Facts & Figures

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Dutch policy promoting scientific excellence

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In this publication, the Rathenau Instituut presents facts and figures on Dutch government policy meant to promote scientific excellence. It explains the background to that policy and the various policy instruments used in the Netherlands. It also shows how funding is allocated across individual researchers, research institutions and research domains.

Content

The Rathenau Instituut supports the formation of public and political opinion on socially relevant aspects of science and technology. It conducts research on this subject and organises debates on science and new technology.

1 Introduction

Since the early 1990s, the Dutch government has increasingly sought to encourage scientific excellence in its science policy.

As the word “excellence” indicates, this policy is meant for only a small group of extraordinarily talented researchers. Not everyone can be extraordinarily talented, because that would make “extraordinary” ordinary.

A growing number of funding instruments identify excellence as a priority. Their purpose is to increase differentiation in research quality within the science system by offering selective support to a small number of researchers, research groups or research organisations that perform extraordinarily well or have the potential to do so.

Excellence has become an overriding aim not only of government policy but also at research institutions. Many of these institutions are striving to achieve excellence, for example by including the concept as one of the main criteria in performance reviews and career advancement.

The consensus is that scientific excellence is extremely valuable. But it is also a topic of debate. Is the excellence policy going too far? Is it too one-sided or too selective? Does it put too much emphasis on competition at the expense of cooperation? This publication provides facts and figures for this discussion.[1]

Here, we offer a brief review of the policy instruments available to researchers at Dutch universities, university hospitals and the research institutes belonging to the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Organisation for Scientific Research (NWO). These instruments consist of funding awards – in the form of both grants and prizes – for which the main selection criterion is the excellence of the research proposal and/or researcher. Taken as a whole, such awards constitute the core of the government's scientific excellence policy.

Our figures offer a glimpse of total expenditure within the context of the Dutch scientific excellence policy, the selective nature of that policy, and the degree to which funding is concentrated. Our most important findings are:

- The government's scientific excellence policy has branched out considerably since the early 1990s: there are now more instruments and the budget itself is larger. Scientific excellence is encouraged primarily by means of competitive funding awards. In the case of university research, 40% of all funding acquired through NWO and the European Union is tied to excellence instruments.
- Only a very small group of researchers has access to excellence funding. That is because the majority of researchers never apply for grants and because the likelihood of award is small. Researchers who have received excellence funding generally only do so once. Increasingly, however, researchers who receive excellence funding at an early stage of their careers also receive an individual grant later on.
- Given the number of grants available and the number of researchers working at Dutch universities, a grant is not a prerequisite for being offered an academic appointment. Researchers who have a grant are promoted more often, but they are not given tenure more often than researchers who do not.
- The available data do not allow us to see whether funding is concentrated in certain subject areas. What we have noticed is that the distribution of funding across the institutions has been stable since 2003, with the non-specialist universities receiving the largest share of excellence funding, relatively speaking.

2 Excellence as a policy objective

Dutch science policy first began to emphasise the term "scientific excellence" or "research excellence" in the early 1990s. Scientific excellence can be interpreted in three ways:

1) the excellence of the entire national science system
2) the excellence of a small number of research groups, subject areas or institutions
3) the excellence of individual researchers.

The idea arose in the late eighties and early nineties that research funding required selectivity to facilitate the very best research (Ministerie van Onderwijs en Wetenschappen, 1989; Kamerstukken II,

[1] The Rathenau Instituut will address the above questions at length in a future publication.

1990/1991, nr. 8; Kamerstukken II, 1994/1995, nr. 6; Bartelse et al. 1999).The budget for research is limited, and choices must be made. Politicians and administrators of the time chose to make more funding available for the very best research. Their policy built on an existing quality-driven policy that was meant to lift the entire system to a higher level. Unlike this broad quality policy, however, they made specific appropriations to promote excellence, with their policy focusing instead on a smaller group of top researchers.

Policymakers assumed that this was the royal road to a science system that would outperform others internationally. They also assumed that there would be a "trickle-down effect"; by supporting excellent researchers and research groups, they would allow "peaks" to arise in the research landscape (otherwise referred to as research priorities) that would take the entire system up several notches. In its 2014 *Vision for Science 2025* policy document (Ministerie van OCW, 2014), the Science Ministry stated that its aim was for Dutch science to be "of worldwide significance".

International comparisons and evaluations give us an indication of Dutch scientific excellence system-wide. The customary indicators point to a system of outstanding quality.[2] We do not know the extent to which this outstanding quality can be ascribed to the Dutch government's excellence policy.

- Every six years, Dutch academic research groups undergo an external quality review using the Standard Evaluation Protocol (SEP). Between 1994 and 2015, the quality review scores increased from an average of 3.5 to 4.5 (on a scale of 1 to 5). According to the international review committees, then, large segments of the Dutch science system can be regarded as "very good" or "excellent".[3]
- Citation impact scores indicate that the Netherlands scores higher than the worldwide average in almost every subject area. In fact, based on this indicator Dutch researchers in some subject areas can be regarded as among the best in the world.
- In various international rankings, the Netherlands is one of the few countries to have all of its universities in the second tier. The Leiden Ranking, for example, is an index of universities that have the largest proportion of publications belonging to the top 10% most frequently cited publications in a specified field. All Dutch universities rank in the top 300 of this index.
- According to the OECD (2017), almost 15% of all Dutch publications are among the top 10% most frequently cited publications. Only Switzerland has a higher score on this indicator.

3 Policy instruments for scientific excellence

Virtually all funding instruments in the Dutch science system select for quality, but some have excellence as their only or most important selection criterion. These instruments include both grants and prizes. Their aim is to create more leeway in the science system for excellent researchers. In this section, we offer a brief review of policy instruments in which funding recipients are selected largely for the excellence of their research proposal and/or for their excellence as researchers.

Policy instruments that are meant to address a particular research theme (for example NWO's thematic programmes and the EU's Horizon2020 thematic programmes), and grants or awards meant for specified disciplines (such as the Nobel prizes and the Heineken Prizes), are not considered here as excellence policy instruments. We also do not include NWO's open competition in this report because it was not established explicitly as excellence funding. On top of that, the open competition

[2] See also *De Balans van de Wetenschap* (Rathenau Instituut, AWTI, KNAW, 2017).

[3] A new protocol was introduced in 2015 that measures performance on a four-point scale, ranging from (1) world leading / excellent to (4) unsatisfactory. There have not been enough external reviews to include their outcomes in our analysis.

consists of separate programmes that differ across divisions or domains. That is why there are almost no aggregated data on this competition.

Since 1989, the Dutch government's excellence policy has taken the form of the following policy instruments (see also Figure 1):

- **PIONIER programme (abbreviation for individual grants for research groups with new ideas for excellent research)**: NWO introduced the PIONIER programme in 1989. A small number of promising researchers, none older than 40 years of age, were awarded one to two million guilders for a five-year period, allowing them to set up a new research programme. NWO administered the programme. In 2000, the PIONIER programme became the Talent Scheme (*Vernieuwingsimpuls*).
- **Research schools**: Research schools were introduced in 1992. Their purpose was to improve young researcher training and improve coordination and quality in research (Bartelse et al., 1999). The idea behind this policy was to promote the international reputation and excellence of Dutch science by introducing more specialisation. The idea of encouraging scientific excellence faded into the background as the work of building the research schools proceeded. Today, their most important tasks consist of coordination and training (VSNU & SODOLA, 2013).
- **Spinoza Prize**: NWO established the Spinoza Prize in 1995. It is awarded annually to two to four researchers who rank as the absolute best in their fields by international standards. Initially, the Spinoza Prize was meant to complement the research schools; its purpose was to encourage excellent research groups within the research schools by honouring individual researchers (Kamerstukken II, 1994/1995, nr. 6). The Spinoza Prize serves to recognise prior achievements and to subsidise future research. Laureates now receive 2.5 million euros for a five-year period.
- **Top research schools**: In 1997/1998, the Dutch Science Minister drafted a plan to transform a small number of research schools into top-quality international research centres (KNAW, 2010). Ultimately, the procedure was whittled down to a single round of proposals, with six Top Research Schools being selected. An annual total of 20 million euros was appropriated for these six Top Research Schools from the budget that the national government transfers directly to the universities (first funding stream). The programme ran until 2013, after which it was turned into the Gravitation Programme (*Zwaartekrachtprogramma*). The two Top Research Schools that came out as "exemplary" in the most recent assessment will continue receiving funding until 2021 and 2023 respectively.
- **Innovational Research Incentives Scheme (or Talent Scheme)**: In 1999, NWO, the Association of Universities in the Netherlands (VSNU) and the Academy announced their plan to boost innovation in academic research. At the request of the Ministry of Education, Culture and Science, they developed a funding instrument for innovative, high-risk research of outstanding scientific quality that would promote the advancement of talented researchers at research institutions (Ministerie van OCW, 2000). The Talent Scheme began in 2000 and acquired its present form in 2002. At that point, it was still administered jointly by NWO, VSNU and the Academy. Now, however, NWO is the sole administrator. It consists of three grants: Veni, Vidi and Vici. The grants are awarded to individual researchers in different stages of their careers:

