edge AI | — | 2023 | US | AI, National Security, Network Security | Venture - Series Unknown | — | Deal Box Ventures | Deal Box Ventures | US | Corporate VC | No |
| Cambium | — | 2022 | US | Advanced Materials, Aerospace, Law Enforcement Military, National Security, Renewable Energy | Seed | Seed | 8VC, Jackson Moses, Marlinspike Capital, Susa Ventures | 8VC | US | VC | No |
| Kula | — | 2022 | US | Law Enforcement Legal Tech | Venture - Series Unknown | — | Serge Chiaramonte, Y Combinator | — | — | — | No |
| Bounce Imaging | — | 2022 | US | Consumer Electronics, Hardware, Law Enforcement Robotics, Sensor, Video | Series A | Early Stage Venture | New York Ventures | — | — | — | No |
| Federal Holdings Financial Services | — | 2023 | US | Financial Services, Law Enforcement | Series A | Early Stage Venture | Sunriver Ventures | Sunriver Ventures | US | VC&PE | No |
| Velontra | — | 2022 | US | Aerospace, Air Transport, Military | Pre-Seed | Seed | Reinforced Ventures, Y Combinator | — | — | — | No |
| Law Enforcement Network | — | 2023 | US | Law Enforcement Network Security, Software | Series A | Early Stage Venture | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ZeroMark | — | 2022 | US | Augmented Reality, Law Enforcement, National Security, Robotics | Pre-Seed | Seed | Andreessen Horowitz | Andreessen Horowitz | US | VC | no |
| Firehawk Aerospace | — | 2022 | US | 3D Printing, Aerospace, Chemical Engineering, Manufacturing, National Security, Space Travel | Series A | Early Stage Venture | Raytheon | Raytheon | US | Corporate | Yes |
| Blue Vigil | — | 2022 | US | Drone Law Enforcement | Venture - Series Unknown | — | Virginia Venture Partners | Virginia Venture Partners | US | VC | No |
| Impervious.ai | — | 2022 | US | Bitcoin, Blockchain, Cybersec, ICT, National Security, Software Engineering | Seed | Seed | Bitcoiner Ventures, CoinShares, Fundamental Labs, Jungle Boys Capital, Lightning Ventures, NYDIG, Strategic Cyber Ventures, Ten31, Trammell Venture Partners, XBTO Humla Ventures | — | — | — | Yes |
| Atmo | — | 2022 | US | AI, Hardware, ICT, Military | Pre-Seed | Seed | — | — | — | — | — |
| CYBERA | — | 2022 | US | Banking, Business Intelligence, Cryptocurrency, Cybersec, Law Enforcement | Seed | Seed | Blu Venture Investors, Converge, Correlation Ventures, Dreamit Ventures, Founder Collective, New North Ventures, Serpentine Ventures | — | — | — | Yes |
| Valorant Health | — | 2022 | US | GovTech, Health Care, Home Health Care, ICT, mHealth, Military | Seed | Seed | — | — | — | — | — |

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | At least one investor specialised in aerospace and defence |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ametrine Technologies | — | 2022 | US | Consumer Electronics, Military, Textiles, Wearables | Series B | Early Stage Venture | Ilavska Vuillermoz Capital | — | LU | VC&PE | No |

Source: CSIL based on Crunchbase data

### Deals involving UK defence companies (1 January 2022-31 July 2023)

| Company | Deal value | Year | Country | Industries | Funding type | Funding stage | Investors | Lead investors | Location | Type of fund | Specialised in aerospace and defence | Fund sectors | Nationality of co-investors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Labrys Technologies | $4.367.440 | 2023 | UK | AI, ICT, National Security, SaaS | Seed | Seed | — | — | — | — | — | — | — |
| IDR Law | £3.250.000 | 2023 | UK | Law Enforcement | Venture - Series | — | BGF Ventures | BGF Ventures | UK | Venture Capital | No | Generalist | Not relevant |
| Disruptive Industries | £79.408 | 2023 | UK | Cybersec, ICT, InsurTech, Military, National Security | Pre-Seed | Seed | — | — | — | — | — | — | — |

Source: CSIL based on Crunchbase data

### Deals involving EDF beneficiary companies (SMEs and midcaps only)

| Fund name | Fund country | Fund type | Sectorally specialised | Investee country | Company |
|---|---|---|---|---|---|
| BNP PARIBAS FORTIS PRIVATE EQUITY BELGIUM SA/NV | Belgium | PE | No | Belgium | Aerospacelab |
| AV CAPITAL MANAGEMENT LLC | Belgium | VC | No | Belgium | Aerospacelab |
| BELAERO SA/NV | Belgium | VC | No | Belgium | Aerospacelab |
| SAMBRINVEST SA/NV | Belgium | VC | No | Belgium | Aerospacelab |
| CREDIT MUTUEL NORD EUROPE SA | Belgium | PE & VC | No | Belgium | Aerospacelab |

| Fund name | Fund country | Fund type | Sectorally specialised | Investee country | Company |
|---|---|---|---|---|---|
| SOFTWARE HOLDING & FINANCE SA/NV | Belgium | VC | Deep technologies | Belgium | Xenics |
| FORTIS PRIVATE EQUITY BELGIUM | Belgium | PE | No | Belgium | Xenics |
| GIMV NV | Belgium | PE & VC | Human health, Life sciences, Smart industries, Sustainable cities | Belgium | Luciad |
| HOLNEST INVESTMENTS LTD | Cyprus | PE & VC | Digital | France | Cerbair |
| NIDOCO AB | Estonia | PE | No | Estonia | Skeleton Technologies |
| UP INVEST OU | Estonia | PE | Healthcare, media, consumer brands, real estate, cleantech | Estonia | Skeleton Technologies |
| ANDERA EXPANSION | France | PE | No | France | Microwave Characterization Center |
| BREEGA CAPITAL SARL | France | VC | No | France | Eyelights |
| ASTER CAPITAL EUROPE SAS | France | VC | Climate technologies | France | Eyelights |
| BNP PARIBAS DEVELOPPEMENT SA | France | PE & VC | No | France | Aerospacelab Scalinx |
| WATERSTART CAPITAL | France | VC | No | France | Scalinx |
| UNEXO SAS | France | PE | No | France | Scalinx |
| SIPAREX XANGE VENTURE SAS | France | PE | Digital services | Belgium | Aerospacelab |
| EMERTEC GESTION SA | France | PE | Sustainable development | France | Tiempo |
| INPG ENTREPRISE SA | France | PE | No | France | Tiempo |
| ODDO MERITEN ASSET MANAGEMENT SAS | France | PE & VC | No | France | Tiempo |
| ALMA CAPITAL FINANCE SAS | France | PE | No | France | Tiempo |
| SIGMA GESTION SA | France | PE | No | France | Fab'entech |
| AURIGA PARTNERS SA | France | VC | Deep technologies | France | Fab'entech |
| FONDS AMBITION AMORCAGE ANGELS | France | VC | Software, AI, cybersecurity, digital services, hardware | France | Eyelights |
| TECHNOFOUNDERS SAS | France | PE & VC | Human health, agriculture, chemicals and new materials | France | Cerbair |
| ARTS ET METIERS - BUSINESS ANGELS | France | VC | No | France | Cerbair |
| VAL DE FRANCE ANGELS | France | VC | No | France | Cerbair |
| INNOVAFONDS SAS | France | PE | No | France | Bertin Technologies |
| IDI SA | France | PE | No | France | Bertin Technologies |
| CICLAD GESTION SARL | France | PE & VC | No | France | Bertin Technologies |

| Fund name | Fund country | Fund type | Sectorally specialised | Investee country | Company |
|---|---|---|---|---|---|
| ECAPITAL ENTREPRENEURIAL PARTNERS AG | Germany | VC | Deep technologies, Life sciences | Germany | Pace Aerospace Engineering and Information Technology |
| S&D INDUSTRIEBETEILIGUNGEN GMBH | Germany | PE | No | Germany | Industrieanlagen Betriebsgesellschaft |
| ECKERT WAGNISKAPITAL UND FRÜHPHASENFINANZIERUNG GMBH | Germany | VC | Life sciences | Germany | Myelo Therapeutics |
| IBB BETEILIGUNGSGESELLSCHAFT MBH | Germany | VC | Digital, Healthcare, Industrial technologies, Software & IT | Germany | Myelo Therapeutics<br>Pace Aerospace Engineering and Information Technology |
| ELSA ECKERT LIFE SCIENCE ACCELERATOR GMBH | Germany | VC | Life sciences | Germany | Myelo Therapeutics |
| VC FONDS TECHNOLOGIE BERLIN II GMBH | Germany | VC | Digital, Healthcare, Industrial technologies, Software & IT | Germany | Myelo Therapeutics |
| WHITE BRIDGE INVESTMENTS SPA | Italy | PE | No | Italy | Sighup |
| LEMANIK SICAV | Luxembourg | PE | No | Italy | Txt E-solutions |
| FIRSTFLOOR CAPITAL SDN BHD | Malaysia | PE & VC | Information technology, mobility, communications, life sciences | Estonia | Skeleton Technologies |
| WISE GUYS INVESTMENT OU | Netherlands | VC | No | Estonia | Skeleton Technologies |
| WARSAW EQUITY ALTERNATYWNA SPOLKA INWESTYCYJNA SP ZOO | Poland | PE | No | Poland | Vigo System |
| BUCHAREST STOCK EXCHANGE INVESTORS | Romania | PE & VC | No | Romania | Safetech Innovations |
| CAJA DE AHORROS DE CASTILLA-LA MANCHA | Spain | PE & VC | No | Spain | Tecnobit |
| SEPI DESARROLLO EMPRESARIAL SA | Spain | PE | No | Spain | Satlantis Microsats |
| ORZA GESTION Y TENENCIA DE PATRIMONIOS AIE | Spain | VC | No | Spain | Satlantis Microsats |
| ENAGAS EMPRENDE SL | Spain | VC | Sustainable development | Spain | Satlantis Microsats |
| AXIS PARTICIPACIONES EMPRESARIALES SGECR SA | Spain | VC | No | Spain | Satlantis Microsats |

