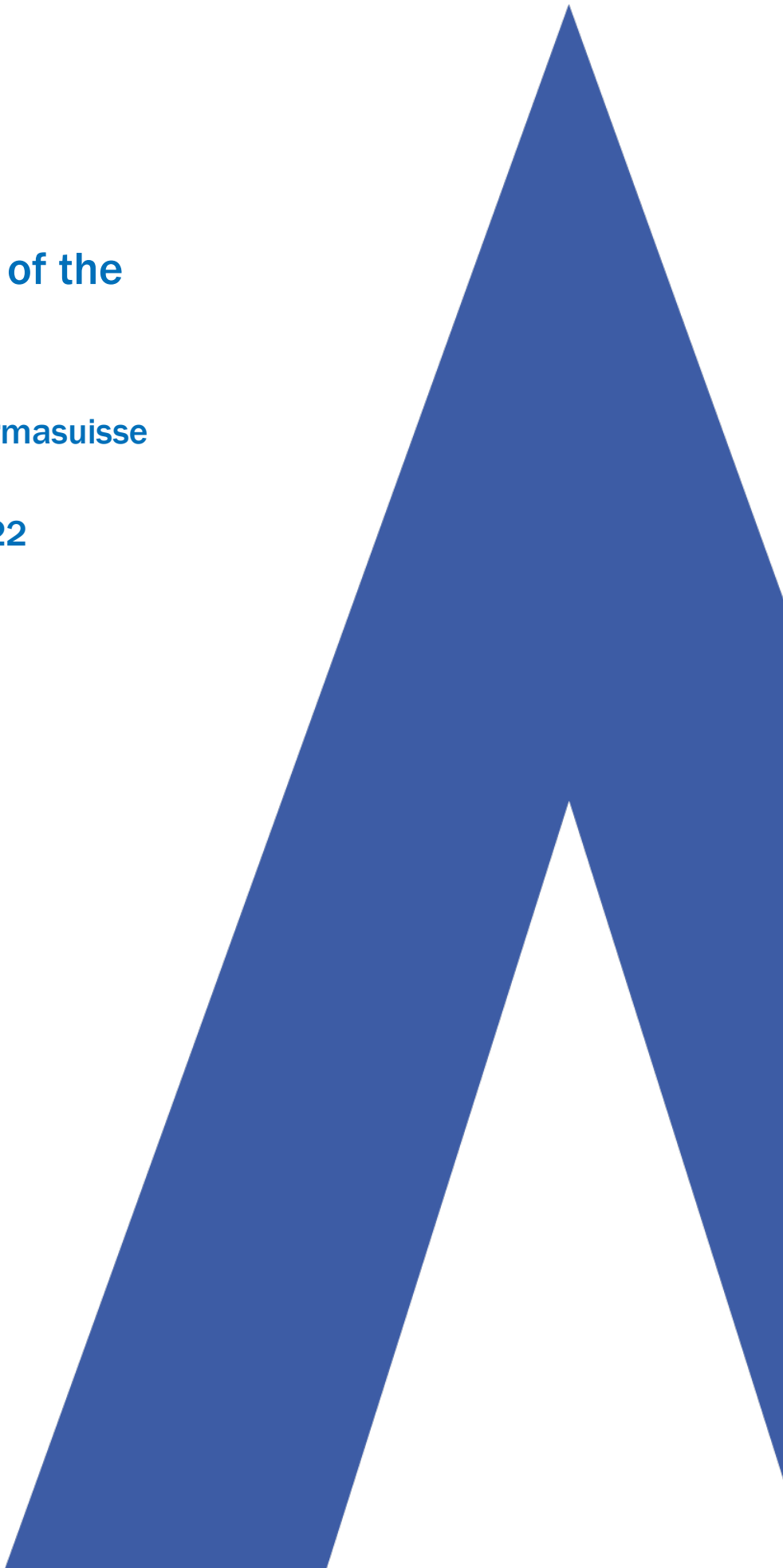
BAK economic intelligence

Impact Analysis of the "Offset" Tool

Study on behalf of armasuisse

Basel, 3 October 2022



Customer
Federal Office for Defence Procurement (armasuisse)

Editor
BAK Economics AG

Contact
Michael Grass
Executive Board, Area Manager Industry Sector Analysis
T +41 61 279 97 23, michael.grass@bak-economics.com

Marc Bros de Puechredon
Executive Board, Head of Marketing and Communication
T +41 61 279 97 25, marc.puechredon@bak-economics.com

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Contents

1 Introduction

One of the key tasks of the state is to ensure internal and external peace and the security of its citizens. An important prerequisite for fulfilling this task is the best possible equipment, both for the armed forces and for the civil security agencies. Complete independence from foreign countries is not a realistic goal for Switzerland in the defence sector. It is therefore necessary to focus on mastering selected technologies and industrial core capabilities which are of key importance for national security. The Security-relevant Technology and Industry Base in Switzerland (STIB) should be able to ensure these central technological competences and industrial capabilities with the required capacities in Switzerland. Strengthening the STIB is therefore an important element of Swiss security policy.

The Principles of the Federal Council for the Armaments Policy of the DDPS name seven management tools which are available to the Swiss Confederation for this purpose. One of these tools is offset transactions: in the event of procurement from abroad, the Federal Office for Defence Procurement (armasuisse) obliges foreign armament suppliers to enter into an industrial cooperation with the STIB where the volume of procurement exceeds CHF 20 million. With this measure, procurements abroad can also contribute to the maintenance and development of security-relevant technologies and industrial core capabilities and capacities in Switzerland. This reduces military defence dependency on other countries and strengthens the security of supply to the Swiss Armed Forces as well as other institutions of national security of the Swiss Confederation.

Two types of offset transaction can be distinguished: In a direct offset transaction, the economic output of the Swiss beneficiary company is incorporated directly into the armaments procured. With an indirect offset transaction, this is not the case. The foreign manufacturer concerned commits to various activities in selected industry sectors in Switzerland, such as industry and research orders, project financing, technology and the transfer of expertise as well as marketing support.

The implementation and control of offset transactions in the case of armament procurements from abroad are regulated in armasuisse's Offset Policy, based on the Principles of the Federal Council for the Armaments Policy of the DDPS and the Armaments Strategy of the DDPS. In order to examine the effectiveness of the Offset Policy, armasuisse has commissioned BAK Economics to perform an impact analysis, i.e. an evaluation of the achievement of the objectives of the offset tool. The evaluation is being performed for the first time to see which data can be used to measure the effects of offset transactions and whether there are any initial indications that the strategic (security policy) objectives of the offset tool are being achieved. In addition, recommendations are to be developed regarding which data requirements need to be created for a future monitoring system that is efficient as possible.

2 Scope of the study

The aim of offset transactions is to contribute to strengthening the competitiveness of the STIB by enabling companies in Switzerland to have access to the relevant expertise and markets, generating further export volume and strengthening the position of Swiss industry in the international markets.

However, economic costs are also incurred with offset transactions, for example in the form of transaction costs (with offset obligations as well as with Swiss controlling) or higher procurement prices. Apart from the security policy benefits, these costs are also offset by foreign funds flowing back into Switzerland, which involves added value, jobs and not least also tax income for the Confederation, cantons and municipalities.

Focus of this study

This study neither quantifies the benefits in the form of value creation or jobs from offset transactions, nor does it compare costs and benefits (cost-benefit analysis).

Instead, the two aims are the following:

1. Evaluation of the extent to which the offset tool achieves its objective:

   Based on a data-supported feasibility analysis, the intention is to examine which data/indicators can be used to measure the strategic objectives pursued using the offset tool and whether there are any indicators for these objectives being achieved (Sections 3 to 8).

   Three different perspectives will be applied:

   1. Focus: Swiss companies that are beneficiaries of offset

      With regard to beneficiary companies, the objectives are:

      - to open up access to security-relevant technologies,
      - to acquire expertise in these technologies,
      - to increase competitiveness,
      - to generate additional export volumes,
      - to strengthen the position on the international markets.

   2. Focus: Swiss industry overall

      With regard to Swiss industry overall, the objectives pursued with offset are to gain expertise in the area of security-relevant technologies and industrial core capabilities.

   3. Focus: language region

      With regard to the language regions, a balanced distribution of offset transactions is sought.

   Specifically, the Customer has formulated seven research questions which cover the objectives pursued with offset and guide the evaluation (see grey box on the following page).

2. Recommendations for monitoring system

The second aim of the study is to develop recommendations for possible periodic monitoring of the effect of offset in subsequent years (Section 9).

Assessment period

A four-year assessment period will be used (2018 to 2021).

Overview of research questions

With regard to the companies benefiting from offset:

Research question 1: Have offset transactions opened up access to cutting-edge technologies for beneficiary companies, in particular in the areas of security-relevant technologies?

Research question 2: Have offset transactions led to a gain in expertise for beneficiary companies in the area of security-relevant technologies and industrial core capabilities?

Research question 3: Have offset transactions increased the export volume of beneficiary companies (defined economic sectors)?

Research question 4: Have offset transactions helped beneficiary companies (defined economic sectors) to become more competitive?

Research question 5: Can the expectation that offset transactions could strengthen the position of Swiss industry on the international markets be confirmed for the period examined?

With regard to Swiss industry overall:

Research question 6: Have offset transactions in Swiss industry led to a gain in expertise in the area of security-relevant technologies and industrial core capabilities?

With regard to the language regions:

Research question 7: Were the guidelines for the desired regional distribution achieved?

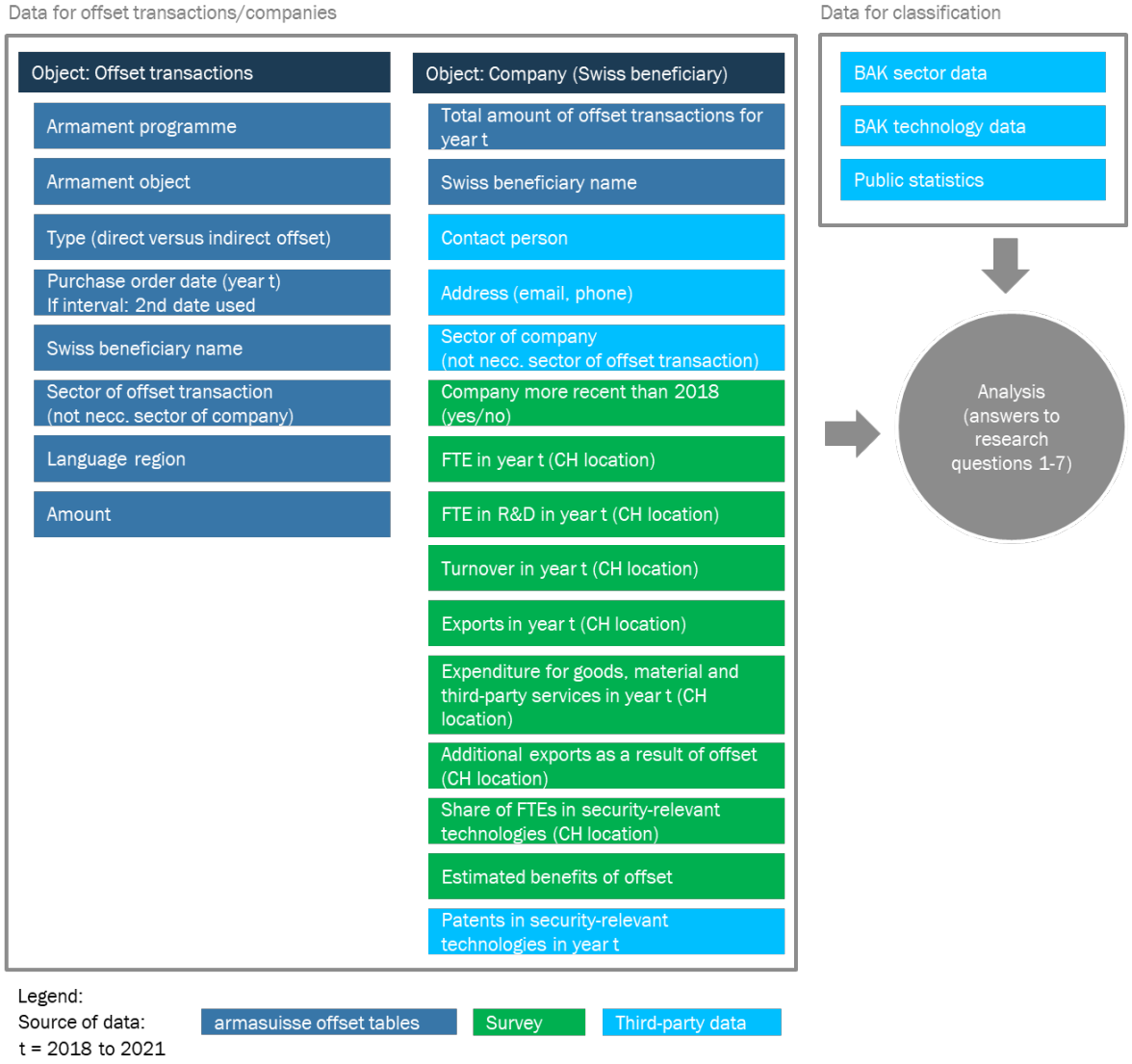
3 Data basis

This section explains the data basis used for the evaluation and Sections 4 to 7. The focus is mainly on the data from armasuisse (offset tables) and the additional company survey designed for this purpose. The experience obtained in data collection and data preparation will be incorporated in the recommendations for monitoring (Section 9).

Overview

The analysis has been performed based on a series of different data sources linked with each other (see Fig. 3-1).

Fig. 3-1 Overview of data bases



Comments on data sources and how they are linked:

- The offset information forms – or more precisely, the offset overview tables generated from these in Excel (SharePoint) by the Offset Office Bern – formed the starting point on the data side (the offset overview tables will be frequently abbreviated to "offset tables" in this study. The overview tables contain a series of variables/parameters for all offset transactions (object). All offset transactions for which the purchase order date is between 2018 and 2021 were selected from these tables; if a period is given for the purchase order date, the second date is considered to be the relevant date (filter 1).

- The offset overview tables which are individually available for each procurement project have been combined into an "Offset transactions" database, taking into account the parameters relevant for the study (see Fig. 3-1, column 1).

- In the next step, a "Companies" database was derived from this, in which the companies are the object (see Fig. 3-1, column 2). Here, all companies from the "Offset transactions" database where the offset amount is greater than zero (filter 2) were recorded. This means that companies for which only rejected offset transactions are listed in the offset tables have not been taken into account.

- This second database has been supplemented by parameters collected through the survey, as well as by other data from third parties (businessmonitor.ch, Institute of Intellectual Property IIP).

- In addition, various macroeconomic data (BAK sector data, BAK technology and patent data, public statistics) have been accessed for the analysis, and used to classify the data of the offset transactions and companies and hence to answer the research questions.

Important aspects of the individual data sources are discussed in detail below.

Offset overview tables (armasuisse)

Offset transactions considered:

- In principle, all offset transactions from completed or ongoing procurement projects have been taken into consideration, but only to the extent that the offset transactions were commissioned in the period between 2018 and 2021.

- Banking (pre-fulfilment) has been taken into account.

- Basically, both direct and indirect offset transactions have been taken into account. However, no data on direct offset transactions is contained in the offset overview tables for the period before 1 July 2021 (entry into force of the new Offset Policy) and this data has also not been systematically entered elsewhere. The analysis therefore had to be carried out without including these offset transactions, which made up around 10% of offset transactions in the period 2018 up to the first half of 2021, according to the Customer's estimate.