    - The Veni grant is for recent PhDs, who receive 250,000 euros paid out over a three-year period.

- The Vidi grant is for more experienced researchers, who receive 800,000 euros paid out over a five-year period; it is meant to help them set up their own research track.
- The Vici grant is meant to help senior researchers set up or expand their own research group and consists of 1,500,000 euros paid out over a five-year period.

– **Academy Professors Prize**: The Academy considered that the Talent Scheme had made its own Academy Researchers Programme superfluous. Instead, in 2002 it introduced the Academy Professors *Programme*, which honoured professors who had made a unique contribution to advancements in their subject area. As of 2010, the instrument was known as the Academy Professors *Prize*. The purpose of the prize was to honour excellent professors (aged 54-59) with an outstanding track record and to encourage research in their subject area. The Academy Professors Prize amounted to a million euros and was awarded annually to at least two professors. Prizes were awarded for the final time in 2016.

– **European Research Council (ERC)**: The European Commission introduced the European Research Council in its Seventh Framework Programme for Research and Innovation (2007-2013). The ERC funds high-risk, high-gain frontier research. It awards five different grants, each serving a different purpose and subject to different criteria:

  - The ERC Starting, Consolidator and Advanced Grants are similar to the Veni, Vidi and Vici grants in the Talent Scheme, although the amounts awarded per grant are considerably larger and the assessment criteria differ somewhat.
  - The Synergy Grant is awarded to consortia that combine small groups of researchers. It is therefore similar to the Dutch Gravitation Programme/Top Research Schools.
  - The Proof of Concept Grant was created to establish ‘proof of concept’ of an idea generated in the course of an earlier ERC project. We do not consider it an excellence instrument.

  The size of the ERC budget rose quickly in the first few years, as did the number of ERC grants awarded to researchers working at Dutch institutions.

– **Gravitation**: The Gravitation Programme succeeded the Top Research Schools. Gravitation grants are meant for consortia of researchers who number among the best in the world and who wish to work together on a particular research subject. The first grants were awarded in 2012 and the programme will run until 2026. As in the case of the Top Research Schools, NWO organises the selection procedure and funding is appropriated through the first funding stream. The grants amount to between 18 and 36 million euros per consortium over a ten-year period.

There are three types of grants available under these excellence instruments:

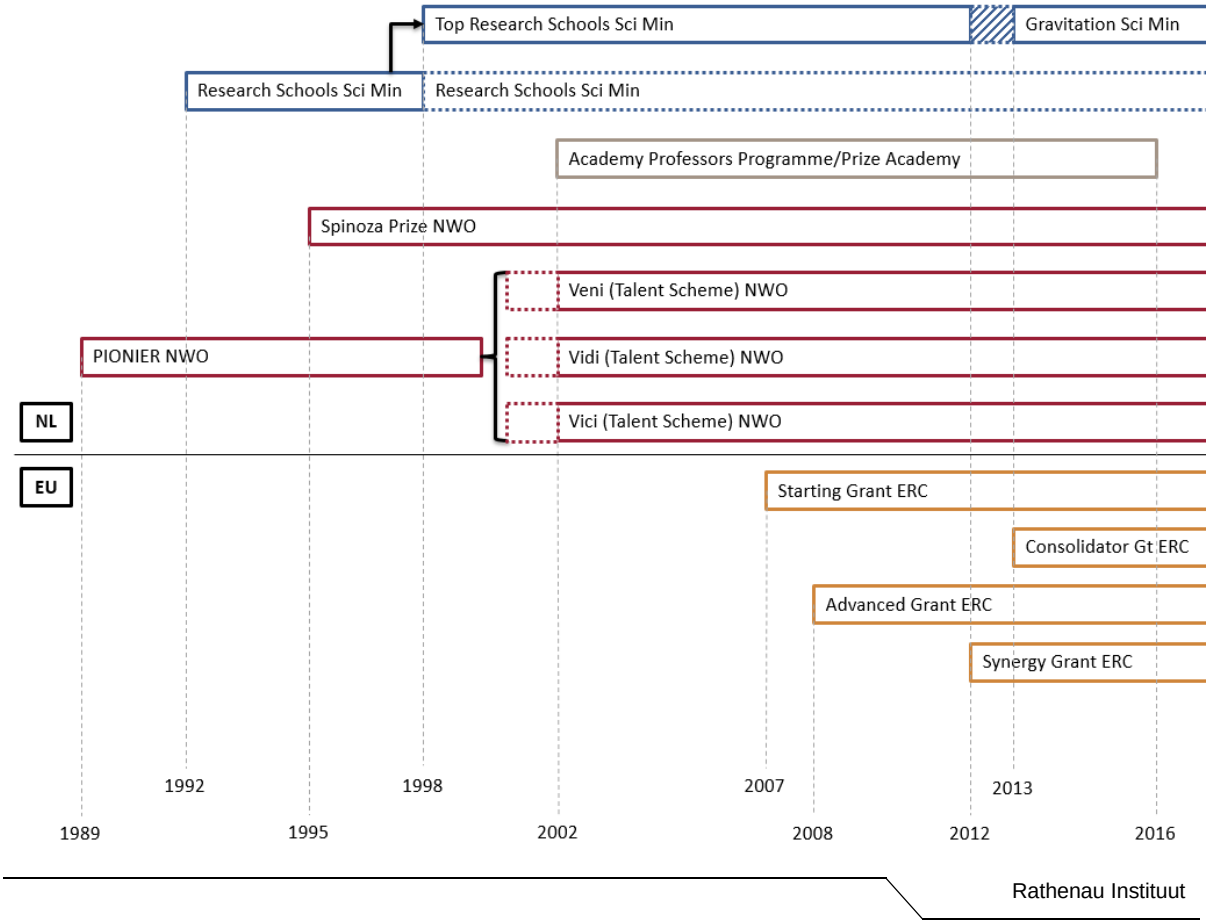
– The first are grants that support the careers of excellent researchers based on research proposals for innovative research: NWO’s Talent Scheme and the individual ERC grants.

– The second are prizes that give excellent researchers the financial leeway to initiate research because they have already proven their ability to produce excellent research: the Academy Professors Prize and the Spinoza Prize.

– The third are grants that allow excellent researchers to collaborate in consortia: the Top Research Schools, NWO’s Gravitation Programme, and the ERC’s Synergy Grant.

The introduction of the ERC grants has created a collection of excellence instruments at European level comparable to the instruments at national level in the Netherlands.

Figure 1. Instruments developed under the scientific excellence policy since 1989.