| Fund name | Fund country | Fund type | Sectorally specialised | Investee country | Company |
|---|---|---|---|---|---|
| FONDO AXON INNOVATION GROWTH IV FCR | Spain | PE & VC | No | Spain | Embention Sistemas Inteligentes |
| CAJA CASTILLA LA MANCHA CORPORACION SA | Spain | PE & VC | No | Spain | Tecnobit |
| UNINVEST SGECR SA | Spain | VC | Technology transfer | Spain | Das Photonics |
| SEB VENTURE CAPITAL | Sweden | VC | Human health, Robotics, Sustainable development | Sweden | Clavister |
| IQ CAPITAL PARTNERS LLP | United Kingdom | VC | Deep technologies | Denmark | Quadsat |
| SERAPHIM SPACE MANAGER LLP | United Kingdom | PE | Aerospace | Denmark | Quadsat |
| 3I GROUP PLC | United Kingdom | PE | AI, mobility, security | Germany | Pace Aerospace Engineering and Information Technology Tecnobit |
| NOSHAQ SA/NV | United States | PE & VC | No | Belgium | Aerospacelab |
| TECHSTARS CENTRAL LLC | United States | VC | Deep technologies | France | Eyelights |
| SHIFT4 VENTURES | United States | VC | Sustainable mobility | France | Eyelights |
| KABOUTER MANAGEMENT LLC | United States | PE & VC | No | Italy | Txt E-solutions |

Source: CSIL elaboration on ORBIS Zephyr data

# Annex IV. Summary of the survey findings

## AIV.1. Defence industry representatives

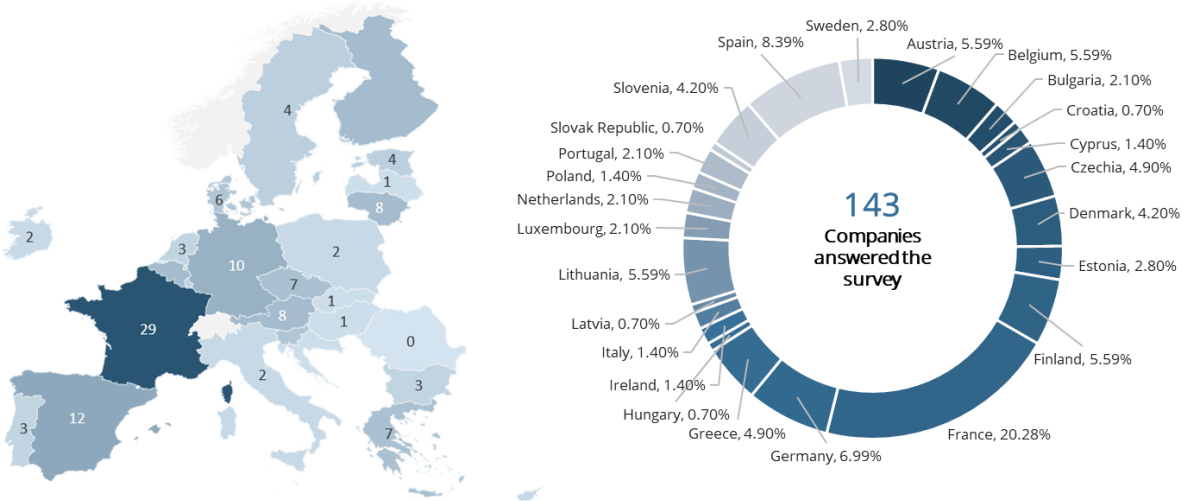
The following table provides the summary structure of the questionnaire. It is structured into eight sections, aiming to be concise while still gathering relevant and essential information. It considers both equity and debt-based financial instruments and the availability of public funding sources such as grants and subsidised loans.

**Table 19 Structure of the questionnaire to SMEs and midcaps**

| QUESTIONNAIRE SECTION | DESCRIPTION |
|---|---|
| 1) Enterprise profiling | Section to gather company data concerning the year of incorporation, location, size based on turnover and the number of employees, and ownership). Additional information DEFIS requires includes the company's civil/defence focus (% of revenues) and ESG assessments. ORBIS may be used to verify respondent answers where appropriate. |
| 2) Challenges for enterprise growth | Problems faced (access to finance, competition, production cost, labour, cash/liquidity). Changes in a list of performance indicators (turnover, labour costs, other costs such materials, energy, etc.) |
| 3) Financing needs | Reasons to look for external finance, including both debt and equity products (R&D, production, export, inventory, and other working capital, etc.) |
| 4) Debt funding sources | Relevance of debt funding sources (bank loan, credit line, venture debt, etc.), types of debt financing for which the company applied in the last two years, amount of debt funding the company obtained in the last two years, and the main concerns expressed by the lender. |
| 5) Equity funding sources | Relevance of equity funding sources, types of equity financing for which the company applied in the last two years, amount of equity investment the company obtained in the last two years, and the main concerns expressed by the investor. |
| 6) Grant funding sources | Relevance of grant funding sources, types of grant funding for which the company applied in the last two years, amount of grant funding the company obtained in the last two years, and interaction between grants and equity/debt funding. |
| 7) Consequences of insufficient financing | Elaborate on the possible consequences of lack of access to finance (project downscale, transfer of activities in other non-EU countries, limited growth, resort to financers outside the EU, termination of defence-related activities). |
| 8) Improving public support for access to finance | Elaborate on the measures that can be taken to improve a company's access to public and private financing beyond today's situation. |

The following figures present the survey's responses to the various questions.

