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Norwegian industry-related R&I policy agencies, measures and beneficiaries

-A mapping conducted as a part of the study on "Raising the ambition-level in Norwegian research and innovation policy"

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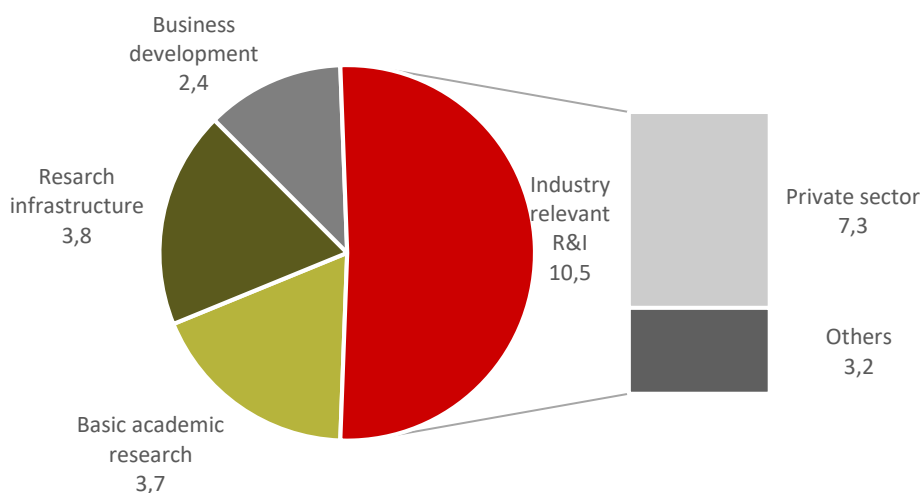
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Executive summary

The Norwegian research and policy portfolio cover a wide range of measures addressing various explanatory factors for what hinders and promotes economic growth.¹

Innovation Norway (IN) and Research Council of Norway (RCN) are the two main agencies, but SkatteFUNN is by far the most important single measure. Grants (incl. advisory services) aimed at fostering research, innovation, and business development totalled to about 20 billion NOK in 2017, whereas industry relevant measures aimed at fostering research and innovation totalled to 10,5 billion NOK.² The remainder includes funding for basic research and research infrastructure (corresponding to about 60 percent of the RCN portfolio, but also parts of H2020 and RFF portfolio) as well as business development measures (corresponding to about 60 percent of Innovation Norway portfolio and all measures administrated by regional authorities).

Funding for industry relevant R&I measures¹. By primary goal² and recipient sector.³ Grants and advisory services only. 2017. In billion NOK.



Source: Samfunnsøkonomisk analyse AS (samspillsdatabase)

Note: ¹Covers grants and advisory services to identifiable recipients, not research funding channelled to universities and research institutes not covered by the basic funding scheme for research institutes. The funding neither includes funding for profiling activities, loans, equity and guarantees, nor administrative cost. ² SØA categorisation ct. chapter 2 and annex. ³ All commercial companies registered in Norway. Research institutes and university colleges organised as AS are not included as private sector. Others includes Universities and other higher education institutions, research institutes, public sector and international organisation.

¹ See final report «Raising the Ambition-level in Norwegian research and innovation policy» (Technopolis, 2019) for a further discussion on market failures, system failure and transition failure.

² This figure covers grants and advisory services to identifiable recipients, not research funding channelled to universities and research institutes not covered by the basic funding scheme for research institutes. The funding neither includes funding for profiling activities, loans, equity and guarantees, nor administrative cost.

There has been a steady growth in public funding for measures to stimulate R&I over the past decade (measured in total grant-based funding) with a particularly strong growth/development during period from 2013 to 2016. During this period, growth was stronger for industry relevant R&I measures than for measures for basic research and business development. The growth is largely driven by growth in funding from SkatteFUNN, but also funding from Enova, EU programs and FHF (marine research). Industry relevant R&I funding through the main agencies Innovation Norway and RCN has remained relatively unchanged during this period.

Total industry R&I-funding to private sector is estimated to 7,3 billion NOK in 2017 (out of 10,5 billion NOK in total).³ The remainder is channelled to HEI sector and research institutes and others (public organisation and international recipients). Since 2013, the vast majority of the increase in R&I funding has been channelled to the private sector due to the strong growth in predominantly SkatteFUNN, but also Enova and FHF.

In monetary terms, SkatteFUNN is by far the most important single measure. In 2017, the budgeted tax deduction for the scheme was estimated to 5,6 billion NOK, which is over four times that of 2010. Actual costs/expenditure the same year is estimated to some 3,7 million NOK⁴, corresponding to 35 percent of all industry related R&I grants. Other important measures are BIA (RCN), Environmental technology program (IN), Innovation Contracts (IN), basic funding for industry relevant research institutes (RCN), and cluster and centre programs. SkatteFUNN and the 19 largest grant-based measures and programs make up about 85 percent of all industry relevant R&I-grants during the period of 2016 and 2017. The remaining funding comes from a variety of measures, thematic or not.

The various measures play different roles in the R&I policy portfolio. SkatteFUNN is particularly suited for smaller R&I projects due to the simple application procedures and thus particularly relevant for SMBs and young firms. RCN-programs, Enova and H2020 measures are particularly suitable for larger and more complex R&I projects. The differences can be observed in private sector beneficiaries' characteristics; beneficiaries of SkatteFUNN and IN are relatively speaking younger and smaller than those of RCN, Enova and EU programs. However, the share of more mature firms in SkatteFUNN has increased over the last years. One possible explanation is the increase in the threshold for R&D tax credit⁵, making the measure more suitable for larger R&D projects.

With regards to recipients' cross measures, we observe that the same recipient uses different R&I programs simultaneously and over time. It is reasonable to see the interactions between agencies and measure because programs play different roles in the companies' R&I work. However, it cannot be ruled out that certain programs overlap in objectives and scope. Here, it is conceivable that companies can "shop" between programs. To avoid "program shopping", there is a need for good coordination between program owners,

³ Private sector is all Norwegian recipients except from HEI sector, research institutes, health enterprises and public sector

⁴ SØA estimate based on actual redemption in previous years

⁵ct.5.2

as well as coordination between the policy agencies of what challenges the various programs are meant to face.

In economic terms, instruments that are sector and theme neutral, such as SkatteFUNN, BIA, SFI and Innovation contracts, made up about two thirds of all industry relevant R&I-funding in 2017. Over the past five years funding for open instruments has increased faster than that of thematic instruments.⁶ There has been a strong growth in funding for measures related to renewable energy, climate and environment, but a decline in funding for other thematic programs, resulting in modest growth in funding for all thematic programs.

Given the increase in funding for open programs, it seems as if open programs no longer complement the thematic programs, but that thematic programs complement the open programs. This shift in relative importance raises the question about what role thematic programs should play in the future. Thematic programs allow for a strategic channelling of resources and long-term competence building and technology development, but how many thematic programs do Norway need? As a small country Norway can most likely not develop world class competences in all areas (meaning that the number of thematic programs should be lower). Clear delineation and strategic coordination are important to ensure an efficient and competitive research and innovation system.

⁶ Based on SØA categorisation

1 Background

This paper contains a mapping of the Norwegian funding agencies, programmes and beneficiaries of Norwegian industry-related research and innovation policy.

The mapping is undertaken by Samfunnsøkonomisk analyse AS (SØA).

The mapping is one out of several work packages in the Technopolis/SØA project for the Research Council of Norway (RCN) summarised in the report “Raising the ambition-level in Norwegian research and innovation policy” (Technopolis/SØA, 2019).

This mapping was first and foremost written to give RCN and the team behind the above-mentioned analysis an updated presentation on the Norwegian R&I policy mix. However, the mapping can also be read as a standalone document and be of interest for others following the Norwegian research and innovation policy.

The Technopolis/SØA analysis is commissioned by RCN which serves as the chief advisory body for the government authorities on research policy issues and administrator of various funding instruments for research-based innovation and knowledge-building. RCN distributes roughly nine billion NOK to research and innovation activities each year.

RCN has a special role in enhancing research quality, with regards to basic research, research-based innovation in industry, and public sector. Other agencies also play a role in enhancing innovation and knowledge-building in industry.

The mapping focuses on industry relevant measures, beneficiaries and agencies set up to foster research and industry, and thus where RCN measures have close interference with other agencies and measures.

1.1 Delineation

The Norwegian policy measures to promote industry growth and development covers a wide range of **economic** measures for individuals, companies, institutions, networks, and tax redemption schemes, in addition to **non-economic** measures such as advisory services, marketing activities, procurement practices, patent regulations and others. The ultimate objective of such measures is increased industrial value added.

This mapping focus on industry related measures aimed to stimulate research and innovation (R&I). The delineation of what measures to include in such a mapping is not obvious. For analytical and communicational purposes however, a transparent delineation is needed.

In this mapping we will make a distinction between:

- I. Measures that aim to stimulate research and innovation relevant for industrial innovation
- II. Measures with a primary objective of increased innovation and research in the industrial sector
- III. Measures with a primary objective of increased innovation in which the beneficiary is a private sector company

Which measures to include, and thus the scale of public intervention, differs for the three different approaches. This mapping focus on measures to enhance industry relevant research and innovation, reflected by II).

I) covers measures that stimulate research and innovation, including RCN funding for basic research, grants, loans and advisory services for entrepreneurship and business development, guarantees, loans and advisory services for expert as well as equity and seed-funding. Research funding⁷ directly channelled to Higher Education Institutions (HEI sector), research institutes not included in and health enterprises is not included. The primary goal

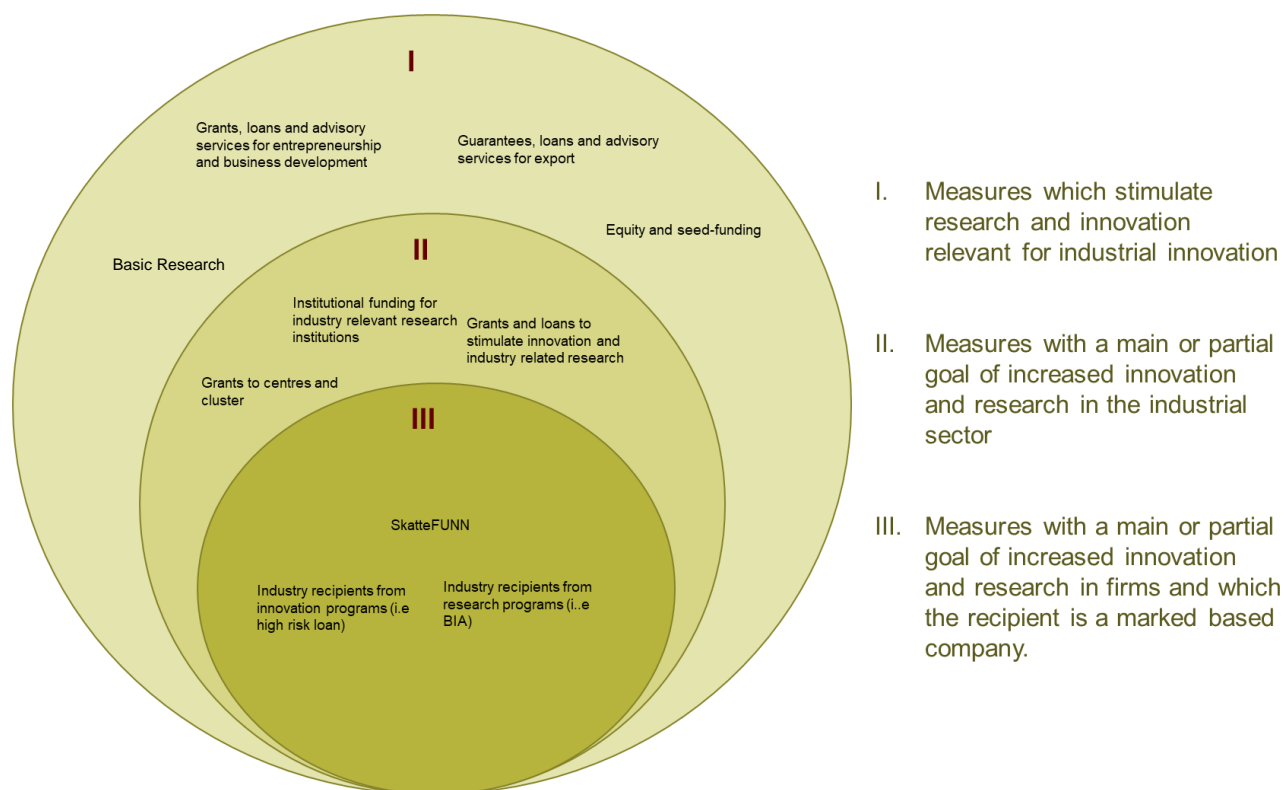
of such funding and measures is to support basic research, higher education, governmental task and public service production and so forth. Although such funding and measures are an important part of the research and development system as such, we do not cover such funding in this mapping.

II covers measures with main or partial goal being innovation and research-based innovation in the industrial sector.

Measures and thus funding for measures included in II) can be viewed as a subset of I), and measures in III) can be viewed a subset of II) and I), ct. Figure 1.1.

⁷ Total public funding for research is estimated at some 35 billion NOK in 2018 corresponding to about 1,04 percent of GDP (NIFU, 2018).

Figure 1.1 Delineation of measures to stimulate to research, innovation and business development



Source: Samfunnsøkonomisk analyse AS

1.2 Method

The mapping is based on document studies, use of public available statistics on innovation, research and development (i.e. from SSB, NIFU, RCN and OECD) and use of Samfunnsøkonomisk analyse AS' database of Norwegian industrial support schemes (Samspillsdatabasen).

Documents such as annual reports, government assignments, evaluations and programme descriptions provides in depth descriptions of the Norwegian research and development system.

«Samspillsdatabasen» is a database covering all public funded activities by Innovation Norway, Norway's Research Council, SkatteFUNN, Siva, EU

Framework Programs for Research (EU's 7th Framework Program and Horizon 2020), Enova, Regional Authorities, Regional Research Fund, Seed Fund, Argentum, Investinor, Giek, Export Credits, Fisheries- and the aquaculture industry research fund (FHF) and The Norwegian Space Centre.

The database allows for a mapping of how public funds distribute across users, funding agencies and instruments, and time.

The database includes figures based on actual funding. For project that persists for several years, funding is periodised according to the project length. Last available data from this database is 2017.

Figures based on this database may thus differ from other figures i.e. in annual reports, national budget and national R&D statistics. Figures from other sources can be based on self-reporting or funds granted in a given year.

Other data sources can also use other delineation and categorisations of measures.

A detailed description of the categorisation relevant for this mapping is included in the appendix.

2 Growth in industry relevant R&I measures

In this first chapter we will look at the portfolio of measures which directly or indirectly aim to stimulate industry growth, innovation and development.⁸ The chapter serves as a general description of agencies and key measures. In chapter 4 we will address the R&I measures in more detail.

2.1 A broad range of measures

The Norwegian portfolio of measures to simulate research, innovation and industry growth has developed over time. After second World War several institutes supporting industrial research institutes and their supporting schemes were reorganised as the Royal Norwegian Council for Scientific and Industrial Research which in 1992 merged with four other research councils to The Research Council of Norway. There were also schemes outside the research councils as the Public Research and Development Contracts (OFU) currently administrated by Statens nærings- og distriktsutbyggingsfond (SND) a predecessor of Innovation Norway.

Other programmes, such as measures to stimulate clusters, research centres and SkatteFUNN, are relatively new, but now important measures within the current policy mix.

As laid out in the most recent budget bill Prop. 1 S (2018–2019), the overall goal of the government's industry policy is to achieve the greatest possible overall value creation. Although various measures have different secondary objectives (increased in-

novation, high-quality research, cooperation, targeting societal challenges etc.), neither should weaken the overall goal of increased value creation (measured by industrial value added).

The portfolio of measures to stimulate research and development is considered particularly important in a time of need for change (Prop. 1 S (2018–2019)).

What contributes to increased value creation and economic growth has been a subject of economic research for centuries and there is no simple unified theoretical framework.⁹ However, there is a broad agreement that market conditions and companies' use of input factors such as capital, labour (including their expertise) and technology are important drivers for value creation and growth. Likewise, there is broad consensus that innovation fosters growth by changing markets, products and input factor use, and that the quality of framework conditions such as monetary policy, the judicial system, democracy, education system is of great importance for how markets develop, which innovations take place where and how businesses adapt.