4 Spending and budget appropriations for excellence policy

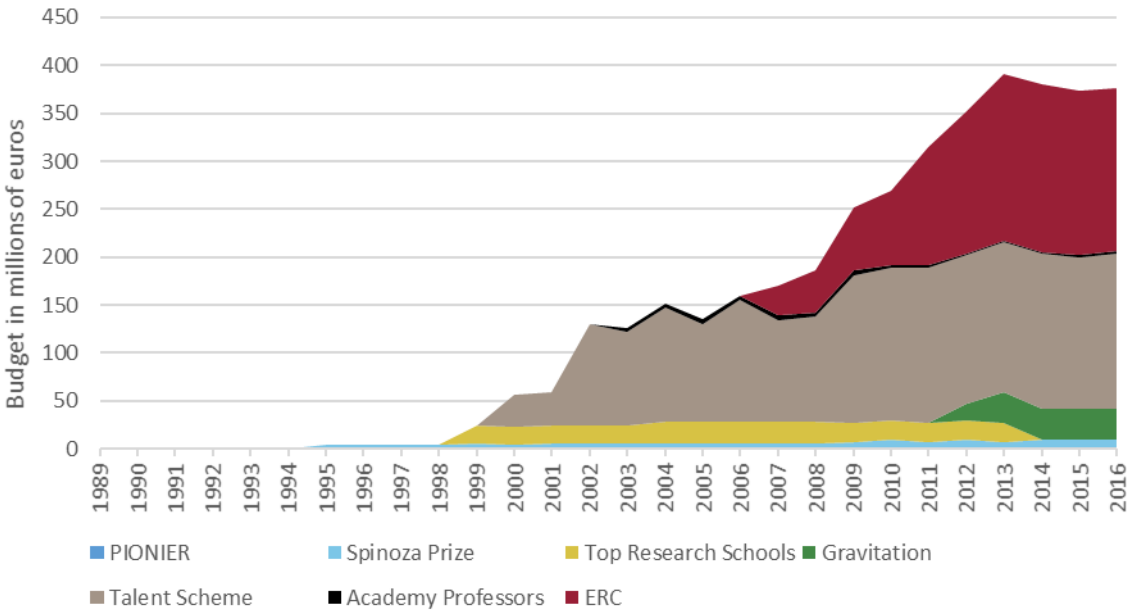
The main way that the Dutch government encourages excellent research is to have researchers and research groups compete for funding that goes to finance their research for a number of years. In this section, we look at trends in the overall budget for scientific excellence and at the size of each instrument.

4.1 Total budget for excellence instruments

As the number of funding instruments for excellent researchers has grown, so has the budget (see Figure 2). The budgetary trends fall into three distinct periods. From 1989 to 2000, the budget was fairly modest in size. It increased to approximately 150 million euros a year after the introduction of the Top Research Schools and Talent Scheme. After 2007, the budget continued to grow to more than 350 million euros, in particular owing to the establishment of the ERC grants.[4] What is notable is the sharp increase in ERC grants awarded to researchers working in the Netherlands. From 2013 on, the ERC outstrips the Talent Scheme.

[4] If we include NWO's open competition in the total budget appropriation for scientific excellence, that budget increases by approximately 90 million euros for 2017.

Figure 2. Trends in the total budget appropriated for excellence instruments.



Explanation: The total amounts calculated for the individual grants and prizes are based on the year of the award. The larger amounts for consortia are divided over the award period (ten years for Gravitation, six years for the ERC Synergy Grant) to avoid major fluctuations.

Sources: OCW, NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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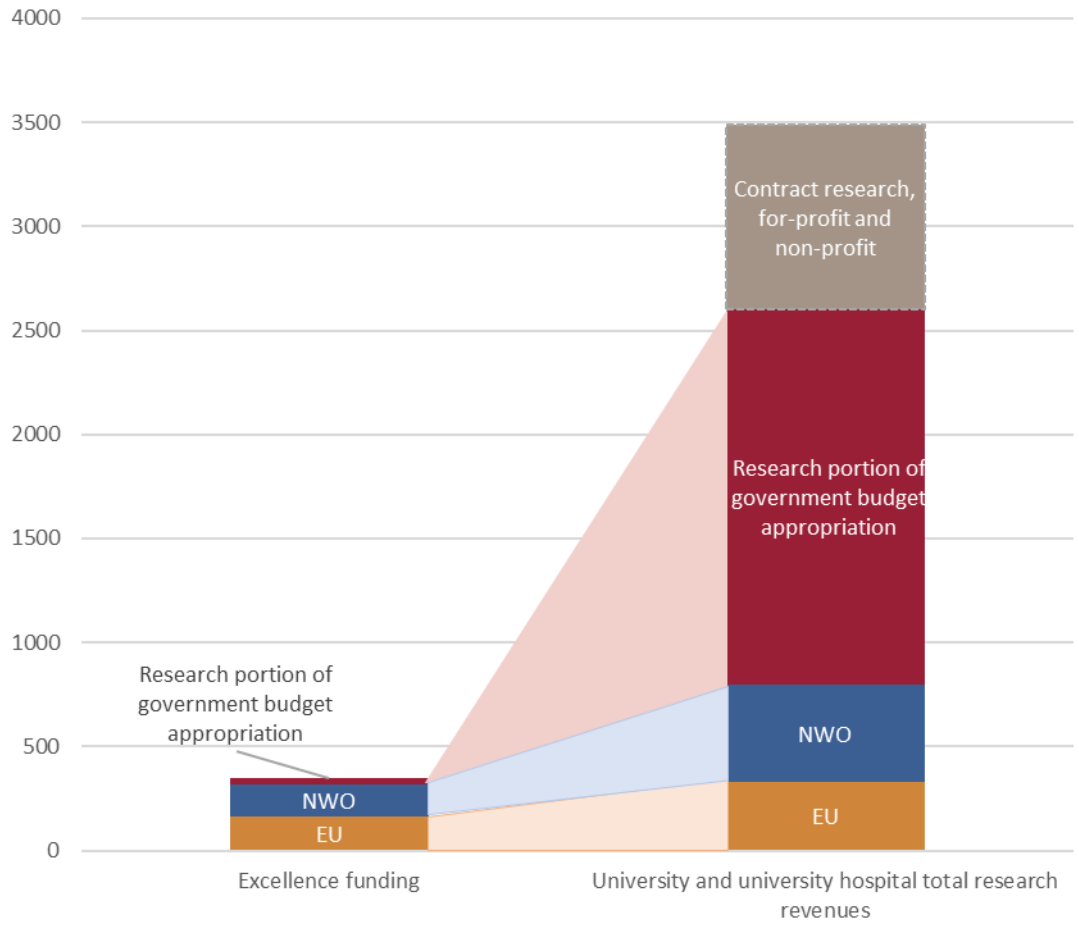
4.2 Relative size of budget for excellence policy

To calculate the relative size of the budget for scientific excellence, we looked at the revenues of Dutch universities and university hospitals. The amounts channelled through scientific excellence instruments represent only a modest proportion of their total research-related revenue. Excellence funding accounts for 10% of total research-related revenue and 14% of research-related revenue drawn from public sources (excluding publicly funded contract research and including European funding). Of the public research revenue acquired through competitive programmes run by the EU and NWO, 40% counts as excellence funding (see Figure 3).[5]

Most excellence programmes reimburse a portion of the costs incurred for a research project. In many cases, the funding programme stipulates that research institutions must provide matching funds to cover the indirect costs of the project. EY (2014) has calculated that, viewed across all categories of research funding, institutions match every euro received in funding by 74 eurocents of their own. Because the matching requirement differs from one grant to the next, we do not know precisely how much institutions are obliged to match to receive the total amount in excellence funding. The matching criterion presumably makes the impact of excellence funding on the system larger than the percentages lead us to surmise.

[5] The present analysis does not include excellence funding earmarked for NWO and Academy institutes and the “Other” category.

Figure 3. The ratio between excellence funding and total research revenues of universities and university hospitals (in millions of euros). Excellence funding falls under these total research revenues.



Explanation: The research portion of the government's budget appropriation is not necessarily spent on research. The budget appropriation for universities is divided into a research portion and a teaching portion, but the universities ultimately receive the total appropriation as a block grant. They can decide for themselves how to spend the research portion. The same goes for the education portion.