**Figure 19 Geographic distribution of survey responses**




Source: CSIL / SpaceTec Partners

**Figure 20 Classification of respondents following EDF thematic categories**

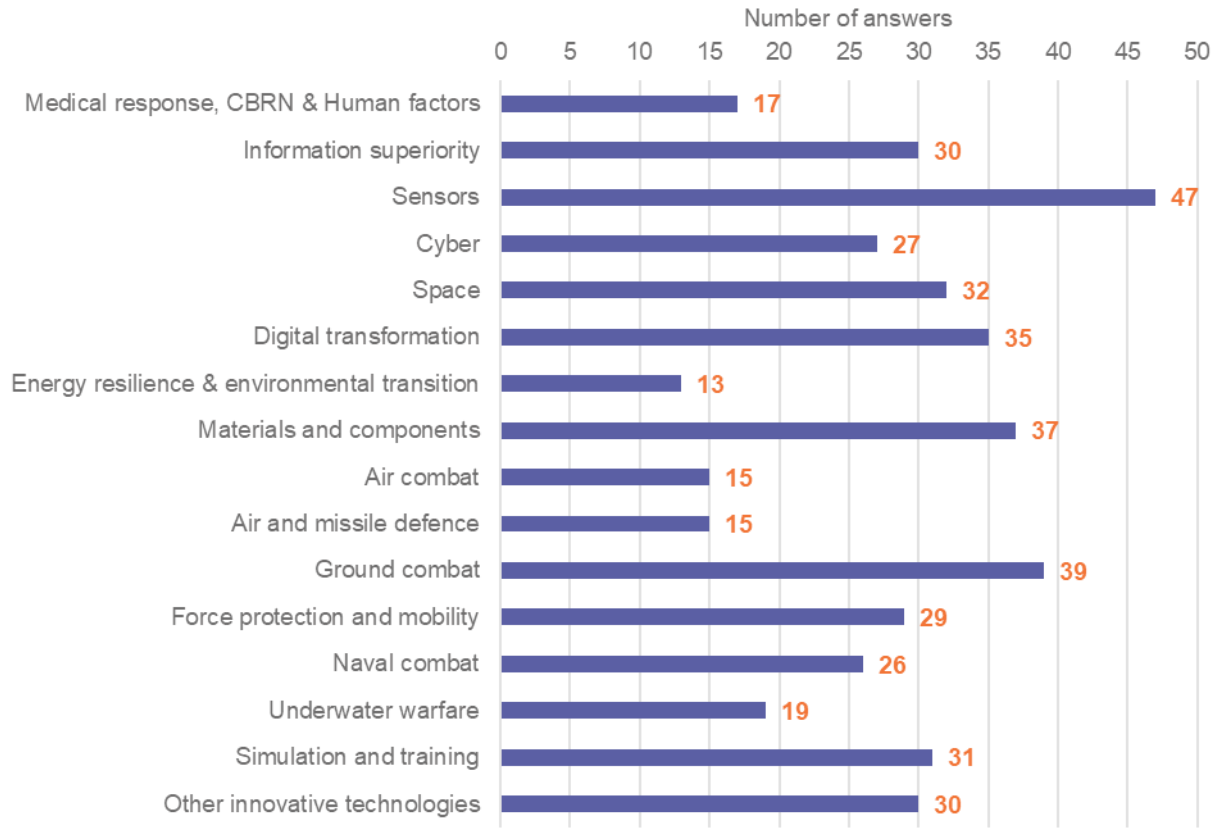
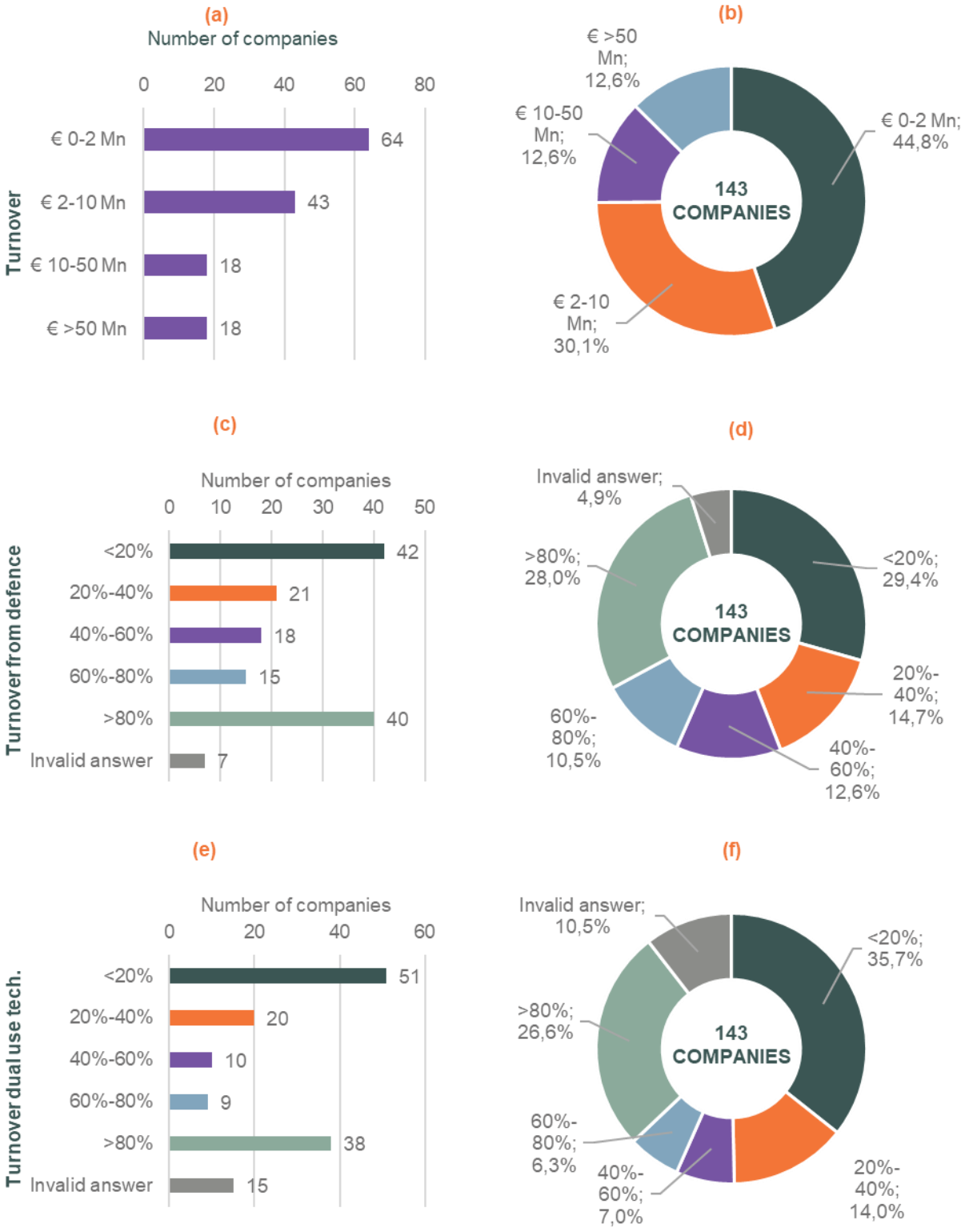
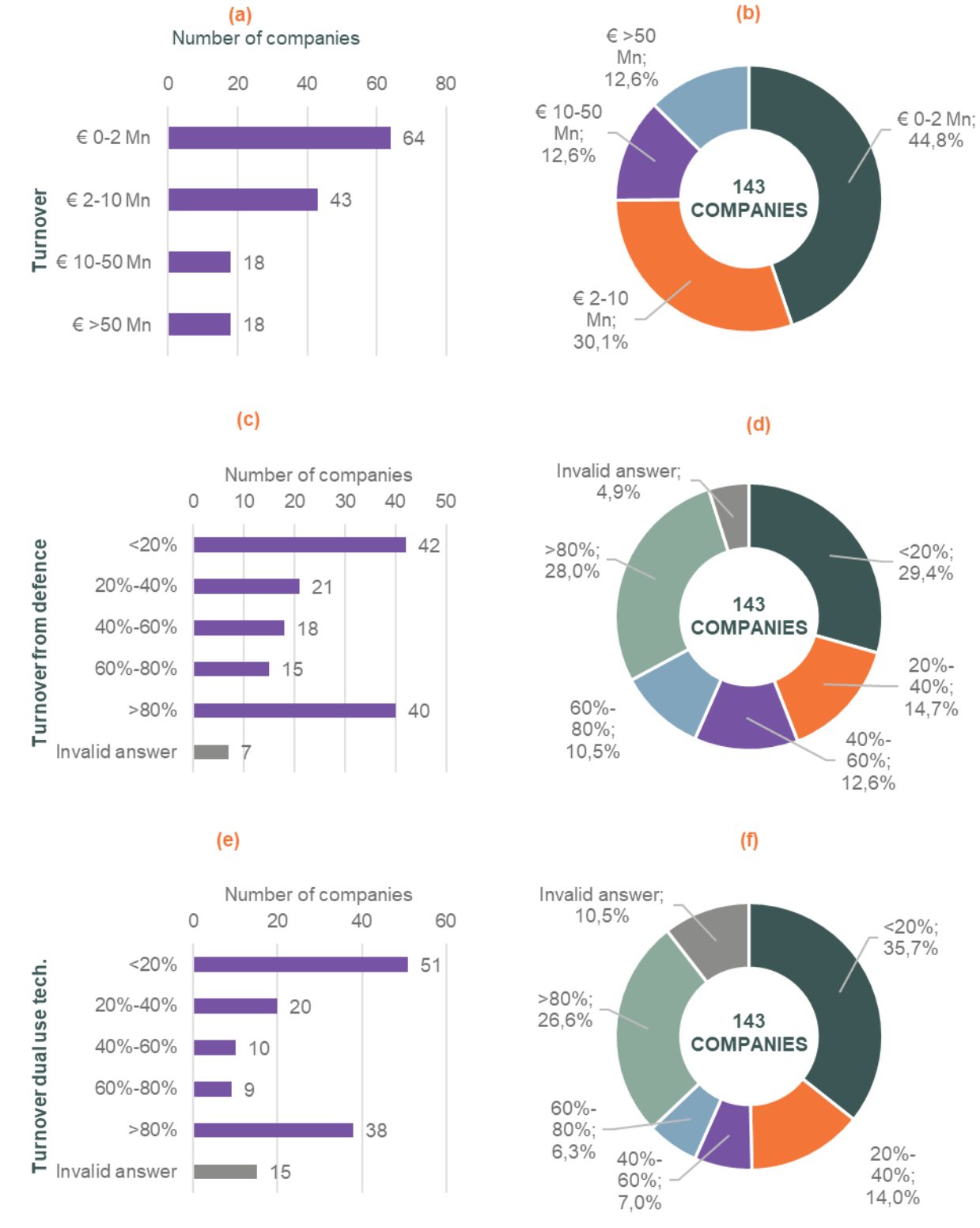