Relevant offset amount:

- Basically, a distinction must be made between "Amount claimed" (= contract value of the offset transaction), "Amount weighted" (= amount after weighting of the added value in Switzerland) and "Amount accepted" (= amount after consideration of multipliers and reasons for exclusion such as late submission, failure to reach a threshold value, lack of additionality, etc.).

- The relevant amount for this analysis is basically the "Amount claimed" (contract value of the offset transaction, in other words, before taking into account the Swiss added value and the multiplier) in CHF.

  Reason: In economic terms, this involves a turnover, which can be related to other parameters (total turnover, exports and preliminary work of the company from the survey and the sector data). While the "Amount weighted" and the "Amount accepted" make sense within the framework of the offset strategy, because this ensures that sufficient added value is accrued in Switzerland (Amount weighted) and a multiplier is estimated for transactions that are particularly important in terms of security policy (Amount accepted), the resulting parameters do not permit any meaningful economic comparisons with other economic parameters.

  Qualification: Even if the relevant amount involved is basically the "Amount claimed", offset transactions in which the "Amount accepted" is zero have been excluded, because in this case the offset transaction has not been accepted due to an exclusion reason.

  Summary: The (economic) amount of the offset transactions relevant for the study was calculated using the following formula:[1]

  Amount =
  if "Amount accepted" > 0: "Amount claimed"
  if "Amount accepted"= 0: 0.

[1] In the case of marketing support, the relevant amount is also the "Amount claimed", after consultation with armasuisse (in other words, without taking into account degression).

Company survey

- The population consists of all companies which had at least one offset transaction with an amount greater than zero (filter 2) between 2018 and 2021 (filter 1). Each of these companies was invited to participate in the survey. Participation was on a voluntary basis.

- The contact persons and addresses were taken from the company businessmonitor.ch. Wherever possible, a member of the Executive Board was chosen as the contact person, in order to increase response and data quality. The invitation was sent by email, and the address was personalised. In addition to the initial invitation, a personalised reminder was sent a short time later.

- The survey was not anonymous but confidential. The reason for non-anonymous implementation was that the name of the company was required to be able to link the survey data with the data from the offset overview tables.

- The survey was performed online using the software LimeSurvey and offered in German, French and Italian.

- The survey was opened for companies to answer between 9 May and 29 June 2022.

- With all questions, the option “No answer” was given explicitly (by selection option) or implicitly (through closure option, despite incomplete answers), so as not to unnecessarily reduce responses.

- The questionnaire is included in the Appendix.

Third-party data

In order to be able to answer the research questions, the data on the offset transactions and offset companies from the offset tables and the survey had to be aligned with (macroeconomic) data. Data from various different sources was used for this purpose, the most important of which were:

- BAK Economics: BAK sector data, BAK technology data (and patent data).

- Federal Statistical Office (FSO): Production account, accounting results, personnel research and development.

- Federal Office for Customs and Border Security (FOCBS): Exports.

4 Overview: Offset transactions, offset companies, survey participants

This section provides a statistical overview of the offset transactions, the benefiting Swiss companies ("offset companies") and the survey participants for the period under study of 2018-2021. The findings form the background to the answers to research questions 1-7 in Sections 5 and 7.

Offset transactions

The armasuisse offset tables contain 616 offset transactions which were commissioned in the period 2018-2021. The total offset amounts of these transactions come to just over CHF 1 billion. (See Section 3 for the definition of "offset amount" used). A short analysis of how offset transactions break down financial year, type and industry sector is given below. The distribution of transactions by language region is given in Section 7.

The distribution of the offset transactions is not uniform over the four years (see Fig. 4-1). While the number and offset amounts of transactions in the years 2018 to 2020 were similarly high in each case, 2021 saw only around half of that number and amount.

Basically, two types of offset transaction can be distinguished: With a *direct* offset transaction, the economic performance of the Swiss beneficiary is directly incorporated in the procured armaments; with *indirect* offset transaction, this is not the case (see methodology for the precise definitions). In the period 2018-2021, the share of the direct offset was almost 10%, the rest (around 90%) was indirect offset (see Fig. 4-2).

The armasuisse offset information forms record the economic activity (by NOGA sector classification) to which the transaction is to be assigned. This is not the sector of the benefiting Swiss company (see below for a corresponding analysis). The reason is that companies can perform different economic activities and the NOGA industry classification is by main activity – the economic activity within the framework of an offset transaction therefore need not necessarily correspond to the main activity of the company.

Measured in terms of number, the majority of offset transactions were in the MEM industry (67%), followed by aviation (21%) and ICT (7%) (see Fig. 4-3). The remaining sectors (such as the chemical sector) account for smaller shares. The distribution changes slightly if one focuses on the offset amount (volume) instead of on the number. What is striking is that the share of aviation increases (34%) and that of ICT decreases (0.5%). The aviation sector tends to receive transactions with a large order volume and the ICT sector transactions with a small order volume.

Definition of direct and indirect offset transactions[2]

Direct offset denotes the industrial cooperation between a foreign armament supplier and the STIB within the framework of an offset obligation which is incorporated into the defence equipment to be procured. Direct offset transactions take place, for example, in the form of full or partial licence production, sub-supplier relationships and joint ventures. This also includes the final assembly of the system, the installation of components, participation in the (further) development of the system and component maintenance.

Direct offset is aimed to qualify the STIB for the most autonomous possible maintenance, useful life extension, value retention and upgrade of military systems and reduce dependencies on foreign armament suppliers.

Indirect offset denotes the industrial cooperation between a foreign armament supplier and the STIB within the framework of an offset obligation which is not incorporated into the defence equipment to be procured. Indirect offset takes place, for example, in the form of industrial and research orders, the transfer of technology and expertise, project financing and marketing support.

Indirect offset aims to enable the STIB to have access to expertise, technologies and foreign markets.

Fig. 4-1 Offset transactions 2018-2021 by year

Year	Number of offset transactions		Offset amount	
	Offset table [Number]	[Share]	Offset table [Thousand CHF]	[Share]
2018	172	28%	296'797	29%
2019	165	27%	283'082	28%
2020	180	29%	291'869	28%
2021	99	16%	155'482	15%
TOT	616	100%	1'027'230	100%

Source: BAK Economics, armasuisse (offset tables)

Fig. 4-2 Offset transactions 2018-2021 by type

Type	Number of offset transactions		Offset amount	
	Offset table [Number]	[Share]	Offset table [Thousand CHF]	[Share]
Direct	53	9%	83'601	8%
Indirect	563	91%	943'629	92%
TOT	616	100%	1'027'230	100%

Source: BAK Economics, armasuisse (offset tables)

[2] Quoted from the Offset Policy 2021 (pp. 4 et seq.)

Fig. 4-3 Offset transactions 2018-2021 by NOGA sectors

NOGA		STIB	No. of offset trans.		Offset amount	
Code	Description		Offset table		Offset table	
			[Number]	[Share]	[Thousand CHF]	[Share]
20	Chemical industry	Yes	17	3%	15'931	2%
22	Rubber and plastics industry	Yes	6	1%	5'304	1%
23*	Glass, ceramics, concrete, cement industry	Yes	0	0%	0	0%
2425	Metal industry	Yes	61	10%	50'626	5%
2627	Electronics, optics, watches, electrical equip.	Yes	244	40%	352'103	34%
28	Mechanical engineering	Yes	87	14%	90'635	9%
2930	Vehicle construction	Yes	20	3%	148'374	14%
32*	Manufacturers of other goods	Yes	0	0%	0	0%
33*	Repair and installation of machines and equip.	Yes	0	0%	0	0%
51	Aviation	Yes	130	21%	350'312	34%
6163	ICT	Yes	42	7%	4'660	0%
71*	Architecture, eng.; tech., phys., chem. analysis	Yes	0	0%	0	0%
72	Research and development	Yes	1	0%	120	0%
95*	Repair of data proc. devices and cons. goods	Yes	0	0%	0	0%
NA	NA	Yes	8	1%	9'164	1%
TOT	Total		616	100%	1'027'230	100%

Comments: (*) The industry sectors marked with an asterisk are only contained in the new Offset Policy (from 1 July 2021); the corresponding transactions have been “entered” in the old policy under other sectors. “NA” stands for not available: this means that no value is entered in the offset tables for these offset transactions under “NOGA sector”.
Source: BAK Economics, armasuisse (offset tables)

Offset companies and survey participants

Offset companies and the survey participants are in the ratio of total population to sample. This means that offset companies include all companies which have received at least one offset transaction in the period under study and which were invited to take part in the survey; the survey participants are a subset of this, in other words, those offset companies which completed the survey.

A total of 194 Swiss companies (referred to here as “offset companies”) profited from the 616 offset transactions analysed above in the period 2018 to 2021. Of these, 95 participated in the company survey, which corresponds to a participation quota of 49%. In view of the fact that participation was voluntary and for certain questions, the accounts of the last four years had to be consulted, the participation quota was comparatively high. In addition, the participating companies provided high-quality information, which is shown, for example, in the consistency of the data given. Some of those who did not participate informed BAK of their reasons: Mainly, these concerned Group policy on non-disclosure of (in particular financial) data and a perceived lack of relevance (such as unawareness of the receipt of offset transactions).

The sectors, size classes, frequency and the offset turnover share of offset companies will be discussed briefly below.

Of offset companies, 90% are attributable to the STIB (according to the definition in the Offset Policy 2021, Appendix 1) (see Fig. 4-4). The reason that the STIB share is not 100% is that offset transactions are awarded based on the economic activity (according to the NOGA industry sector classification) associated with the transaction and

not on the NOGA industry sector of the company, which does not need to be identical. As mentioned further above, the background to this is that companies can perform different economic activities and the NOGA industry classification is by main activity – the economic activity within the framework of an offset transaction therefore need not necessarily correspond to the main activity of the company.

The three most frequently represented sector groups are the MEM industry at 68% (NOGA 24 to 33), architecture and engineering firms; technical, physical and chemical analysis at 10% (NOGA 71) and the ICT sector (NOGA 61 to 62) at 9%. The sample of the survey participants shows a similar sector distribution as the basic population of offset companies and can therefore be taken as representative in this regard.

The analysis of the size structure of the companies can only be carried out based on the sample of the survey participants, as the number of full-time employees (FTEs) is not collected in the offset forms (see Fig. 4-5). According to the survey, 84% of the companies are SMEs (less than 250 FTEs) and 16% large companies (250 or more FTEs). Naturally, the picture is reversed if one focuses on the number of FTEs who are employed in both size classes – large companies account for 79% of the workforce, while SMEs account for 21%.

A further aspect concerns the number of years in which a company profits from offset transactions (see Fig. 4-6). Evaluation of the armasuisse offset tables shows that in the period 2018 to 2021, almost half (46%) of the companies received a transaction in more than one year. In the sample of survey participants, it is even slightly more than half.

Finally, the offset quota will be discussed. In this study, this is understood to mean the share of the offset amount in the turnover of the company (see Fig. 4-7). On average across the companies, the offset quota over the entire period 2018-2021 was 5.8%. With the SMEs, the quota is higher (6.4%) than with the large companies (2.1%).

The average offset quotas fluctuate over the years and in particular were low in 2021 (1.8% viewed across all companies) – this reflects the findings above, that in 2021 the number and volume of offset was lower than in previous years. In addition, the offset quota varies heavily across companies: If one considers the entire four-year period, the quota ranges from 0% (or a fraction more) to 97%. This means that for companies where offset counted least in terms of turnover, the share of the offset amount in the turnover was practically 0%; and for companies where offset counted most, it was 97%. If one considers individual years, then the offset quota for individual companies is in some cases above 100%. The explanation for the latter is that offset transactions can be processed over several years, which means they do not necessarily accrue as turnover in the same year as companies receive them.

Fig. 4-4 Offset transactions 2018-2021 by industry sectors

NOGA		STIB*	Number of companies			
Cod	Description		Offset table		Survey	
			[Number]	[Share]	[Number]	[Share]
13	Textile industry	No	1	1%	0	0%
17	Paper industry	No	1	1%	0	0%
20	Chemical industry	Yes	3	2%	3	3%
22	Rubber and plastics industry	Yes	4	2%	2	2%
24	Metal production	Yes	6	3%	2	2%
25	Metal products	Yes	21	11%	11	12%
26	Electronics, optics, watches	Yes	44	23%	25	26%
27	Electrical equipment	Yes	14	7%	7	7%
28	Mechanical engineering	Yes	38	20%	15	16%
29	Automotive and components	Yes	2	1%	1	1%
30	Other vehicle manufacture	Yes	5	3%	1	1%
32	Manufacturers of other goods	Yes	1	1%	0	0%
33	Repair and installation of machines and equip.	Yes	1	1%	1	1%
43	Other Construction activity	No	1	1%	0	0%
46	Wholesale business	No	8	4%	5	5%
47	Retail trade	No	2	1%	1	1%
51	Aviation	Yes	1	1%	1	1%
52	Storage and other transport services	No	1	1%	0	0%
61	Telecommunications	Yes	1	1%	0	0%
62	Information technology	Yes	15	8%	7	7%
69	Legal and tax advisors, auditors	No	1	1%	0	0%
71	Architecture, eng.; tech., phys., chem. analysis	Yes	19	10%	11	12%
72	Research and development	Yes	1	1%	0	0%
74	Other freelance, sci., tech. activ.	No	1	1%	1	1%
78	Labour recruitment	No	1	1%	0	0%
85	Education and teaching (incl. universities)	No	1	1%	1	1%
TOT			194	100%	95	100%

Comments: (*) Security-relevant economic sectors according to Offset Policy (2021), Appendix 1. The STIB share is not 100% here because offset transactions are awarded based on the economic activity (according to the NOGA industry sector classification) associated with the transaction, not on the NOGA industry sector of the company, which does not need to be identical. By way of explanation: companies can perform different economic activities and the NOGA industry assignment is by main activity – the economic activity within the framework of an offset transaction therefore need not necessarily correspond to the main activity of the company.

Source: BAK Economics, armasuisse (offset tables), company survey

Fig. 4-5 Offset companies 2018-2021 by size (only survey)

Size	Number of companies		Employees (FTEs)	
	Survey		Survey	
	[Number]	[Share*]	[Number]	[Share*]
SME	76	84%	4'923	21%
LC	15	16%	18'206	79%
NA	4		0	
TOT	95	100%	23'129	100%

Comments: (*) Shares calculated without NAs. "NA" stands for "not available": this means that the companies concerned did not provide any details on the FTE in the survey and therefore no size classification is possible.
Source: BAK Economics, armasuisse (offset tables), company survey

Fig. 4-6 Offset company 2018-2021 by number of years with offset transaction

Years	Number of companies			
	Offset table		Survey	
	[Number]	[Share]	[Number]	[Share]
1	105	54%	43	45%
2	43	22%	23	24%
3	30	15%	20	21%
4	16	8%	9	9%
TOT	194	100%	95	100%

Comments: The table shows in how many years the companies have received offset transactions in the time period 2018-2021. For example: of all offset companies, 105 companies only received offset transactions in one year, 43 companies in two years, etc. Of the survey participants, 43 companies only received transactions in one year, 23 in two years, etc.
Source: BAK Economics, armasuisse (offset tables), company survey

Fig. 4-7 Share of offset amount in turnover (offset quota) 2018-2021

	2018	2019	2020	2021	Yearly average 2018-2021
TOT	5.7%	6.0%	5.7%	5.6%	5.8%
SME	6.3%	6.3%	6.4%	6.6%	6.4%
LC	2.9%	2.3%	2.5%	0.7%	2.1%

Source: BAK Economics, armasuisse (offset tables), company survey

5 Analysis of beneficiary companies

In this section, the strategic objectives pursued with offset will be evaluated with regard to the beneficiary companies. Research questions 1 to 5 form the background for this.