Sources: Factsheet *Het onderzoek aan universiteiten en UMC's*, Rathenau Instituut, 2018; OCW, NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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4.3 Funding and budgets per instrument

The grants awarded to individual researchers for scientific excellence vary in size. The number of grants awarded every year also varies within the various programmes. Table 1 indicates the amounts awarded per grant, the period of validity, the number of grants awarded and the total budget per programme for the year 2016. Three patterns are detectable in the list of grants for individual researchers:

1. There are fewer grants for top professors than for researchers who are just starting out. Individual excellence grants grow scarcer as researchers advance in their academic careers.
2. The EU grants are larger in size than their Dutch counterparts.
3. The more advanced a researcher's career, the larger the amount in funding available, and the more likely that the researcher can set up and maintain his/her own research group and research programme. This group of experienced researchers also has access to the Gravitation Programme and the ERC Synergy Grant.

Table 1. Key figures concerning excellence grants awarded to individuals in 2016 (x millions of euros).

	Veni	ERC Starting Grant	Vidi	ERC Consolidator Grant	Vici	ERC Advanced Grant	Spinoza Prize	Academy Professors Prize
Maximum amount per grant	0.25	1.5	0.8	2	1.5	2.5	2.5	1
Maximum duration per grant	3 years	5 years	5 years	5 years	5 years	5 years	5 years	5 years
No of grants awarded (2016)	158	37	89	29	34	19	4	2
Total budget (2016)	39.5	55.6	71.2	57.6	51	46.8	10	2

Explanation: The amount per grant is the maximum amount for which researchers/groups can apply. We know the precise amount awarded in the case of the ERC grants. The “total budget” takes the maximum amount for the Talent Scheme grants (Veni, Vidi, Vici). Researchers/research groups almost always apply for close to the maximum amount.

Sources: OCW, NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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The situation has not always been the same for the programmes. The biggest change for the Talent Scheme grants came in 2009. That was when the number of grants awarded increased moderately and the amount per grant rose by 20 to 33%. The number of ERC grants depends on the relative success of researchers working at Dutch research institutions and varies considerably from year to year.

The amount awarded under the Spinoza Prize has increased a number of times. In 1995 it was 0.9 to 1.8 million euros (2 to 4 million guilders). It is awarded to two, three or four researchers annually. From 2011 on, the Academy Professors Prize was awarded annually to two professors; before then, there were three to five recipients per year.

The Top Research Schools grants and Gravitation grants are divided between six consortia in each funding round. The six consortia usually do not receive the same share of the total budget. The amount awarded depends on the specific consortium’s application and on the applications of the other consortia. To illustrate: in 2013, the grants varied from 19.9 to 31.9 million euros for a ten-year period. In 2017, six consortia each received 18.8 million euros for their plans. The ERC Synergy Grant is 14 million euros maximum over a six-year period.

5 Allocation across research domains

One of the main aims of the government’s scientific excellence policy is to create “peaks” where outstanding research and researchers will converge. This is possible when the relevant funding is concentrated within specific groups, specific disciplines or research institutions. In this section, we see how the funding appropriated for scientific excellence is allocated across the various research domains. Sections 6 and 7 consider how funding is concentrated around individuals and within institutions.

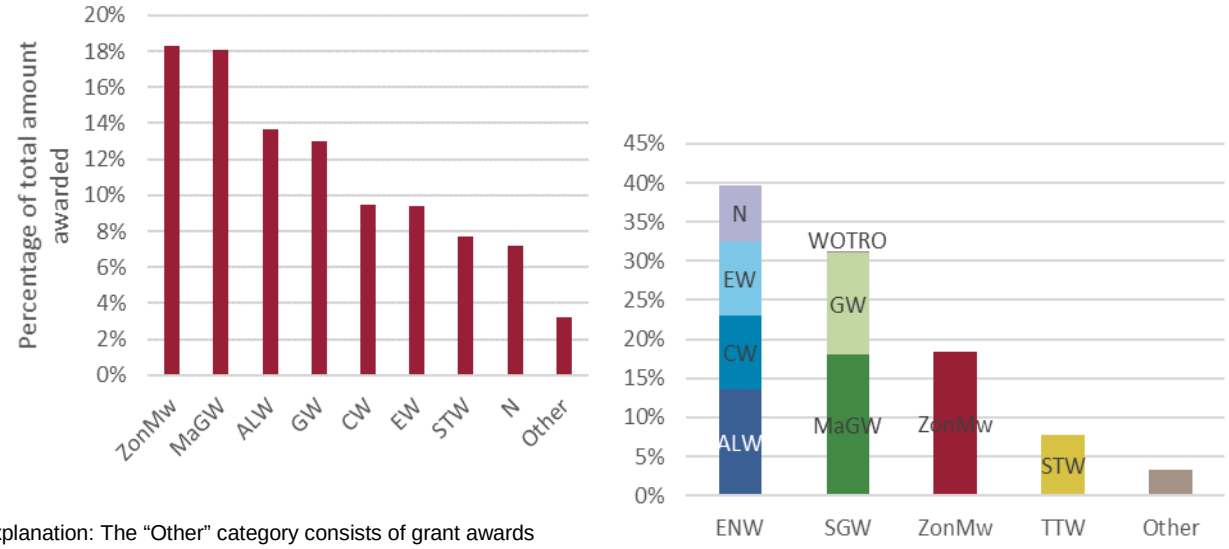
The data made available by various funding bodies are not sufficient to analyse specific disciplines or subdisciplines. We can therefore provide only a rough idea of how funding is allocated across the various research domains. We must also estimate the size of a subject area before we can say whether it has received relatively more or relatively fewer excellence grants. Unfortunately, there are

very few figures that give us that information. Another problem is that organisations have different ways of classifying research into domains and disciplines or subdisciplines. In this section, we therefore present only a few figures on how excellence funding is allocated across the research domains.

5.1 Talent Scheme per research domain

Until the end of 2016, the Innovational Research Incentives Scheme (or Talent Scheme) grants were awarded to researchers working in nine different NWO divisions. In 2017, the divisions were reorganised into four domains. Figure 4 shows how the money appropriated for the Talent Scheme has been allocated across the old divisions and new domains.

Figure 4. Share of total amount awarded by NWO through the Talent Scheme, by former NWO division and current NWO domain.



Explanation: The "Other" category consists of grant awards about which, for whatever reason, we do not know the relevant division, as well as cross-divisional awards. In the old system, WOTRO (science for global development) was classified under "Other". In the new system it comes under Social Sciences and Humanities (SGW).

Abbreviations for old divisions: ALW = Earth and Life Sciences; CW = Chemical Sciences; GW = Humanities; EW = Physical Sciences; N = Physics; MaGW = Social Sciences; WOTRO = science for global development; STW = STW Technology Foundation; ZonMw = Netherlands Organisation for Health Research and Development.

Abbreviations for new domains: ENW = Science; ZonMw = Health Research and Development; SGW = Social Sciences and Humanities; TTW = Applied and Engineering Sciences.

Source: NWO. Adapted by the Rathenau Instituut.

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Recalculated to allow for the new NWO structure, most research funding goes to the Science domain (ENW), followed by Social Sciences and Humanities (SGW), Health Research and Development (ZonMw) and Applied and Engineering Sciences (TTW).

NWO's division or domain boards may choose how to distribute the Talent Scheme budget across the three grant categories. Table 2 shows that the MaGW and GW division boards (SGW domain) have chosen to award a relatively large number of Veni grants. The ENW domain (and especially the

former EW and N divisions, Physical Sciences and Physics), award the most Vici grants, relatively speaking.[6]

Table 2. Talent Scheme (TS) awards and amounts by NWO division and domain, 2002-2016.