**Figure 21 Respondents' profile**




Source: CSIL / SpaceTec Partners

**Figure 22 Respondents' financial figures**




Source: CSIL / SpaceTec Partners

**Figure 23 Respondents' financial figures (2)**

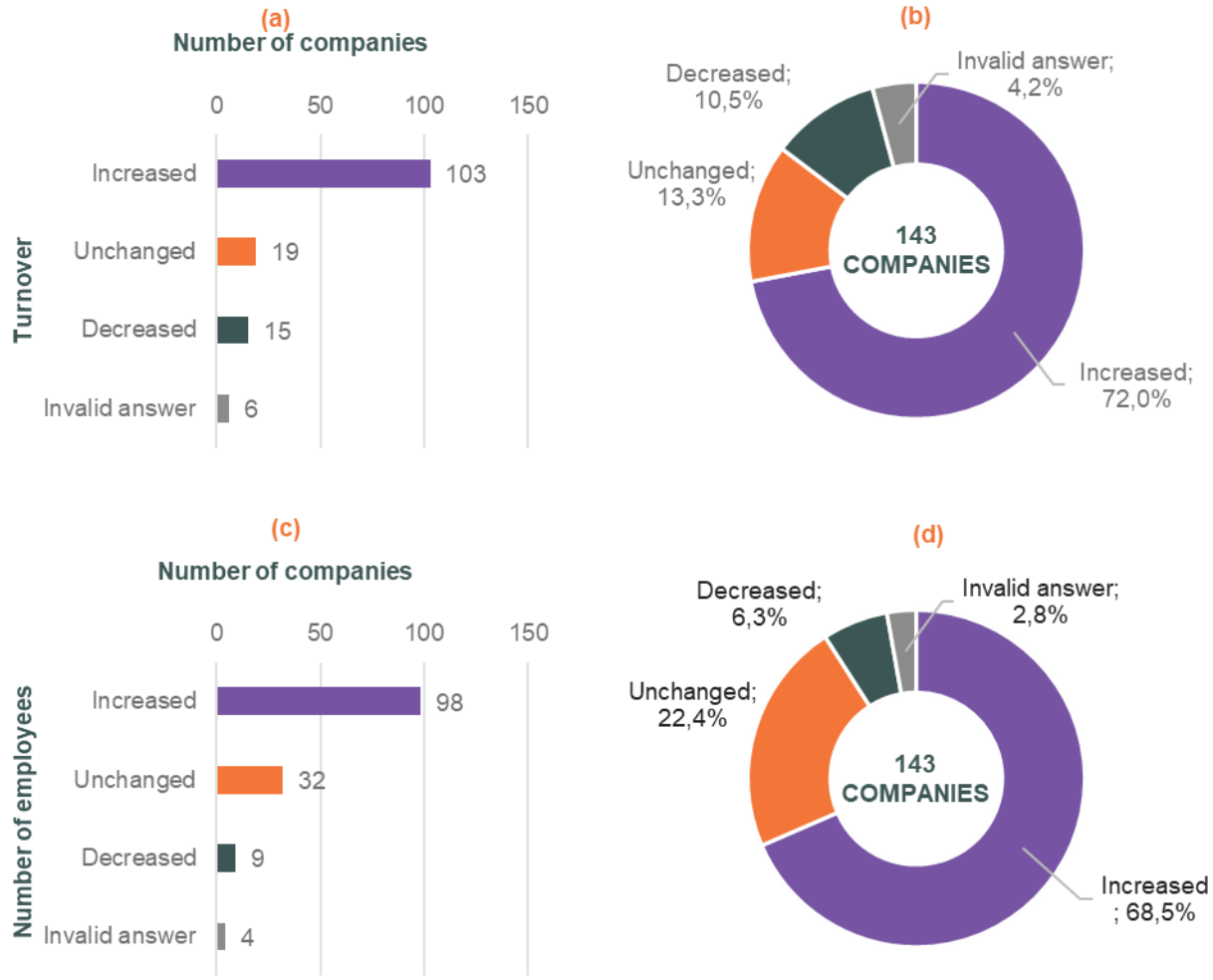
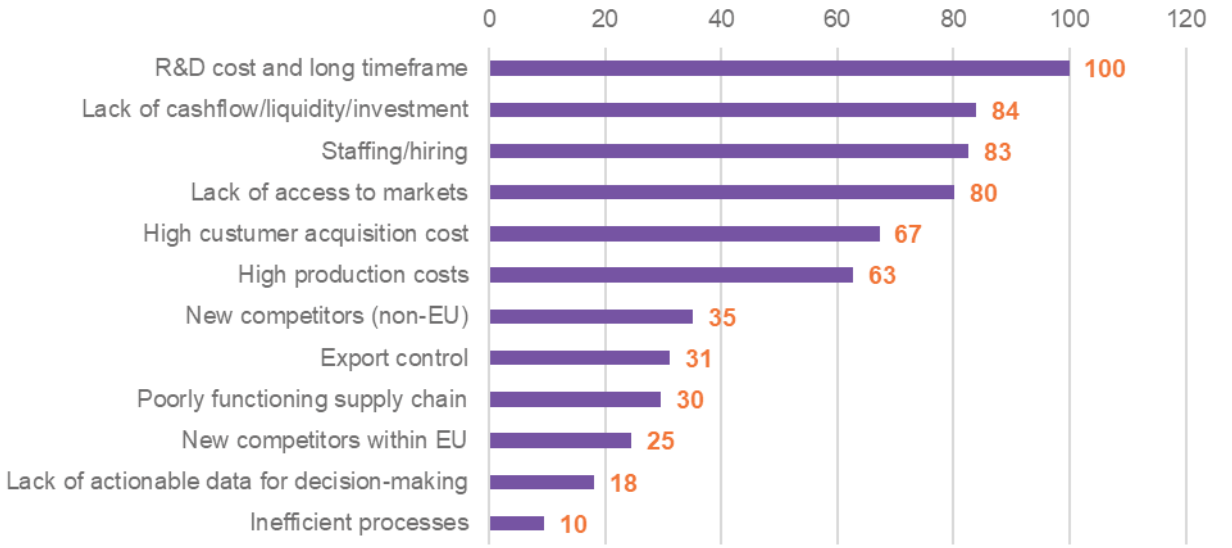
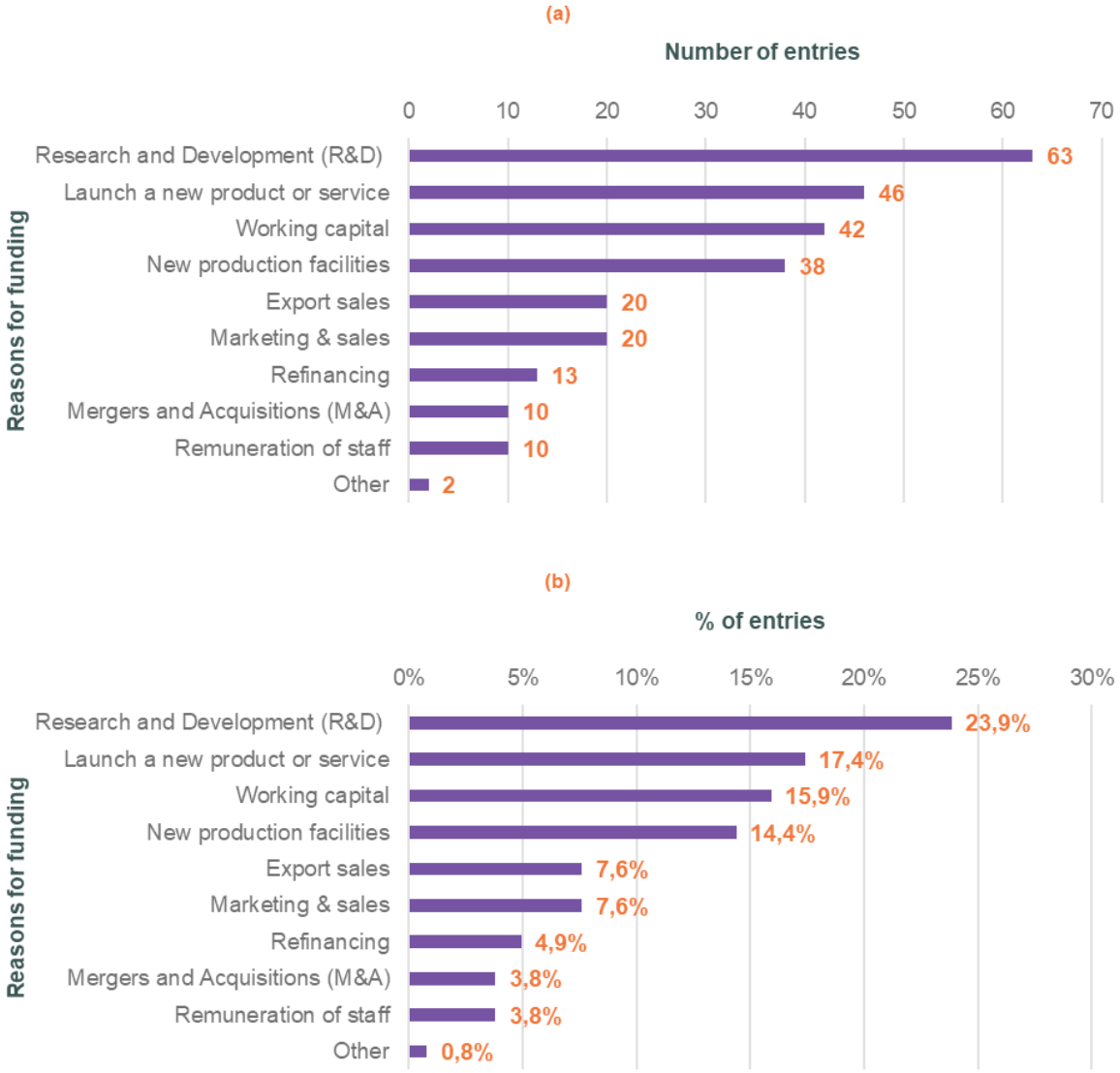