The understanding of innovation has evolved from a focus on technology and a linear innovation chain to a greater emphasis on agglomeration and learning¹⁰, innovation systems¹¹ and cumulative effects over time.¹²

⁸ Corresponding to measures covered in the delineation (I), ct. section 1.

⁹ See for example E. Stiglitz and B. C. Greenwald (2014): *Creating a Learning Society*, Colombia University Press

¹⁰ See for example Porter M. (1990): *The Competitive Advantage of Nations*. The Free Press, New York, Porter, M. E. (1998). *Clusters and the new economics of competition*. Harvard Business Review, November-December, s. 77-90

¹¹ See for example Edquist, C. & Johnson, B. (1997). *Institutions and organisations in systems of innovation*. In C. Edquist, *Systems of Innovation: Technologies, Institutions and Organisations*. London and Washington: Pinter and Cassell Academic.

¹² See for example Bloom, Schankermann and Van Reenen (2013), Colino (2017), Kline and Moretti (2014)

We do not discuss the theory of economic growth further in this mapping but point out that the policy mix we see in Norway addresses various explanatory factors for what hinders and promotes economic growth.¹³

Table 1 lists key policy agencies and measures to stimulate innovation, research and economic growth. The categorisation is naturally a simplification but shows nevertheless the extent of the Norwegian policy portfolio and one possible way of cat-

egorising the actors promoting industrial research and innovation (and key instruments).

The portfolio of policy measures can be viewed as an instruments to ensure well-functional institutional framework conditions (i.e. The Patent Board), measures to meet imperfections that arise in an economy despite developed institutional framework conditions (i.e. SkatteFUNN) and measures particularly designed to reach certain objectives and or grand challenges (i.e. Enova).

Table 1: The Norwegian portfolio of measures to simulate research, innovation and business development

Factors affected by policy	Category	Key agencies and measures
Market	Price	Norwegian industrial property office*
	Demand	Innovative Procurement programme* and Norwep, Innovation Norway, DOGA, Norwegian Seafood Council (all profiling*)
Capital	Equity	Investinor, Argentum, Nysnø
	Loans and guarantees	Innovation Norway, GIEK, Export credit
Labour	Entrepreneurship	Innovation Norway, Regional municipalities, industrial PhD (RCN), Young entrepreneurship*
Technology	Industry relevant research, research-based innovation and incremental innovation	RCN (ie. research programs), Innovation Norge (i.e. OFU/IFU), SkatteFUNN, EU FP/H2020, FHF (Marin research), Norwegian Space Centre, Regional research Councils
	Technology development, demonstration and commercialisation	Innovation Norway (i.e Environmental tech. program), Enova, RCN (i.e FORNY, DEMO2000), SIVA (Catapult)
Cooperation and network	Learning, public goods	Regional municipalities, SIVA (i.e. incubator), Innovation Norway (i.e. business network), Norwegian Innovation Cluster Program
Strategy and policy development		Strategy-21 process**

Source: Samfunnsøkonomisk analyse AS

¹³ See final report «Raising the Ambition-level in Norwegian research and innovation policy» (Technopolis, 2019) for a further discussion on market failures, system failure and transition failure.

Most agencies offer economic measures (loans, grants, equity i.e.) to distinct businesses, institutions, networks and centres, but also advisory services.

The Research Council of Norway (RCN) and Innovation Norway (IN) are the most central agencies. Innovation Norway offers advisory services, network services, and loans and grants to companies and networks to enhance business development and innovation. RCN offers programmes and activities aimed at fostering research, including industry-relevant R&D and research-based innovation. RCN offers both institutional funding, project based funding and individual funding.

SkatteFUNN¹⁴ is a tax incentive scheme aimed at increase business' investment in research and development. RCN has an administrative role with regards to SkatteFUNN, but SkatteFUNN is a rights-based scheme that differs from other instruments in the RCN portfolio. Thus, it is useful to regard SkatteFUNN not as a part of RCN, but as a distinct measure.

The Research Council, SkatteFUNN and Innovation Norway should stimulate innovation, business development and research throughout the entire country and within all industries.

SIVA is small in economic terms but has a dedicated role in developing innovation infrastructure. This includes both physical infrastructure through the property ownership and organisational infrastructure through the program activities, Norwegian catapult and ownership in innovation companies. The pro-

gram activities include the incubation program, Business garden program and Norwegian Catapult. The incubation program provides innovation support services to entrepreneurs. Business gardens has a more district-oriented profile than the incubation program. Catapult is a relatively new measure aimed at making it easier for innovative companies to develop prototypes to test, visualize and simulate new technology. Through its instruments, Siva offers grants, expertise and networks to the program operators. Siva seeks to stimulate research indirectly through operate the abovementioned programs.

Other agencies are responsible for specific measures and or specific industry sectors.

Norwegian Seafood Research Fund (FHF) funds (applied) marine research, Gassnova funds technology research, development and demonstration in carbon capture and storage, Enova funds energy and climate related programmes (for business and private households) and Norwegian Space Centre funds space research (and coordinate international space related activities).

Norwegian Export Credit Guarantee Agency (GIEK) and Export Credit Norway issue credit and securities for export-related activities.

Investinor, Argentum and Nysnø are publicly funded investment companies.

Regional authorities' support regional mobilisation, innovation and competence projects (directly or via

¹⁴ SkatteFUNN decreases firms' R&D investment costs through tax credit up to set caps. SMEs may receive a tax credit of up to 20 per cent of the eligible R&D costs for approved projects, whereas large firms may receive a tax credit of up to 18 per cent. If the tax credit for R&D expenses is

greater than the amount for which a firm is liable in tax, the remainder is received through a tax settlement in which Skattefunn effectively becomes an R&D grant rather than a tax incentive.

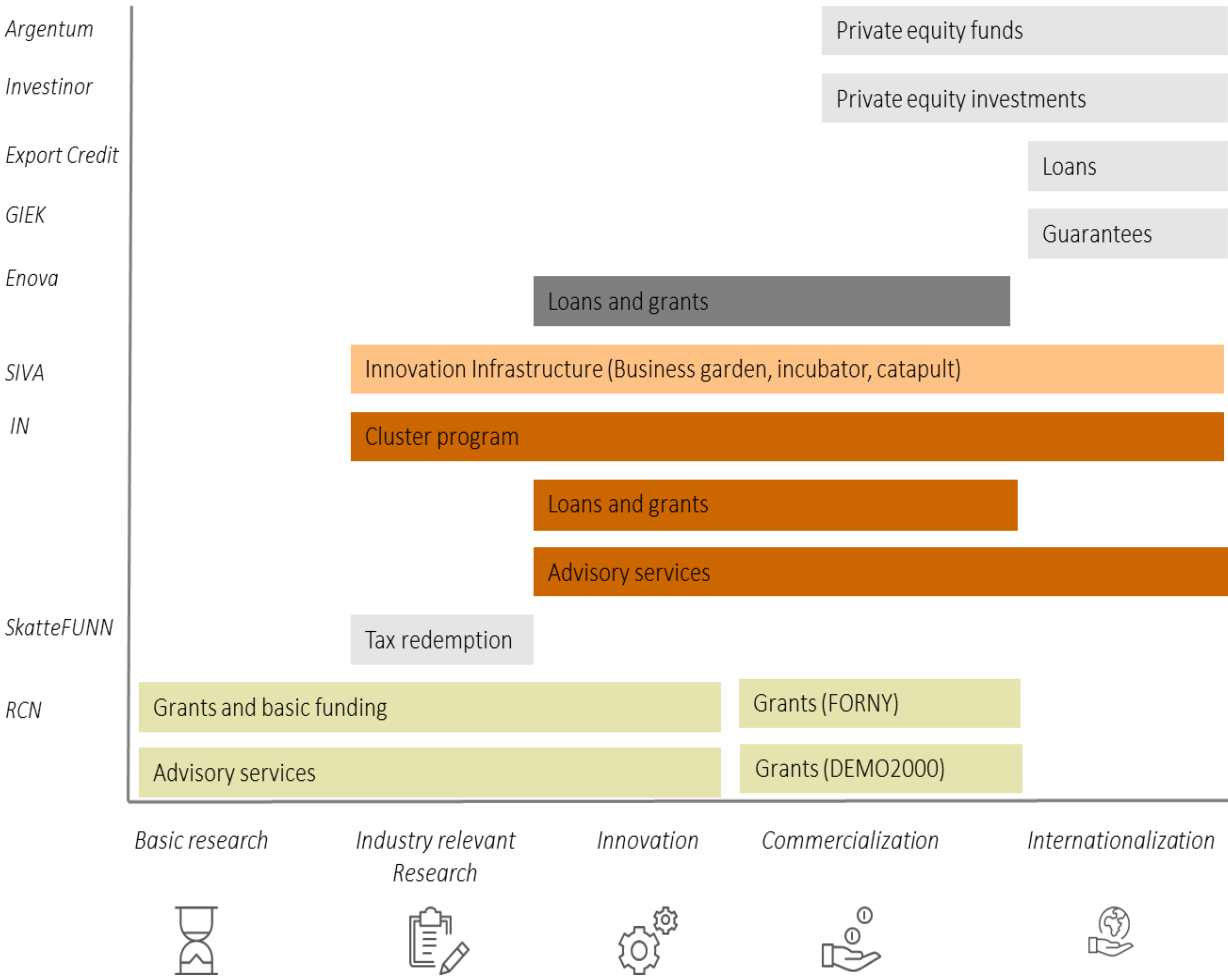
the other funding agencies/programmes such as Innovation Norway, SIVA and RCN).

Regional research funds (RFF) shall foster mobilisation and innovation taking regional opportunities and challenges into consideration.

Simplified, the division of labour between the agencies is based on a linear innovation understanding

(ct. Figure 2.1) in which the Research Council (and EU programmes and FHF) and SkatteFUNN stimulate research and research-based innovation, while Innovation Norway, Enova aim to contribute to more market-oriented innovation and business development. Innovation Norway, Investinor, Argentum and Nysnø aim to stimulate industry growth and export.

Figure 2.1 key agencies (and measures) to simulate research, innovation and business development



Source: Samfunnsøkonomisk analyse AS

Note: for simplification, the figure does not cover FHF, regional authorities, Norwegian Space Centre, MABIT, DOGA, Gassnova or NYSNØ. The figure neither includes international measures nor measures for profiling.

Players marked with * in table 2 aim to stimulate growth and innovation by influencing market conditions and do not provide financial support to companies or others.

For examples does NORWEP have a mandate to profile the Norwegian energy sector abroad. Norwegian Seafood Council (“*Sjømatrådet*”) has a similar mandate with regards to Norwegian seafood and Innovation Norway with regards to Norwegian Tourism. Norwegian Design and Architecture (DOGA) work to profile Norwegian Architecture and Design in Norway and abroad and to facilitate collaboration between creative talents and businesses.

Innovative Procurement Program (“*Leverandørutviklingsprogrammet*”) is a methodology to stimulate innovation in public procurement.

It is also worth mentioning the 21-strategy processes marked with ** which is not considered a market intervention as such, but an instrument to bridge key players within the innovation system and provide strategic input to policy development.

2.2 Most industry R&I are funded privately, but share of public funding increase

To understand the role of industry relevant R&I policy measures, it is nevertheless important to note that most of the Norwegian business R&D, innovation and growth take place without support from any of the abovementioned players and measures.

In 2017, the combined portfolio of industry relevant measures for innovation and research supported

some 10 000 unique recipients of which 7000 are commercial companies¹⁵. By comparison, there were about 192,000 registered companies with more than 1 employee in Norway the same year.

Business sector's total investments in innovation-related activities (including research) are, based on the national innovation survey, estimated to NOK 65 billion in 2016 (last available figure, Statistics Norway, 2017). We have estimated public funding for R&I measure for industry to some 7 billion NOK 2017 based on historic funding, indicating that industry fund roughly 90 percent of their R&I investments themselves.¹⁶

When only looking at R&D funding, business sector investment is estimated to some 38 billion NOK in 2017 based on the national R&D survey (covers companies with more than 5 employees¹⁷). This includes 30,5 billion NOK of own research activities and 7,5 billion NOK of purchased R&D (from research institutes, other companies, and / or other parts of the company nationally or abroad).

Publicly funded R&D in business sector, based on the national R&D survey, is estimated to about 3,4 billion NOK in 2017, corresponding to 10,3 percent of total own conducted R&D funding in the business sector (SSB, 2017).

The national R&D survey indicate that there has been an increase in private sector investment in R&D for the past years (approximately 5 percent for the past year measured in total investment and 8 percent measured in man years). Private sector

¹⁵ Delineation II

¹⁶ Survey based data and data based on historic funding are based on different methodologies and population, thus share of public funding should be viewed as a rough estimate.

¹⁷ For units with less than 50 employees, the survey is based on a selection of units either as they have reported to have significant R&D activities in previous surveys or on a random selection. For more information about the national R&D survey, see <https://www.ssb.no/foun>

share of R&D is also increasing as a share to total GDP ct. Figure 2.2.

According to the estimates in the national survey, growth in publicly funding of R&D in business sector, however, outgrows growth in private funding. Consequently, share of publicly funded R&D has risen (from 8,5 percent in 2015 to 10,3 percent in 2017).

One might thus raise the question if the industry relevant measures combined have been sufficiently effective in raising investments in R&D and innovation in business sector.

Investments in R&D varies significantly cross sectors ct. Figure 2.3, but also share of R&D that is publicly funded varies cross sectors, but relatively speaking to a lesser degree. Share of public funding is highest within scientific sector, marine sector, agency and wholesale¹⁸, food and beverage production and metal industry (between 14 and 30 per cent). Share of public funding is relatively speaking lower within Information services and telecommunication (despite the strong growth in these industries participation in R&I measures).

Figure 2.2 Research and innovation indicators. Business sector.

