

Research Assessment and Research Evaluation in Italy: the ANVUR Experience

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1. The Italian National Agency for the Evaluation of Universities and Research

Institutes

2. The Research Evaluation for the period 2004-2010 (VQR 2004-2010)

3. The National Scientific Habilitation Program

4. The ANVUR bi-annual Report on the Italian Research system

5. Classification of journals in Humanities and Social Sciences

The Italian National Agency for the Evaluation of Universities and Research Institutes

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According to the legislation established in 2010, the Italian National Agency for the Evaluation of Universities and Research Institutes (ANVUR) is in charge of:

- .External evaluation of the quality of activities of Universities and Public Research Organisations (PROs);
- .Giving general advices for the activities of internal evaluation bodies;
- .Evaluate public funding programs aimed at enhancing research and innovation activities

The Italian National Agency for the Evaluation of Universities and Research Institutes

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More specifically, according to the law, main ANVUR activities include:

- .The evaluation of the quality of processes, results, and products of all the activities concerning research, teaching and technological transfer performed by Universities and Research bodies
- .The definition of methods and criteria - based on objective parameters – to be used for the periodical accreditation of Universities (undergraduate and postgraduate courses and curricula)

The Italian National Agency for the Evaluation of Universities and Research Institutes

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In its activities, ANVUR makes use of bibliometric information contained in the major international databases

More specifically, since 2010 ANVUR has been involved in three main projects implying the use of bibliometric information and indicators:

- The quality of research evaluation exercise for the period 2004-2010 (VQR 2004-2010, from the Italian Valutazione della Qualità della Ricerca), results of which have been presented on July 16, 2013
- The National Habilitation program, which is currently completed (1st wave)
- The bi-annual report on the Italian Research system, which is scheduled for release in February, 2014

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The Decree regulating the second Italian research quality evaluation exercise has been issued in 2011

According to the Decree, all the Italian Assistant, Associate and Full Professors participate to the evaluation exercise, together with Researcher and Technicians of PROs directly funded by the Ministry of University and Education (MIUR)

Evaluation refers to Areas of research, Universities and Departments – **it does not concern individual researchers**

Evaluation will affect the distribution of public funding to the Italian research system

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Each University has chosen the three best research products (six products for PROs) published in the 2004-2010 period by each researcher

Research products considered for evaluation are:

- .Articles
- .Books, books chapters and proceedings (with ISBN code)
- .Critical editions, translations, scientific comments
- .Patents
- .Design, Performance, Dataset, Software and other research products

Research evaluation is classified according to official organisation of Scientific Areas of research established by the National University Council (CUN)

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- .More specifically, Italian academia is officially divided up in 14 Scientific Areas (*Aree CUN*)
- .The 14 Areas may be distinguished into:
 - .Areas for which is common to evaluate research quality on the basis of bibliometric indicators regarding the impact of the Journal on which the article is published and the number of citations of the article:
 - .Mathematics (Area 1)
 - .Physics (Area 2)
 - .Chemistry (Area 3)
 - .Earth Sciences (Area 4)
 - .Biology (Area 5)
 - .Medicine (Area 6)
 - .Agricultural and Veterinarian Sciences (Area 7)
 - .Part of Architecture and Civic Engineering (Area 8)
 - .Industrial and communication Engineering (Area 9)
 - . Humanities and Social Sciences
 - .Among Social Sciences, bibliometric indicators are also used in Economics and Statistics (Area 13) and in a small part of Psychology (Area 11)