**Figure 24 Relevance of business challenges affecting companies' ability to grow**



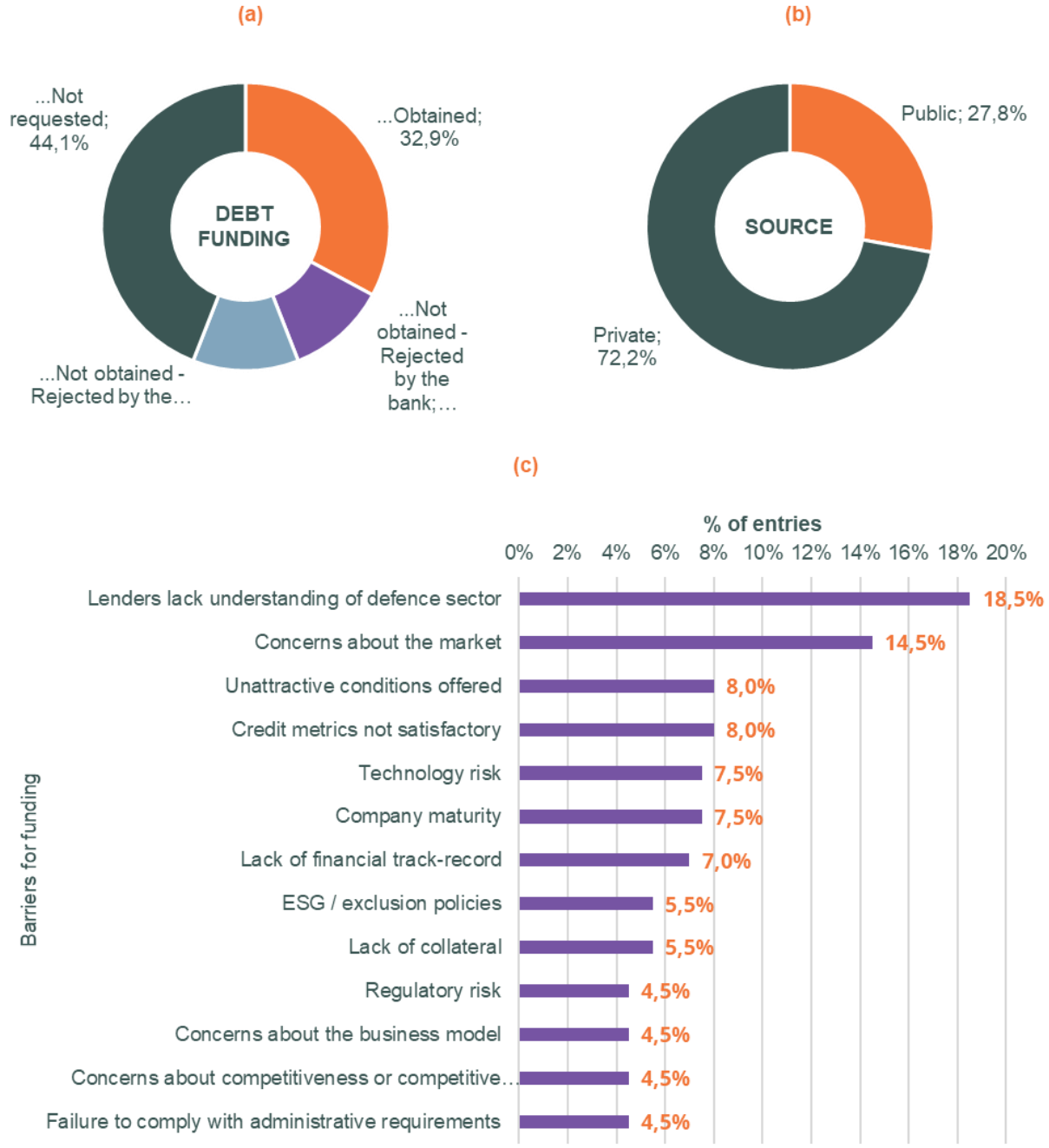

Source: CSIL / SpaceTec Partners

**Figure 25 Companies' main needs and reasons to look for funding in 2021 – 2022 period**



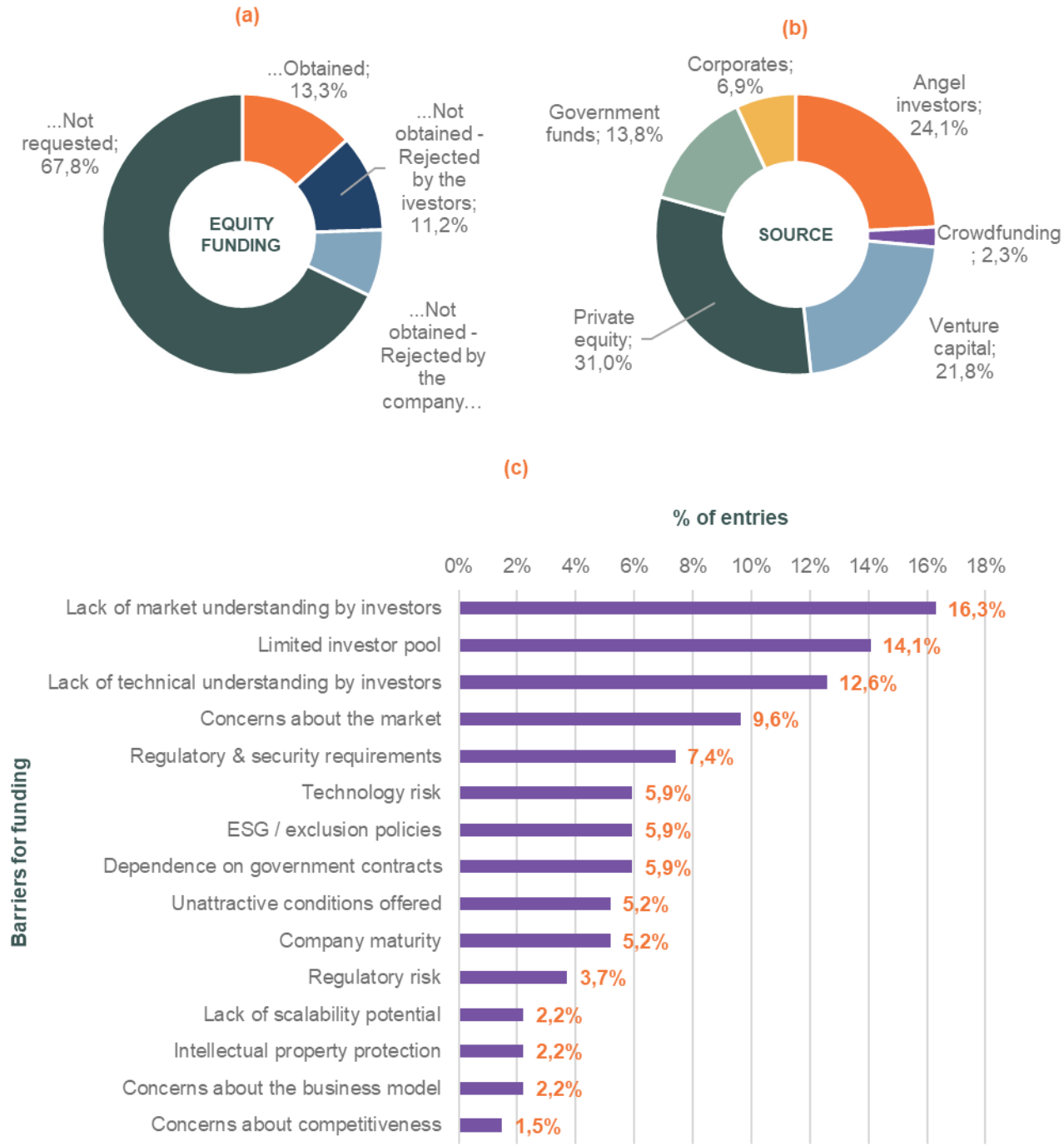

Source: CSIL / SpaceTec Partners

**Figure 26 Debt funding (2021 – 2022)**



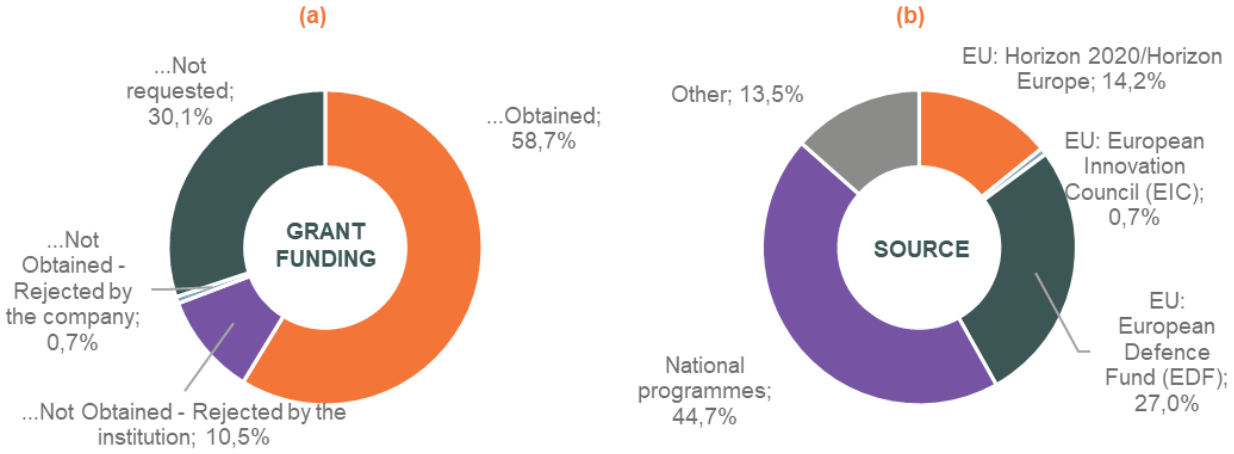

Source: CSIL / SpaceTec Partners

**Figure 27 Equity funding (2021 – 2022)**



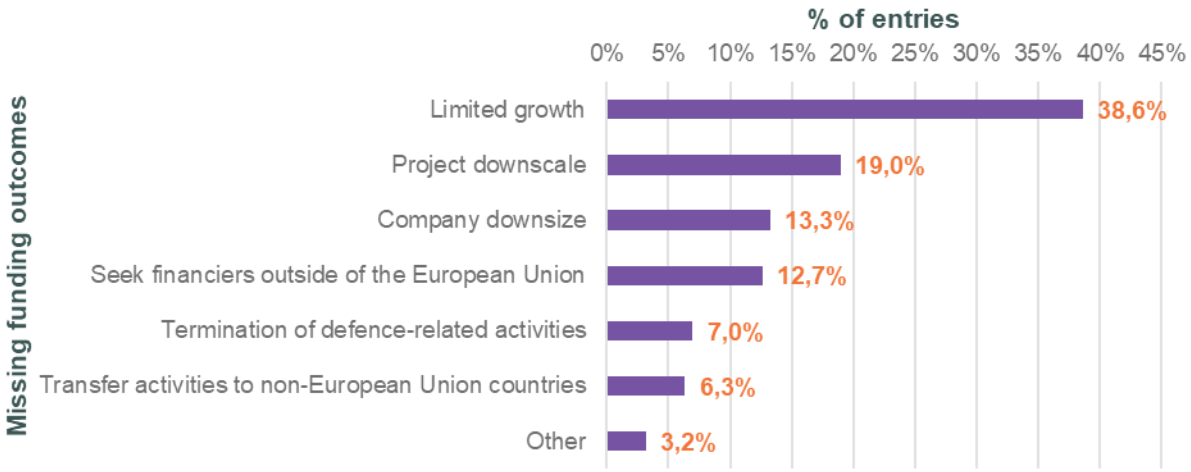

Source: CSIL / SpaceTec Partners

**Figure 28 Grant funding (2021 - 2022)**




Source: CSIL / SpaceTec Partners

**Figure 29 Consequences of insufficient funding on companies**




Source: CSIL / SpaceTec Partners

## AIV.2. Investor industry representatives

The table below provides a snapshot of the questionnaire sections.

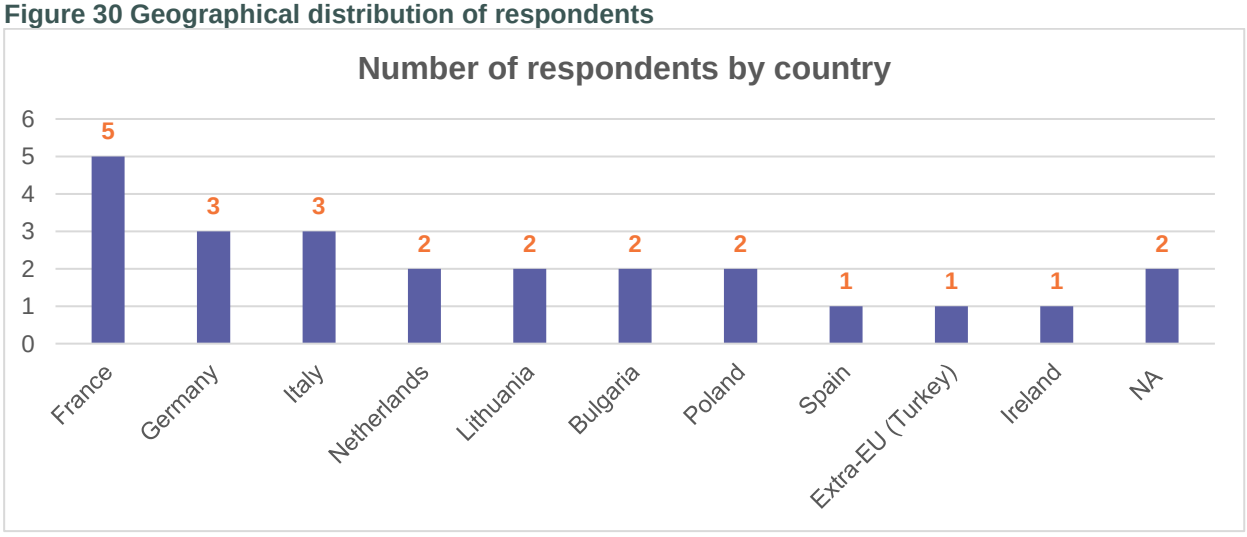
**Table 20 Structure of the questionnaire for investors**

| QUESTIONNAIRE SECTION | DESCRIPTION |
|---|---|