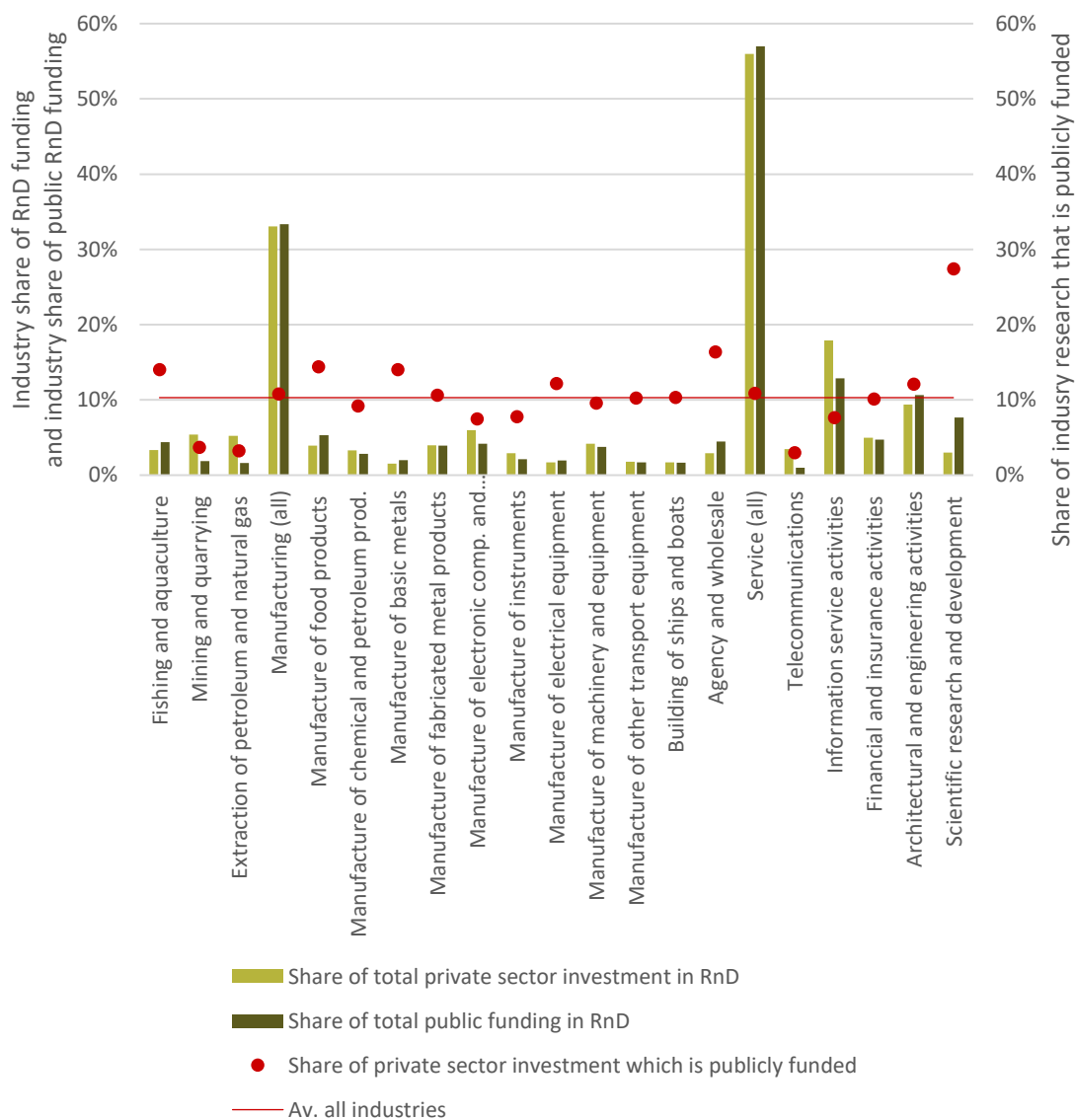
	2015	2016	2017	Relative change 2016-2017
Innovation incl. R&D (in Bill. 2017 NOK)	64,4 ¹		66,0	N/A
R&D man year	19087		19616	21205 + 8,1 percent
Own conducted R&D (in Bill. 2017 NOK)	29,3		30,4	32,0 + 6 percent
Purchased R&D (in Bill. 2017 NOK)	7,1		7,1	7,4 +4,6 percent
Share of R&D that is publicly funded ²	8,5 %		10,0 %	10,3 % + 0,3 percent points
Private sector R&D as s share of GDP			0,95 %	0,97 % + 0,2 percent points

NIFU, SSB

Note: ¹ 2014 figure. ² incl. SkatteFUNN

¹⁸ It is expected that part of R&D funding within engros is attributable to manufacturing sector.

Figure 2.3 Total R&D funding and share of public funding. 2017. Industry share of total private and public investment in R&D (left), industry share of total investments in R&D which is publicly funded (right).



Source: National R&D survey, SSB (table 07965)

Note: The figure does not cover sectors constituting less than 1 per cent of total R&D funding, nor petroleum extraction industries

2.3 IN and RCN are two major players

Innovation Norway (IN) and Norwegian Research Council (RCN) are the two most significant agencies, measured in operating profit and man year, ct. Figure 2.4.

The agencies size reflects that both agencies administrate a wide range of instruments and connected advisory services to both beneficiaries and others. Innovation Norway has wide representation throughout the country and internationally.

The two institutions are also responsible for tasks other than providing direct support (for example, being policy advisors).

SkatteFUNN, Innovation Norway and RCN are largest in terms of NOK given as grants, while GIEK and Export Credit are the major players in terms of loans and guarantees.

Argentum is the largest measured in investment capital. Nysnø climate investments was founded in 2018 and is not included in figure.

Both RCN and IN manage a large portfolio of instruments, many of which is relatively small in support amounts. Innovation Norway and RCN are thus also large in terms of number of unique recipients per year ct. Figure 2.5.

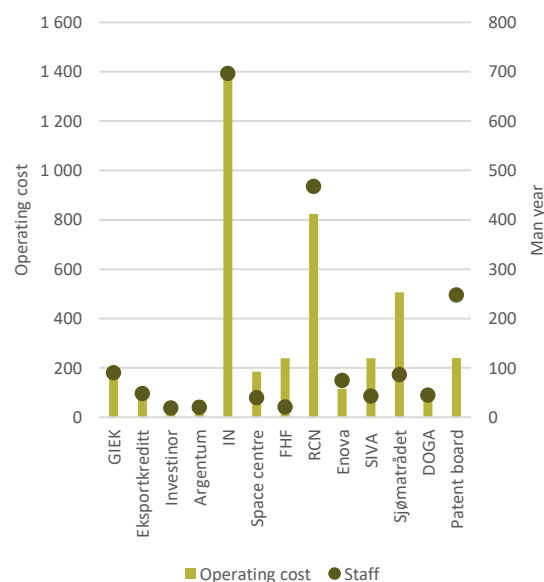
Argentum, Investinor, GIEK and Export credit administrates capital measures to a limited number of beneficiaries.

Enova co-finance energy efficiency measures in business and household. Such measures are disregarded in this mapping. Enova has however also become an important instrument to foster development, testing and demonstration of new technology. Such measures are included in this mapping. Enova

generally funds few, but large projects and funding can vary on an annual basis.

The single largest measure in the portfolio is by far the R&D tax incentive scheme SkatteFUNN which was introduced in 2002 with the objective of enhancing innovation by increasing R&D investment in the private sector and particularly in SMEs.

Figure 2.4 Total operating cost in million NOK (left) and staff in number of full time equivalent (right). Key agencies.

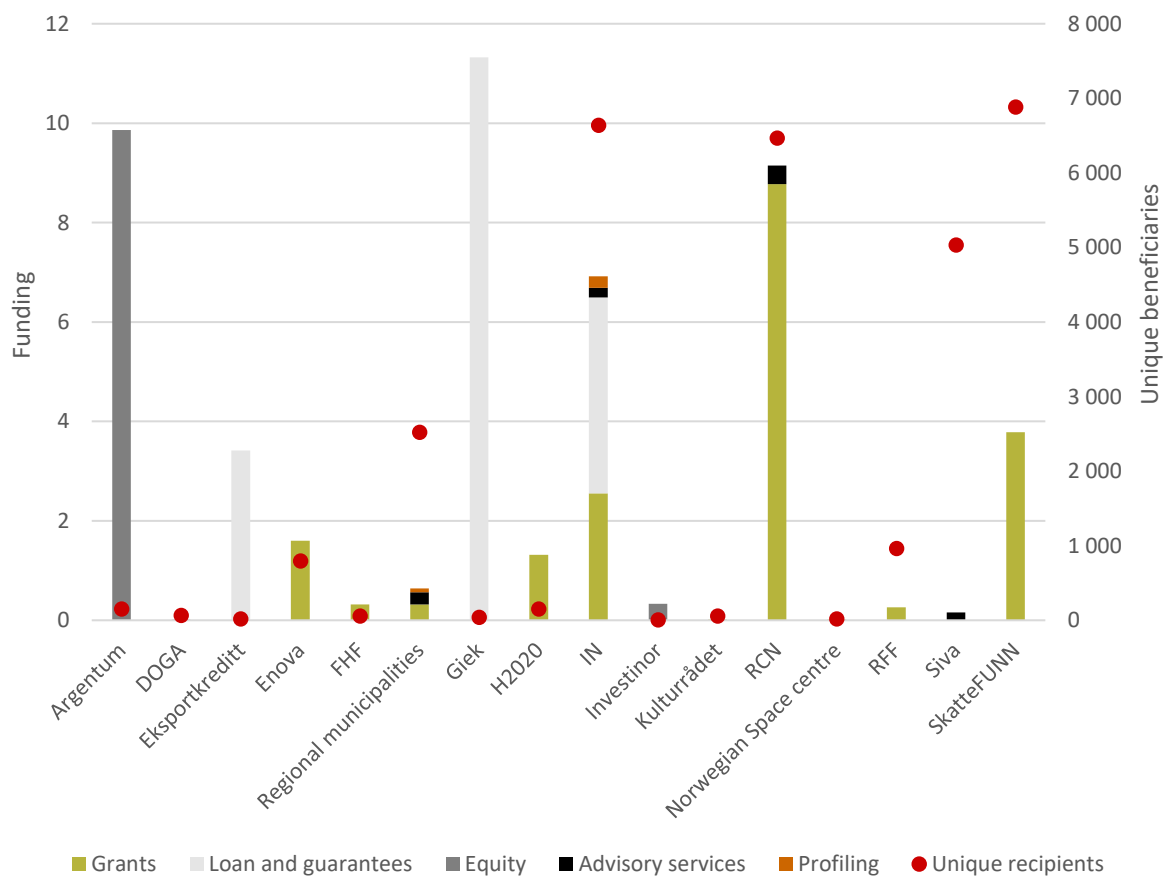


Source: Samfunnsøkonomisk Analyse AS based on agencies annual report for 2017

Based on support given in 2017, Innovation Norway provided support to most recipients, followed by Skattefunn and the RCN.

Measures administrated by regional authorities and regional research fund are relatively modest in economic terms, but the reach in terms of beneficiaries are relatively high. SIVA also have a significant number of unique beneficiaries but have on the other hand relative low operating cost reflecting the indirect way Siva operates.

Figure 2.5 Total funding given per agency (key measure)¹. 2017². In billion 2017-NOK (left). Unique recipients (right).



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)

Note: ¹Note that RCN grants includes industry relevant grants, but also grants for basic research and research infrastructure. ²Total funding from investor is 2016-figure. For 2017 actual cost of SkatteFUNN is estimated to some 3,7 billion NOK. This is actual redemption for 2017, and lower than the total redemption based on all application received which totalled to 5,6 billion NOK in 2017.

2.4 Growth in industry relevant measures

Measures to support research, innovation and business development covers loan, guarantees, equity support and grants. Loan, guarantees and equity have lower elements of public support and problematic to compare with grants and advisory services¹⁹ in monetary terms.

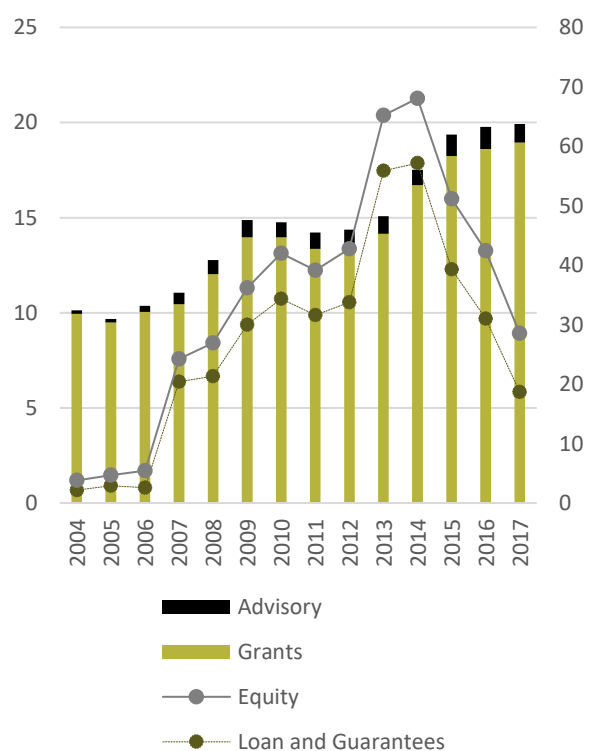
Grants (incl. advisory services) aimed at fostering research, innovation, and business development totals to about 20 billion NOK in 2017.²⁰

This figure does include RCN grant to basic research and research infrastructure (but not funding for basic research directly channelled to HEI institutions and public health enterprises)²¹, funding for measures to enhance business development (entrepreneurship, export etc.) and innovation.

This figure covers only grants and funding for advisory services that are distributed to distinct recipients. Measures such as profiling activities is not included, neither is Enova grants aimed at energy efficiency, nor administrative cost for the various agencies. Thus, the total public economic cost of public research and innovation support extends beyond our estimate of 20 billion NOK.

Availability of public funding has risen for all kinds of support during the past decade, ct. Figure 2.6.

Figure 2.6 Funding for public measures to support innovation, research and business development. 2004-2017¹. In billion 2017-NOK. By type of public support. Grants and advisory services (left), equity and loan and guarantees (right).



Source: Samfunnsøkonomisk analyse AS

Note: ¹ based on delineation I) ct. Chapter 1.

¹⁹ Advisory services include funding for advisory measures, i.e. mentoring, marked assessment and international assistance. Advise given as a part of the process of application is not included but included in administrative cost.

²⁰ Based on delineation (1), ct. Chapter 1.

²¹ Even though Norwegian companies potentially benefit directly or indirectly research undertaken at higher education institutions (HEIs), hospital trusts etc. such measures is traditionally not considered industry-relevant

measures as such, though a significant part of the R&I system. Total public funding for research is estimated at some 35 billion NOK in 2018 corresponding to about 1,04 percent of GDP (NIFU, 2018). Of this is 14,5 directly channelled directly to the HEI sector, 9,7 Billion NOK to RCN and the remaining to other research organisations and abroad (incl. EU framework programmes).

2.5 About 40 percent of RCN portfolio is industry relevant

RCN provides support for research through several different measures and activities. These measures have different purposes i.e. to strengthen Norwegian business sector, strengthen the interaction between business and research institutions, strengthen research in prioritised areas and or to strengthen research institutions.

Funding is in general given on a competitive basis, and research quality is the main criteria for grant allocation in addition to program specific criteria.

Grants are given to projects, individuals and centres. Some grants are offered as a part of national and open programs (i.e. BIA), whereas others are offered as a part of specific initiatives covering thematic areas or societal challenges.

RCN also administrates individual and institutional funding, but such funding is also given on a competitive basis or reallocated based on institutions achievements on a predefined set of criteria (as is the case of basic funding to research institutes covered by the nation scheme for basic funding to research institutes).

Many, if not most, policy measures are designed to reach multiple objectives, however, for analytical purposes it is useful to categorize measures with similar primary objective. On important distinction is measures aimed to foster research-based innova-

tion in industry and measures aim to foster basic research and or improvements of public services and research infrastructure.

We have estimated that the industry relevant research portfolio of RCN corresponds to about 40 percent of total RCN funding in 2017.²²

Our estimate is based on a systematic categorisation of funding based on a combination of application type and program (not individual projects).

In this estimate, RCNs industry relevant measures includes all projects funded based on programs such as BIA, HAVFORSK, PETROMAX, BIONÆR, DEMO2000 etc.

Funding for basic research programs (i.e FRIPRO) and thematic programs aimed at public sector (i.e. VAM) is categorised as non-industry relevant, except from where grants are given based on the application type “innovation projects in private sector” (IPN) or “Competence projects in private sector” (KPN). Funding based on such project type is categorised as industry relevant independent upon research programme.²³

Institutional funding such as institutional basic funding for research institutes²⁴ and funding for research centres like SFI and FME are also included as industry relevant R&I-measures. So is funding for industrial phd (NÆRINGSPHD), ct. annex for more information about our delineation.

²² Figures for 2018 is not available. RCN use a slightly different methodology when calculating funding for industry relevant measures. According to their estimate industry relevant funding totals to 50 percent of total RCN funding in 2018. As for when using our delineation, RCN find a growth in funding to and for industry for the past years.

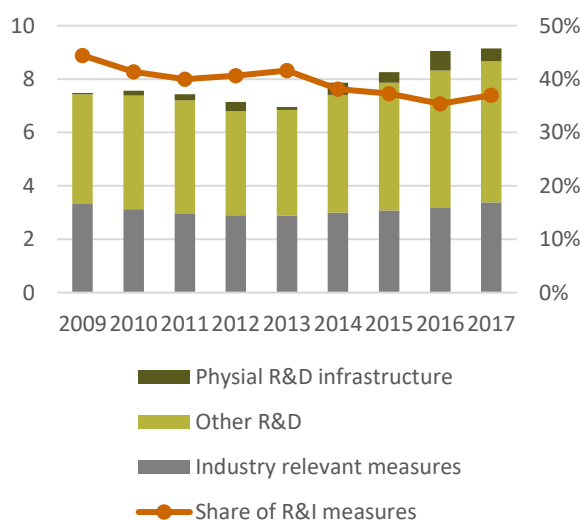
²³ Our delineation follows the categorisation of measures, not of single projects. Se annex for further details on categorisation of RCN measures.