5.1 Access to and expertise in security-relevant technologies

Research question 1: Have offset transactions opened up access to cutting-edge technologies for the beneficiary companies, in particular in the areas of security-relevant technologies?

Research question 2: Have offset transactions led to a gain in expertise for the beneficiary companies in the area of security-relevant technologies and industrial core capabilities?

Methodology

Before starting with the analysis, the methodology used should be explained at this point. This refers not only to the analysis with regard to access/expertise in the area of security-relevant technologies (research questions 1 and 2), but also to the analyses with regard to the export volume (research question 3) and competitiveness (research question 4).

The analysis is performed primarily based on benchmarking. This means that parameters from offset companies are compared with parameters of their respective sectors and findings are derived from these in order to answer the questions. In addition to this, assessments of offset companies surveyed on the significance of offset with regard to the various aspects examined are added.

An inter-temporal approach to the study was not implemented. With this type of approach, the impact of offset transactions on the respective target parameter in terms of a “before and after” comparison using econometric methods would be examined. This type of quantitative approach is not possible for the current study for several reasons: (1) The time series of four years are too short for this purpose. (2) The four-year period examined represents an exceptional economic phase. (3) The analysis in Section 4 above has shown that a considerable portion of offset companies benefit from offset transactions on a recurring basis. (4) Offset transactions are not necessarily processed in the year of receipt. (5) At least for some of the aspects examined, delays in impact probably play a role, which means that the effect of offset does not occur immediately, but only between one year and several years later. Given complications (2) to (5), considerably longer time series would have to be available to be able to conduct an inter-temporal impact analysis in a useful manner.

Benchmarking

Research questions 1 and 2 are dealt with together in the benchmarking exercise. The reason is that no parameters can be found in the publicly available statistics to distinguish between *Access to* and *Expertise in* in the areas of security-relevant technologies (SrT) (according to Offset Policy 2021, Appendix 2). Both are primarily operationalised in this study through the share of full-time employees (FTEs) active in the area of research and development (R&D). In addition to the benchmarking exercise the share of R&D employees who are specifically active in the area of security-relevant technologies is determined for offset companies, and patent development by offset companies in these technologies is analysed.

To benchmark offset companies (and the samples of the survey participants) with regard to access/expertise in security technologies, the share of employees in the area of R&D was divided by the share in its corresponding comparable sector for each offset company, and the result multiplied by a factor of 100. This results in a company-specific R&D comparison quota: a value of more than 100 means that the company has a higher share of R&D employees than comparable sectors and a value of under 100 means that the share is lower. The average of the company-specific R&D quotas was then created.

The data on the comparable sectors is provided by the statistics on "Personnel Research and Development" from the Federal Statistical Office (FSO). This data is only available for the year 2019 in the period under study of 2018 to 2021; however, this is not a significant problem as the influence of the economy on the share of R&D employees is moderate. Furthermore, the FSO does not publish data in the granularity of NOGA two-digit sectors, but only for larger sector groups. In order to exclude distortions, only offset companies which could be meaningfully assigned to a R&D sector group of the FSO have been taken into consideration in the calculations.[3]

Fig. 5-1 contains the results for the individual years as well as for the yearly average 2018-2021.[4] On average across offset companies, the R&D comparison quota is 265. This means that in offset companies the share of R&D employees is on average higher by a factor of 2.7 (or 265%) than in the respective comparable sectors. At large companies this is even more pronounced, with a factor of 3.4 ,than for SMEs, which have a factor of 2.5. It can thus be stated that offset companies are characterised by a clearly above-average research intensity.[5]

[3] This represents a conservative approach. If one were to consider all offset companies to which a sector group can be remotely assigned (in particular the collective category "Other"), then the results are significantly more strongly tilted towards a positive impact of offset on R&D. Specifically, the FSO statistics contain data on the following sector groups: foodstuffs, chemicals, pharmaceuticals, metals, machines, high technology instruments, ICT1 production, ICT1 services, research and development, other.

[4] As only values for the year 2019 are available for the comparable sectors, a comparison of the R&D quota over is time not informative.

[5] On average across offset companies, the share of R&D employees in the total workforce is 20%, which means that one employee in five at offset companies works in R&D. In the STIB, this share, which can be calculated approximately using the FSO data mentioned above, is around 6%. The comparison is less precise than the R&D comparison quota used above on a company basis, as differences in the sector structure between the sample and the STIB are not taken into consideration, but lead to a similar result.

In addition to benchmarking, offset companies surveyed were asked about the share of R&D employees who were specifically active in the period 2018-2021 in the area of security-relevant technologies (according to Appendix 2 of the Offset Policy 2021) (see Fig. 5-2). On average in offset companies, this is 21%; the share is higher (28%) in large companies than in SMEs (20%). A projection (taking into account size differences in the companies) shows that in the period under study an estimated 6,000 FTEs were employed in R&D in the 616 offset companies. Of these, around 1600 FTEs were specifically active in the area of security-relevant technologies.

Likewise in addition to benchmarking, a patent evaluation of offset companies was carried out. Of the 195 offset companies in 2018-2021, 23 companies had patents in the area of security-relevant technologies (see Section 6 for the background to the patent analysis). The patent portfolio increased by 57 patents from 2017 (285) to 2021 (342). If one considers only world-class patents, the increase was 13 patents (from 52 in 2017 to 65 in 2021). The evaluation of the data for the group of companies participating in offset transactions shows that the patent dynamic of these firms lies within the STIB average. The average increase in the patent portfolio in security-relevant technologies cumulatively amounts to 23% (STIB: 24%) in com-panies participating in offset between 2017 and 2021. It is important to consider here that the innovation effect in SMEs frequently appears less in the form of patented knowledge.

Estimate of the companies

In the survey, the participating offset companies were questioned about the significance of offset for access to security-relevant technologies, expertise and the employment of skilled workers in this area (see Fig. 5-3 to 5-5).

28% of the companies estimated offset as (fairly) important for access to technology, 31% for technological expertise and 23% for the employment of skilled workers in areas of security-relevant technology. Generally speaking, SMEs attach greater importance to offset transactions with regard to access, expertise and skilled workers in the technological area than do large companies – what is particularly pronounced is the difference in the area of employment of skilled workers, where offset appears to play only a subordinate role for large companies. In a similar manner to competitiveness, the significance which the companies attribute to offset in the technology area also increases with the offset quota (i.e. the share of offset volume in the company turnover).

Conclusion

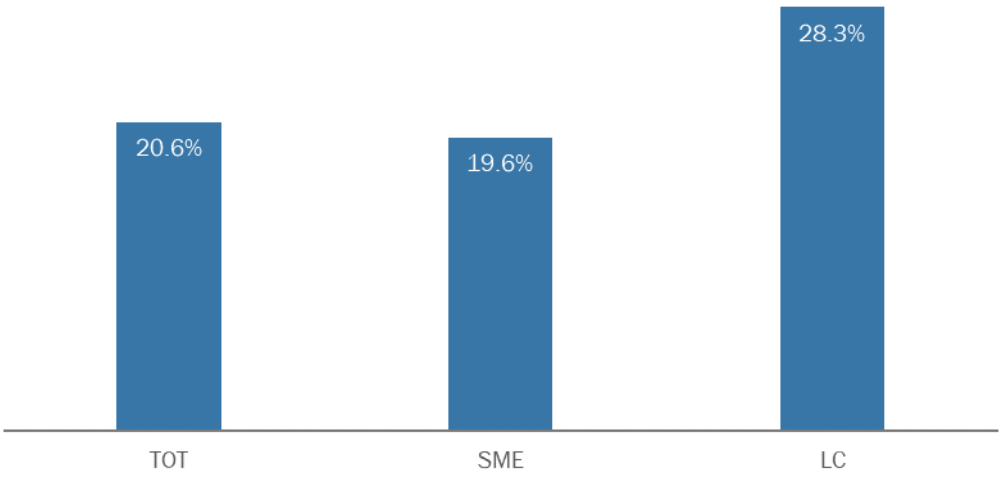
The results show that companies with offset transactions are more R&D-intensive than average. The share of R&D employees in offset companies who are specifically active in the area of security-relevant technologies is significant at 21%. According to the self-assessment, slightly less than one-third of the companies surveyed consider offset to be (fairly) important for access and expertise in security technology. For around one-quarter of companies, offset transactions are either important or very important for the employment of skilled workers in the area of security-relevant technologies. In companies which generate at least 5% of their turnover from offset transactions, the significance of access to technologies, expertise and skilled workers is considerably higher.

Fig. 5-1 Share of R&D employees relative to comparable sectors (Index: comparable sectors = 100)

	2018	2019	2020	2021	Yearly average 2018-2021
TOT	257.6	260.4	268.3	273.8	265.0
SME	239.4	242.8	252.1	256.5	247.7
LC	333.2	333.6	337.1	347.5	337.9

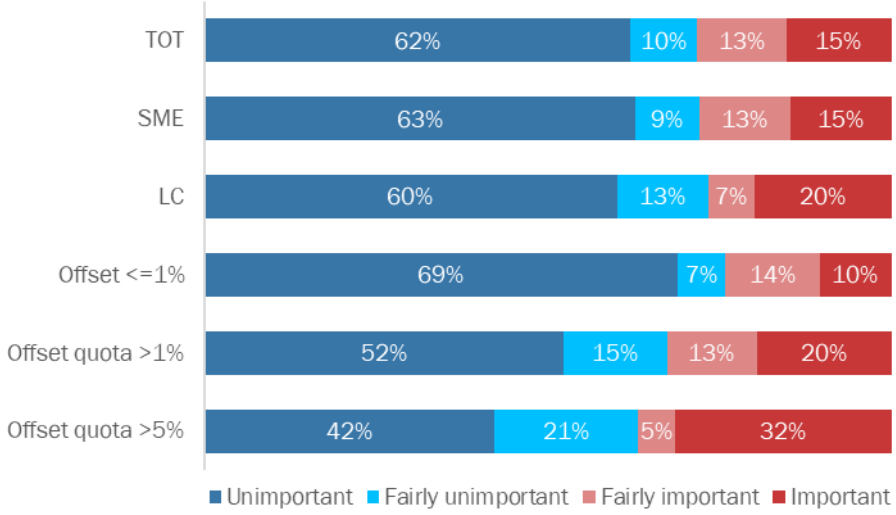
Comments: 100 = On average, offset companies are on a par with their respective comparable sector. Under 100 = On average, they are below; over 100 = on average, they are above.
Source: BAK Economics, company survey

Fig. 5-2 Share of the R&D employees in offset companies who are specifically active in the area of SrT (yearly average 2018-2021)



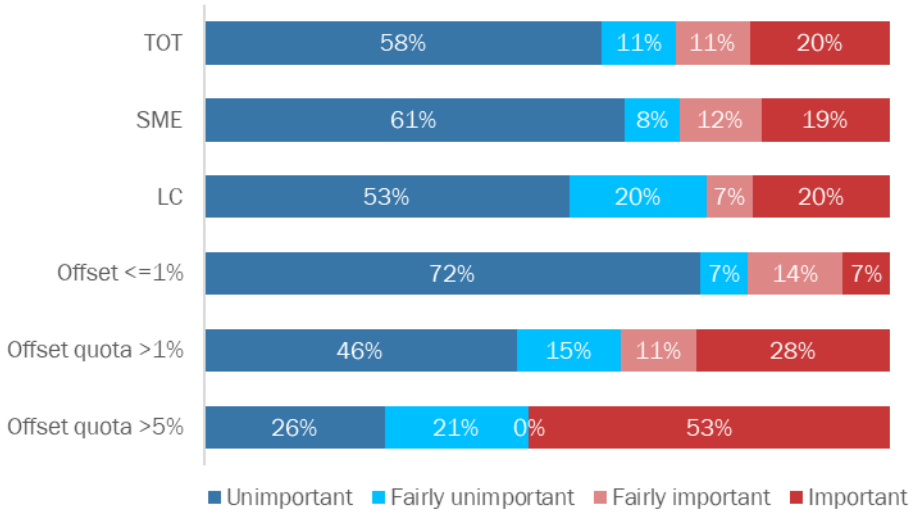
Source: BAK Economics, company survey

Fig. 5-3 Significance of offset for access to SrT



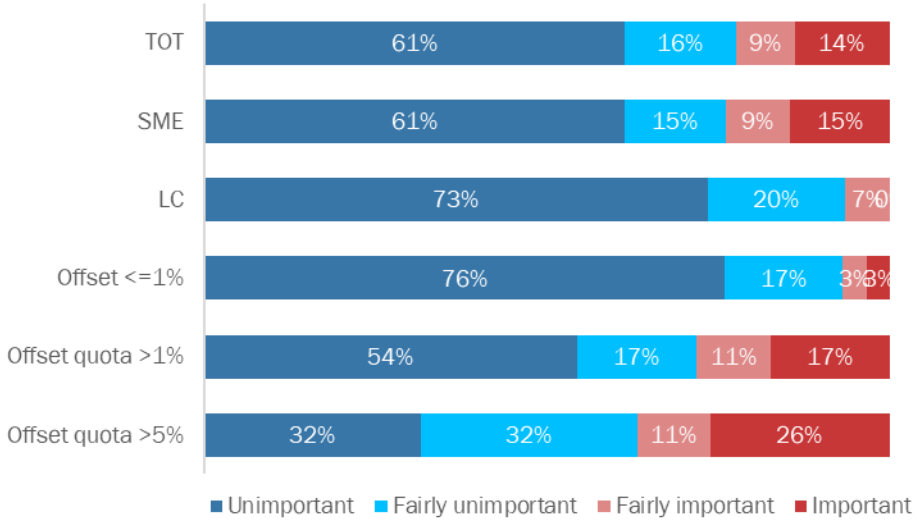
Comment: SrT: Security-relevant technologies. Companies were asked to indicate significance on a numerical scale from "1: not at all important" to "10: very important". The answers have been coded here as follows: 1-3 = unimportant, 4-5 fairly unimportant, 6-7 fairly important, 8-10 important.
Source: BAK Economics, company survey

Fig. 5-4 Significance of offset for expertise in the area of SrT



Comment: SrT: Security-relevant technologies. Companies were asked to indicate significance on a numerical scale from "1: not at all important" to "10: very important". The answers have been coded here as follows: 1-3 = unimportant, 4-5 fairly unimportant, 6-7 fairly important, 8-10 important.
Source: BAK Economics, company survey

Fig. 5-5 Significance of offset for employment of skilled workers in SrT



Comment: SrT: Security-relevant technologies. Companies were asked to indicate significance on a numerical scale from "1: not at all important" to "10: very important". The answers have been coded here as follows: 1-3 = unimportant, 4-5 fairly unimportant, 6-7 fairly important, 8-10 important.
Source: BAK Economics, company survey

5.2 Export volume

Research question 3: Have offset transactions increased the export volume of the beneficiary companies (defined economic sectors)?