| 1) Profile of the investor | Key information about the fund (e.g., location, investment stage), confirmation of the fund is or is not investing in the defence sector, receiving support from the public programme. |
| 2) Investment barriers | |
| | **No defence sector in the portfolio.** Focus on barriers that deter the investment. |
| | **Defence in portfolio.** Focus on the obstacles that the fund faced. Factors that hamper the portfolio growth in this investment area. |
| 3) Investment drivers | |
| | **No defence sector in the portfolio.** Factors that may change the fund sentiment towards the defence sector as a potential investment area. |
| | **Defence in portfolio.** Factors that have drawn the fund's attention towards the defence instruments and aspects that would lead to additional investments, including new public programmes. |
| 4) Further information | This section asks for information about the availability for a short interview and further comments on the survey. |

Source: CSIL / SpaceTec Partners

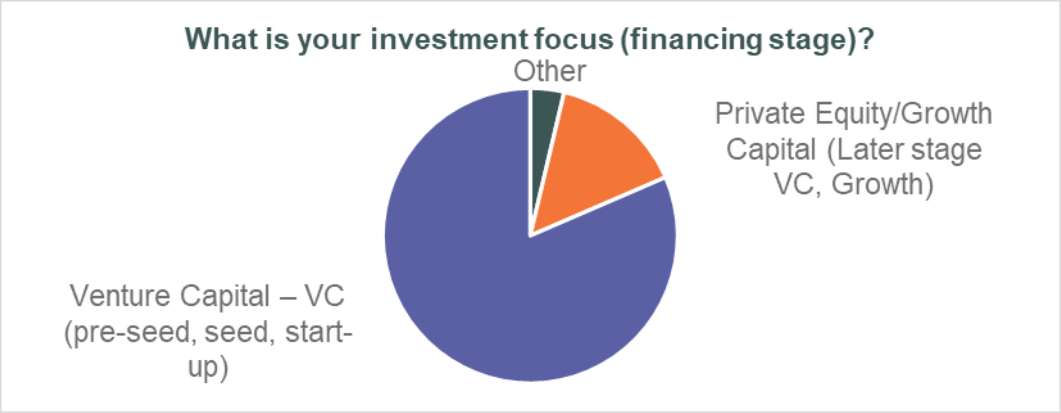
The following figures present the survey's responses to the various questions.