²⁴ The research institutes are subject to basic funding and receive their basic funding through the Research Council. The university and university college sector receive its basic grant directly from the Ministry of Education and Research. Basic funding to research institutes should be used for retaining competence and relevance. Research institutes focus on applied research and most research institutes are oriented towards industry. We have included basic funding for technological research institutes and primary industry institutes.

Funding for industry relevant measures (based on our categorisation) has been relatively stable during the period of 2009-2017. After a slow decline in 2009-2013, there has been a rise after 2013 (corresponding to an annual growth of 4 percent during 2013-2017).

There has been a strong growth in funding for other RCN measures in the past years, i.e. academic research and physical infrastructure. Consequently, we find that the RCN share of funding from industry relevant measures has fallen slightly for the past decade ct. Figure 2.7.

Figure 2.7 RCN funding in R&I measures in 2009-2017¹. In billion 2017 – NOK (left) and share of funding from industry relevant measures² (right)



Source: Samfunnsøkonomisk analyse AS

Note: ¹ based on delineation I ct. Chapter 1. ²“other R&D” includes project funding, individual funding, network funding and well as basic funding to other institutes and advisory services not assumed to be industry relevant. See annex for further details.

²⁵ Our categorisation of industry R&I measures includes all funding for measures given as part of Innovation Norway “innovation task” as reported

2.6 IN measures are increasingly aimed at enhancing innovation

Innovation Norway is the other significant agency in the R&I landscape. Innovation Norway offers loans, grants, guarantees and equity to firms, in addition to advisory services, promotional services and network services that stimulate interaction between enterprises and various knowledge institutions.

The marketing of Norway as a tourist destination is also considered an important task, likewise, is the task of securing business development in rural areas (based on funding from the Ministry of Local Government) and within agricultural sector (funded by the Ministry of Agriculture and Food).

Innovation Norway funding in terms of grants and advisory services totalled to some 2,7 billion NOK in grants and advisory services, 3,9 billion in NOK loans and 0,23 billion NOK in profiling activities in 2017.

Enhanced innovation is a general goal for all industry relevant measures, however, in this mapping we are particularly interested in measures with close interference with RCN measures. We will thus focus on IN measures for which enhanced innovation is the primary goal.²⁵

We have estimated that about 1,6 billion NOK (corresponding to 41 percent of IN grants) and 10 percent of IN loans have industry innovation as the primary objective in 2017. Other IN programs and measures naturally also aim to enhance innovation, however, the primary objective is entrepreneurship, business development, internationalisation and so

in the company annual report and the Norwegian Innovation Cluster Program.

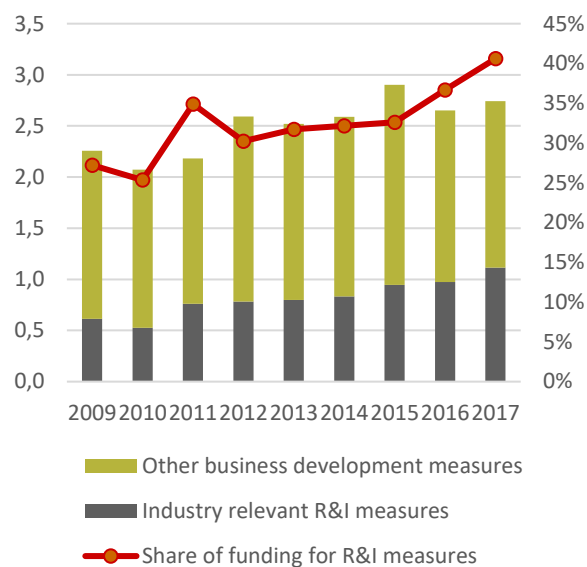
forth. Such measure makes up a substantial part of IN portfolio ct. Figure 2.8.

There has however been a growth in funding for R&I relevant measures for the past decade, both in absolute and relative terms.

Program for environmental technology (Miljøteknologiordningen) and program for research and development contracts (innovasjonskontrakter formerly known as IFU/OFU) make up about 50 percent of Innovation Norway’s industry relevant innovation measures. Other industry relevant R&I measures includes innovation programs targeting the forestry sector, bioenergy and marine sector. IN industry relevant R&I-measure also includes The Norwegian Cluster program in which Innovation Norway cooperate with SIVA and RCN.

Innovation Norway’s R&I portfolio also includes a high-risk loan program.

Figure 2.8 IN funding, 2009-2017¹. In billion 2017 – NOK and share of industry relevant measures. Only grants and advisory services.



Source: Samfunnsøkonomisk analyse AS

Note: profiling is not included, loan and guarantees is not included in this figure as support cannot be compared directly.

Note: ¹ based on delineation I ct. Chapter 1.

2.7 Strong growth in industry related R&I funding and agencies

Cross agencies, we estimate public funding for industry relevant R&I measures to some 10,5 billion NOK in grants in 2017²⁶.

This figure is based on the delineation II in which we exclude basic research and research infrastructure (corresponding to about 60 percent of the RCN portfolio, but also basic research funded by H2020 and RFF) and business development measures (corresponding to about 60 percent of Innovation Norway

²⁶ Based on the delineation II

portfolio and all measures administrated by regional authorities, argentum, investinor, GIEK and Export Credit).

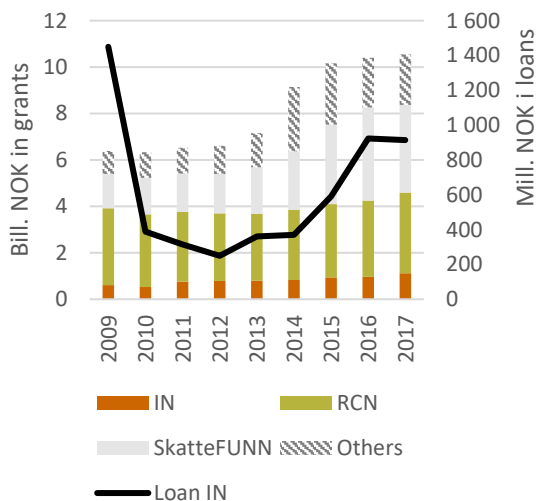
Industry relevant research and innovation is mainly stimulated using tax exemptions (SkatteFUNN), direct grants advisory services to businesses, research institutions and clusters.

The most significant exemption is high-risk lending program administrated by Innovation Norway.

SkatteFUNN is by far the most important single measure in monetary terms. For 2017, the budgeted tax deduction was estimated to some 5,6 billion NOK which is more than four times more than the tax deduction in 2010. Actual cost the same year is estimated to some 3,7 million NOK²⁷ corresponding to 35 percent of all industry related R&I grants. SkatteFUNN and other significant measures are presented in further detail in the next chapter.

²⁷ SØA estimate based on actual redemption in previous years

Figure 2.9 Funding for industry related R&I measures (II). 2009-2017. In 2017-NOK. By type of funding. Grants¹ (left) and loan from IN (right).

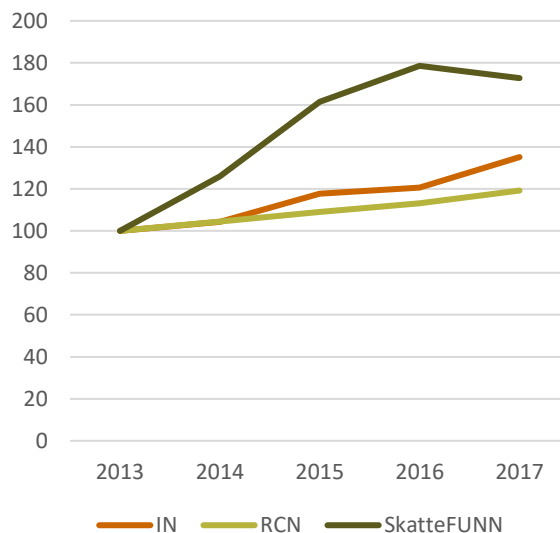


Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: grants include economic support given as direct grants, institutional funding, tax redemption and advisory services
 “others” includes EU programs, FHF, RFF, Space Centre, Enova. For Enova funding for energy efficiency measures are not included.

There has been a steady growth in public funding for measures to stimulate R&I. There has been a growth in both grants and loans (when disregarding the year of 2008 in which lending was particularly high). Growth have been particularly strong for the past few years.

Growth has been stronger for SkatteFUNN than for the two key agencies IN and RCN.

Figure 2.10 Funding for industry related R&I measures (II). 2013-2017. Index 2013=100.



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: grants include economic support given as direct grants, institutional funding, tax redemption and advisory services

Not only has there been a growth in available funding, there has also been a growth in instruments and agencies administrating such measures.

Regional Research Councils (RFF), Norwegian Space Centre, EU framework programs and Enova are “new” agencies and key measures.

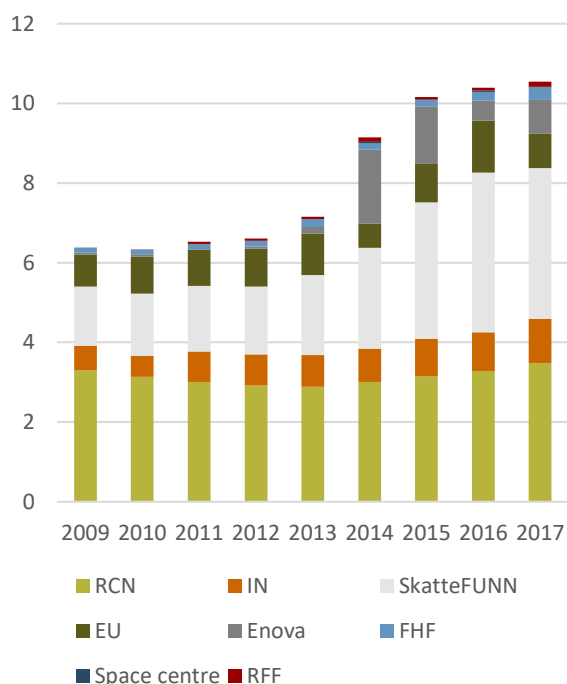
SkatteFUNN is also relatively new and has grown to become a significant measure, corresponding to about 35 percent of all funding for industry R&I measures in 2017.

Funding from RCN measures make up about half of all industry relevant R&I funding.

For the past 5 years, growth in RCN and IN funding is less strong that funding from “others” agencies

such as EU framework programmes, Enova²⁸ and FHF.

Figure 2.11 Funding for industry related R&I measures (II). 2004-2017. In billion 2017-NOK. By agent (and key measure). Only grants¹.



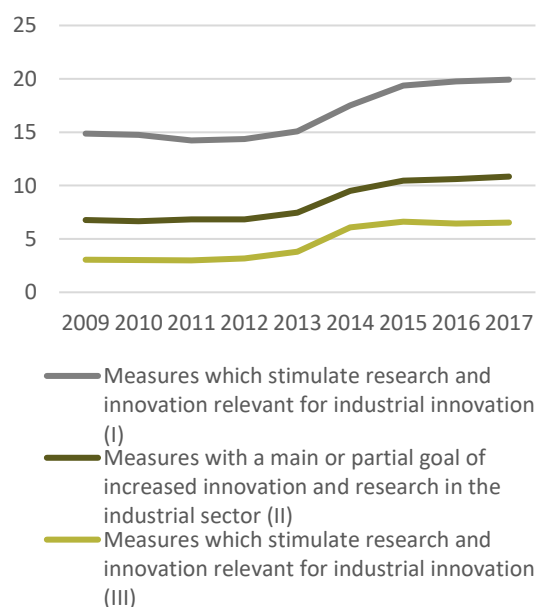
Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: ¹ incl. advisory services and tax redemption scheme.
 For Enova not funding for energy efficiency measures.

This mapping focus on industry related measures aimed to stimulate research and innovation (R&I), referred to as II ct. chapter 1. Which measures to include and thus the scale of public intervention differs for the three different approaches.

The increase in availability of public funding can however, be seen independent of delineation and is particularly strong during the years of 2013-2015 ct. Figure 2.12.

The strong jump in public funding (I) during the years of 2008 and 2009 is linked to an extra-ordinary stimulus as a respond to the financial crisis, whereas the increase in R&I funding (II) during 2013-2015 can be linked to a strong growth in skatteFUNN and measures administrated by Enova.

Figure 2.12 Public support to innovation, research and business development. 2009-2017. In Billion 2017-NOK.



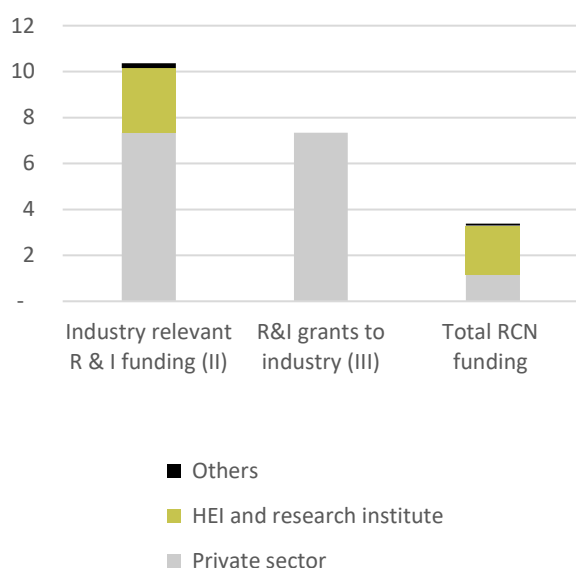
Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)

²⁸ Funding from Enova project can vary from one year to the next as we here look at actual funding and not total funding budget.

2.8 RCN funding is channelled via the research sectors

Private sector, but also HEI sector and research institutes are beneficiaries of industry relevant R&I funding ct. Figure 2.13. Total industry R&I-funding to private sector is estimated to some 7,3 billion NOK in 2017 (out of 10,5 billion NOK in total). This constitute about 70 percent of all funding from industry relevant R&I measures. The remaining is channelled to HEI sector and research institutes (incl. Health cooperation's) and others (i.e. public organisation and foreign organisation).

Figure 2.13 R&I funding, by sector 2017. In billion NOK. Only grants.



Source: Samfunnsøkonomisk analyse AS based on samspillsdatabasen and categorisation from RCN. Beneficiaries not categorised is not included.

SkatteFUNN and IN measures are particularly relevant for the business sector, whereas RCN measures (and Eu programs) are highly relevant for the HEI sector and research institutes.²⁹

For the overall portfolio of R&I measures, funding for private companies have outgrown funding for research institutions for the past years (corresponding to about 10 percent per year for the period of 2013-2017 for private sector and 1 percent for research sector during the same period).

Since 2013, the vast majority of the increase in R&I funding has been channelled to the private sector due to the strong growth in predominantly SkatteFUNN, but also Enova and FHF.

For RCN portfolio, distribution cross sectors have remained relatively stable (about 34-35 percent for private sector and the remaining to the research sector and others).

2.9 Agencies role in the R&I portfolio

The various agencies and instruments play different role in the portfolio although the primary objective of enhanced innovation and value creation is the same. In analysing innovation support instruments, it is important to recognise that 'innovation' has different meanings.

In the most general sense, we think of Schumpeter's definition of innovation as a "new combination of factors of production", and in Schumpeter's broad sense an innovation is any change in product, process, distribution or any other part of the business model that is different from previous practice and that is intended to generate higher profits by

²⁹ Sectoral distribution is based on funding for the project manager. Funding can be "redistributed" to industry partners as a part of projects for ex-

ample in case of KPN projects. Private sector funding can thus be slightly underestimated.

giving an advantage over competitors. This might involve painting the product a different colour, finding a new distribution model, collaborating with others in a cluster to win business jointly, even entering a new market. IN can help with many of these things, if help is needed.

Technological innovation is a sub-set of what Schumpeter was writing about that depends on the creation or identification and then the use of new knowledge. This can be reflected in patents, which are rarely produced in non-technological innovation – though such broader innovation may produce other forms of intellectual property, for example copyrights or registered designs. Technological innovation requires ‘absorptive capacity’ (Cohen & Levinthal, 1989) (Cohen & Levinthal, 1990). This is where RCN specialises its efforts with business: the creation and application of new knowledge for technological innovation; and the support of absorptive capacity building by companies.