Current NWO domain	Former NWO division	No. of grants	Total awarded x millions of euros	No. of Veni grants (% of total in domain/ division)	No. of Vidi grants (% of total in domain/ division)	No. of Vici grants (% of total in domain/ division)
ENW		1,405	805	705 (50%)	496 (35%)	204 (15%)
	ALW	527	276.7	291 (55%)	179 (34%)	57 (11%)
	CW	342	191.4	169 (49%)	128 (37%)	45 (13%)
	EW	313	191.1	155 (50%)	99 (32%)	59 (19%)
	N	223	145.8	90 (40%)	90 (40%)	43 (19%)
SGW		1,294	635	789 (61%)	374 (29%)	131 (10%)
	MaGW	758	366.4	462 (61%)	226 (30%)	70 (9%)
	GW	525	263.2	319 (61%)	146 (28%)	60 (11%)
	WOTRO	11	5.1	8 (73%)	2 (18%)	1 (9%)
ZonMw		723	371	391 (54%)	260 (36%)	72 (10%)
	ZonMw	723	371.4	391 (54%)	260 (36%)	72 (10%)
TTW		298	156	167 (56%)	98 (33%)	33 (11%)
	STW	298	155.8	167 (56%)	98 (33%)	33 (11%)
Other		108	60	51 (47%)	41 (38%)	16 (15%)
Total TS		**3,828**	**2,027**	**2,103 (55%)**	**1,270 (33%)**	**456 (12%)**

Explanation: The “Other” category consists of grant awards about which, for whatever reason, we do not know the relevant division, as well as cross-divisional awards.

Abbreviations for old divisions: ALW = Earth and Life Sciences; CW = Chemical Sciences; GW = Humanities; EW = Physical Sciences; N = Physics; MaGW = Social Sciences; WOTRO = science for global development; STW = STW Technology Foundation; ZonMw = Netherlands Organisation for Health Research and Development.

Abbreviations for new domains: ENW = Science; ZonMw = Health Research and Development; SGW = Social Sciences and Humanities; TTW = Applied and Engineering Sciences.

Source: NWO. Adapted by the Rathenau Instituut.

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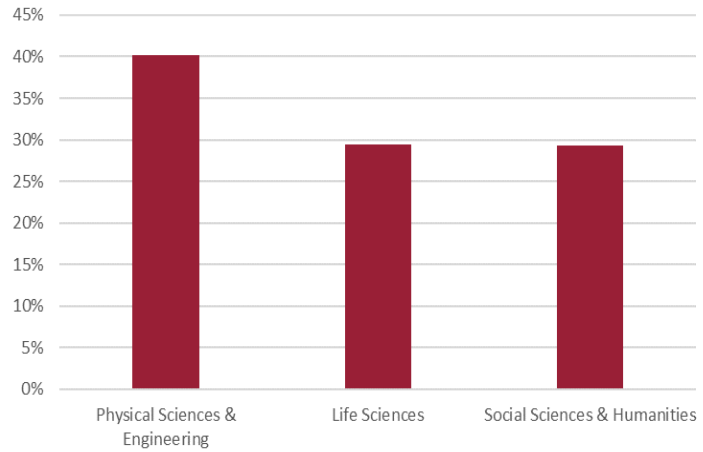
[6] NWO began using a cross-divisional competition for the award of Vici grants some years ago. The awards are only designated to a specific division/domain later on.

5.2 ERC per research domain

The ERC allocates grants in three domains: Physical Sciences & Engineering (PE), Social Sciences & Humanities (SH) and Life Sciences (LS). The largest number of ERC grants going to researchers at Dutch institutions are awarded in the Physical Sciences & Engineering (see Figure 5).

Figure 5. ERC grants awarded to researchers at Dutch institutions, by domain (in %).



Source: ERC. Adapted by the Rathenau Instituut.

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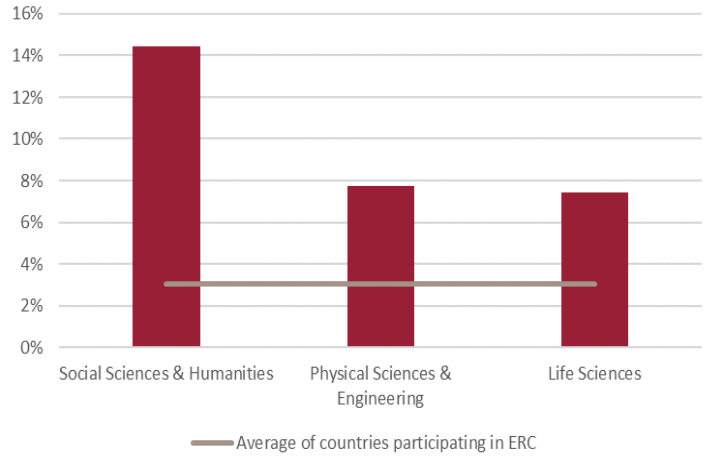
On average, participating countries receive 3% of the total number of ERC grants. Researchers at Dutch universities are more successful than that across all domains. From 2007 on, researchers at Dutch institutions have had the most success winning grants in the Social Sciences & Humanities, with 14.4% of the total of ERC grants in that domain going to them. The percentages for the Life Sciences and Physical Sciences are 7.4% and 7.7% respectively.

Figure 6. Share of ERC grants awarded to researchers at Dutch universities, compared with the average across countries participating in the ERC.



Source: ERC. Adapted by the Rathenau Instituut.

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Researchers in the Social Sciences & Humanities domains received a relatively large proportion of Consolidator Grants and a relatively small proportion of Advanced Grants compared with the ERC totals. The distribution is similar to the totals for the Netherlands and within the ERC (see Table 3).

Table 3. Grant awards and amounts by ERC domain, 2007-2016.

ERC domain	Total no. of ERC grants	No. of grants for researchers at Dutch institutions	Total allocated to researchers at Dutch institutions in millions of euros	No. of ERC StG grants (% of total in domain/division)	No. of ERC CoG grants (% of total in domain/division)	No. of ERC AdG grants (% of total in domain/division)
Physical Sciences & engineering	3,137	243	455	119 (49%)	38 (16%)	86 (35%)
Social Sciences & humanities	1,316	190	332	96 (51%)	50 (26%)	44 (23%)
Life Sciences	2,414	179	334	94 (53%)	27 (15%)	58 (32%)
Other		5	12,5	1 (20%)	0 (0%)	4 (80%)
Total Netherlands		617	1,133	310 (50%)	115 (19%)	192 (31%)
Total ERC	6,867		Unknown	3,420 (50%)	1,204 (18%)	2,243 (33%)

Source: ERC. Adapted by the Rathenau Instituut.

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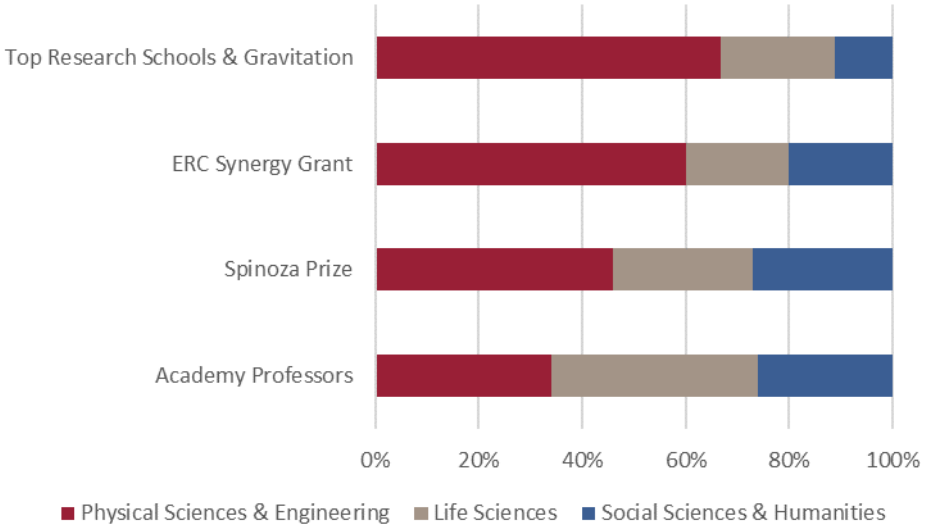
5.3 Other excellence programmes per research domain

Looking at other excellence programmes, we see that the allocation across research domains is a factor in the award itself. In recent years, awards made under the Academy Professor Prize were evenly divided between the two Academy Divisions, i.e. humanities and the social sciences on the one hand and physics, technical and life sciences on the other. That was not the case in years in which more than two Academy Professors were chosen. The Spinoza Prize may not be awarded to more than two researchers working in the same research domain (there are three domains, the same classification system as the ERC). If three or four Spinoza Prizes are awarded, at least one must go to a researcher in the social sciences and humanities. The Gravitation and Top Research Schools programmes initially did not specify any criteria associated with research domains. Before the most recent Gravitation award, the Science Minister stipulated that at least two of the recipient consortia must be active in the social sciences and humanities. We have used the ERC's classification into three domains to show, roughly, how the other programmes have distributed their funding awards (see Figure 7).