**Figure 30 Geographical distribution of respondents**



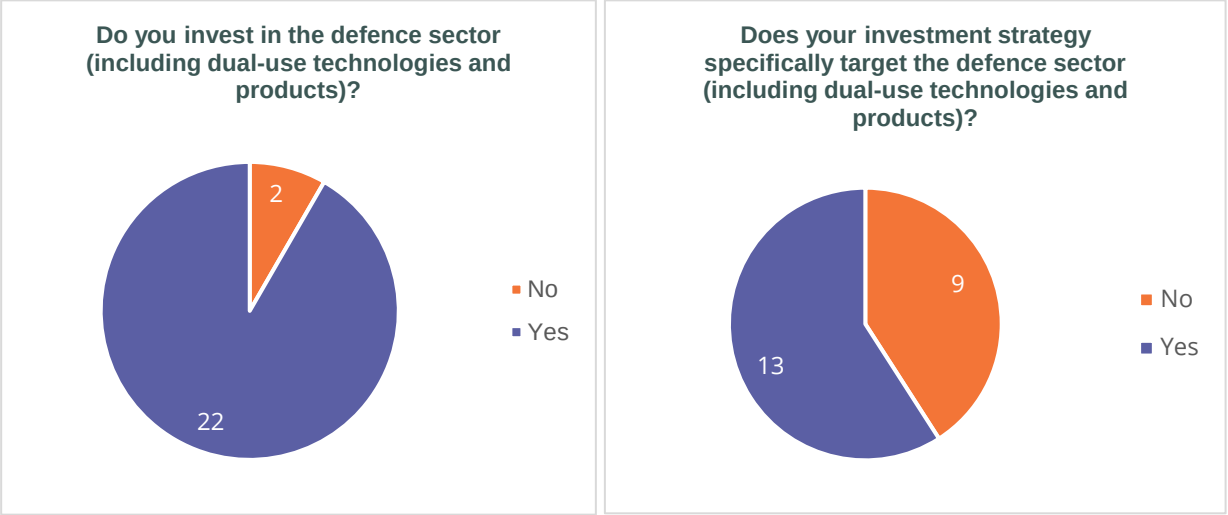

Source: CSIL / SpaceTec Partners

**Figure 31 Investment stage of the respondents**



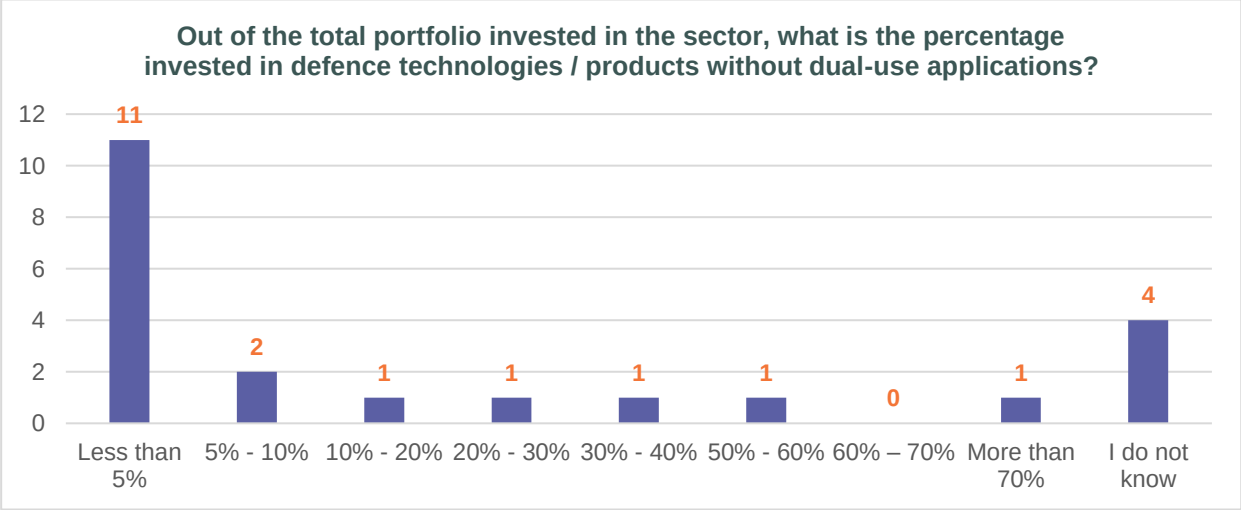

Source: CSIL / SpaceTec Partners

**Figure 32 Investment focus of the respondents**



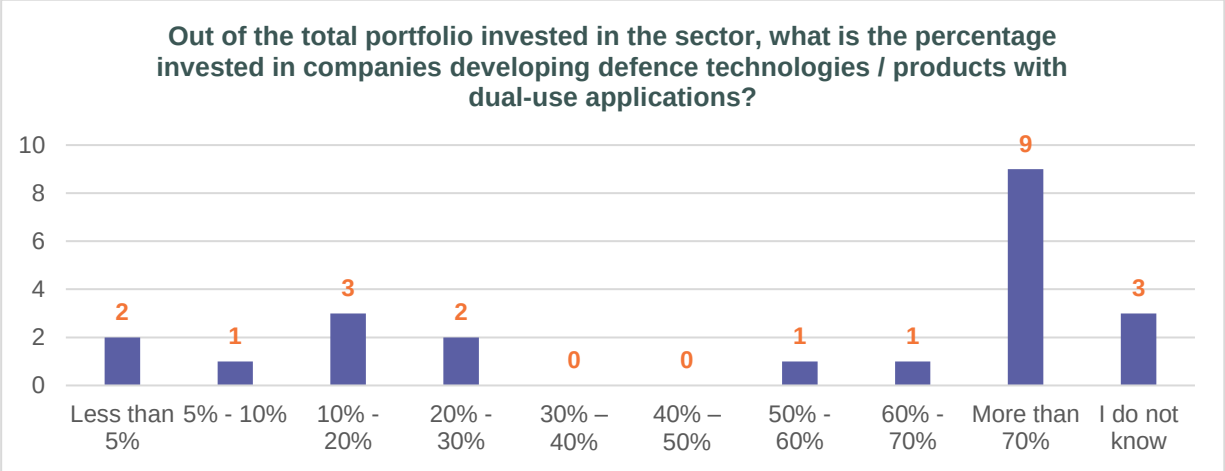

Source: CSIL / SpaceTec Partners

**Figure 33 Share of financing dedicated to defence technologies and products**



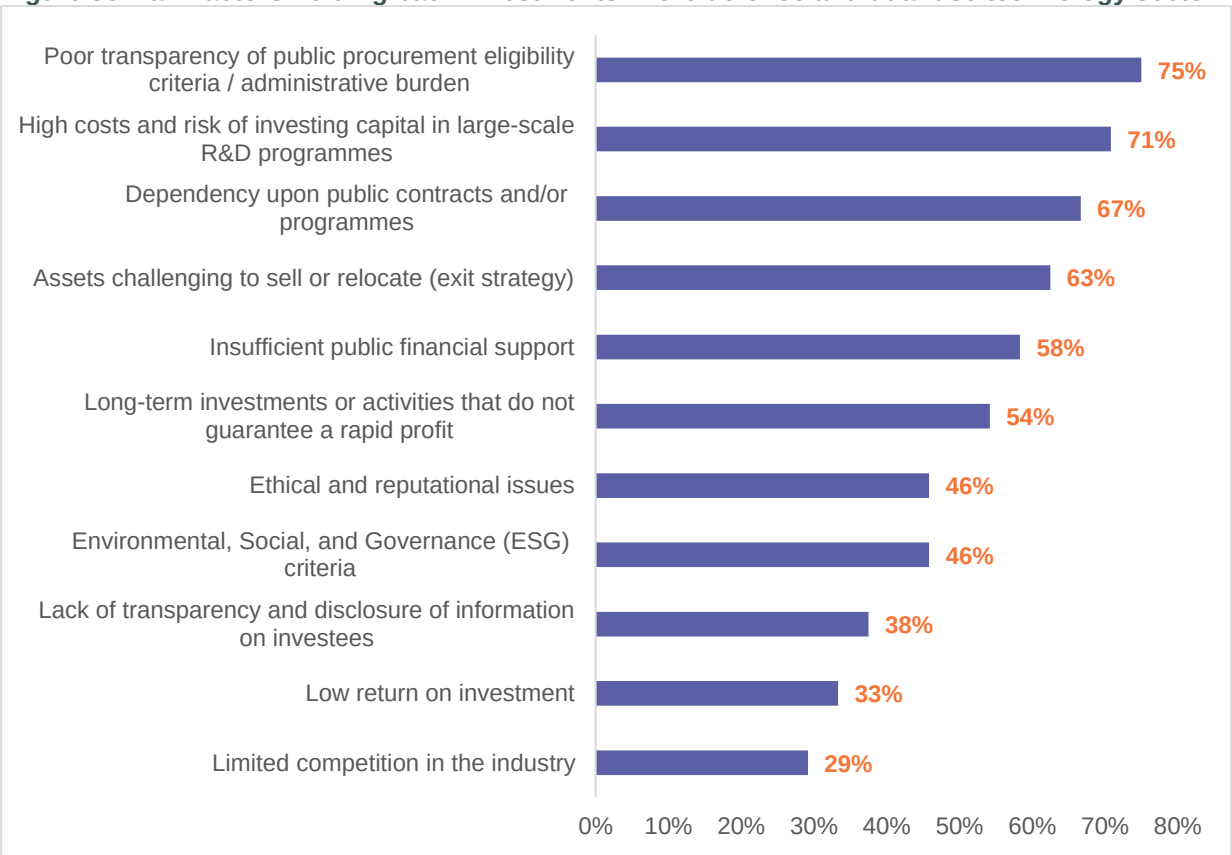

Source: CSIL / SpaceTec Partners

**Figure 34 Share of financing dedicated to dual-use technologies**



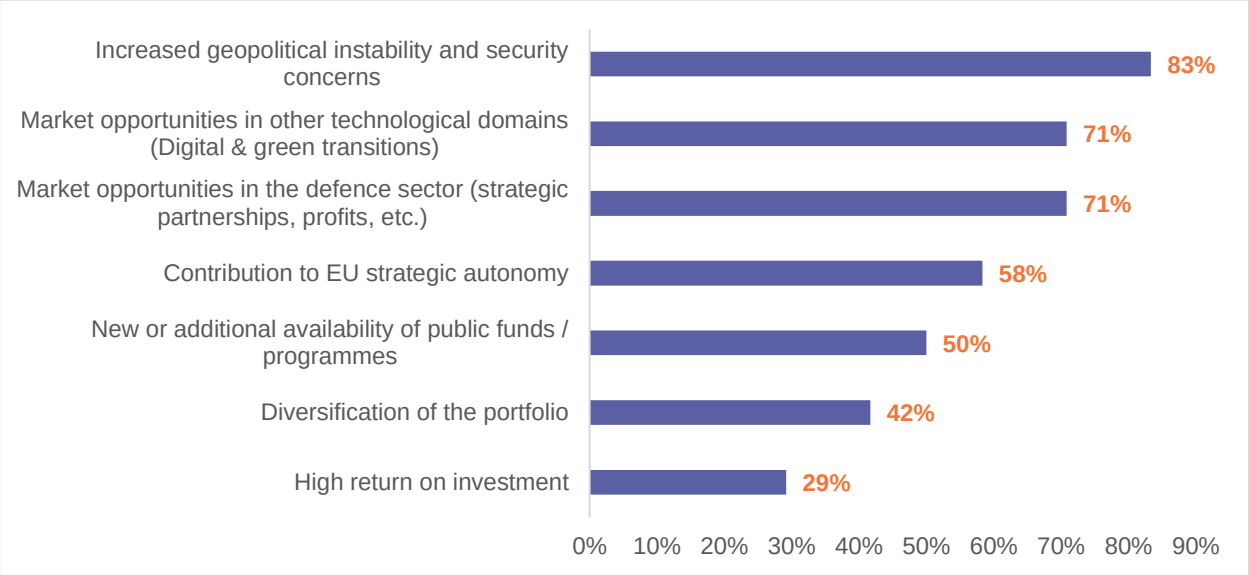

Source: CSIL / SpaceTec Partners

**Figure 35 Main factors holding back investments in the defence and dual-use technology sector**




Source: CSIL / SpaceTec Partners

**Figure 36 Opportunities for Investors**




Source: CSIL / SpaceTec Partners

# Annex V. Bibliography


Amélie FÉREY, Laure DE ROUCY-ROCHEGONDE (2022). “Don’t Bank on the Bombs”. New European Standards Affecting the Defence Industry. IFRI Briefing.

Angelet, B. (2022). “The War against Ukraine and European Defence: When will we square the circle?“ Egmont Institute.

Arturo G. Munoz (2015). “Review: Chinese Industrial Espionage. Technology Acquisition and Military Modernization”, *Studies in Intelligence,* Vol. 59, No. 4, December 2015.

Association française des investisseurs institutionnels (Af2i), 2023. ESG et financement de l’industrie de défense

Aurélie Pugnet (2023). EU defence industry pressures Commission, EU countries to step up financing, EURACTIV.com 27 June 2023

Axa Venture Partners (2023). Who will fund the next innovation wave in European Defence Technologies?

ASD, 2021. Considerations on Sustainability and the European Defence Industry 6 October 2021

ASD, August 2022. “Considerations on further initiatives to strengthen the European defence industrial and technological base”.

ASD, October 2022. “A note on access to private funding for the defence industry”.

CPPR (2023). China – A Close Look on Industrial Espionage – Intellectual Property Rights.

European Investment Bank (2022). The EIB continues its support to the EU’s Security and Defence Agenda. EIB press release.

European Investment Bank (2022). European Cybersecurity Investment Platform. Available at https://www.eib.org/attachments/lucalli/20220206-european-cybersecurity-investment-platform-en.pdf Last accessed on 08/09/2023.

European Investment Bank (2023). Evaluation of EIB Group equity and quasi-equity support for SMEs and mid-caps. https://www.eib.org/en/publications/20220197-evaluation-of-eib-group-equity-and-quasi-equity-support-for-smes-and-mid-caps Last access on 12/07/2023.

EIF (2022). The European Small Business Finance Outlook 2022. EIF Research and Market Analysis. Working Paper 2022/84.

European Commission (2018). Deliverable 3 of the Expert Group on the European Defence Fund's Financial Toolbox “Financial instruments in support of resilient and autonomous European defence sector.

European Commission (2021). Action Plan on synergies between civil, defence and space industries. Brussels, 22.02.2021 COM (2021) 70 final

European Commission (2022). Proposal on establishing the European defence industry Reinforcement through common Procurement Act Brussels, 19.7.2022 COM(2022) 349 final 2022/0219 (COD)