The two key organisations RCN and IN shall both foster industry innovation and research, however, they are also different in many aspects. In general Innovation Norway operate on a decentralised and all year-round application process, in which central evaluation criteria’s is financial viability, but also innovation (and sustainability) in addition to program specific criteria. RCN on the other hand operates on a 1 or 2 call for projects annually in which applications are evaluated using a combination of peer re-

view and board assessment in which research quality (novelty and record) are central criteria in addition to program specific criteria.

Both RCN and IN tackle innovation risk. IN addresses the commercial risks of innovation and, where it provides financial support, it must judge financial risks. Where loans rather than grants are involved, additional expertise is required to make detailed judgements about beneficiaries’ ability to repay.

RCN first and foremost tackles technical risk even if they also must tackle innovation risk in instruments relevant for businesses. Axiomatically, all innovation carries commercial risk; technological innovation additionally carries technical risk.

Different innovation support instruments address different stages of product development, from basic research (which may not even be done with an application in mind) through to product design, marketing and production. In Norway as elsewhere, instruments addressing different stages tend to be clustered in different support organisations, which maintain relevant skill sets.

Table 2 is one possible way of describing the division of labour between key agencies and measures for enhanced industry R & I.

Table 2 De facto division of labour across with objectives and measures like those of RCN¹

Organisation	Basic re- search	R&D, proof of concept	Pilot and large- scale demo	R&D ca- pacity building	Routine prod- uct/ process development	Start-up funding	Business skills	Investments and loans
RCN	√	√	√	√		√		
IN					√	√	√	√
SkatteFUNN		√			(√)			
RFF		√		√	(√)			
FHF		√						
Enova			√					
Norwegian Space Centre	√	√						
EU programs	√	√		√	√			
	<i>Relevant to technological innovation</i>				<i>Relevant to all kinds of innovation</i>			

3 Skattefunn is by far the most important single instrument

In this second chapter we will look more closely into the key industry relevant R&I-measures. As a remainder, when applying this delineation, we exclude basic research and research infrastructure (corresponding to about 60 percent of the RCN portfolio, but also parts of H2020 and RFF portfolio) and business development measures (corresponding to about 60 percent of Innovation Norway portfolio and all measures administrated by regional authorities, Argentum, Investinor, Nysnø, Export Credit and GIEK).

We will concentrate this chapter on the grant-based industry relevant R&I measures as this is where RCN has its sole focus.

3.1 20 most significant programs make up 85 of total grants

SkatteFUNN is by far the most important industry relevant R&I-measure, both in economic terms and in terms of unique users.

During the period of 2013-2017, SkatteFUNN funding totalled to some 15 billion NOK. Total number of unique beneficiaries are 10 000. SkatteFUNN has grown in importance during this period. Funding from SkatteFUNN have nearly doubled in economic terms for the past 4 years, from 2 billion NOK in 2012 to 3,8 billion in 2017.

SkatteFUNN correspond to about 1/3 of all funding for industry relevant R&I measures.

Other important instruments include BIA and various thematic research programs funding by RNC, IFU/OFU program administrated by IN, technology demonstration programs funded by Enova as well

as marine research programs administrated by FHF ct. Figure 3.1.

Around 150 different R&I instruments are included in our database (based on the combination of programs, agencies and application type). Rough ¾ of all instruments are thematic.

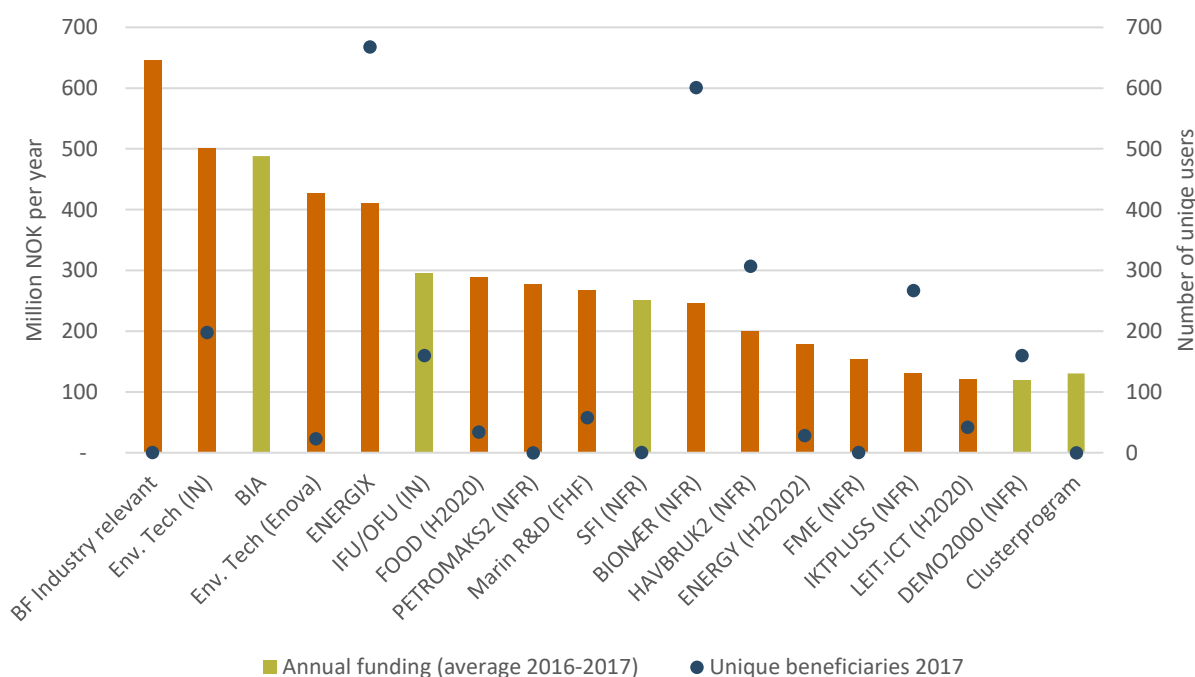
Figure 3.1 reflects the 19 most significant grant-based industry relevant R&I programs in economic terms. Institutional and network programs such as basic funding for industry-relevant research institutes, SFI and cluster program are other significant measures in economic terms. Green scale indicates that the program or instrument is open, whereas orange scale indicate that the program or instrument is thematic³.

SkatteFUNN is given its significant size, not included in the figure.

SkatteFUNN and these 19 programs make up about 85 percent of all industry relevant R&I-grants during the period of 2016 and 2017.

In the following paragraphs, we will briefly present central features of the most significant industry relevant R&I-measures.

Figure 3.1 Most important industry related R&I measure¹, in economic terms. In billion 2017-NOK (left) and total number of unique recipients². Average funding for 2016-2017. Green scale indicates that the program or instrument is open, whereas orange scale indicate that the program or instrument is thematic³. Blue dot indicates number of unique beneficiaries.



Source: Samfunnsøkonomisk analyse AS (Samspillsdatabasen)

Note: ¹SkatteFUNN is significantly larger than other measures and for the sake of presentation not included in the figure. BF is basic funding for industry relevant research industries referred to as technical institutes and institutes targeting basic industry. ²Unique beneficiaries is not limited to business sector. ³ Samfunnsøkonomisk analyse AS categorisation of open vs. thematic program/measure

3.2 SkatteFUNN

SkatteFUNN was introduced in 2002. NOU 2000: 7, which laid the foundation for SkatteFUNN, pointed out that to stimulate R&D in the private sector, it was necessary to supplement existing schemes with a broader scheme in order to embrace a wider range of R&D projects. At the time, firms conducting smaller R&D projects made little use of established R&D funding schemes. The R&D tax incentive scheme was introduced with the objective of en-

hancing innovation by increasing R&D investment in the private sector and particularly in SMEs.

R&D tax incentives are among the most popular R&D policy tools and the schemes share many similarities with tax regimes used worldwide.

SkatteFUNN decreases firms' R&D investment costs through tax credit up to set caps. SMEs may receive a tax credit of up to 20 per cent of the eligible R&D costs for approved projects, whereas large firms may receive a tax credit of up to 18 per cent.

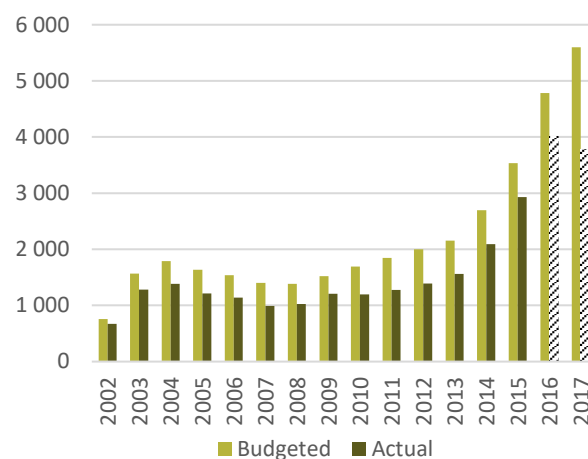
If the tax credit for R&D expenses is greater than the amount for which a firm is liable in tax, the remainder is received through a tax settlement.

To receive SkatteFUNN it is a requirement that the firm is taxable in Norway. However, it is not a requirement that the firm is in a tax position, i.e. has tax liabilities.³⁰ On average about 60 percent of SkatteFUNN beneficiaries are not tax liable in which Skattefunn effectively becomes an R&D grant rather than a tax incentive (Samfunnsøkonomisk analyse AS, 2018).

The scheme has been expanded in four rounds; in 2009, 2014, 2015 and 2016 (see attachment for further details). All the extensions of SkatteFUNN have increased the deduction basis. However, it is not until the years 2013 and 2014 that we see a significant increase in the total tax deduction. For 2017, the budgeted tax deduction for the scheme was estimated to some 5,6 billion NOK which is more than four times more than the tax deduction in 2010. Actual cost the same year SØA has estimated actual tax redemption to some 3,7 million NOK.

In line with the objective, most SkatteFUNN beneficiaries' projects are small and received an annual tax credit equal to 0.72 million NOK or lower. Only 12 firms in 2014 and 2 in 2015 got a maximum possible amount of tax credit for both intramural and purchased R&D.

Figure 3.2 Budgeted and actual tax deductions. NOK million. 2017-NOK.



Sources: RCN and the Norwegian Tax Administration

A major advantage of SkatteFUNN, compared to many other schemes, is its neutrality with respect to geographic location, industry, ownership and technology. As it is a rights-based, general scheme, decisions on R&D investment are left to the market. The fact that SkatteFUNN is available to all, without a time-consuming and costly application process (for the authorities as well as the firms), differ from other R&D-enhancing schemes, where firms need to apply or engage in consortia's and or networks.

However, there are also some disadvantages. Firstly, R&D tax incentives increase the government's budgetary uncertainty. Secondly, there is a risk that a certain share of the R&D activities would have been carried out irrespective of the scheme. Thirdly, because of low administrative costs and a simple application process, the potential for misuse is typically higher than for more demanding R&D in-

³⁰ When the tax credit exceeds the firm's tax payable or if the firm is not in a tax position, i.e. have a tax liability of zero, the difference between

the tax credit and the firm's tax payable (which is zero in the latter case) is paid out to the firm as a grant.

centives. Lastly, open programs do not allow for strategic channelling of resources towards areas, sectors or themes of strategic importance (Samfunnsøkonomisk analyse AS, 2018).

3.3 Basic funding for industry relevant research institutes and centres (RCN)

Norway has a relative extensive research institute sector. The establishment of the research institutes dates back to the inter-war period when industry research institutes were established to create a close collaboration between industry and public authorities (for example, the Hermetics Industry Laboratory which is a part of the of today's Nofima), but most Norwegian research institutes were established in the post-war period. Some institutes were established as an industry and welfare policy instrument, some were set up to offer insights need for fulfilment of public tasks whereas others were established to foster industry development.

In 2009 a uniform system of basic funding for research institutes were established. Some 50 institutes are a part of this scheme.³¹

The overall purpose of the basic funding is to ensure a strong institutes sector which can offer industry and public sector relevant expertise and research facilities. The basic funding is based on historic funding, but funding is also reallocated according to some criteria's (i.e. external income).

Basic funding to research institutes under this scheme totals to some 1 billion NOK in 2017, which is about 10.4 per cent of the total revenue of the recipient's institutes.

Institutes are grouped as being "technological", "primary industry", "environmental" and "social science".

The level of funding, measured as a share of revenue and as a share of funding per R&D personnel, varies between the institutes and group of institutes.

On average, basic funding make up about 7 percent of total funding for institutes categorised as technical research institutes and 15,2 percent amongst institutes categorised as relevant for primary sector.

Although all institutes can be industry relevant, institutes categorised as being "technological" and "primary industry relevant" are considered industry oriented. Thus, we have considered basic funding for such institutes as an industry-relevant R&I-measure.

Basic funding can be view as a long term right-based measure, however, ever year a small portion of the funding is redistributed amongst institutes based on a predefines criteria's. Total funding used for basic funding is flexible can change from with time in line with government priorities.

Basic funding for industry relevant research institutes totalled to 650 million NOK in 2017.

3.4 BIA (RCN)

BIA is another open industry relevant R&I-measure which has grown to become an important program.

The user-driven innovation arena (BIA) was established in 2005 based on the governmental research report St.meld. no. 20 (2004-2005) *Willingness to*

³¹ Some research institutes do not receive basic funding at all, whereas some research institutes still receive funding directly from owner ministry

i.e. Defence Research institutes. Such funding is not included as industry relevant R&I measures.

research which specified the need to strengthen research activity in business.

The program is administrated by RCN. The establishment of BIA was based on a merger of five thematic programs.

BIA is a R&D program that aim to promote innovation in Norwegian enterprises by supporting R&D projects that are based on the companies' own strategies and challenges.

Grant is given based on two different application procedures IPN – innovation project in business and KPN – competence project for industry. Selection is made based on a set of well-defined criteria (innovation, research quality, potential for value creation and social benefit).

More than 80 percent of the funds in the program are given based on IPN application procedure. The program has developed form being a program for funding of R&D project that does not fit within other thematic programs, to be the most important open program for industry relevant R&D funding.

The growth in BIA is in line with the intentions of the long-term plan and government priorities to step up the business-oriented research. In a recent evaluation, an international panel argues that that the openness stimulate new ideas, needs and innovation possibilities (RCN, 2017).

As with SkatteFUNN, BIA is neutral with respect to geographic location, industry, ownership and technology. Compared to SkatteFUNN, BIA is costlier to administrate and to participate in, as firms need to apply or engage in consortia's and or networks. A

recent evaluation, however, point to BIA as being efficiently managed.

Total funding of BIA was 630 million NOK in 2017. BIA funding constitutes about 20 percent of RCN industry-relevant portfolio.³² The remaining part of RCN funding is made up of various other thematic programs such as HAVBRUK, PETROMAX, BIONÆR and RENERGI ct. Figure 3.1.

3.5 Environmental technology scheme (IN)

The environmental technology scheme offers public funding to build pilot and demonstration facilities. It gives companies the opportunity to try out and showcase their environmental technology solutions, and to ensure that the products are most adapted to the national and international markets in which they will compete. The grant reduces the risk in the project for the other investors.

Financial support is given to;

- Pilot plant development of a new, functioning solution (product, service or process) for testing on a smaller scale than full scale.
- Demonstration facilities are the further development of a functioning solution (product, service or process) for large-scale testing before it can be put into full industrial production or launched as a full service.

Innovation Norway process applications on an ongoing basis.