Benchmarking

To benchmark offset companies (or the samples of the survey participants) with regard to the exports, the procedure was the same as the analysis regarding access/expertise in the security-relevant technologies. This means that in the first step, for each offset company from the survey, the export share (i.e. the share of exports in the turnover) was divided by the export share of the respective NOGA two-digit comparable sector and the result multiplied by a factor of 100. If the company-specific export comparison quota obtained in this manner is over 100, then the export share of the company is higher than the comparable sector; if it is lower, the export share is correspondingly lower. In the second step, the average of company-specific export comparison quotas was created.

For the comparable sectors, the data basis consisted of the export data of the Federal Office for Customs and Border Security (FOCBS), the production account of the Federal Statistical Office (FSO) and the accounting results (also FSO). The former data is restricted to goods exports or manufacturing sectors, while the latter two restrict the period under study to 2018 to 2020.

On average across offset companies, the export comparison quota is 116 on a yearly average 2018-2020 (see Fig. 5-6). This means that offset companies with the same turnover on average export 16% more than the companies in the respective NOGA 2-digit comparable sectors. With the SMEs, it is 11% more, with large companies 36%.[6]

The export comparison quota increased across all offset companies considered from 2018 to 2020 (from 114 to 123). This means that offset companies have improved their export share relative to the comparable sectors and show a more favourable export dynamic in the period under study. This development applies for large companies and SMEs to the same extent.

In the survey, companies were also asked how many additional exports they estimate that they achieved through offset transactions on a yearly average between 2018 and 2021 (see Fig. 5-7). “Additional exports” include exports which obtained directly as part of an offset transaction as well as exports which result in addition beyond this (follow-up orders, orders through connections, orders through the acquisition of new competences, etc.). On average at participating companies, additional exports were 7.1%; this figure was higher at SMEs (8.5%) than large companies (2.5%).

Estimate of the companies

Of the offset companies which took part in the survey, 25% consider offset to be (fairly) important for export volume; this share (20%) is higher among SMEs than at large companies (7%). Less surprisingly, but consistently, the significance which companies attribute to offset regarding exports also increases with the share which offset accounts

[6] The share of exports in turnover is on average 66% across offset companies surveyed on a yearly average. In the STIB (or STIB sectors in manufacturing industry which export goods) the export share is 57% (where data is available). In principle, the comparison is less precise than the export comparison quota used above on a company basis, as differences in the sector structure between the sample and the STIB are not taken into consideration, but lead to a similar result.

for in the company's turnover (see Fig. 5-8). Among companies with an offset quota of at least 5%, the share of companies who consider offset (fairly) important is 43%.

Conclusion

The results can be taken as an indication that offset has a positive influence on the exports of beneficiary companies. The share of exports in turnover is higher for offset companies than in the respective NOGA two-digit comparable sectors. In addition, companies improved their export share from 2018 to 2020 relative to the comparable sectors, which has been accompanied by above-average growth. Companies also indicate that they achieve around 7% additional exports through offset. According to the self-assessment, around 25% of companies consider offset to be (fairly) important for export volume; the share is higher among companies which have a more significant offset share in turnover.

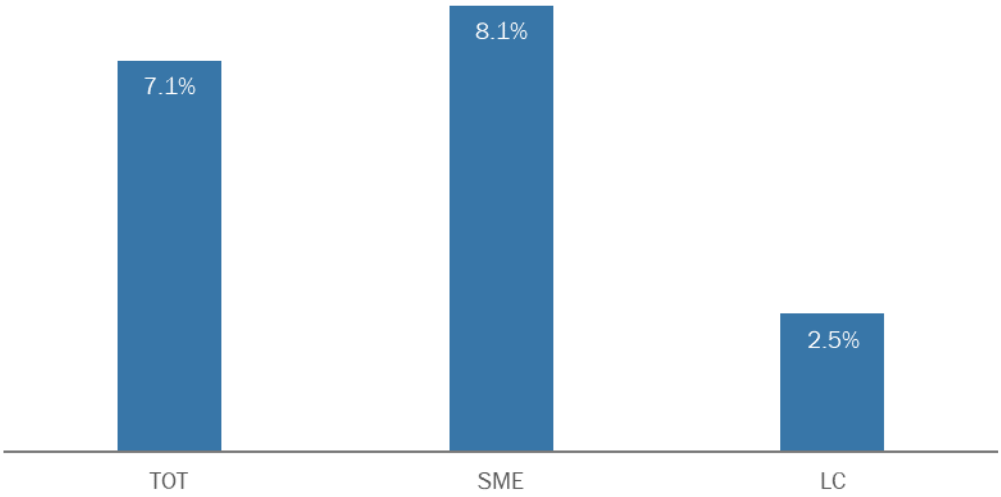
These results on the exports should be interpreted with caution. Due to the exceptional economic situation in the 2019 (start of the recession in the MEM industry), 2020 (severe COVID recession) and 2021 (heavy COVID rebound) and the fact that the exports are a particularly economically sensitive parameter, the significance of the export benchmarking exercise is limited. It will only be possible to arrive at statistically robust results when additional data points are available.

Fig. 5-6 Share of exports in turnover relative to comparable sectors (Index: comparable sectors = 100)

	2018	2019	2020	2021	Yearly average 2018-2020
TOT	113.8	111.3	122.8	NA	116.0
SME	108.9	105.8	117.5	NA	110.7
LC	132.5	132.1	142.8	NA	135.8

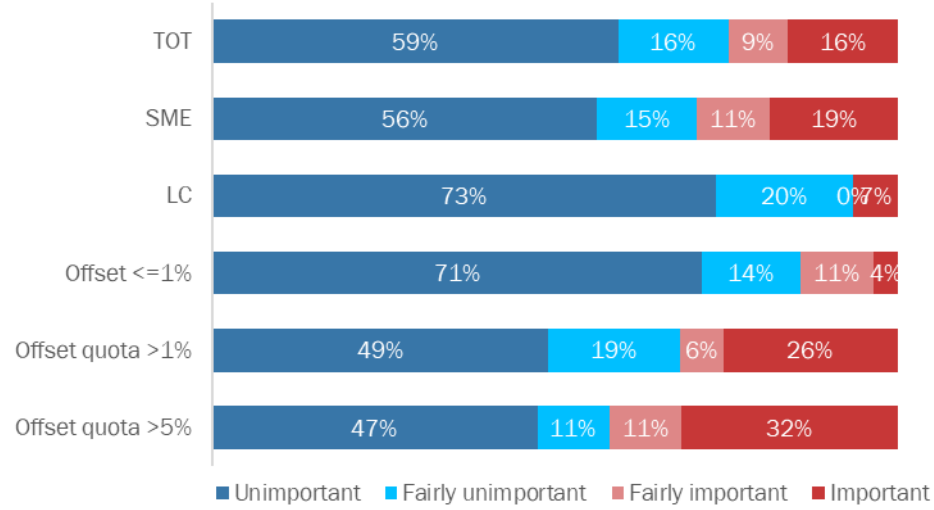
Comments: 100 = On average, offset companies are on a par with their respective comparable sector. Under 100 = On average, they are below; over 100 = on average, they are above.
Source: BAK Economics, company survey

Fig. 5-7 Additional exports through offset (yearly average 2018-2021)



Source: BAK Economics, company survey

Fig. 5-8 Significance of offset for exports



Comment: companies were asked to indicate significance on a numerical scale from "1: not at all important" to "10: very important". The answers have been coded here as follows: 1-3 = unimportant, 4-5 fairly unimportant, 6-7 fairly important, 8-10 important.
Source: BAK Economics, company survey

5.3 Competitiveness

Research question 4: Have offset transactions helped the beneficiary companies (defined economic sectors) to become more competitive?

Benchmarking

As a measure of competitiveness, work productivity will be used in this section (abbreviated to productivity). The work productivity of a company or a sector measures the economic performance for each unit of work used (hours, persons or full-time employees). Specifically, work productivity in this analysis is defined as the gross value added for each full-time employee (FTE).

A similar approach as in the two previous sections was once again used to benchmark the work productivity of offset companies (or of the sample of survey participants). This means that the productivity level of each individual company was divided by the productivity level of the respective NOGA two-digit sector and the result was multiplied by a factor of 100. This results in a company-specific productivity comparison quota: a value of over 100 means that the company is more productive than its industry average and a value of under 100 means that it is less productive in comparison with its sector. The average of the company-specific productivity comparison quotas was then created. Fig. 5-9 contains the results for the individual years as well as for the yearly average 2018-2021.

The yearly average 2018-2021 will be discussed first. On average across offset companies, the productivity comparison quota reached a value of 90.9, which means that the productivity level of offset companies was on average 9.1% lower than in the respective NOGA two-digit sector. Among SMEs, the productivity level is on average 9.4% below the level of the respective comparable sector; among large companies it is 7.3%.[7]

In view of the high intensity of research at the companies, these results raise questions, as a higher intensity of research would typically be accompanied by a higher level of work productivity. How can the results be classified with this background? At large companies, the data indicates that in the period observed special economic effects heavily overshadowed the structural picture. With regard to the SMEs, it must be taken into consideration that they typically exhibit below-average productivity due to scale effects. According to statistics from the OECD (2021) the productivity differentials at SMEs were between 8% and 51% compared with large companies in Switzerland in 2018.[8] In the above figures, the sector average of the respective NOGA two-digit sector was always used as the reference parameter, and also included large companies. If the productivity of the SMEs from the sample is put in relation to this, then the value is accordingly distorted downwards.

Estimates based on the OECD figures come to the conclusion that the effect of economies of scale heavily influences the overall results (productivity index 91, i.e. 9% lower productivity at companies benefiting from offset). As the data from the OECD on the productivity level by size classes is only available at the level of the economy as a whole

[7] Expressed in Swiss Francs, the productivity of offset companies on a yearly average over 2018-2021 amounts to CHF 155,000, while that of STIB sectors (according to Offset Policy 2021, Appendix 1) amounts to CHF 169,000. This comparison is less precise than the above productivity comparison quota, as differences in the sector structure between the sample and the STIB are not taken into consideration, but in practice lead to a similar result.

[8] According to the OECD (2021), the productivity differential at SMEs compared to large companies with at least 250 employees was 51% for micro-companies (<10 employees), 38% for small businesses (10 to 49 employees) and 8% for medium-sized companies (50 to 249 employees). This data applies for the Swiss economy as a whole.

(and not for each individual reference sector), no exact correction of the data could be carried out for the analytical approach pursued in this study for relative productivity. If one assumes the correction factor resulting for the economy as a whole, the result would be reversed (productivity index>100), which means that for companies benefiting from offset above-average productivity would result. Plausibility considerations suggest that the actual effect could be even stronger with detailed data.[9]

Next, the development of productivity in the period under study will be discussed. From 2018 to 2021, a slight increase in the productivity comparison quota was established on average across offset companies, from 89.6 to 90.5, which corresponds to a slight improvement in the productivity of offset companies relative to their comparable sector. While this improvement is more pronounced among SMEs (from 87.7 to 92.3), a sharp decline in the productivity comparison ratio was recorded for large companies, from 104.7 to 78.4. Offset SMEs were thus able to increase their productivity during the period in comparison with the respective NOGA two-digit sectors, while large companies lost a great deal in productivity.

Special economic effects appear to be behind the sharp decline in productivity at large offset companies between 2018 and 2021. The sub-sample of large companies surveyed is relatively small and so a small number of companies which were particularly affected by the exceptional economic situation in the years 2019 to 2021 can distort the picture. It is also important to note that work productivity is a particularly economically sensitive parameter, because gross added value (the numerator of the metric) reacts heavily to economic influences, while employment (its denominator) moves much less strongly in comparison.

Estimate of the companies

Of the surveyed participants, one-third consider offset transactions to be (fairly) important for the competitiveness of their company (see Fig. 5-10), while the rest consider it to be (fairly) unimportant. The significance of this was ranked higher by SMEs than large companies.[10] As one would expect, the significance of offset for competitiveness increases with the offset quota. This means that the higher the share of offset in turnover, the higher the significance for competitiveness is ranked. In companies with an offset quota of at least 5%, the majority of companies (58%) consider offset to be (fairly) important for competitiveness.

Conclusion

The results on competitiveness in offset companies are mixed, based on the measurement of work productivity. With regard to the relative productivity level, the results are only of limited significance due to distortions (economies of scale, special economic effects). The data available indicates that if corrected for these effects, the result could reverse and companies benefiting from offset might exhibit an above-average productivity level.

[9] Firstly, because the sample of companies benefiting from offset contains an above-average number of industrial companies and the OECD data for the manufacturing sector exhibits higher productivity differentials between SMEs and large companies than for the service sector. Secondly, because in the relevant reference sectors the share of large companies is higher than in the overall economic average.

[10] The share of companies who consider offset transactions to be (fairly) important for competitiveness is the same for the TOT (i.e. across all companies, SMEs and large ones) as for SMEs, although this share is lower for large companies. The reason for this is that with the TOT, the answers from those companies who had not provided any data on FTEs, in other words, which could not be assigned to a size class, were also taken into consideration.

With regard to the productivity dynamic, a slightly above-average value was determined among SMEs benefiting from offset in the period from 2018 to 2021, whereas with large companies the opposite is the case. Among the latter, however, special economic effects appear to play an important role for just a few companies.

The self-assessment by companies shows that one-third of companies consider offset to be (fairly) important for competitiveness and that the significance increases with a notable share of offset in turnover.

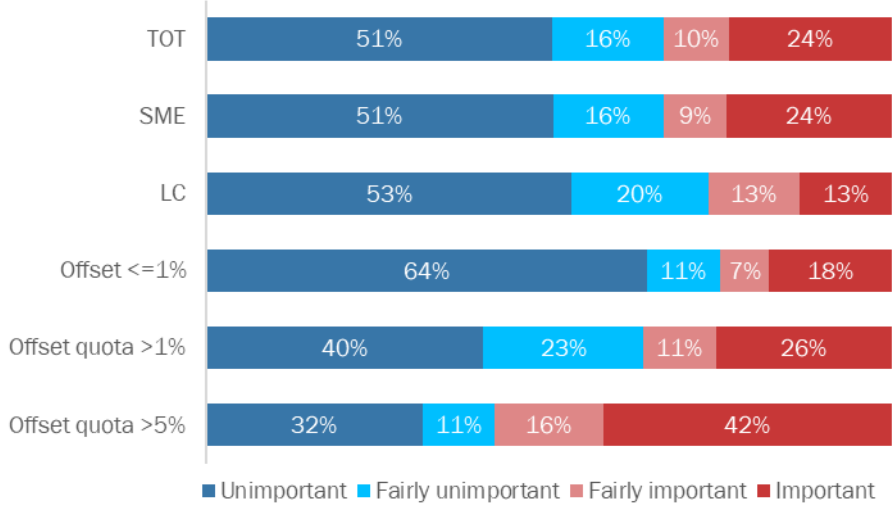
These results on competitiveness should be interpreted with caution. Due to the exceptional economic situation in the years 2019 (start of the recession in the MEM industry), 2020 (severe COVID recession) and 2021 (heavy COVID rebound) and the fact that productivity is a particularly economically sensitive measure, the significance of the productivity benchmark is limited.