Figure 7. Distribution of grants (number) under the Top Research Schools and Gravitation programmes, the Spinoza Prize, and the Academy Professors Prize across the three research domains.



Source: NWO and Academy. Adapted by the Rathenau Instituut.

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It is difficult to determine whether the various research domains receive a large or small number of excellence grants relative to the number of researchers working in those domains. The social sciences and humanities appear to differ from the other domains in that they receive comparatively few large grants. This can be seen in the distribution of Talent Scheme and ERC grants. The other programmes, which only work with large sums, award more grants in the other domains than in the social sciences and humanities. The relative success of the social sciences and humanities in the competition for ERC grants for individual researchers indicates that the special status of this domain is likely owing to factors other than the quality of research.

6 Concentration and differentiation of excellence funding among individual researchers

As the word “excellence” indicates, this policy is meant for only a small group of outstanding researchers. Not everyone can be extraordinarily talented, because that would make “extraordinary” ordinary. Besides, one of the aims of the government’s excellence policy is to concentrate funding among a select group of excellent researchers or researchers who have the potential to excel.

In this section, we describe the extent to which the government’s scientific excellence policy focuses on a select group of excellent researchers, and the extent to which excellence funding is concentrated among a select pool of individual researchers.[7] When we say that funding is concentrated, we mean that it is not evenly distributed across all researchers, but that there is a certain vertical differentiation, with one researcher receiving more than another.

[7] The analyses in this section are based on all awards made to individuals under an excellence funding programme, except where the text explicitly mentions another programme.

6.1 Selectivity and competition

Only a very select group of researchers at Dutch universities stands to benefit from the government's scientific excellence policy. There are two reasons for this. First, only a small proportion of researchers eligible for an excellence grant actually apply for one. Second, the excellence funding programmes have a strict selection procedure, with only a small percentage of the applications being successful.

The total number of researchers working at Dutch universities who have received an excellence grant (excluding PhD candidates) works out to a little more than 1% per annum since 2009 (1 out of 70 to 80 researchers). Before 2009, there were somewhat fewer grants available for this population. At any given time, about 5% of all researchers in the Netherlands have an excellence grant.[8]

Selection based on applications

In the battle for excellence funding, some selection takes the form of self-selection: most researchers who are eligible for funding do not apply for it. Many excellence grants are available only to a specific target group, identified by their research experience (number of years following award of PhD). The Veni grant, for example, is meant for inexperienced researchers (up to three years after PhD award), the Vidi grant for more experienced researchers (up to eight years after PhD award) and the Vici grant for highly experienced researchers (up to 15 years after PhD award). No records are kept of the total number of researchers in any given year who had received their PhD less than three, eight or fifteen years before.

We estimated the size of these target groups in two ways and then examined how many researchers in these groups had applied for a grant.

First we compared the number of grants awarded to the total number of researchers who had received their PhDs in the Netherlands in the years preceding the respective grant award. For the 2015 Veni award procedure, 13,200 people had received their PhD in the three preceding years. Of these, 1,124 (8.5%) applied for a grant. We did the same for the Vidi and Vici grants by comparing the number of grant applications in a given year to the number of PhDs awarded four to eight years previously (Vidi) and nine to fifteen years previously (Vici). The results for 2015 can be found in Table 4.

The number, 13,200, is a very generous upper ceiling.[9] Many PhDs do not pursue a career in academia. They will not be interested in applying for excellence research funding and no longer belong to the target group of the instrument.

Second, we estimated the size of the group that would be eligible for excellence funding based on the age of researchers working at Dutch university. Researchers are an average of 29.5 years of age when they obtain their PhD. In the three years thereafter, when they are roughly between 30 and 32 years of age, they are eligible to apply for a Veni grant. In 2015, there were 2,262 researchers of that age working at a university. More than a third of them had applied for a grant. We did an analogous analysis for the Vidi grant (number of researchers aged 33 to 37) and Vici grant (number of researchers aged 38 to 44) (see Table 4).

[8] We assume that the grants are awarded for an average of four years and that the number of grants and researchers is more or less stable.

[9] PhDs from abroad may also apply if they intend to carry out their research at a Dutch research institution. In theory, then, the target group is much larger than the group of Dutch PhDs alone but in reality NWO receives very few applications from abroad.

Table 4. Percentage of researchers who applied for a Talent Scheme grant for 2015.

	Target group (in years since PhD)	Percentage that had applied	Target group (working at university + age)	Percentage that had applied
Veni	0-3 years	8.5%	aged 30-32	34.9%
Vidi	4-8 years	3.3%	aged 33-37	10.1%
Vici	9-15 years	1.1%	aged 38-44	4.4%

Explanation: Officially, NWO does not maintain a lower limit for number of years after receipt of PhD. We did so in our analysis in order to estimate the size of the target group.

Source: NWO, WOPI-Flex 2016 and Statistics Netherlands. Adapted by the Rathenau Instituut.

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Selection based on award

In addition to self-selection, many researchers fall by the wayside because their application is unsuccessful. The excellence programmes have had award percentages ranging from 12% to 20% for the Talent Scheme. We also have relevant ERC figures; there, the award percentages range from 8% to 15%. The portion of the target group that is ultimately awarded excellence funding is very small, in other words. In Table 5, we multiply the portion of the target group that applies for funding (from Table 4) by the award percentages for the various instruments and add in our estimates for the ERC Starting Grant and ERC Consolidator Grant.

Table 5. Percentage of researchers who were ultimately awarded a Talent Scheme or ERC grant for 2015.

	Target group (in years since PhD)	Award percentage	Share ultimately awarded a grant	Target group (working at university + age)	Share ultimately awarded a grant
Veni	0-3 years	14.3%	1.2%	aged 30-32	5.0%
Vidi	4-8 years	15.2%	0.5%	aged 33-37	1.5%
Vici	9-15 years	14.9%	0.2%	aged 38-44	0.7%
ERC StG	2-7 years	12.3%	0.2%	aged 31-36	0.7%
ERC CoG	7-12 years	14.9%	0.1%	aged 36-44	0.6%

Explanation: Officially, NWO does not maintain a lower limit for number of years after receipt of PhD. We did so in our analysis in order to estimate the size of the target group.

Source: NWO, WOPI-Flex 2016 and Statistics Netherlands. Adapted by the Rathenau Instituut.

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The target group for the ERC Advanced Grant, Spinoza Prize and Academy Professors Prize is not clearly delineated, but in reality it will often consist of full professors. The percentage of full professors who receive an ERC Advanced Grant every year is about 0.5% (1 out of 200). Given the small

number of Spinoza and Academy Professor prizes awarded annually, it is only logical that the percentage of professors receiving one of these awards will be much smaller. Every year, about 1 out of 800 to 1000 professors working at a Dutch university wins a Spinoza Prize, and 1 out of 1600 an Academy Professors Prize.