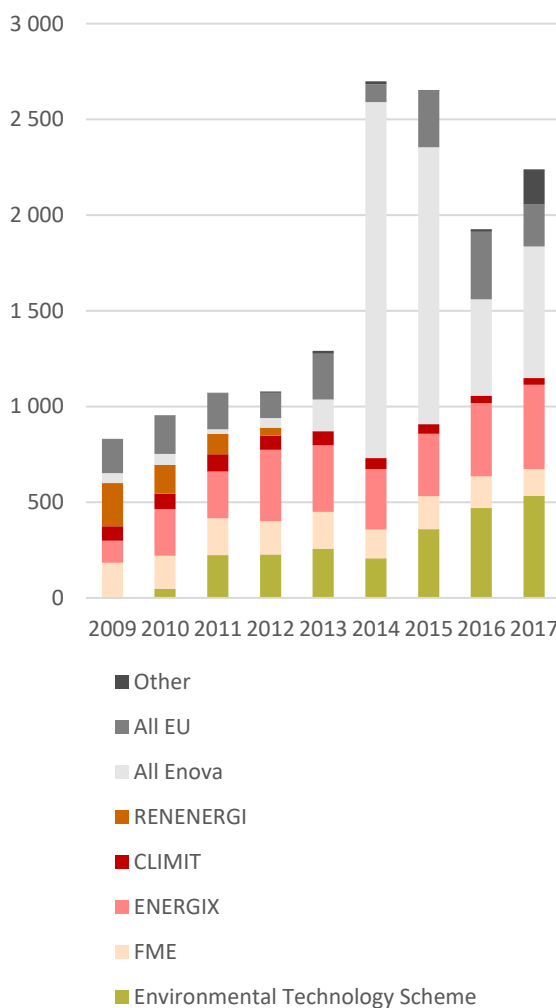
Funding for the environmental technology scheme has grown significantly over the past years following the current and previous governments.

³² based on SØA delineation (II)

Project size differs. The largest single project is 40 million NOK. However, about 70 per cent of the projects supported by the Environmental Technology Scheme are below NOK 2.5 million, and almost 90 per cent of the projects are below NOK 5 million.

In 2017 total funding from the Environmental Technology Scheme was 530 million NOK. There has been a strong growth in funding for this measure since its start-up in 2009, but also in other measures particularly aimed at fostering innovation and research related to renewable energy, climate and environment. Figure 3.3 reflects funding for such programs. Other measures might also be used to fund energy, climate and environmental projects i.e. DEMO2000, BIA and SkatteFUNN however, as measures, these are categorised as thematically neutral. Enova funding in 2014/2015 was particularly high following some few large projects.

Figure 3.3 Total funding of thematic industry relevant R&I measures¹ NOK million. In 2017 NOK. 2002-2017



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note; ¹ includes only funding from programs categorised as renewable energy, climate and environment. SØA categorisation, and only funding categorised as industry relevant funding i.e. not funding for basic research projects or energy efficiency projects.

3.6 Innovation contracts (IN)³³

Innovation Norway have a special grant supporting innovative projects in companies that have established a formal contract with a potential customer, given the project succeed. The customer could be within the public or the private sector. The grant is given to the developer company, not the customer.

The aim is that a R&D contracts trigger an innovative partnership between two or more parties. Through close cooperation a supplier gets unique insight into the customers need resulting in the development of a product that is much better adapted to consumer need.

The selection criteria are the project's level of innovation, international marketing potential, as well as the economic feasibility and ability to carry the project through.

Public funding for Research and development contracts (IRD/PRD) totalled to 290 million NOK in 2017.

3.7 Norwegian Innovation Cluster programs

RCN, but also innovation Norway and SIVA alone and together fund various cluster and centre programs. Funding for each program and cluster or centre is relatively modest, but in aggregated terms total funding is not negligible. Such measures have significant number of beneficiaries.

The Norwegian Innovation Cluster program aim to stimulate to innovation by fostering cooperation cross companies. Without distinguishing between type of membership or degree of involvement, the

clusters included in Norwegian Innovation Clusters have almost 2,600 members.

Although the various programs have their distinct features, there are also many similarities between them. We will here present the most important network and cluster programs aimed to promote innovation and research-based innovation in industry.

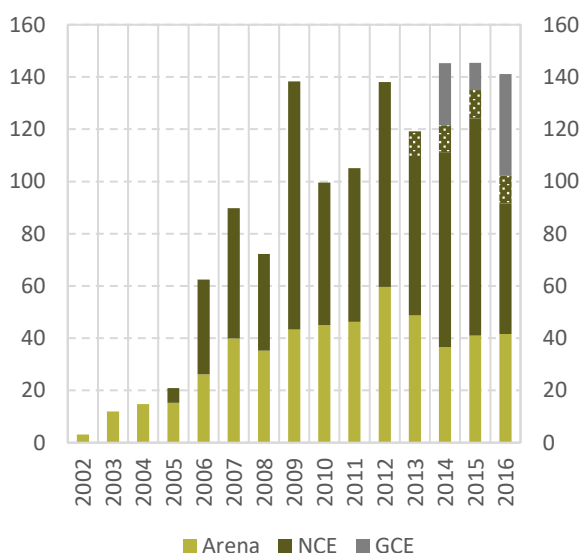
Since the early 2000s, Norway has had a strategy to strengthen industry clusters through a national cluster programme.

The Arena programme was launched in 2002 and has since then supported nearly 70 cluster projects. Norwegian Centres of Expertise (NCE) was launched in 2006 to further strengthen interaction in the Norwegian innovation system. NCE has supported 15 projects. In 2014, Arena and NCE were merged into one programme: the Norwegian Innovation Clusters programme (NIC). At the same time, Global Centres of Expertise (GCE) was initiated as a third level.

Norwegian Innovation Clusters has grown to become an important industry policy instrument over the years. The cluster programme had a total budget of NOK 166 million in 2016. The introduction of GCE increased the size of the programme by about 25 per cent.

³³ Formerly known as Research and development contracts

Figure 3.4 Total funding of cluster projects.1 NOK million. In 2016-NOK. 2002-2016



Source: Samfunnsøkonomisk analyse AS (samsjillsdatabasen)
 1) The dotted area indicates grants to NCE clusters via Innovation Norway's scheme 1022

The cluster projects are located all over Norway, but the number of projects per region varies. Arena targets cluster projects with a regional position and a significantly larger proportion of clusters at this level are in more rural regions, compared to NCE and GCE clusters, which are all located in central regions.

The cluster programmes' role is to stimulate cluster development, or more specifically to *trigger collaboration-based development* which would not otherwise have happened, and to *reinforce and accelerate existing collaboration*. This concerns stimulating collaborative potential (relational basis), as well as specific collaboration processes.

The cluster programme mainly finances up to 50 per cent of the total cost of eligible activities. The remainder should be funded by members of the cluster in the form of cash payments (membership fees),

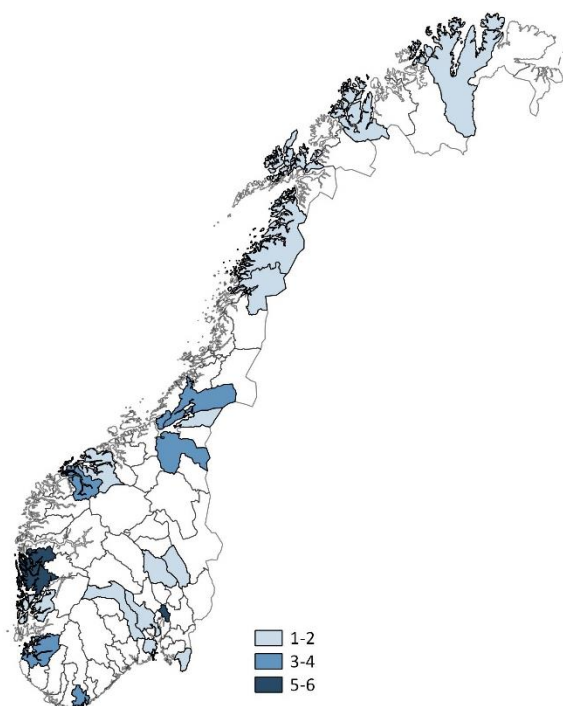
or hourly rates and direct expenses (connected to implemented projects).

A cluster project may also receive funding from other public sources than Innovation Norway, e.g. municipalities or county municipalities. If this funding is channelled to the same activities as the funding from the cluster programme (via Innovation Norway), this must be included in an overall budget for these activities and be in line with the requirements for maximum public funding. Additional funding of cluster projects must not be confused with the public funding that individual members may receive.

Most clusters have members from several different regions. Nevertheless, one region usually stands out when counting members per region and can be considered as the cluster's "headquarters". When defining core members, we have chosen to define the cluster's geographical location as the economic region where the largest proportion of members is located (excluding R&D, educational institutions and public development actors).

Some clusters gather firms within the same value chain and/or market, while others gather firms with common technology or competence needs.

Figure 3.5 Number of cluster projects per economic region. 2005-2016¹



Source: Samfunnsøkonomisk analyse AS

Map: ©Kartverket

1) The 47 cluster projects included in the evaluation (Samfunnsøkonomisk analyse AS).

3.8 Research Centre Program (SFI/FME)

Another relevant institutional measure includes the Norwegian Scheme for Research-based Innovation (SFI) which aims to strengthen innovation and research expertise at a high international level through investing in long-term research in close co-

operation between R&D-active companies and prominent research environments.

The instrument is a long term funding scheme (5 + 3 years)³⁴. Since its inception in 2005, the SFI scheme has supported 38 centres in three generations, encompassing consortia of research institutions and commercial actors from across Norway. The first generation of 14 SFI centres concluded their period of operation in 2015, which some 24 centres currently active.

The centres are co-financed by enterprises, host institutions and the RCN. The annual grant from the RCN is 9-12 million NOK. Together with the contribution of the host institution and partners, this will provide an annual total budget for each centre of NOK 20-30 million.

The main criterion for selecting centres is their potential for innovation and value creation, but scientific quality of the research must also be of a high international standard.

The target group for the SFI scheme is especially the established companies and the R&D active part of the Norwegian business sector, and it is primarily the companies participating in a centre that are expected to exploit the results of the research.

Co-financing is required between companies, host institutions and the Research Council. Companies must participate actively in the center's management, financing and research. The centers are established for a maximum period of five plus three years.

³⁴ When the centres are established, they are given a contract for five years. Based on a successful midway evaluation, the contract may be extended for another three years.

There are large variation in not only the number of partners per centre, but also the share of business partners.

RCN also funds Research centres for environmentally friendly energy (FME). FME share many similarities with SFI with regards to objective, funding and period of funding, but is thematically concentrated on research on renewable energy, energy efficiency, CO2 management and social science.

The scheme was established after the climate settlement ("klimaforlik") in 2008 and is aimed to contribute to solving major challenges facing society on climate and climate issues energy area. The scheme is mainly financed by the Ministry of Petroleum and Energy's budget and is an important sector policy instrument that also receives broad political attention.

The first eight FMEs started up 2009 and ended in 2017. In 2011, three new centres were granted FME status and in 2016, eight new technologically oriented FMEs were appointed.

From the first to the second group of FMEs, there has been a clear shift in the focus from renewable energy production to energy use. There has also been an increase in efforts within energy policy and social science. This is considered a desired development (Norwegian Research Council, 2017).

Funding is given as basic funding for research institutes, FME and SFI totalled to some 420 million NOK in 2017 (278 million NOK for SFI and 140 for FME).

3.9 Innovation loan (Innovation Norway)

Innovation Norway administrate a high-risk loan scheme. The total funding can vary on an annual basis; however, total funding was particularly high in 2008/2009 following the financial crises. In 2010

funding went down to a level which was significantly lower, but still higher than before the financial crisis. However, total lending has since then increased.

This increase is caused both from a clearly defined strategy of increasing lending on behalf of grants. The gradually shift assumes that lending is more effective in increasing innovation and value creation than grants.

The substantial increase for the past years is also driven by a co-funding agreement with the European Investment Fund (EIF) which enabled the lending of high-risk loans to Norwegian companies to be increased by NOK 500 million in 2017 (Innovation Norway, 2018).

3.10 Program cooperation cross agencies

In general, the various agencies administrate programs independently. However, the Cluster program is a common program in which IN administrate and fund the program in close cooperation with RCN and SIVA.

SIVA have in cooperation with RCN and Innovation Norway recently established Norwegian Catapult, an instrument to fund industry relevant facilities to strengthen development and commercialisation of new technologies.

Another, new initiative is the PILOT-E scheme which was established in 2016 as a response to the major societal challenges related to energy, transport and the environment, where new technology and new solutions are needed. PILOT-E includes both the Research Council, Innovation Norway and Enova, and aim of the scheme is to increase the speed of development through higher predictability for support, closer follow-up and stronger coordination between these policy agencies. A PILOT-E project is carried out in a binding partnership, which consists of one or more compa-

nies and often research institutions that together develop a new solution, in close collaboration with the first customer who takes the solution into use. Similar initiative related to other “grand challenges” is currently under discussion.

3.11 Evaluations indicate that key R&I programs work

Most R&I schemes are evaluated regularly. In general, evaluations find that R&I programs do enhance innovation, and also value creation.

For example, in a recent evaluation of SkatteFunn Samfunnsøkonomisk analyse AS (2018) finds that SkatteFUNN increase innovation in the form of new products, development of new processes and more patents. Moreover, that SkatteFUNN projects have the same effect on labour productivity as privately financed R&D projects.

For every NOK in lost tax revenue, the evaluators find that the business sector invests more than 2 NOK in R&D. Additionality varies however across years, size of business, scheme rules, and when the business began to receive support through the scheme.

Samfunnsøkonomisk analyse AS does for example find that additionality is highest amongst early users confirming a strong selection of the firms into the scheme, i.e. firms with managers searching for opportunities and with high potential have made use of SkatteFUNN early. Conversely, the firms recently starting to use SkatteFUNN have delivered lower additionality.

Henningsen, Hægeland and Møen (2012) estimate the input additionality of R&D direct subsidies from RCN. They conclude that the input additionality of RCNs subsidies is 1.15, that is lower than the estimated input additionality of SkatteFUNN.

Henningsen, Hægeland and Møen (2012) estimate additionality associated with grants from ministries, Innovation Norway and other public agencies, is 0.33, which is very low. Such low level is, however, plausible as this type of support includes contract R&D, which is not primarily given with the aim to stimulate the firms' own R&D investments.

Statistics Norway has since 2014 assisted IN with the operationalisation and measurement of effect of industry relevant measures.

Statistics Norway's analysis indicate that Innovation Norway's instruments have a positive effect. When only looking at the Innovation-related measures, Innovation Norway's customers on average have more than six percentage points higher annual growth in value creation than comparable companies that are not customers of Innovation Norway, measured over a three-year period. Productivity has increased two percentage points more in the companies that have made use of Innovation Norway's services than the companies in the control group (Innovation Norway Annual Report to Ministries 2017).

In a recent evaluation of BIA (RCN, 2017) an expert panel finds it is reasonable to claim that the BIA has helped strengthen the competitiveness of companies that have contracted BIA. This applies to both new and existing businesses. With BIA's requirements for collaboration constellations in all projects are well-built collaboration and knowledge transfer between companies and research environments. This transfer is bidirectional. BIA has also created new and deepened collaboration between the companies.

The evaluation panel also argue that BIA is a suitable tool for safeguarding political ambitions of escalating support for business-oriented research with-

out the authorities having had to point to where one expects innovation to actually or should happen.

The panel argues that BIA has shown that removal of thematic guides has not weakened the quality of the application mass – rather on the contrary. It has been an important stimulus for businesses and industries with little experience with research.

The Norwegian Innovation Cluster program was evaluated in 2017. By using econometric analysis comparing cluster members with a matched control group, Samfunnsøkonomisk analyse AS found significant positive effects on employment, sales revenues and value added in the first three years after enrolment in a cluster project.

The evaluators also find that Norwegian Innovation Clusters contributes to more innovation-oriented collaboration between members of the cluster projects, and between members and R&D institutions. There is further reason to assume that this collaboration contributes to greater innovation than would otherwise have been the case, although this conclusion requires a separate analysis.

Very few studies, so far, have evaluated different policies simultaneously. It is thus uncertain to what

extent and whether there are specific schemes that contribute to measured effects or whether it is the combination of instruments that produce effects.

Cappelen et al. (2016) evaluated various R&D supporting schemes in Norway, including SkatteFUNN and direct subsidies (grants) from RCN and IN. They find SkatteFUNN to be the most effective R&D scheme with respect to value added per million NOK in project support.³⁵

Furthermore, they find that both direct subsidies and tax credits have positive effects on firms' probability to apply for more patents. While direct subsidies triggered a higher number of patents among firms between 2002 and 2011,³⁶ SkatteFUNN was more effective given the number of triggered patents per krone spent.

Still, this does not support channelling all RnD funds to skatteFUNN.