Fig. 5-9 Productivity relative to comparable sectors 2018-2021 (Index: comparable sectors = 100)

	2018	2019	2020	2021	Yearly average 2018-2021
TOT	89.6	90.4	92.9	90.5	90.9
SME	87.7	90.7	91.9	92.3	90.6
LC	104.7	87.9	99.9	78.4	92.7

Comments: 100 = On average, offset companies are on a par with their respective comparable sector. Under 100 = On average, they are below; over 100 = on average, they are above.
Source: BAK Economics, company survey, FSO

Fig. 5-10 Significance of offset for competitiveness



Comment: companies were asked to indicate significance on a numerical scale from "1: not at all important" to "10: very important". The answers have been coded here as follows: 1-3 = unimportant, 4-5 fairly unimportant, 6-7 fairly important, 8-10 important.
Source: BAK Economics, company survey

5.4 Synthesis

Research question 5: Can the expectation that offset transactions could strengthen the position of Swiss industry on the international markets be confirmed for the period under study?

This question should be answered within the framework of a synthesis of the previous results. In other words, on the basis of the analyses on technology access and technological expertise, export volume and the competitiveness of beneficiary companies (research questions 1-4).

The offset companies examined have proved to exhibit above–average research intensity. In addition, they are more export-intensive than average. Both are usually associated with a higher level of competitiveness. However, for higher competitiveness, based on the measure of work productivity, no evidence (level of productivity) or only limited evidence (growth of productivity) could be found; the picture is distorted by special effects in this regard.

Due to the limitations of the data (number of data points), no statistically sound causal correlation could be found between offset transactions and various economic impact parameters. Statistically more reliable results will only be possible when additional data points are available.

The analysis results on the various offset objectives can therefore be interpreted as an indication rather than proof that offset contributes to strengthening Swiss industrial companies. However, the strength of the impact of offset appears to vary across individual offset companies – viewed across all companies the effects seem restrained, but at some companies they can be considerable. In general, the following tendencies apply:

- First, the higher the share of offset in the turnover of a company, the more likely positive effects of offset seem to appear – overlapping effects then play a less important role.

- Secondly, in the self-assessment of companies, the positive effect of offset tends to be expressed more strongly by SMEs than by large companies – for most large companies, the share of offset transactions in the turnover is very small and, correspondingly, the positive effects of offset are overshadowed.

- And thirdly, the positive correlation between offset and research and development (and access/expertise in the technological area) is particularly striking.

6 Analysis of Swiss industry

In this section, the strategic objectives pursued with offset will be evaluated with regard to Swiss industry. As part of this process, it is particularly important to take stock of and analyse Swiss industry with regard to its position in international technology competition with a focus on security-relevant technologies. The background to this is research question 6 (“Have offset transactions in Swiss industry led to a gain in expertise in the area of security-relevant technologies and industrial core capabilities?”).

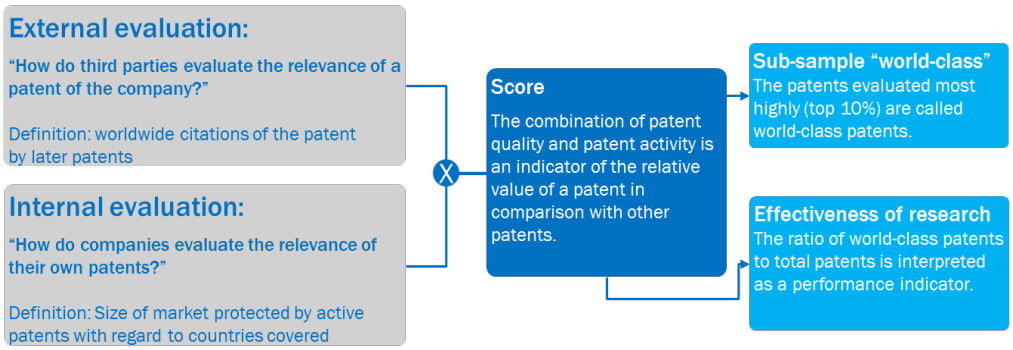
Investigation approach

In this section, we examine how the position of Swiss companies in the area of security-relevant technologies (SrT) (according to Appendix 2 of the Offset Policy 2021) developed relative to foreign countries in the period 2018 to 2021.

As an indicator of expertise in the area of security-relevant technologies, patent data from the most important national patent offices, the international patent databases of the European Patent Office and the World Intellectual Property Organisation (WIPO) are used. The classification of patents by country is made based on the researcher addresses in the registrations. The advantage of this is that innovation performance is measured where it effectively takes place (and not where the patent owner manages the patent).

In the analysis, BAK uses what is known as active patents. Active patents reflect the actual technology basis of a country comprehensively. However, patents differ strongly with respect to their economic potential. An evaluation system developed together with the Swiss Federal Institute of Intellectual Property (IIP) helps to separate “the wheat from the chaff” here. For this purpose, each individual patent is assessed based on two criteria – patent activity and patent quality. The combination of patent activity and patent quality results in a value for each individual patent. For each technology, patents in the upper decile are filtered out. These patents are defined as "world-class”. The share of these world-class patents in the total number of patents enables an estimate to be made of the research effectiveness of a country or a company.

Fig. 6-1 Patent assessment



Source: BAK Economics, IIP, PatentSight

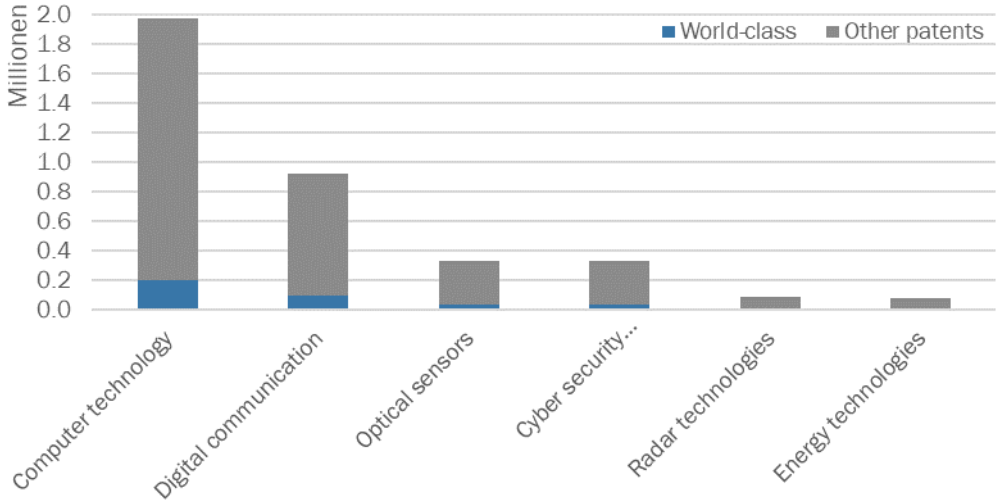
In agreement with the Customer and in accordance with the BAK study on the STIB (2021) the following six security-relevant technology fields were selected for the analysis: computer technology, digital communication, cyber security technologies, optical sensors, energy technologies and radar technologies. Technology definitions by the World Intellectual Property Organisation (WIPO) and definitions by the IIP have been used here. We refer to the BAK study (2021) for a description of the technology fields. Fig. 6-2 gives an overview of the global and Swiss patent portfolio (number of patents and number of world-class patents) in the six technology fields.

The countries used as comparative countries are those which were one of the top 15 countries with regard to the number of patents or world-class patents in one of the six technology fields in the STIB study by BAK (2021). The end result is a comparison group of 19 countries from Europe, America and Asia.

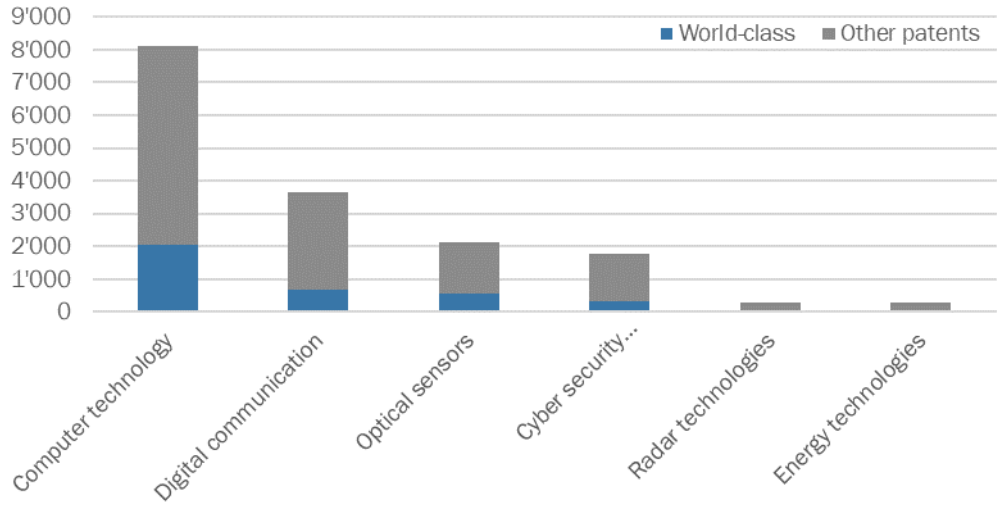
In contrast to the analyses in Section 5, offset companies (i.e. those companies which received an offset transaction in the period 2018 to 2021) are not considered specifically, but rather all Swiss companies with patents in the area of security-relevant technologies (i.e. the STIB, if they are differentiated by technology fields and using patent data). The correlation between offset in 2018 and 2021 and the variable measured (here: patent development) is thus less closely linked than in the previous section. However, the analysis can still be informative, because some of the Swiss companies taken into consideration benefited from an offset transaction in the period 2018 to 2021, others received an offset transaction at an earlier point in time and still others likely profited from spill-over effects from other companies with offset transactions.

Fig. 6-2 SrT patent portfolio in the six technology fields 2021: CH and the world

World: SrT Patent portfolio 2021



CH: SrT Patent portfolio 2021



Source: BAK Economics, IIP, PatentSight

Benchmarking

Before the development over the period 2018 to 2021 is discussed, the status at the current end-point (2021) should first be analysed.

Fig. 6-3 gives an overview of how the Swiss STIB performs in an international comparison in 2021 regarding the six technology fields taken together. The share of Switzerland in global patents and global world-class patents is comparatively small in the area of security-relevant technologies, at 0.4% (all patents) and 1.0% (world-class patents). In view of the size of Switzerland, this is not surprising. The picture is put into perspective if the size of the population is included in the comparison. For example: in terms of population, Germany is around ten times larger than Switzerland, but has only seven times more patents and 4.5 times as many world-class patents. Overall, Switzerland performs well, if corrected for population size (see BAK 2021, study on STIB).

The share of patents which are world-class is 23% in Switzerland in the area of security-relevant technology fields (all six technology fields together). Switzerland ranked first among the 19 comparative countries in 2021. The high share of world-class patents is a strong indication of the fact that the quality and efficiency of Swiss research in the area of security technologies are high.

The analysis can be refined by considering the international position of Switzerland in 2021 in the six technology fields individually. The Appendix contains an analogous evaluation for Fig. 6-3 for each individual technology field. For overview purposes, we have summarised the status of the Swiss STIB in the individual technology fields in Fig. 6-4. Switzerland's share of global patents in the various security-relevant fields of technology varies : measured by patents, the Swiss share varies from 0.3% to 0.6%, measured by world-class patents it varies from 0.7% to 1.6%. Ranked by world-class patents, Switzerland's share is by far highest in the technology field of optical sensors, followed by cyber security technologies and computer technology, then by digital communication and energy technologies, with radar technologies as the tail light. To put this in context, in the biotechnology/pharmaceutical area, Switzerland achieved a share in global patents of 5% in cutting-edge technology (world-class patents).

Next, the Swiss performance is internationally ranked for security-relevant technologies in the period 2018-2021. First, all six technology fields are again considered here (Fig. 6-5). In the period under study, the annual growth of security-relevant patents in Switzerland was 6% and for world-class patents it was 9%. If one compares this growth with the global growth in patents or world-class patents, which both increased by 10% each year, then the figures are at first glance disappointing. However, the picture is distorted by China, which exhibits a high weighting and simultaneously a massively high patent growth compared with the rest of the world – due partially to China's liberal patent strategy.[11] If China is therefore excluded from global growth, then Swiss growth in patents and world-class patents is above the global growth rate by 4% (all patents) and 7% (world-class patents). The Swiss STIB also appears to perform well in the period 2018-2021 with security-relevant patents in a direct comparison with the 19 comparison countries. Thus, Swiss companies achieve sixth place in annual growth of patents

[11] China's national patent strategy explicitly aims at increasing the number of domestic patent registrations, which is why the patent guidelines in China are less stringent than in the west. As a result, minor improvements in the area of computer technology are more often patented in China than in other countries. Several of the patents developed in China are also registered only in China (source: https://www.bloomberg.com/news/articles/2018-09-26/china-claims-more-patents-than-any-country-most-are-worthless).

and eighth place in that of world-class patents. The companies were also able to expand the share of world-class patents in the period 2018-2019 by 2.9 percentage points – which puts them in fourth place among comparison countries.

The international performance of Switzerland from 2018 to 2021 in the six individual technology fields is shown in Fig. 6-6 (see Appendix for the detailed results on each individual technology field). If China is excluded for the reasons mentioned above, then Swiss companies are outpacing global growth in the vast majority of security-relevant technology fields (if China is not excluded then the opposite is the case, as with the total of the six technology fields). With regard to world-class patents, Switzerland has made particularly strong progress relative to the global trend (excluding China) in the fields of cyber security technologies and optical sensors, and above-average progress in the fields of radar technologies, computer technology and digital communication; only in the field of energy technologies has Switzerland been unable to keep pace with global growth.

Conclusion

In the period under study from 2018 to 2021, Swiss companies were able to gain more ground in most of security-relevant technologies with patents and world-class patents (i.e. the measure used here for expertise in these technologies) than the global average (if China is excluded) and the majority of the comparable countries. How well Switzerland fares today (2021) in the area of security-relevant technologies depends on the viewpoint: the shares of global patents and world-class patents are relatively small (0.4% and 1.0% across all technology fields taken together); they are, for example, considerably lower than Switzerland's shares in the areas of biotechnology/pharmaceuticals. If, on the other hand, one focuses on the share of patents or world-class patents per inhabitant, then Switzerland is well-placed in security technologies (see the study on the STIB from BAK 2021). In addition, the share of patents which can be deemed world-class is high in Switzerland, which demonstrates a high level of research efficiency.