European Commission (2022). Joint Communication to the European Parliament, the European Council, the Council, the European Economic And Social Committee and the Committee of the Regions on the Defence Investment Gaps Analysis and Way Forward Brussels, 18.5.2022 JOIN(2022) 24 final

European Commission, 2023. “Proposal for a Regulation of the European Parliament and of the Council on establishing the Act in Support of Ammunition Production Brussels, 3.5.2023 COM(2023) 237 final 2023/0140 (COD)

European Defence Agency (2022). From peacetime production to new capabilities: be smart and strategic.

European Defence Agency (2017). Space& Defence: The Sky is not the limit.

European Parliament (2023). Reinforcing the European defence industry. EPRS briefing.

European Union (2023). Regulation (EU) 2023/1525 of 20 July 2023 on supporting ammunition production (ASAP).

European Parliament, (2022). Suply of computer chips and semiconductors. EPRS briefing.

European Union (2022a). Questions and Answers on the EU Taxonomy Complementary Climate Delegated Act covering certain nuclear and gas activities.

European Union (2022b). Regulation (EU) 2022/1288 of 6 April 2022 supplementing Regulation (EU) 2019/2088 with regard to regulatory technical standards.

European Union (2021). REGULATION (EU) 2021/821 of the European Parliament and of the Council of 20 May 2021 setting up a Union regime for the control of exports, brokering, technical assistance, transit and transfer of dual-use items (recast).

European Union (2019). Regulation (Eu) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union.

French National Assembly, 2021. Mission « Flash » sur le Financement de l'industrie de Défense.

French Senate (2020). Rapport d'information fait au nom de la commission des affaires étrangères, de la défense et des forces armées sur l'industrie de défense dans l'œil du cyclone, Par MM. Pascal ALLIZARD et Michel BOUTANT, Sénateurs. Sénat session extraordinaire de 2019-2020

Joint declaration of European Defence Associations. (2022). No sustainability without a defence and security industry.

KPMG (2021). The private equity opportunity in aerospace & defence

Nicolas Baverez (Institute Montaigne) 2022, The Defence Industry: an Unintended Victim of Financial Regulation. 12/04/2022

Nouwens, M., & Legarda, H. (2018). China's pursuit of advanced dual-use technologies.

OECD (2023) OECD SME & Entrepreneurship Ministerial Meeting 27-28 June 2023. Managing Shocks and Transitions Future-Proofing SME and Entrepreneurship Policies.

Osservatorio Politica Internazionale (2023). La produzione industriale a sostegno della difesa europea e transatlantica.

Portugal Government (2021). The future of European Defence Economy and the role of defence industries.PT Non-paper February 2021.

Thales. 2022 Defence and Sustainable Finance: Europe's Strangely Split Personality. 29 September 2022.

UK Parliament (2023). It is broke - and it's time to fix it: The UK's defence procurement system - Report Summary

XERFI, (2022). Étude prospective et stratégique n°2021-02 « Les fonds d'investissement et les entreprises de défense.

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