In 2018, Ministry of Finance and Ministry of Fishery and Trade initiated a review of the entire portfolio of industry-oriented instruments in collaboration with other ministries; the review is to be completed in 2020.³⁷

³⁵ . More details on this specific part of evaluation can be found in Nilsen et al. (2018).

³⁶ We have also observed higher patent intensity among firms with support from RCN compared to SkatteFUNN and IN are in line with in Chapter 6.1.

³⁷ <https://www.regjeringen.no/no/aktuelt/starter-arbeidet-med-a-rydde-opp-i-virkemiddel-jungelen/id2612290/>, viewed 16 February 2019.

4 Open programs support R&D, but also growing industry sectors

In this chapter we will investigate recent trends within the R&I portfolio and how different industry relevant R&I measures play together and gives opportunities to mutually support industrial R&D investments.

4.1 SkatteFUNN and IN particularly relevant for SMBs

Even if the industry relevant R&I all aim to enhance innovation and research-based innovation, the measures play different role in the R&I policy portfolio.

SkatteFUNN is particularly suited for smaller R&I projects due to the simple application procedures, and thus particularly relevant for SMBs and young firms. RCN, Enova and H2020 measures are particularly suitable for larger and more complex R&I projects.

The differenced is reflected in measures' beneficiaries.

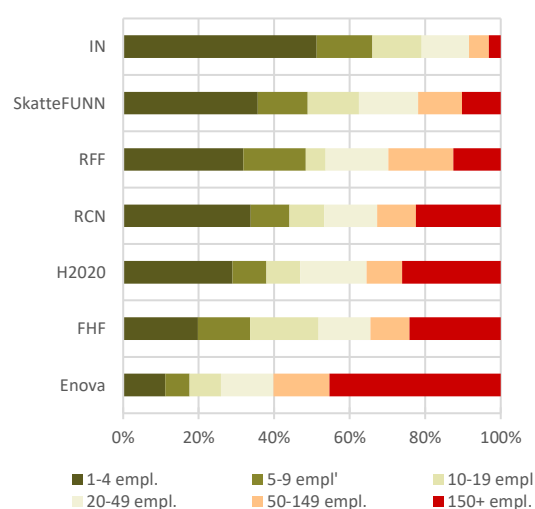
Investigation of the SkatteFUNN beneficiaries reveals that SkatteFUNN, but also R&I measures funded by IN is more relevant for SMBs compared to schemes with similar objectives, such as industry relevant RCN measures, ct. Figure 4.1.

RCN, Enova, but also FHF and H2020 beneficiaries are relatively speaking larger.

About 50 per cent of project managers in BIA projects are firms with less than 50 employees, whereas only 22 per cent of these firms have less

than 10 employees. About half of SkatteFUNN firms have less than 10 employees.

Figure 4.1 Firm size first year. Key agencies and measures. Average 2016-2017. Per observation. Private firms.

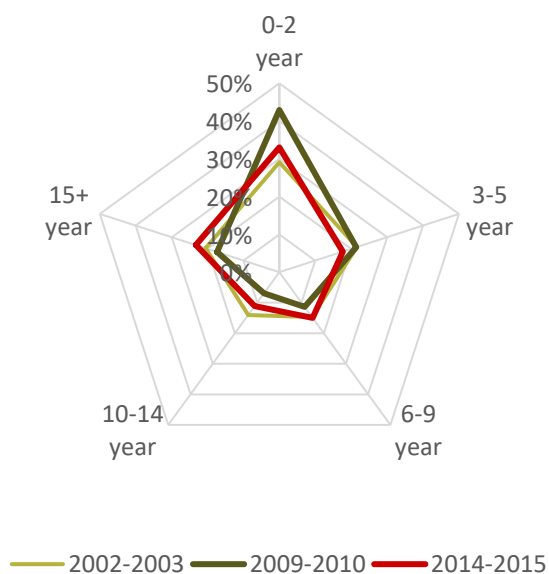


Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
Note: Research institutes and university colleges organised as AS are not included.

Similar pattern can be seen with regards to firm's maturity. Firms participating in SkatteFUNN and IN are in general younger than firms participating in RCN and H2020 measures. With time, however, share of more mature firms have increased in SkatteFUNN. One possible explanation is the increase in the threshold for R&D tax credit³⁸ making the measure more suitable for larger R&D projects ct. Figure 4.2.

³⁸ct.5.2

Figure 4.2 Firm age first year with an R&D tax credit. 2002-2015. Private firms.



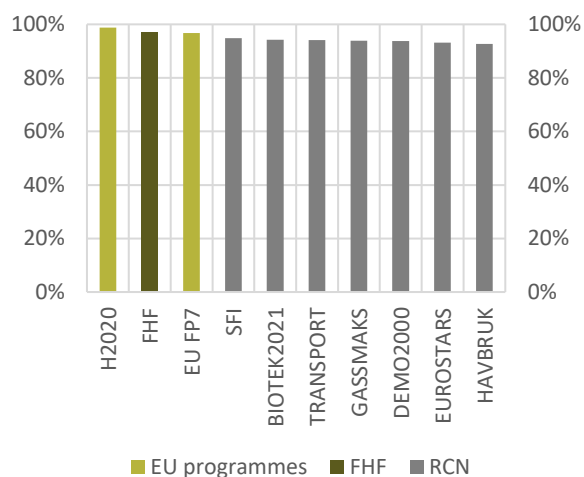
Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: Research institutes and university colleges organised as AS are not included.

4.2 R&I programs interact – in and between agencies

When we see all the R&I programs together, we also see that the same recipient uses different R&I programs simultaneously and over time.

It is interesting to note that the interplay between programs is not limited to programs within the same policy agency, but that the interaction goes across the agencies.

Figure 4.3 Selected innovation-oriented schemes with a high share of recipients of support from three or more agencies.¹ Share of total funding from the given scheme in the period 2013-2017²



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)

- 1) Number of agencies is counted for each firm in the period 2000-2017. Only schemes with total funding in the period 2013-2017 above NOK 100 million and that has existed for at least two years in the same period is included in the sample.
- 2) Total funding to firms with funding from three or more agencies as share of the scheme's total funding.

Cluster and network programs stand out as the programs where most schemes interplay (in Figure 4.3 only SFI is shown).

It is possible to see cluster and network activities such as the Norwegian Cluster Program as catalysts for enhanced collaboration on strategic needs within each cluster project. The extent of other schemes channelled towards the cluster participants can be a result of the cluster program itself.

There may be two reasons for this; Firstly, several cluster facilitators assist firms in providing information about the possibilities of using public

schemes to support various innovation projects. Secondly, given that participating firms have to some extent revealed their innovation potential by being included in the cluster programme, participation can increase the likelihood of being approved for support from other schemes.

But also EU schemes and certain thematic programs stands out as programs with participants also using other schemes.

It is reasonable to see the interactions between these and other programs because they play different roles in the companies' R&I work.

Of course, it cannot be ruled out that certain programs overlap in objectives and scope. In that case, it is conceivable that companies can "shop" between programs. To avoid "program shopping", there is a need for good coordination between program owners, as well as coordination between the policy agencies of what challenges the various programs are meant to face.

Cooperation between agencies is also considered important to enhance effectiveness and "user-friendliness".

4.3 Several companies use only one or two instruments for R&I support - SkatteFUNN is most important

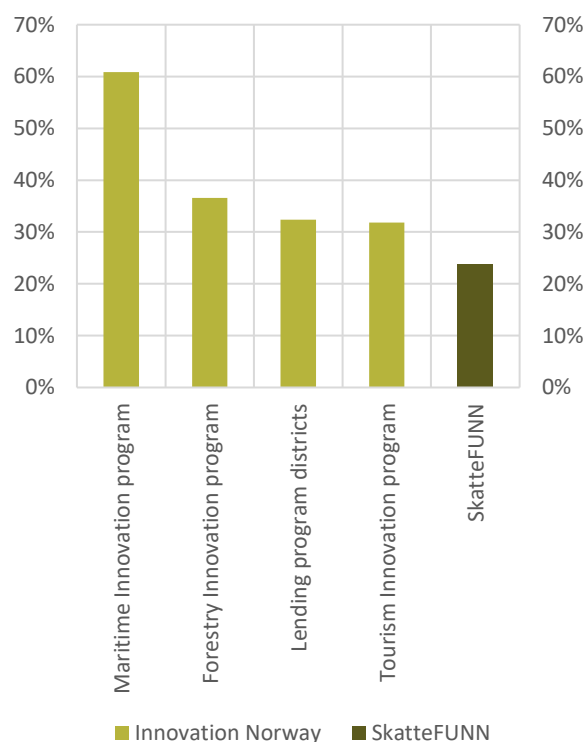
Most R&I activities is carried out with little involvement of public support programs, ct. chapter 2.

The reason may be that the programs are not relevant to them or that the costs associated with applications and reporting exceed the benefits. However, in special situations, it may be conceivable that programs reduce specific challenges the company meet.

It may also be that the cost of using a specific scheme is so low that the support benefit easily exceeds the company's "transaction costs" of participating in a given program.

In several programs, the share of users only using that specific program is relatively high. Figure 4.4 shows that in particular, R&I programs within Innovation Norway have these characteristics. In addition, SkatteFUNN also stands out as a program with many companies that only use SkatteFUNN as support for their own R&D investments.

Figure 4.4 Selected innovation-oriented schemes with a high share of recipients of support from one single agency.¹ Share of total funding from the given scheme in the period 2013-2017²



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)

4.4 Growth in open programs

SkatteFUNN and BIA have grown to become important measures within the portfolio of industry related R&I-measure. Both programs are thematically open programs available to all business independent on sector, size and geography. So are the IN-Innovation Contracts program.

Many instruments such as FME and thematic research programs offered by RCN, but also FHF, Enova and Innovation Norway (i.e. forestry innovation program and environmental technology program) are however, thematical.

In economic terms, instruments that are neutral with regards to sector and theme made up about 2/3s of all industry relevant R&I-funding in 2017. For the past five years growth in funding for open instruments is above that of non-neutral instruments.³⁹

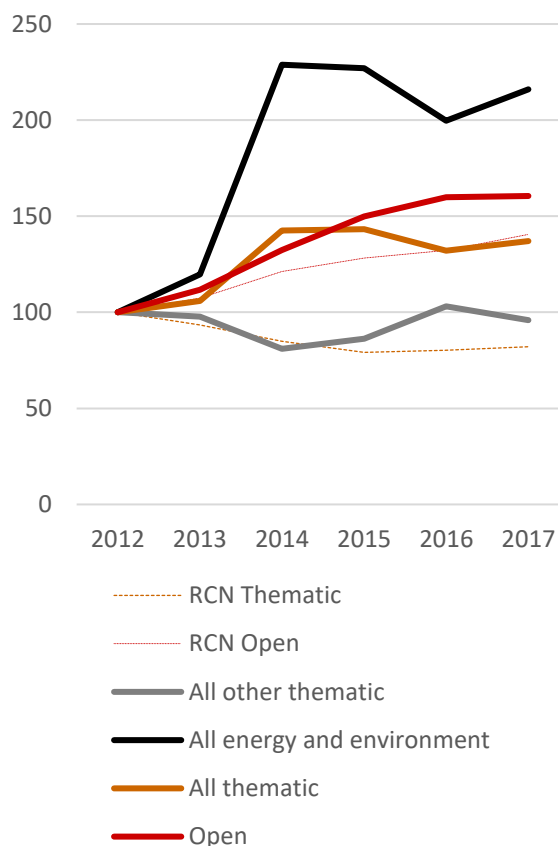
There has however also been a growth in funding based on non-neutral instruments, but not for all themes. There has particularly been a strong growth in funding in programs focusing on renewable energy, environment and climate⁴⁰ from Enova, but also from RCN, IN and EU FP7/H2020. Funding for other thematic programs have fallen slightly.

Only looking at the RCN portfolio, open programs also make up about 2/3s of total industry relevant R&I-funding. Growth in open programs is also for RCN slightly above that of thematic programs when looking at the period of 2012-2017 ct. Figure 4.5.

Given the sharp increase in funding for open programs, it seems as if open programs no longer

complement the thematic programs, but that the thematic programs complement the open program.

Figure 4.5 Funding for industry relevant R&I measures. By type of programs. Index 2009=100. 2009-2017.



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)

³⁹ Samfunnsøkonomisk analyse AS' categorisation in which all funding from FHF, Enova, Space Center and Doga is categorised as thematic. Funding from IN, EU programs and RCN is categorised according to each instrument. See annex for further details.

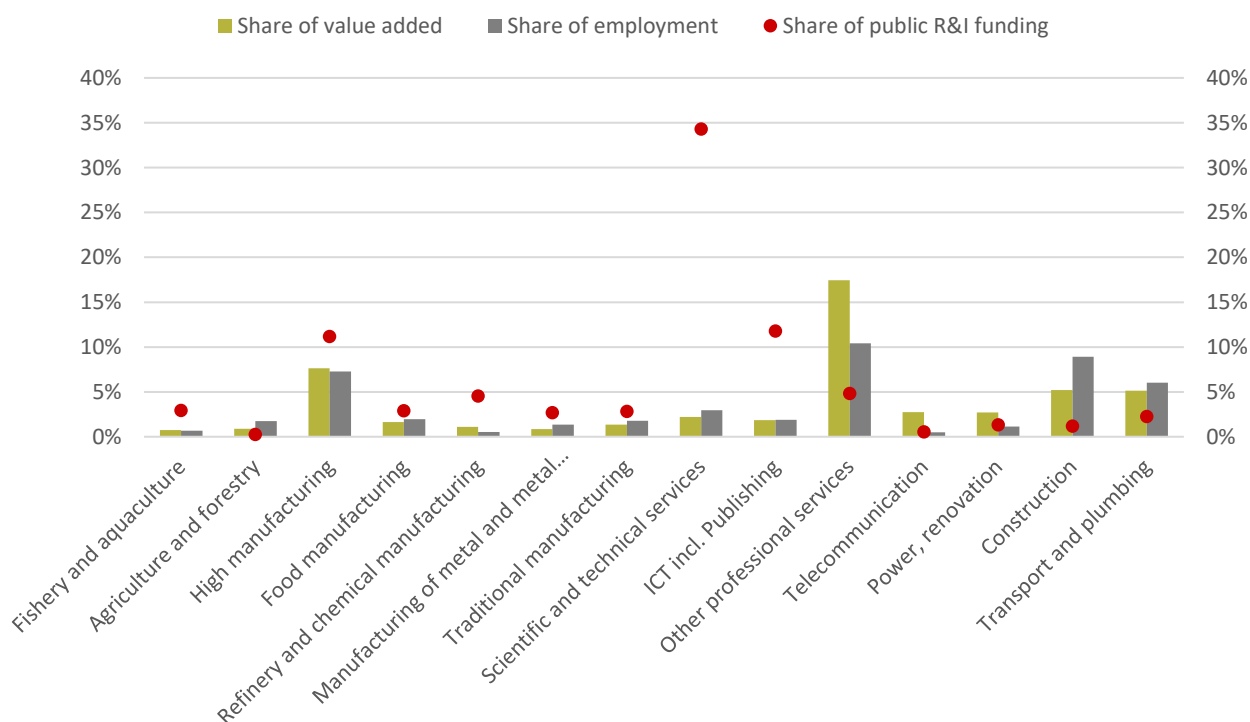
We also observe a growth in funding for regional instruments⁴¹ like FORREGION and RFF (corresponding to about 30 per cent growth each year during the period of 2013-2017). Funding from such programs does however only constitute 2 percent of all industry relevant R&I-funding. Industry relevant R&I measures are in general geographically neutral.⁴² In the ongoing process of regional reform, the detailed analysis⁴³ on the industry relevant measures will assess whether a larger part of the

industry relevant measures (not limited to R&I measures) should be regionalised.

4.5 Industry distribution cross agencies

When we investigate industry participation, we find that a large portion of public industry relevant R&I funding goes to players within research and scientific services, high tech manufacturing and ICT services, indicating that such industries are research and innovation intensive ct. Figure 4.7.

Figure 4.6 Industry relative share of public funding and of the economy¹. 2017.



Source: Samfunnsøkonomisk analyse AS and SSB based on industry code

Note; ¹ Excl. oil extraction industries, household services. High tech manufacturing includes manufacturing of machinery, transport machinery, whereas traditional manufacturing includes manufacturing of paper products, rubber, furniture etc.