Fig. 6-3 Status CH with SrT patents 2021: Total of the six technology fields

Status 2021: Values

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	3'732'591	373'256	100.0%	100.0%	10%
Europe	**CH**	**16'267**	**3'771**	**0.4%**	**1.0%**	**23.2%**
	DE	**116'332**	**17'089**	**3.1%**	**4.6%**	**14.7%**
	FR	60'077	7'611	1.6%	2.0%	12.7%
	IT	14'281	2'649	0.4%	0.7%	18.5%
	AT	8'132	1'496	0.2%	0.4%	18.4%
	NL	21'529	4'942	0.6%	1.3%	23.0%
	SE	27'365	5'074	0.7%	1.4%	18.5%
	FI	17'982	3'801	0.5%	1.0%	21.1%
	GB	63'076	12'633	1.7%	3.4%	20.0%
	RU	15'623	1'790	0.4%	0.5%	11.5%
	IL	38'091	6'637	1.0%	1.8%	17.4%
Am.	**US**	**810'079**	**156'428**	**21.7%**	**41.9%**	**19.3%**
	CA	61'358	13'456	1.6%	3.6%	21.9%
Asia-Pacific	**CN**	**1'699'109**	**96'511**	**45.5%**	**25.9%**	**5.7%**
	JP	487'147	45'787	13.1%	12.3%	9.4%
	AU	13'129	2'912	0.4%	0.8%	22.2%
	KR	312'404	35'140	8.4%	9.4%	11.2%
	TW	82'704	7'038	2.2%	1.9%	8.5%
	IN	68'894	11'718	1.8%	3.1%	17.0%

Status 2021: Ranking

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**15**	**15**	**15**	**15**	**1**
	DE	**5**	**5**	**5**	**5**	**13**
	FR	10	9	10	9	14
	IT	17	17	17	17	8
	AT	19	19	19	19	10
	NL	13	13	13	13	2
	SE	12	12	12	12	9
	FI	14	14	14	14	5
	GB	8	7	8	7	6
	RU	16	18	16	18	15
	IL	11	11	11	11	11
Am.	**US**	**2**	**1**	**2**	**1**	**7**
	CA	9	6	9	6	4
Asia-Pacific	**CN**	**1**	**2**	**1**	**2**	**19**
	JP	3	3	3	3	17
	AU	18	16	18	16	3
	KR	4	4	4	4	16
	TW	6	10	6	10	18
	IN	7	8	7	8	12

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 6-4 Status CH with SrT patents 2021: Overview of the six technology fields

Status 2021: Values					
Technology field	Number of p.		Share of global p.		Number of p. that are WC
	Patents	WC p.	Patents	WC p.	
Computer technology	8'123	2'063	0.4%	1.0%	25%
Digital communication	3'643	695	0.4%	0.8%	19%
Cyber security technologies	1'791	344	0.5%	1.0%	19%
Energy technologies	291	64	0.4%	0.8%	22%
Optical sensors	2'124	542	0.6%	1.6%	26%
Radar technologies	295	63	0.3%	0.7%	21%
Total security rel. T.	16'267	3'771	0.4%	1.0%	23%

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

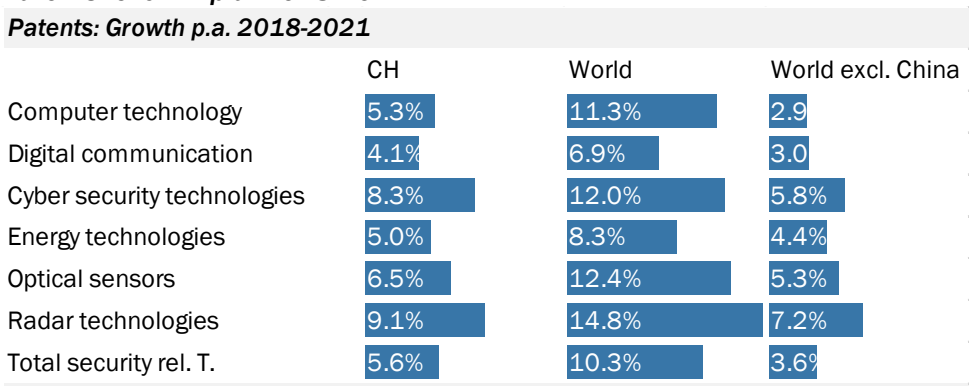
Fig. 6-5 Dev. CH with SrT patents 2018-2021: Total of the six technology fields

		Development 2018-2021: Values			Development 2018-2021: Ranking		
Region/ country		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	10%	10%	0.0%	NA	NA	NA
Europe	**CH**	**6%**	**9%**	**2.9%**	**6**	**8**	**4**
	DE	**5%**	**10%**	**2.4%**	**8**	**7**	**5**
	FR	3%	4%	0.8%	15	15	13
	IT	4%	8%	2.3%	9	9	6
	AT	5%	11%	3.3%	7	5	2
	NL	3%	2%	-0.4%	16	18	17
	SE	4%	3%	-0.3%	10	16	16
	FI	1%	-2%	-2.9%	18	19	19
	GB	3%	6%	1.7%	11	11	12
	RU	7%	12%	2.0%	4	4	10
	IL	6%	10%	2.2%	5	6	7
Am.	**US**	**3%**	**6%**	**1.8%**	**12**	**12**	**11**
	CA	3%	6%	2.1%	14	14	8
Asia-Pacific	**CN**	**22%**	**25%**	**0.4%**	**1**	**1**	**15**
	JP	1%	2%	0.5%	19	17	14
	AU	2%	7%	4.0%	17	10	1
	KR	8%	13%	2.1%	3	3	9
	TW	3%	16%	3.2%	13	2	3
	IN	9%	6%	-2.3%	2	13	18

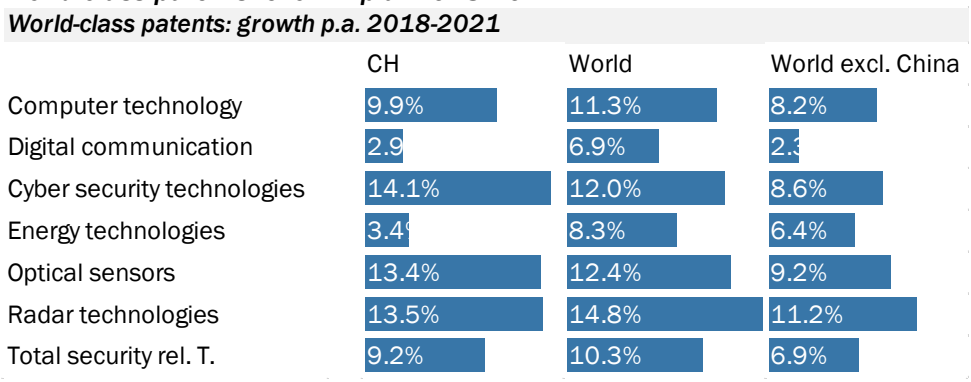
Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 6-6 Dev. CH with SrT patents 2018-2021: Overview of the six technology fields

Patents: Growth p.a. 2018-2021



World-class patents: Growth p.a. 2018-2021



Comments: World excluding China: China has been excluded from world growth; this means that world growth corresponds to the growth of all countries without China. On the other hand, when determining the world-class patents that exist for each technology field by definition in the best 10% of patents, China was not excluded.
Source: BAK Economics, IIP, PatentSight

7 Analysis of the distribution by language region

In this section, the strategic objectives pursued with offset will be examined with regard to balanced consideration of the language regions. The background for this is research question 7.

Research question 7: Were the guidelines for the desired regional distribution achieved?

Requirements with regard to language regions

One requirement for offset in the Offset Policy 2021 is that the foreign supplier should strive for a balanced regional distribution when fulfilling its offset obligation. The guidelines given were 65% in German-speaking, around 30% in French-speaking and around 5% in Italian-speaking Switzerland, with the location of the provision of services being taken.

Language region analysis

Based on armasuisse's offset tables, BAK analysed the distribution by language regions for the total of 616 offset transactions in the period 2018-2021. The result is shown in Fig. 7-1.

Altogether, German-speaking Switzerland is slightly over-represented: its share in the number of transactions is 67.6%, its share in the offset volume is 68.4% (guideline: 65%). Italian-speaking Switzerland is under-represented; its share in the number of transactions is 3.8%, while its share in the total offset amount is 1.5% (guideline: 5%). In contrast, French-speaking Switzerland is closer to the guideline than Italian-speaking Switzerland – its share in the number of transactions is 28.5%, while its share in the volume is at 30.1% (guideline: 30%).

Conclusion

Altogether, based on the available data, it could be established that the regional language guidelines have been more or less achieved, although there is room for improvement in Italian-speaking Switzerland. However, this result must be interpreted with some caution because a relatively large number of offset transactions (133 out of the 616) were not assigned (explicitly) to a language region in the offset tables and as a result were not incorporated into the analysis.

Fig. 7-1 Offset transactions by language region distribution

Language region	Number of offset transactions		Offset amount	
	Offset table		Offset table	
	[Number]	[Share*]	[Thousand CHF]	[Share*]
DE	327	67.6%	464'700	68.4%
FR	138	28.5%	204'432	30.1%
IT	18	3.8%	9'958	1.5%
NA	133		348'140	
TOT	616	100%	1'027'230	100%

Comments: * Shares calculated without NAs. “NA” stands for “not available”: this means that no (explicit) value is entered in the offset tables for these offset transactions under “language region”.
Source: BAK Economics, armasuisse (offset tables)

8 Summary of impact analysis/evaluation

With regard to the companies benefiting from offset

Research question 1: Have offset transactions opened up access to cutting-edge technologies for the beneficiary companies, in particular in the areas of security-relevant technologies? Research question 2: Have offset transactions led to a gain in expertise for the beneficiary companies in the area of security-relevant technologies and industrial core capabilities?

- The share of R&D employees is considerably above average in offset companies. In addition, the share of R&D employees who are specifically active in the area of security-relevant technologies is 21% in offset companies.
- According to slightly less than one-third of offset companies surveyed, offset is (fairly) important for access and expertise in security technologies. This share increases if offset has a more significant share in turnover.

Research question 3: Have offset transactions increased the export volume of the beneficiary companies (defined economic sectors)?

- The export ratio is above average in offset companies. In addition, the export share improved from 2018 to 2020 relative to the comparable sectors. However, these results must be interpreted with caution due to the exceptional economic situation in the period under study and the economic sensitivity of exports.
- On average, companies benefiting from offset transactions generate an additional 7.1% in exports.
- Around one-quarter of offset companies consider offset to be (fairly) important for exports. The significance of offset for export volume increases (as one would expect) with the share of offset in the turnover of the company.

Research question 4: Have offset transactions helped the beneficiary companies (defined economic sectors) to become more competitive?

- The result is mixed based on the measure of work productivity: on average, offset companies indicate a lower productivity level over the period 2018-2021 than the comparable sectors. However, with regard to the evaluation for SMEs, these results are systematically distorted (economies of scale of large companies distort the reference level upwards). Available data on the level of the overall economy indicates that when corrected for these effects, companies benefiting from offset were able to exhibit an above-average productivity level. A correction consistent with the analysis method at the level of individual reference sectors is not possible due to lack of sector-specific data.
- It is important to differentiate between the changes in productivity during the period under study: offset SMEs were able to expand productivity slightly relatively to their respective comparable sectors during the period 2018-2021. For large companies, the opposite is the case. The significance of these results remains limited due to the exceptional economic situation in the period under study and the economic sensitivity of the measure “work productivity”.
- One-third of offset companies consider offset to be (fairly) important for competitiveness. Companies with a significant share of offset in turnover estimate the significance to be higher.

Research question 5: Can the expectation that offset transactions could strengthen the position of Swiss industry on the international markets be confirmed for the period under study?

- Overall, the results of the analysis can be taken as an indicator that offset contributes to strengthening Swiss industrial companies.
- Offset companies exhibit above-average research and export intensity. Both are usually associated with higher competitiveness, even if the latter is not shown in the measure of work productivity (level of productivity) or can only be shown to a limited extent (growth of productivity) in the economically volatile period under study of 2018-2021.
- However, the strength of the impact of offset appears to vary across individual offset companies: viewed across all companies, the effects seem modest, while with some companies they can be considerable.
- In general, the following tendencies apply: firstly, the higher the share of offset in the turnover of a company, the more likely positive effects of offset seem to appear. Secondly, the self-assessment by companies shows the positive effect of offset in SMEs rather than in large companies. And thirdly, the positive correlation between offset and research and development (and access/expertise in the technological area) is particularly striking.

With regard to Swiss industry overall:

Research question 6: Have offset transactions in Swiss industry led to a gain in expertise in the area of security-relevant technologies and industrial core capabilities?

- From 2018 to 2021, Swiss companies were able to gain more ground in most security-relevant technologies with patents and world-class patents – the measure used for expertise in these technologies – than the global average (if China is excluded) and the majority of comparable countries.
- How well Switzerland fares today (2021) in the area of security-relevant technologies depends on the viewpoint: the share of global patents and world-class patents is comparatively small (0.4% and 1.0%) and considerably lower than that in the areas of biotechnology/pharmaceuticals. If, on the other hand, one focuses on the patents or world-class patents per inhabitant, then Switzerland performs well; likewise with regard to the share of patents which are considered to be world-class (which indicates a high level of research efficiency in the area of security-relevant technologies).

With regard to the language regions:

Research question 7: Were the guidelines for the regional distribution aimed for achieved?

- The guidelines by language region were more or less achieved overall.
- There is potential for improvement in Italian-speaking Switzerland.

9 Monitoring recommendations

Based on the experience gained in drawing up the evaluation in the previous sections, this section aims to provide recommendations on how future monitoring of the strategic objectives of the offset tool can be carried out.

Objective

Monitoring aims to evaluate, at regular intervals, whether the strategic objectives of the offset tool are being fulfilled.

Monitoring is used for the following purposes:

- Creation of an evidence base for regular evaluation of the objectives of the offset tool, possible adjustment of the goals as well as possible adjustment of the measures (i.e. the Offset Policy).
- Creation of an evidence base that is as up-to-date as possible for the political debate on specific procurement projects in which the particular configuration of offset requirements is at issue (for example, the federal decree on the procurement of new combat aircraft).
- Creation of an evidence base for regularly informing the economy, society and media with regard to the offset tool and its effects.

In order for this type of monitoring to be effective and sustainable, it should be designed as follows:

- Monitoring should allow for statements that are as informative as possible.
- Monitoring should be carried out in a manner as efficient as possible for armasuisse and in particular for offset companies.

Scope in terms of content

The objective of the preceding evaluation was to examine all the strategic goals pursued with the offset tool and corresponding research questions. The analysis has shown that this undertaking is in principle possible and feasible.

For reasons of informative value, it would be advisable to cover the entire spectrum of goals and research questions in terms of content again in future monitoring. For reasons of efficiency, however, concentration on individual objectives would be possible:

- The analysis of research question 6 (Have offset transactions in Swiss industry led to a gain in expertise in the area of security-relevant technologies and industrial core capabilities?) is relatively independent of the remaining questions, because it is based on different data and has a different orientation (in other words it is aimed at industry as a whole and not just beneficiary companies).
- Similarly, research question 7 (Were the guidelines for the regional distribution aimed for achieved?) is also independent of the other questions, because it is only based on data from the offset tables (not data from the survey).

- Although research questions 1-5 (competitiveness, access to and expertise in security-related technologies, exports, position on the international markets) can in principle be examined independently of each other, this is not recommended for logical reasons. The reason is that these questions are ultimately related – R&D activity and export intensity in particular are closely connected with competitiveness. A further reason is that economic influences could have a distorting effect on certain aspects in these questions and an individual assessment could therefore lead to false conclusions. It therefore makes sense to examine these questions holistically.

What the contents of the scope of the monitoring should be, in other words, how significance and efficiency are to be weighted is ultimately at the discretion of the Customer.

Focus: Methodology

The evaluation in the previous sections has shown that the economy can have an impact on the study and that the short (four-year) time series involved methodological limitations (see Section 5.1, Methodology).

Bearing in mind this experience, the following should be taken into consideration for future monitoring:

- The attempt should be made to organise monitoring and data collection such that longer consistent time series are generated for offset transactions and offset companies. Longer, rolling study windows could then be used in the periodic monitoring.

- In addition, where possible, the aim should be to create a panel of offset companies – in other words, longer time series for individual companies.

Using this data – longer time series and panels – more econometric methods could be applied, with which inter-temporal relationships between offset and impact could be examined; economic effects could also be dealt with better. This would increase the chances for statistically more robust statements on causality and magnitude of the effects.

A useful complement to the data-based analyses could be company interviews and individual case studies.

In the area of technology analysis, it should be checked whether a comparative analysis of companies with offset transactions in other countries (for example, Denmark, which also has an active offset policy) would also be possible. This would enable patent benchmarking of the offset companies.