Excellence grants, appointments and tenure

There are frequent claims that universities only appoint or promote researchers who have won an excellence grant. The numbers show otherwise however: at least two thirds of newly appointed assistant or associate professors do not have an excellence grant. Because there are many more appointments and tenured appointments than excellence awards every year, there is no way that universities would be able to restrict appointments or promotions to researchers who have received an excellence grant – despite frequent claims to the contrary. Even so, it seems that receipt of a Talent Scheme grant does have a positive effect on the recipient's academic career.

The Netherlands Bureau for Economic Policy Analysis (Gerritsen et al. 2013) and NWO (2016) have both published figures indicating that many of the Talent Scheme grant recipients have more senior positions at the end of their grant period than when they received their award. In addition, laureates are more likely than non-laureates to still be working in research six years after the award and, ultimately, to be appointed to a professorship. Paradoxically, the Netherlands Bureau for Economic Policy Analysis says that a Talent Scheme grant is less likely to lead to tenure.

A large proportion of *university* appointments are made without the appointee having received excellence grant, however. Since 2010, NWO has awarded about 110 Veni grants and 60 Vidi grants annually to *researchers at universities*. The ERC awards about 30 ERC Starting Grants to *researchers at universities*. These are the three grants for which researchers are eligible as assistant or associate professor. Since 2010, Dutch universities appoint about 410 new assistant professors and 200 new associate professors every year. Clearly, then, many of the appointees do not have an excellence grant.

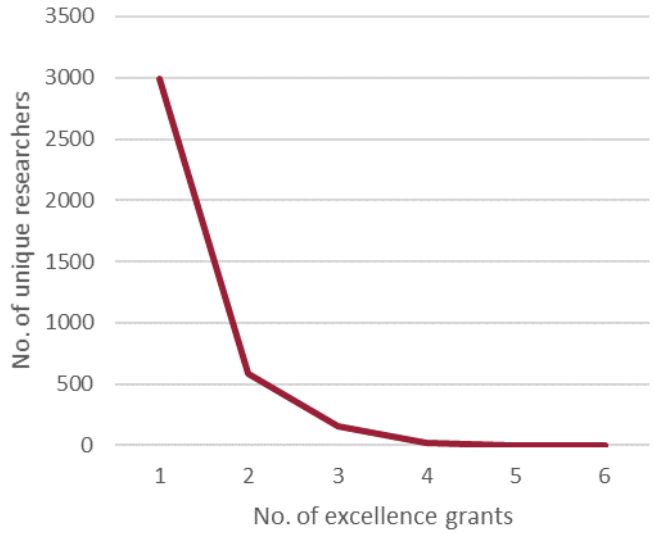
6.2 Single and multiple grants

Between 1995 and 2016, a total of 3,759 researchers received a total of 4,733 individual grants from NWO, the Academy and the ERC.[10] Of these, 20% received multiple excellence grants. Three researchers received a total of five grants, and one a total of six. On average, the researchers were awarded 1.26 grants per person (see Figure 8).

The vast majority of single-grant winners are researchers who have received one Veni grant. Multi-grant recipients tend to have relatively larger grants and therefore also account for a relatively large share of the funding. Researchers who have received two or more grants (20%) account for 50% of the funding (see Figure 9).

[10] Including the Veni grants and Spinoza Prizes for 2017.

Figure 8. Distribution of excellence grants among individual researchers.



Source: NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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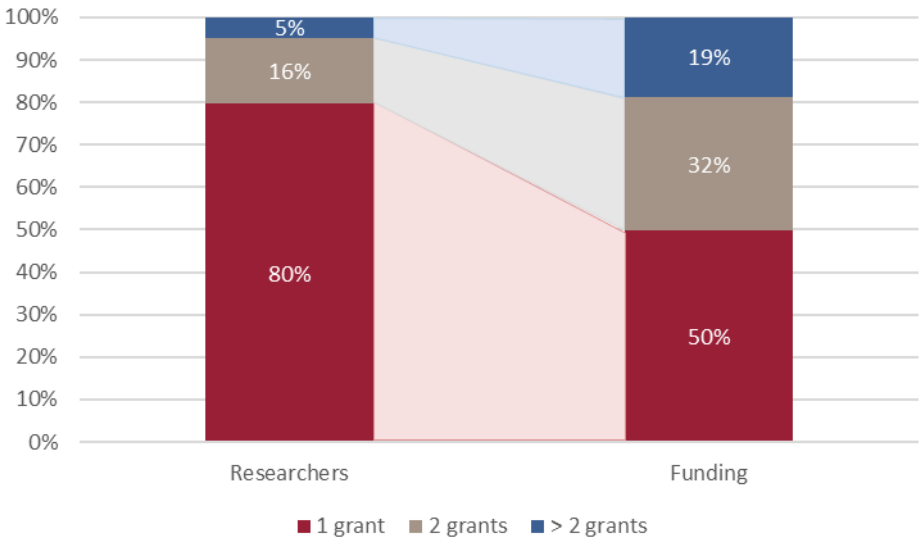
Figure 9. Percentages of researchers with a single grant, two grants and more than two excellence grants (left) and the share of excellence funding that they received (right).



Source: NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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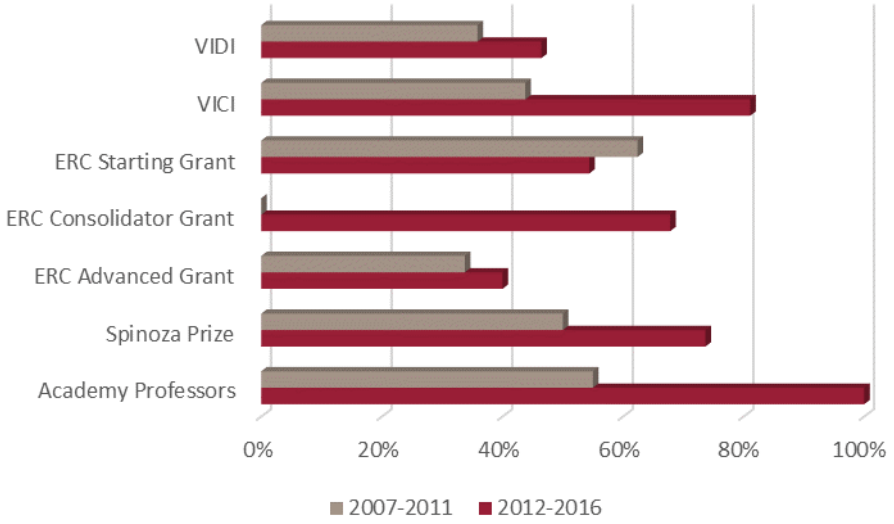
If we look at follow-up grants meant for researchers who are further along in their careers, we see that researchers who receive an excellence grant are also more likely to have received a different excellence grant at an earlier point. We compare the years 2007-2011 and 2012-2016, noting that it would have been possible for grant recipients in these periods to have received a different grant in the

foregoing years. For example, in the 2007-2011 period, 44% of Vici recipients had received an earlier excellence grant. In the 2012-2016 period, 81% had received an earlier excellence grant. Among the Academy Professors Prize laureates, this percentage rose to 100% in the latter period. This trend holds for all individual excellence grants except the ERC Starting Grant. That is likely owing to the establishment of the ERC Consolidator Grant in 2013, which shifted the focus of the ERC Starting Grant more to young researchers at the start of their careers (see Figure 10).

Figure 10. Percentages of grant recipients who had received an earlier excellence grant, 2007-2011 and 2012-2016.



Explanation: The Consolidator Grant was not established until 2013.

Source: NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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Of all the main recipients and co-recipients of Gravitation grants in 2012 and 2013, 84% had received an earlier individual excellence grant. Almost half of these were ERC Advanced Grants. Slightly less than half of the Gravitation laureates had previously received a Spinoza Prize. Twenty-six percent of the applicants had already received both a Spinoza Prize and an ERC Advanced Grant before they were awarded a Gravitation grant. Four researchers had been involved in the award of two Gravitation grants.