⁴¹ Regional instruments include VRI, RFF, FORREGION and FORK-OMMUNE. Regional authorities also stimulate industry development directly and indirectly through regional partnerships. Such measures are categorised as measures for business development and not R&I in this mapping.

⁴² IN and regional authority measures aimed at business development and entrepreneurs are to a larger regionalised, however, share of such funding is decline.

⁴³ Ministry of Finance and Ministry of Trade have commissioned a detailed analysis covering all industry relevant measures.

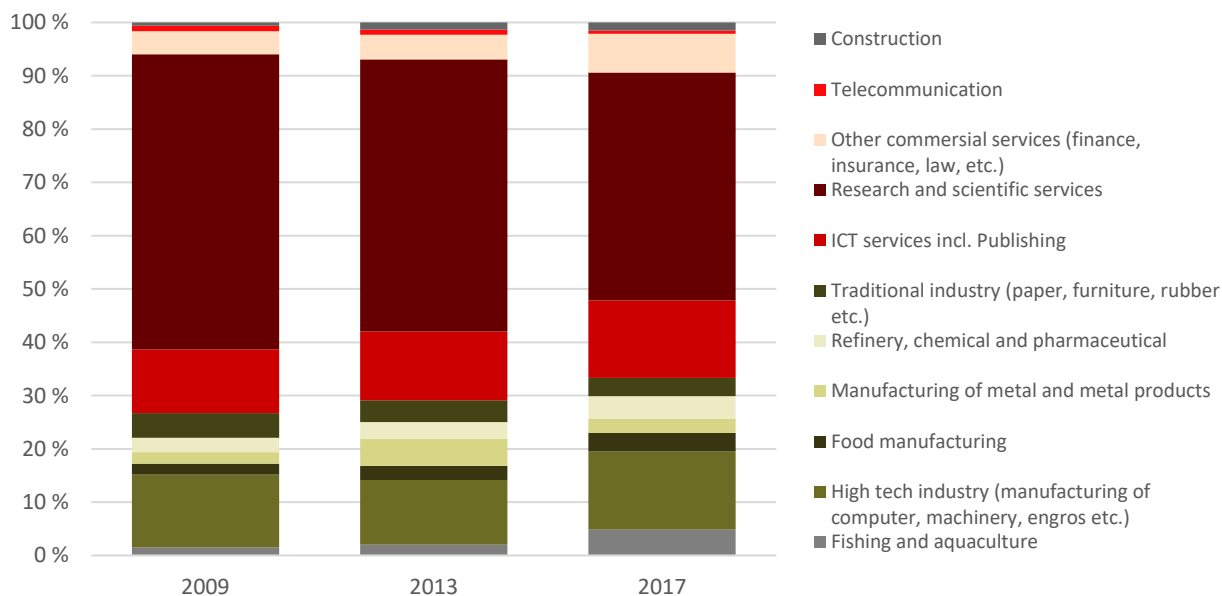
SkatteFUNN, but also RCN and IN are relevant to pretty much all sectors. FHF stands out as focused on marine sector, and Enova as important source of funding for electricity, transport and manufacturing as one might expect given instruments these players administrate.

tion in thematic programs as we can see in the case of FHF and aquaculture industry ct. Figure 4.7.

All industries have benefited from the past years growth in R&I measures, as one might expect given the sharp increase in open programs. Growth has however been particularly strong within the fishery and aquaculture industry, construction industry and other commercial industry.

Use of thematic programs allowing for channelling of resources to strategically important themes and sectors. Increase in funding for certain sectors can thus be a (logic) consequence of growth or reduc-

Figure 4.7 Public R&I funding cross sectors. Selected sectors. 2009-2017

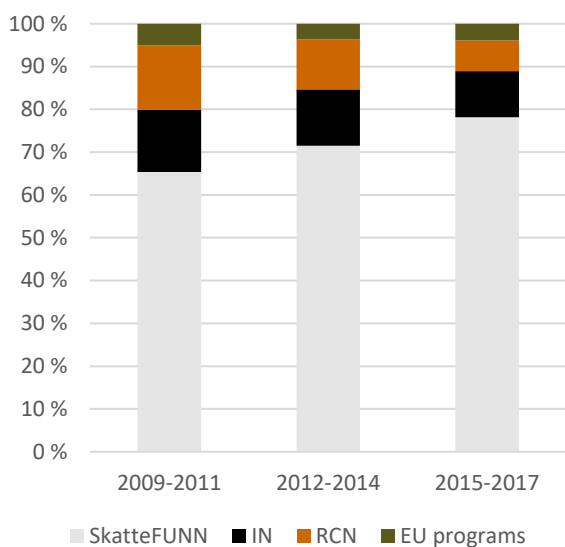


Source: Samfunnsøkonomisk analyse AS

Note; ¹ Excl. oil extraction industries and household services. High tech manufacturing includes manufacturing of machinery, transport machinery, whereas traditional manufacturing includes manufacturing of paper products, rubber, furniture etc.

Open programs like SkatteFUNN are relevant for all industries but have been particularly relevant for growing industries like digital industries like information technology, telecommunication and publishing services ct. Figure 4.8.

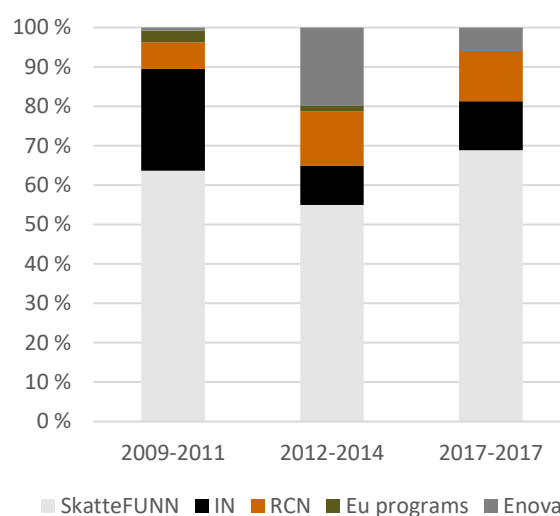
Figure 4.8 Industry relevant R&I funding for digital industries¹. By key agency (measure)². 2009-2017.



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: ¹ Cover Publishing activities (58), Telecommunications (61), Computer programming, consultancy and related activities (62) and Information service activities (63).

Similarly, open programs have also been relevant for industries that traditionally have been less research intensive such as the construction industry ct. Figure 4.9⁴⁴.

Figure 4.10 Industry relevant R&I funding for construction industry (bottom). By key agency (measure)². 2009-2017.



Source: Samfunnsøkonomisk analyse AS (samspillsdatabasen)
 Note: ¹ Construction industry covers Building construction (40), heavy construction (41) and special construction (42) ² Only industry relevant R&I measures ct. delineation II)

⁴⁴ Share of SkatteFUNN, RCN, EU and IN was relatively low in 2014 caused by a large project with Enova funding

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Annex

5.1 Categorisation of industry relevant measures, funding and beneficiaries

Database for public support schemes: The Samfunnsøkonomisk analyse AS's database established for the Ministry of Trade, Industry and Fisheries. The database is a compilation of project data from 16 public funding agencies. All observations are categorised according to the type of support that has been given (grant, loan, equity investment, etc.) and what kind of activity is supported. This allows for comparisons across funding agencies. Per 2018 the database contains 649,749 beneficiary-year observations, from the following agencies:

- Argentum (2001-2016)
- Export Credit Norway (2011-2016)
- Enova (2002-2016)
- EU's Seventh Framework Programme (2007-2016)
- The Norwegian Seafood Research Fund (2001-2016)
- County municipalities (2007-2016)
- Giek (2011-2016)
- Horizon 2020 (2016)
- Innovation Norway (2000-2016)
- Investinor (2009-2016)
- Research Council of Norway (2000-2016)
- Norwegian Space Center (2014-2016)
- Regional Research Funds (2010-2016)
- Siva (2009-2016)
- SkatteFUNN (2002-2016)
- Seed Capital Funds (1998-2016)

Policy measure or instrument (Norsk: virkemiddel) is a word used in many contexts, and in different ways depending on who you ask. To be able to compare the use of remedies across actors, a common understanding of what an instrument is needed. Since there is no agreed understanding of what an instrument is, what was an instrument for the individual policy makers was defined as part of the establishment of the policy database. The definition of an instrument is documents in the method note that were developed in connection with the creation of the database.

In the definition of a policy measure it is a point to clarify what is the analytical unit and which can be used to measure the effect on i.e. innovation and value creation. For example, the Research Council allocates research support through several programs, but for most programs several different application types can be used. Today's data base combines application type and program to gather projects of a similar type.

Industry relevant R&I measures includes funding for measures which has industry innovation and research as its main goal (not projects). Samfunnsøkonomisk Analyse AS has categorised all measures.

Measures can be categorised based on combination of application type and program (not individual projects).

For RCN, industry relevant measures include all projects funded based on programs such as BIA, HAVFORSK, DEMO2000, CLIMIT, PETROMAX, BIONÆR ct. Figure 5.1.

Funding for basic research programs (i.e FRIPRO.,) and thematic programs aimed at public sector (i.e VAM, BEDRE-HELSE, FINNUT) is categorised as non-industry relevant, except from where grants are given based on the application type “innovation projects in private sector” (IPN) or “Competence projects in private sector” (KPN) which is categorised as industry relevant.⁴⁵

Institutional funding such as institutional basic funding for research institutes⁴⁶ and funding for research centres like SFI and FME are also included as industry relevant R&I-measures

Similar methodology is applied to other institutions. For H2020 and RFF industry relevant R&I covers programs and applications type with the primary goal of innovation. All SkatteFUNN, FHF and Enova funding is considered to be industry relevant.

For Innovation Norway, industry relevant R&I measures includes all funding for projects given as a part of the IN “innovation task” and Norwegian Innovation Cluster program.

Figure 5.1 Delineation of Industry relevant measures

	Programs and measures that are considered industry relevant (independent upon application type)	Programs and measures for which funding based on IPN, KPN, BIP and similar is considered as industry relevant.
R&D programs	Ex. DEMO2000, SKOGFOND, JORDBRUK, HAVBRUKS, FORNY, PETROMAX, CLIMIT, BIONÆR, VERDIKT/IKTPLUSS, AREAL, RENERGI/ENERGIX, BIA/EUROSTARS, MAROFF, VRI/FORREGION, GASSMAX, MATSLF, DIP, TRANSPORT2025	Ex. FRIPRO (FRIHUMSAM, FRIMED-BIO, FRIMED, FRINATEK) BEDRE-HELSE, VAM, ØKOKRIM, FOLKEHELSE, FORFI, FINNUT, BIOTEK2025, HAVKYST/MARINFORSK, FUGE, NANOMAT, NATURNÆR, NANO21,

⁴⁵ Our delineation follows the categorisation of measures, not of single projects. See annex for further details on categorisation of RCN measures.

⁴⁶ The research institutes are subject to basic funding and receive their basic funding through the Research Council. The university and university college sector receive its basic grant directly from the Ministry of Education and Research. Basic funding to research institutes should be used for retaining competence and relevance. Research institutes focus on applied research and most research institutes are oriented towards industry. We have included basic funding for technological research institutes and primary industry institutes.

		KLIMAFORSK, RFF, GLOVAC, HELSEVEL, PES
Institutional funding	Basic funding for research institutes (technical and primary sector) SFI, FME, SIP funded by Ministry of Trade and Industry and Ministry of Energy, OG-21	Other institutional funding (i.e. basic funding to remaining institutes and SFF)
Individual funding	Industrial PhD	Other individual funding programs (ie. Public PhD)

5.2 Main changes in SkatteFUNN

There have been several changes in SkatteFUNN since its implementation in 2002. At the time the scheme was implemented it only applied to SMEs and the R&D tax credit of 20 per cent was limited to investment up to NOK 4 million in intramural R&D or NOK 8 million in total R&D (i.e. including purchased R&D). In 2003 the scheme was extended to all firms, but with a lower tax credit for large firms (18 per cent).

Based on an evaluation of the scheme's financial management and administration, including the possibilities of misuse, a maximum hourly rate for personnel and indirect costs was introduced in 2007 (The Norwegian Government Agency for Financial Management, 2006). The maximum hourly rate was limited to NOK 500, in addition to a maximum number of hours per employee of 1,850.

In 2009 the threshold for R&D tax credit was increased to NOK 5.5 million in intramural R&D and NOK 11 million in total R&D.⁴⁷ The increase was one of the government's (Stoltenberg II) several tools to dampen the effect of the Global Financial Crisis (St.prp. nr. 37, (2008-2009)) and based on recommendations in Statistics Norway's evaluation of the scheme in 2008 (Cappelen Å. , et al., 2008).

In 2011, the maximum wage rate was increased to NOK 530 and the calculation rate was reduced from 0.16 to 0.12 per cent of the employee's nominal annual salary. In addition, there was a change in the definition of SMEs and R&D in 2011, in direction of a more generous scheme (larger firms included as SMEs and a wider definition of R&D).

A further increase in the threshold for tax-deductible expenditures was made in 2014, as well as an increase in the maximum hourly wage rate. The thresholds were increased to NOK 8 million for intramural

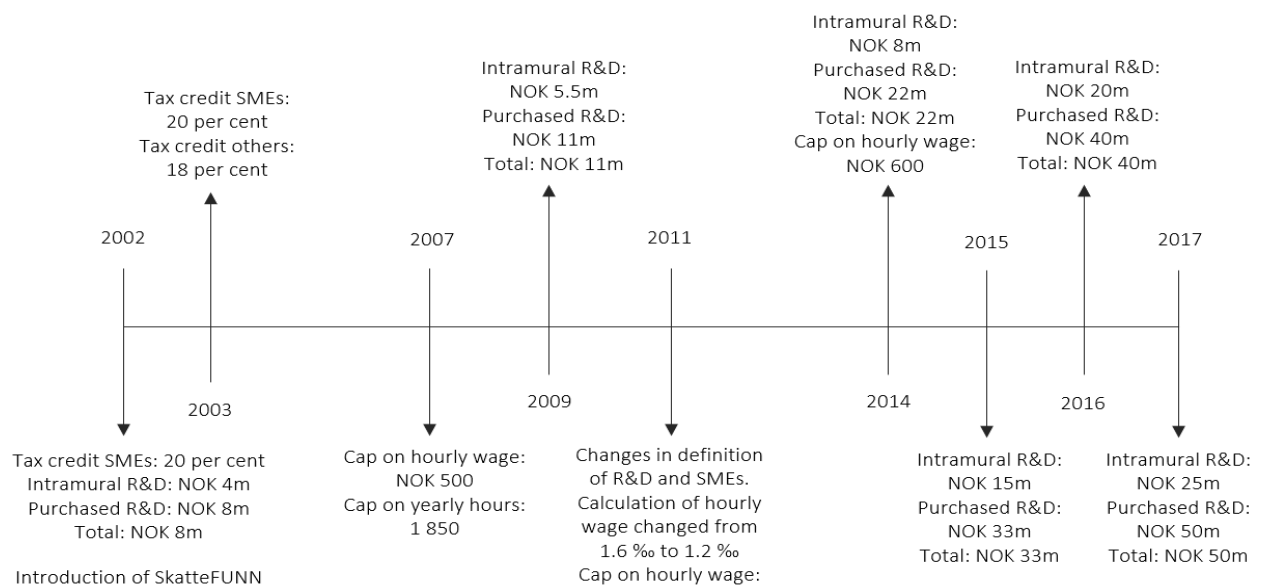
⁴⁷ We exploit this change in our evaluation of the scheme's input additionality in chapter 4.

R&D and NOK 22 million in total R&D. Furthermore, the maximum hourly wage rate was increased to NOK 600.

Since 2014, there has been three consecutive increases in the limits for deductible expenditures, cf. figure 2.1. For 2017 and 2018, the threshold for intramural R&D is NOK 25 million and NOK 50 million for total R&D (intramural and purchased).

The latest increases in the thresholds are intended to stimulate increased R&D collaboration between firms and research institutions and contribute to implementation of more profitable R&D projects (Prop. 1 LS, (2013-2014)).

Figure 5.2 Main changes in SkatteFUNN



Source: The Ministry of Finance