Focus: data basis

Various data sources have been combined with each other in the evaluation in the previous sections: data from armasuisse (offset information forms in PDF format or offset tables generated from these in Excel format), data from the company survey to collect further parameters and data from third parties. Based on the experience gained in the process, BAK sees various potential ways to optimise the process of data collec-

tion, data preparation and connection with a consistent data basis, which could increase the significance and/or efficiency of monitoring, depending on the individual case.

Specifically, BAK sees the following improvement options for future monitoring with regard to the data process:

- It should be checked whether a connection between the "offset data" and company data from other federal offices (such as STATENT from the FSO) is possible. This would require finding a method of dealing with data protection. One possibility could be that external analysts from the Federal Administration receive an anonymised data record for evaluation or alternatively carry out data processing and analysis in the offices of the Federal Administration.

  This would increase the significance of the monitoring, because reliable and, if necessary, additional parameters could be used. At the same time, this type of procedure would also be efficient, because existing data (such as data on the FTEs of companies) would not need to be collected again as part of the monitoring process.

- Additional data should be collected in the offset information forms. On the one hand, this is data sourced from third parties in the evaluation carried out: sector of the company; contact person on the Executive Board, email address and telephone number. On the other hand, it should be checked whether some of the data collected in this study through the company survey could already be covered by the offset information forms. For example: data up to the current end-point on turnover, exports, expenditure and full-time employees (total and in R&D). This would not render a company survey superfluous, because data would still need to be collected for the years from the offset transaction; however, the survey could be slimmed down with regard to the number of data points (years examined), which would increase the participation rate.

  This procedure would have a positive impact both on efficiency and significance (data on more companies).

- Basically, there are several possibilities for increasing the participation of offset companies in the company survey; apart from streamlining the survey by collecting various statistics in the offset information form, as mentioned above, these are as follows: first of all, relevance, in other words, the awareness that a company has received offset transactions, could be strengthened. This could be achieved, for example, by carrying out the survey closer in time to the processing of the offset transaction, or by involving the offset manager in the invitation in addition to the contact person from the Executive Board. Secondly, the Offset Policy could include a note that after a certain period of time, monitoring will be carried out, and that this will include a company survey. Thirdly, it could be checked whether participation in the company survey should be made a condition for offset transactions.

  In particular, these proposals aim to increase the significance of the monitoring (higher participation rate).

- The completeness of the data in the offset information form should be ensured. This means that missing or incomplete entries should be avoided. This applies, for example, to the following parameters, which were either not collected at all

or not collected completely in the offset information forms from the period 2018-2021: language region, offset type (direct or indirect), business types (according to Offset Policy 2021, Section 5.2) and security-relevant technologies (according to Offset Policy 2021, Appendix 2). This is partly due to the fact that the offset information forms originate from a time before the new Offset Policy of July 2021 came into force.

This procedure would increase the significance of the monitoring.

- Standardised coding and formatting of the data in the offset information forms should be ensured. This includes, for example, a uniform spelling of the company for all offset transactions and the additional details of the UID number, so that links to other data sources (from the survey, for example), are possible more easily; use of a standardised date format (day, month, year) and date periods (individual days and time intervals made in separate columns); the response types specified as a selection menu, if possible, in order to enforce uniformity.

  Taking these proposals into account would increase efficiency in data preparation and evaluation of the monitoring.

- Finally, it should be checked whether a digital platform could be created for managing offset transactions, which is connected to a database. The companies would receive access to a login area with an entry screen for the basic data on the company and a screen for each individual offset transaction (the same as existing platforms in the private and public sectors). The entire administration (offset fee of 0.1%, etc.) could also be processed via this platform, and possibly also the company survey. One key argument for creating a digital platform is that the two proposals for improvement above (completeness of data and standardised coding/data formatting) can otherwise only be achieved with difficulty.

  This proposal would increase the efficiency of monitoring (in particular for offset companies).

Monitoring frequency

If one assumes an evaluation cycle of the offset tool of four years, then it is conceivable that a monitoring cycle could basically take place anywhere between every one and four years.

However, there are reasons for not monitoring too frequently or too little:

- The argument against annual monitoring is that it is not efficient because monitoring that is more comprehensive in terms of content requires a company survey. The implementation involves effort and it therefore makes sense not to perform the survey every year, but to query data points for several years at a time in the survey.

- The argument against monitoring only every four years is that knowledge at companies about offset transactions which took place further back in the past decreases over time. This could, for example, be due to the fact that persons who were involved in offset transactions are no longer employed in the company. This is one of the experiences made during the survey for the previous

evaluation. In addition, it might be a participation hurdle for companies to have to provide data points over the last four years.

At least from the perspective of data collection by a company survey, a two-year rhythm seems ideal. In principle, this leaves open the possibility of performing a comprehensive monitoring (evaluation) based on this every two or four years. A compromise between significance and efficiency could be that a partial update of selected key factors is performed every two years and a comprehensive update performed every four years.

10 Appendix

10.1 Questionnaire

Instruction:

- All questions refer only to the Swiss location of your company.
- If you do not know a statistic (precisely), please make an estimate.
- You can temporarily save the survey under “Continue later” (in the header line at the top left), and you will need to create a login with name and password. You can log in and continue with the name and password you previously entered by clicking on “Load saved survey” (in the header line at the top left on the start page).

1. Information on your company

(1) Please enter the name of your company: …

(2) Was your company only founded after 2018? If the answer is yes, please leave the years before company foundation blank in the questions below.
Yes, no (single choice).

2. Key figures for your company

Preliminary remarks: The statistics requested on this page refer not only to offset transactions, but to all transactions by your company; this means the entire turnover, export, expenditure and entire workforce of your company at the Swiss location.

(3) Please enter the number of employees (full-time equivalents) at the location in Switzerland.
2018: …
2019: …
2020: …
2021: …

(4) Please enter the number of employees (full-time equivalents) in the area of Research and Development (R&D) at the location in Switzerland. If you do not know the number, please enter an estimate.
2018: …
2019: …
2020: …
2021: …

(5) Please enter the turnover of your company at the location in Switzerland (in thousand CHF).
2018: …
2019: …
2020: …
2021: …

(6) Please enter the exports of your company at the location in Switzerland (in thousand CHF).
2018: …
2019: …

2020: ...
2021: ...

(7) Please enter the expenditure for material, goods and externally procured third-party services (excluding investments) at the Swiss location from your income statement (in thousand CHF).
2018: ...
2019: ...
2020: ...
2021: ...

3. Estimate of offset transactions

(8) How many additional exports do you estimate that has your company achieved at the Swiss location on average in the years 2018 to 2021 as a result of offset? "Additional exports" include exports obtained directly as part of an offset transaction as well as exports indirectly resulting from this (follow-up orders, orders through connections, orders through the acquisition of new competences, etc.).
Select from list: 0%, 1-5%, 5-10%, 10-20%, 20-40%, 40-60%, 60-80%, 80-100% (single choice)

(9) What portion of your employees in research and development (R&D) at the Swiss location do you estimate was active on average in the years 2018 to 2021 specifically in the area of security-relevant technologies (according to the Offset Policy 2021, Appendix 2)?
Select from list: 0%, 1-5%, 5-10%, 10-20%, 20-40%, 40-60%, 60-80%, 80-100% (single choice)

(10) How important do you estimate offset transactions to be for your company with regard to the following points? Select from:
Scale from 1-10 with 1 = not at all important, 10 = very important
- Competitiveness
- Access to cutting-edge technologies in the area of security-relevant technologies (Offset Policy 2021, Appendix 2)
- Expertise in the area of security-relevant technologies (Offset Policy 2021, Appendix 2)
- Employment of skilled workers in the area of security-relevant technologies (Offset Policy 2021, Appendix 2)
- Export volume

(11) Your comments/feedback (optional): ...

10.2 Detailed results on security-relevant technology fields

Fig. 10-1 Status CH with SrT patents 2021: computer technology

Status 2021: Values						
Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	1'975'307	197'530	100.0%	100.0%	10%
Europe	**CH**	**8'123**	**2'063**	**0.4%**	**1.0%**	**25.4%**
	DE	**50'884**	**8'463**	**2.6%**	**4.3%**	**16.6%**
	FR	26'691	3'887	1.4%	2.0%	14.6%
	IT	6'762	1'304	0.3%	0.7%	19.3%
	AT	3'383	734	0.2%	0.4%	21.7%
	NL	10'231	2'554	0.5%	1.3%	25.0%
	SE	7'805	1'852	0.4%	0.9%	23.7%
	FI	6'075	1'512	0.3%	0.8%	24.9%
	GB	30'188	6'328	1.5%	3.2%	21.0%
	RU	7'303	882	0.4%	0.4%	12.1%
	IL	19'503	3'739	1.0%	1.9%	19.2%
Am.	**US**	**422'791**	**84'331**	**21.4%**	**42.7%**	**19.9%**
	CA	27'734	6'200	1.4%	3.1%	22.4%
Asia-Pacific	**CN**	**937'219**	**47'094**	**47.4%**	**23.8%**	**5.0%**
	JP	262'129	26'411	13.3%	13.4%	10.1%
	AU	6'585	1'516	0.3%	0.8%	23.0%
	KR	143'866	16'752	7.3%	8.5%	11.6%
	TW	52'824	4'362	2.7%	2.2%	8.3%
	IN	35'001	5'225	1.8%	2.6%	14.9%

Status 2021: Ranking						
Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**13**	**13**	**13**	**13**	**1**
	DE	**6**	**5**	**6**	**5**	**12**
	FR	10	10	10	10	14
	IT	16	17	16	17	10
	AT	19	19	19	19	7
	NL	12	12	12	12	2
	SE	14	14	14	14	4
	FI	18	16	18	16	3
	GB	8	6	8	6	8
	RU	15	18	15	18	15
	IL	11	11	11	11	11
Am.	**US**	**2**	**1**	**2**	**1**	**9**
	CA	9	7	9	7	6
Asia-Pacific	**CN**	**1**	**2**	**1**	**2**	**19**
	JP	3	3	3	3	17
	AU	17	15	17	15	5
	KR	4	4	4	4	16
	TW	5	9	5	9	18
	IN	7	8	7	8	13

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10 2 Dev. CH with SrT patents 2018-2021: computer technology

Region/ country		Development 2018-2021: Values			Development 2018-2021: Ranking		
		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	11%	11%	0.0%	NA	NA	NA
Europe	**CH**	**5%**	**10%**	**4.0%**	**5**	**9**	**4**
	DE	**3%**	**11%**	**3.9%**	**9**	**8**	**5**
	FR	2%	7%	2.5%	13	12	12
	IT	4%	13%	5.4%	7	6	3
	AT	4%	13%	6.6%	8	5	1
	NL	2%	4%	1.8%	14	18	15
	SE	2%	5%	2.4%	16	16	13
	FI	1%	1%	-0.1%	17	19	18
	GB	3%	7%	3.0%	10	15	11
	RU	6%	14%	3.1%	4	3	10
	IL	5%	11%	3.9%	6	7	6
Am.	**US**	**2%**	**7%**	**3.3%**	**15**	**14**	**8**
	CA	2%	7%	3.7%	12	13	7
Asia-Pacific	**CN**	**27%**	**26%**	**-0.2%**	**1**	**1**	**19**
	JP	1%	4%	1.2%	18	17	16
	AU	1%	9%	6.1%	19	10	2
	KR	8%	14%	2.0%	3	4	14
	TW	2%	16%	3.2%	11	2	9
	IN	9%	9%	0.0%	2	11	17

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-2 Status CH with SrT patents 2021: digital communication

Status 2021: Values

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	925'576	92'557	100.0%	100.0%	10%
Europe	**CH**	**3'643**	**695**	**0.4%**	**0.8%**	**19.1%**
	DE	**27'217**	**3'647**	**2.9%**	**3.9%**	**13.4%**
	FR	16'688	1'886	1.8%	2.0%	11.3%
	IT	4'038	771	0.4%	0.8%	19.1%
	AT	2'007	283	0.2%	0.3%	14.1%
	NL	5'563	1'169	0.6%	1.3%	21.0%
	SE	15'357	2'385	1.7%	2.6%	15.5%
	FI	8'753	1'638	0.9%	1.8%	18.7%
	GB	18'569	3'350	2.0%	3.6%	18.0%
	RU	3'027	453	0.3%	0.5%	15.0%
	IL	10'038	1'247	1.1%	1.3%	12.4%
Am.	**US**	**221'945**	**39'151**	**24.0%**	**42.3%**	**17.6%**
	CA	21'462	4'639	2.3%	5.0%	21.6%
Asia-Pacific	**CN**	**429'504**	**30'848**	**46.4%**	**33.3%**	**7.2%**
	JP	85'700	6'002	9.3%	6.5%	7.0%
	AU	3'344	753	0.4%	0.8%	22.5%
	KR	87'072	11'582	9.4%	12.5%	13.3%
	TW	14'680	1'417	1.6%	1.5%	9.7%
	IN	22'605	4'511	2.4%	4.9%	20.0%

Status 2021: Ranking

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**16**	**17**	**16**	**17**	**6**
	DE	**5**	**7**	**5**	**7**	**13**
	FR	9	10	9	10	16
	IT	15	15	15	15	5
	AT	19	19	19	19	12
	NL	14	14	14	14	3
	SE	10	9	10	9	10
	FI	13	11	13	11	7
	GB	8	8	8	8	8
	RU	18	18	18	18	11
	IL	12	13	12	13	15
Am.	**US**	**2**	**1**	**2**	**1**	**9**
	CA	7	5	7	5	2
Asia-Pacific	**CN**	**1**	**2**	**1**	**2**	**18**
	JP	4	4	4	4	19
	AU	17	16	17	16	1
	KR	3	3	3	3	14
	TW	11	12	11	12	17
	IN	6	6	6	6	4

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-3 Dev. CH with SrT patents 2018-2021: Digital communication

		Development 2018-2021: Values			Development 2018-2021: Ranking		
Region/ country		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	7%	7%	0.0%	NA	NA	NA
Europe	**CH**	**4%**	**3%**	**-0.9%**	**8**	**8**	**9**
	DE	**4%**	**6%**	**0.9%**	**7**	**5**	**5**
	FR	1%	-2%	-1.5%	16	16	12
	IT	3%	0%	-2.2%	13	15	16
	AT	4%	3%	-0.2%	9	7	7
	NL	0%	-5%	-5.0%	18	18	17
	SE	4%	1%	-2.0%	6	14	15
	FI	0%	-6%	-5.0%	17	19	18
	GB	3%	2%	-0.7%	14	11	8
	RU	9%	7%	-1.1%	2	4	10
	IL	5%	2%	-1.6%	5	12	13
Am.	**US**	**4%**	**2%**	**-1.6%**	**10**	**10**	**14**
	CA	2%	3%	0.2%	15	9	6
Asia-Pacific	**CN**	**12%**	**21%**	**1.8%**	**1**	**1**	**3**
	JP	-1%	-5%	-1.2%	19	17	11
	AU	4%	5%	1.3%	11	6	4
	KR	5%	11%	2.5%	4	3	2
	TW	4%	14%	3.0%	12	2	1
	IN	8%	2%	-5.7%	3	13	19

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10 5 Status CH with SrT patents 2021: cyber security technologies