Overlapping grants

Research funding bodies try to avoid doubling up funding awards for one and the same research proposal. That is why NWO or a researcher occasionally withdraws an application. It is possible, however, for a single researcher to receive multiple excellence grants for different or amended proposals within a short period.

Researchers regularly have overlapping grants. In 153 cases, a researcher received two grants in the same year or received a second excellence grant within two years of receiving the first one. That is almost 9% of the total number of grants received by multi-grant recipients.

In many cases, the two grants that overlap are the Vidi grants and the ERC Starting Grant (76 out of 153 occasions). There were 18 occasions where researchers received a Vici and an ERC Starting Grant within a two-year period, and 13 occasions where the overlap concerned an ERC Advanced Grant and a Spinoza Prize. The figures also reveal that some researchers apply for a Vidi grant

before their Veni grant has run out. On 14 occasions, this resulted in an overlap between the two grants.

The two prizes, the Spinoza Prize and the Academy Professors Prize, hardly ever overlap. There is, however, considerable overlap between the two prizes and the ERC Advanced Grant (on a total of 21 occasions).

7 Concentration and differentiation of excellence funding among research institutions

About 74% of all excellence funding is awarded to researchers at universities. The rest goes to researchers at university hospitals (16%) and Academy and NWO institutes (6%); another category consists of funding awarded to the Netherlands Organisation for Applied Scientific Research (TNO), the Netherlands Cancer Institute, and awards made to researchers whose institutional affiliation at the time of the award is unknown.

Excellence funding is not evenly distributed over research institutions. Larger research institutions receive more money than smaller ones. To some extent this distribution can be attributed to the size of an institution, but even if we adjust for size, differences remain.

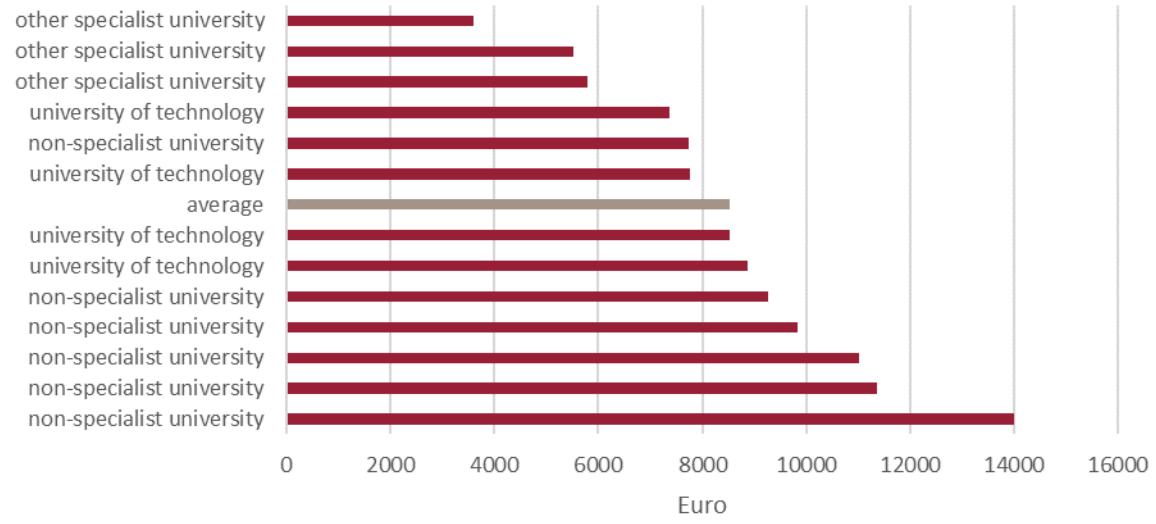
Figure 11 shows that within the group of universities, excellence funding tends to be concentrated in the large, non-specialist universities.[11] Between 2003 and 2016, they received the largest average annual amount in excellence funding per academic staff member.[12] The four universities of technology (including Wageningen UR) each received an average share of the excellence funding in the same period. The other specialist universities received the smallest share of excellence funding.[13]

[11] This analysis is only possible for universities (not including university hospitals). Only in the case of Maastricht University does the analysis include data on MUMC+.

[12] Excluding PhD candidates.

[13] To prevent our analysis from being employed as an “excellence ranking”, we have anonymised the universities and divided them into three groups. The **non-specialist universities** are the University of Amsterdam, Leiden University, Utrecht University, the University of Groningen, VU Univerisity Amsterdam and Radboud University. The **universities of technology** are Eindhoven University of Technology, the University of Twente, Wageningen University and Research Centre, and Delft University of Technology. The **other specialist universities** are Erasmus University Rotterdam, Tilburg University and Maastricht University.

Figure 11. Average annual amount in excellence funding received by universities per academic staff member between 2003 and 2016.



Sources: NWO, ERC, Academy and WOPI-Flex 2016. Adapted by the Rathenau Instituut.

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The overall pattern in Figure 11 is an average. The order of universities changes every year, but no long-term shifts can be detected over time.

There is no sign that excellence funding is becoming more concentrated at one or another type of university. The degree of concentration, expressed as a deviation from the average, remained stable throughout the 2003-2016 period. The non-specialist universities thus consistently receive more excellence funding, but the gap between them and the other universities is not growing larger.

The distribution across universities also differs depending on the excellence programme in question. The universities of technology receive relatively many large grants (Vici, ERC Advanced Grant). The other universities tend to receive more smaller grants (Veni and Vidi). We see this in the average amount they receive per grant (see Table 6). The average for the universities of technology (excluding Wageningen UR) is considerably higher than for the other universities.

In short, since 2003 excellence funding has tended to be concentrated in the broad, non-specialist universities, even if we adjust for university size. The degree of concentration has not increased over the same period. The universities of technology receive many large excellence grants and thus receive a larger average amount in excellence funding awarded to their researchers.

Table 6. Average amount per excellence grant (without adjusting for university size).

University	No. of grants	Total amount x millions of euros	Average amount per grant x millions of euros
Eindhoven University of Technology	172	149	0.87
University of Twente	139	117	0.84
Delft University of Technology	291	231	0.79
Leiden University	404	303	0.75
University of Amsterdam	468	340	0.73
VU University Amsterdam	284	206	0.73
Radboud University	313	224	0.72
University of Groningen	324	230	0.71
Utrecht University	517	352	0.68
Wageningen University & Research Centre	146	98	0.67
Tilburg University	104	63	0.61
Maastricht University (incl. MUMC+)	192	110	0.58
Erasmus University Rotterdam	101	51	0.51

Source: NWO, ERC and Academy. Adapted by the Rathenau Instituut.

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8 Final remarks

In this Facts & Figures, we have shown how the Dutch government's scientific excellence policy has evolved over time and how the associated funding has been allocated across research domains, individual researchers and research institutions. It is clear that this policy has led to selection, concentration and differentiation in the Dutch science system.

Competitive funding has been the main driver of the scientific excellence policy over time. Of the funding received by Dutch universities from NWO and the EU – the two most prominent sources of competitive university funding – 40% has gone to support excellent researchers. Increasingly,

individual grants intended for excellent researchers later in their careers are awarded to researchers who have already received a grant.

Given the number of grants available and the number of researchers working at Dutch universities, a grant is not a prerequisite for an academic appointment. Researchers who have been awarded a grant are promoted more often, but they are not offered tenure more often than those who have not.

The available data did not allow us to determine whether funding is also concentrated in certain subject areas or in specific research groups. What we did notice is that the distribution of funding across the institutions has been stable since 2003, with the non-specialist universities receiving most of the excellence funding, relatively speaking.

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About this publication

This is a publication in the Rathenau Instituut's Facts & Figures series. It examines the Dutch policy promoting scientific international mobility. For more information on this publication, please contact the authors: Wout Scholten (w.scholten@rathenau.nl), Elizabeth Koier (e.koier@rathenau.nl), or the head of research, Barend van der Meulen (b.vandermeulen@rathenau.nl).

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