Status 2021: Values						
Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	332'326	33'232	100.0%	100.0%	10%
Europe	**CH**	**1'791**	**344**	**0.5%**	**1.0%**	**19.2%**
	DE	**8'730**	**1'132**	**2.6%**	**3.4%**	**13.0%**
	FR	6'410	676	1.9%	2.0%	10.5%
	IT	1'293	235	0.4%	0.7%	18.2%
	AT	663	103	0.2%	0.3%	15.5%
	NL	1'770	350	0.5%	1.1%	19.8%
	SE	1'957	383	0.6%	1.2%	19.6%
	FI	1'898	438	0.6%	1.3%	23.1%
	GB	7'537	1'554	2.3%	4.7%	20.6%
	RU	1'644	197	0.5%	0.6%	12.0%
	IL	4'418	630	1.3%	1.9%	14.3%
Am.	**US**	**85'353**	**16'012**	**25.7%**	**48.2%**	**18.8%**
	CA	6'613	1'361	2.0%	4.1%	20.6%
Asia-Pacific	**CN**	**145'454**	**9'127**	**43.8%**	**27.5%**	**6.3%**
	JP	31'139	2'108	9.4%	6.3%	6.8%
	AU	1'587	321	0.5%	1.0%	20.2%
	KR	28'443	1'921	8.6%	5.8%	6.8%
	TW	4'718	295	1.4%	0.9%	6.3%
	IN	7'404	1'218	2.2%	3.7%	16.5%

Status 2021: Ranking						
Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**14**	**14**	**14**	**14**	**7**
	DE	**5**	**8**	**5**	**8**	**13**
	FR	9	9	9	9	15
	IT	18	17	18	17	9
	AT	19	19	19	19	11
	NL	15	13	15	13	5
	SE	12	12	12	12	6
	FI	13	11	13	11	1
	GB	6	5	6	5	2
	RU	16	18	16	18	14
	IL	11	10	11	10	12
Am.	**US**	**2**	**1**	**2**	**1**	**8**
	CA	8	6	8	6	3
Asia-Pacific	**CN**	**1**	**2**	**1**	**2**	**18**
	JP	3	3	3	3	16
	AU	17	15	17	15	4
	KR	4	4	4	4	17
	TW	10	16	10	16	19
	IN	7	7	7	7	10

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10 6 Dev. CH with SrT patents 2018-2021: cyber security technologies

	Region/ country	Development 2018-2021: Values			Development 2018-2021: Ranking		
		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	12%	12%	0.0%	NA	NA	NA
Europe	**CH**	**8%**	**14%**	**3.6%**	**7**	**7**	**2**
Europe	**DE**	**8%**	**15%**	**2.9%**	**9**	**5**	**4**
Europe	FR	4%	5%	0.4%	15	15	13
Europe	IT	9%	12%	2.2%	6	8	6
Europe	AT	6%	16%	4.7%	11	4	1
Europe	NL	5%	4%	-1.1%	13	17	17
Europe	SE	4%	5%	0.8%	16	16	12
Europe	FI	0%	-2%	-2.3%	19	19	18
Europe	GB	7%	11%	3.0%	10	9	3
Europe	RU	12%	17%	2.0%	3	3	8
Europe	IL	10%	9%	-0.3%	4	10	16
Am.	**US**	**6%**	**8%**	**1.3%**	**12**	**12**	**10**
Am.	CA	5%	8%	1.8%	14	13	9
Asia-Pacific	**CN**	**24%**	**25%**	**0.2%**	**1**	**1**	**14**
Asia-Pacific	JP	1%	1%	0.0%	18	18	15
Asia-Pacific	AU	3%	6%	2.7%	17	14	5
Asia-Pacific	KR	10%	14%	1.1%	5	6	11
Asia-Pacific	TW	8%	19%	2.0%	8	2	7
Asia-Pacific	IN	13%	9%	-2.4%	2	11	19

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-4 Status CH with SrT patents 2021: energy technologies

Status 2021: Values

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	79'326	7'932	100.0%	100.0%	10%
Europe	**CH**	**291**	**64**	**0.4%**	**0.8%**	**22.0%**
	DE	**7'694**	**610**	**9.7%**	**7.7%**	**7.9%**
	FR	1'439	169	1.8%	2.1%	11.7%
	IT	340	47	0.4%	0.6%	13.8%
	AT	485	74	0.6%	0.9%	15.3%
	NL	198	44	0.2%	0.6%	22.2%
	SE	201	33	0.3%	0.4%	16.4%
	FI	115	11	0.1%	0.1%	9.6%
	GB	944	216	1.2%	2.7%	22.9%
	RU	217	22	0.3%	0.3%	10.1%
	IL	136	38	0.2%	0.5%	27.9%
Am.	**US**	**9'608**	**1'816**	**12.1%**	**22.9%**	**18.9%**
	CA	922	183	1.2%	2.3%	19.8%
Asia-Pacific	**CN**	**19'484**	**948**	**24.6%**	**12.0%**	**4.9%**
	JP	24'683	2'657	31.1%	33.5%	10.8%
	AU	140	31	0.2%	0.4%	22.1%
	KR	13'523	1'505	17.0%	19.0%	11.1%
	TW	843	71	1.1%	0.9%	8.4%
	IN	324	54	0.4%	0.7%	16.7%

Status 2021: Ranking

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**13**	**11**	**13**	**11**	**5**
	DE	**5**	**5**	**5**	**5**	**18**
	FR	6	8	6	8	12
	IT	11	13	11	13	11
	AT	10	9	10	9	10
	NL	16	14	16	14	3
	SE	15	16	15	16	9
	FI	19	19	19	19	16
	GB	7	6	7	6	2
	RU	14	18	14	18	15
	IL	18	15	18	15	1
Am.	**US**	**4**	**2**	**4**	**2**	**7**
	CA	8	7	8	7	6
Asia-Pacific	**CN**	**2**	**4**	**2**	**4**	**19**
	JP	1	1	1	1	14
	AU	17	17	17	17	4
	KR	3	3	3	3	13
	TW	9	10	9	10	17
	IN	12	12	12	12	8

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-5 Dev. CH with SrT patents 2018-2021: energy technologies

	Region/ country	Development 2018-2021: Values			Development 2018-2021: Ranking		
		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	8%	8%	0.0%	NA	NA	NA
Europe	**CH**	**5%**	**3%**	**-1.4%**	**8**	**8**	**12**
Europe	**DE**	**9%**	**7%**	**-0.7%**	**4**	**6**	**8**
Europe	FR	5%	3%	-1.3%	7	11	10
Europe	IT	8%	-4%	-8.1%	6	19	19
Europe	AT	17%	14%	-1.7%	2	3	14
Europe	NL	5%	3%	-1.6%	9	10	13
Europe	SE	11%	3%	-5.2%	3	9	17
Europe	FI	1%	-2%	-1.3%	16	16	11
Europe	GB	4%	1%	-2.7%	11	12	16
Europe	RU	-1%	-2%	-0.4%	19	16	7
Europe	IL	5%	8%	3.2%	10	5	2
Am.	**US**	**3%**	**1%**	**-1.2%**	**13**	**13**	**9**
Am.	CA	0%	0%	-0.1%	17	14	6
Asia-Pacific	**CN**	**28%**	**31%**	**0.5%**	**1**	**1**	**5**
Asia-Pacific	JP	2%	4%	0.8%	14	7	4
Asia-Pacific	AU	2%	-4%	-5.5%	15	18	18
Asia-Pacific	KR	8%	23%	4.4%	5	2	1
Asia-Pacific	TW	0%	11%	3.0%	18	4	3
Asia-Pacific	IN	3%	0%	-2.2%	12	15	15

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-6 Status CH with SrT patents 2021: optical sensors

Status 2021: Values

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	333'637	33'363	100.0%	100.0%	10%
Europe	**CH**	**2'124**	**542**	**0.6%**	**1.6%**	**25.5%**
	DE	**16'536**	**2'498**	**5.0%**	**7.5%**	**15.1%**
	FR	6'362	806	1.9%	2.4%	12.7%
	IT	1'480	239	0.4%	0.7%	16.1%
	AT	1'240	248	0.4%	0.7%	20.0%
	NL	3'211	713	1.0%	2.1%	22.2%
	SE	1'337	262	0.4%	0.8%	19.6%
	FI	878	152	0.3%	0.5%	17.3%
	GB	4'621	956	1.4%	2.9%	20.7%
	RU	1'831	183	0.5%	0.5%	10.0%
	IL	3'088	810	0.9%	2.4%	26.2%
Am.	**US**	**55'208**	**11'784**	**16.5%**	**35.3%**	**21.3%**
	CA	3'596	816	1.1%	2.4%	22.7%
Asia-Pacific	**CN**	**131'577**	**6'716**	**39.4%**	**20.1%**	**5.1%**
	JP	69'698	7'203	20.9%	21.6%	10.3%
	AU	1'218	226	0.4%	0.7%	18.6%
	KR	32'420	2'739	9.7%	8.2%	8.4%
	TW	8'574	794	2.6%	2.4%	9.3%
	IN	2'591	543	0.8%	1.6%	21.0%

Status 2021: Ranking

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**13**	**13**	**13**	**13**	**2**
	DE	**5**	**5**	**5**	**5**	**13**
	FR	7	9	7	9	14
	IT	15	16	15	16	12
	AT	17	15	17	15	8
	NL	10	11	10	11	4
	SE	16	14	16	14	9
	FI	19	19	19	19	11
	GB	8	6	8	6	7
	RU	14	18	14	18	16
	IL	11	8	11	8	1
Am.	**US**	**3**	**1**	**3**	**1**	**5**
	CA	9	7	9	7	3
Asia-Pacific	**CN**	**1**	**3**	**1**	**3**	**19**
	JP	2	2	2	2	15
	AU	18	17	18	17	10
	KR	4	4	4	4	18
	TW	6	10	6	10	17
	IN	12	12	12	12	6

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10 10 Dev. CH with SrT patents 2018-2021: optical sensors

Region/ country		Development 2018-2021: Values			Development 2018-2021: Ranking		
		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	12%	12%	0.0%	NA	NA	NA
Europe	**CH**	**6%**	**13%**	**5.7%**	**10**	**6**	**2**
Europe	**DE**	**5%**	**9%**	**1.8%**	**14**	**16**	**10**
Europe	FR	5%	9%	1.8%	16	13	11
Europe	IT	5%	11%	3.5%	17	7	4
Europe	AT	7%	9%	1.5%	8	11	15
Europe	NL	7%	9%	1.5%	9	14	14
Europe	SE	8%	11%	2.5%	6	8	8
Europe	FI	8%	6%	-1.3%	5	18	19
Europe	GB	5%	9%	2.6%	15	15	7
Europe	RU	6%	15%	2.8%	13	4	6
Europe	IL	10%	19%	7.5%	3	2	1
Am.	**US**	**6%**	**11%**	**3.7%**	**12**	**9**	**3**
Am.	CA	7%	10%	2.4%	7	10	9
Asia-Pacific	**CN**	**31%**	**33%**	**0.3%**	**1**	**1**	**16**
Asia-Pacific	JP	3%	2%	-0.3%	19	19	17
Asia-Pacific	AU	6%	9%	1.8%	11	17	12
Asia-Pacific	KR	8%	14%	1.6%	4	5	13
Asia-Pacific	TW	4%	16%	3.3%	18	3	5
Asia-Pacific	IN	11%	9%	-1.2%	2	12	18

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-7 Status CH with SrT patents 2021: Radar technologies

Status 2021: Values

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	86'419	8'642	100.0%	100.0%	10%
Europe	**CH**	**295**	**63**	**0.3%**	**0.7%**	**21.4%**
	DE	**5'271**	**739**	**6.1%**	**8.6%**	**14.0%**
	FR	2'487	187	2.9%	2.2%	7.5%
	IT	368	53	0.4%	0.6%	14.4%
	AT	354	54	0.4%	0.6%	15.3%
	NL	556	112	0.6%	1.3%	20.1%
	SE	708	159	0.8%	1.8%	22.5%
	FI	263	50	0.3%	0.6%	19.0%
	GB	1'217	229	1.4%	2.6%	18.8%
	RU	1'601	53	1.9%	0.6%	3.3%
	IL	908	173	1.1%	2.0%	19.1%
Am.	**US**	**15'174**	**3'334**	**17.6%**	**38.6%**	**22.0%**
	CA	1'031	257	1.2%	3.0%	24.9%
Asia-Pacific	**CN**	**35'871**	**1'778**	**41.5%**	**20.6%**	**5.0%**
	JP	13'798	1'406	16.0%	16.3%	10.2%
	AU	255	65	0.3%	0.8%	25.5%
	KR	7'080	641	8.2%	7.4%	9.1%
	TW	1'065	99	1.2%	1.1%	9.3%
	IN	969	167	1.1%	1.9%	17.2%

Status 2021: Ranking

Region/country		Number of p.		Share of global p.		Number of p. that are WC
		Patents	WC p.	Patents	WC p.	
	World	NA	NA	NA	NA	NA
Europe	**CH**	**17**	**15**	**17**	**15**	**5**
	DE	**5**	**4**	**5**	**4**	**13**
	FR	6	8	6	8	17
	IT	15	17	15	17	12
	AT	16	16	16	16	11
	NL	14	12	14	12	6
	SE	13	11	13	11	3
	FI	18	19	18	19	8
	GB	8	7	8	7	9
	RU	7	17	7	17	19
	IL	12	9	12	9	7
Am.	**US**	**2**	**1**	**2**	**1**	**4**
	CA	10	6	10	6	2
Asia-Pacific	**CN**	**1**	**2**	**1**	**2**	**18**
	JP	3	3	3	3	14
	AU	19	14	19	14	1
	KR	4	5	4	5	16
	TW	9	13	9	13	15
	IN	11	10	11	10	10

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

Fig. 10-8 Dev. CH with SrT patents 2018-2021: radar technologies

	Region/ country	Development 2018-2021: Values			Development 2018-2021: Ranking		
		Growth p.a.		Delta share WC P.	Growth p.a.		Delta share WC P.
		Patents	WC p.		Patents	WC p.	
	World	15%	15%	0.0%	NA	NA	NA
Europe	**CH**	**9%**	**13%**	**3.1%**	**9**	**9**	**5**
Europe	**DE**	**11%**	**16%**	**2.2%**	**7**	**8**	**8**
Europe	FR	7%	3%	-1.1%	16	19	17
Europe	IT	12%	21%	3.6%	6	4	4
Europe	AT	15%	19%	1.8%	5	5	10
Europe	NL	7%	11%	2.7%	14	11	7
Europe	SE	8%	13%	3.9%	13	10	3
Europe	FI	10%	4%	-4.5%	8	17	18
Europe	GB	7%	8%	0.6%	15	15	15
Europe	RU	6%	18%	1.2%	17	6	12
Europe	IL	16%	16%	-0.1%	3	7	16
Am.	**US**	**8%**	**11%**	**2.0%**	**10**	**12**	**9**
Am.	CA	8%	10%	1.7%	12	14	11
Asia-Pacific	**CN**	**33%**	**39%**	**0.8%**	**1**	**1**	**14**
Asia-Pacific	JP	2%	4%	1.0%	19	18	13
Asia-Pacific	AU	5%	10%	4.7%	18	13	2
Asia-Pacific	KR	16%	28%	2.9%	4	3	6
Asia-Pacific	TW	8%	33%	5.2%	11	2	1
Asia-Pacific	IN	19%	5%	-11.4%	2	16	19

Comments: WC P.: World-class patents.
Source: BAK Economics, IIP, PatentSight

11 Literature

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