Institutions and experts involved

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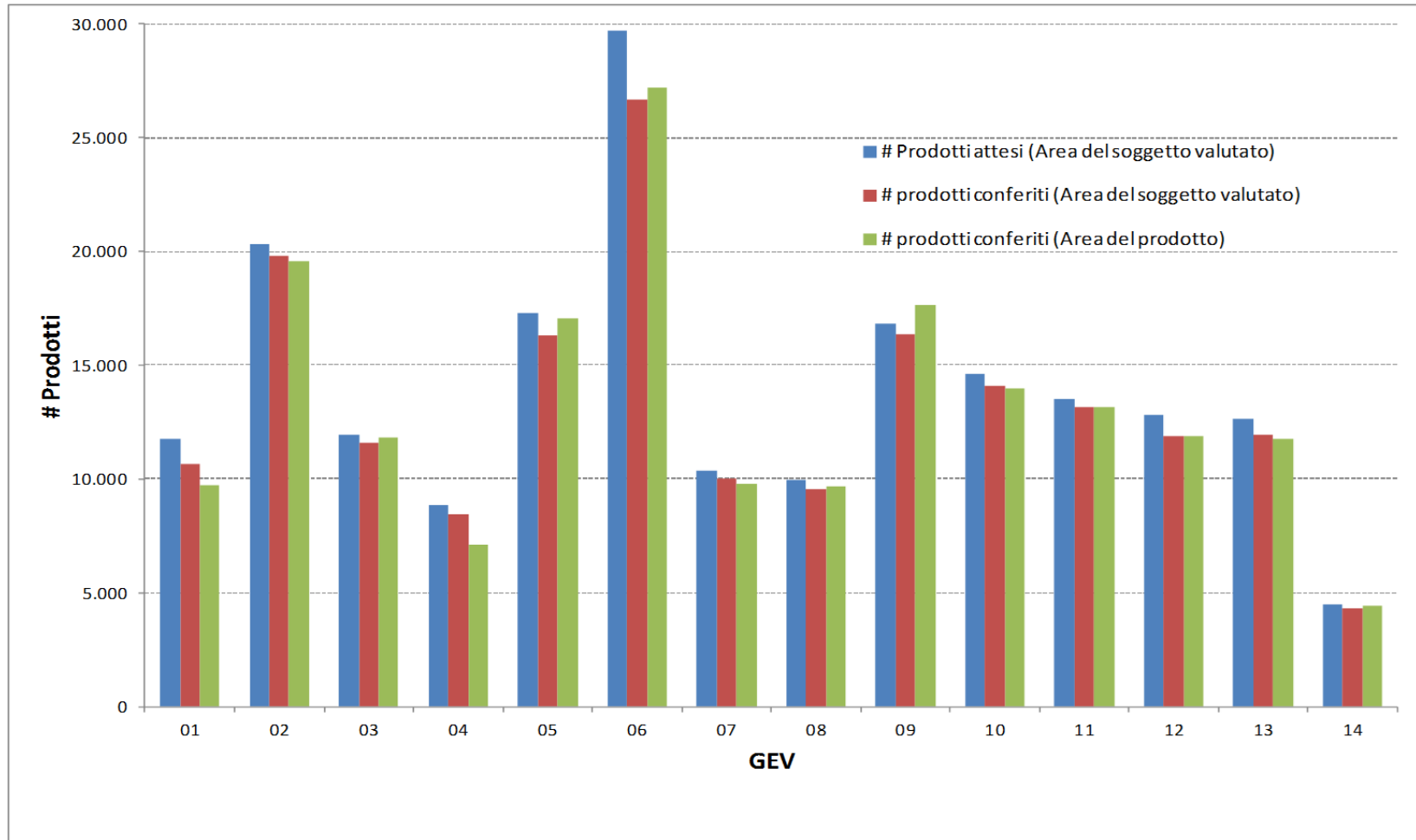
- .Institutions involved in the VQR 2004-2010 include:
 - .67 + 28 public and private Universities
 - .12 PROs under the control of the Ministry of Education and University
 - .27 Research Institutes, Consortia and Foundations which have voluntarily submitted an application to be evaluated by ANVUR
- .Evaluation is performed by:
 - .450 national and international Scientific experts from all the 14 Areas of Research
 - .Almost 14,500 national and international reviewers

Research products submitted for evaluation

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- .A total of 184,742 research products have been submitted for evaluation
- .Among them we find:
 - .73,5% of review articles
 - .19,9% of books, books chapters
 - .5,8% proceedings, translations, scientific comments
 - .0,9% miscellaneous other products
- .Research products may be classified according to the area to which they are submitted for evaluation and to the area of the subject submitting them for evaluation

Expected vs. submitted products



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- Evaluation is based on a combination of bibliometric and peer review methods
- In any case, overall at least 50%+1 of the products of research submitted for evaluation is subject to the revision of the peers
- In the bibliometric sectors defined above, there is an intense use of bibliometric methods
- Bibliometric evaluation concerns research products indexed either in Scopus or Web of Sciences databases

The bibliometric method of evaluation

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- .According to the VQR definition, a research product may be defined as follows:
 - .Excellent, when it falls in the top 20% in terms of quality according to the international scientific community in the field
 - .Good, when it falls in the 60-80% segment in terms of quality according to the international scientific community in the field
 - .Adequate, when it falls in the top 50-60% segment in terms of quality according to the international scientific community in the field
 - .Limited, when it falls in the bottom 50% in terms of quality according to the international scientific community in the field
- .According to the aforementioned criterium:

A product of research randomly extracted in an homogeneous set of all the products published in the world in a given sector and a given year has a probability of being classified as Excellent, Good, Fair or Limited respectively equal to 0,2; 0,2; 0,1; 0,5

The calculation of bibliometric indicators

.According to this methodology, the classification of research products is performed in two steps:

1. Definition of the appropriate bibliometric indicators to be used
2. Definition of an appropriate algorithm assigning the value of the chosen indicator(s) to one of the defined class of merit (E; G; A; L)

Threshold (# citations) for each evaluation class for some subject category according to the ISI database, year 2009

GEV	SUBJECT CATEGORY	E	B	A
01	MATHEMATICS, APPLIED	4	2	1
02	PHYSICS, PARTICLES & FIELDS	10	4	3
03	CHEMISTRY, ORGANIC	9	5	4
04	GEOSCIENCES, MULTIDISCIPLINARY	7	4	3
05	TOXICOLOGY	8	4	3
06	CARDIAC & CARDIOVASCULAR SYSTEMS	10	5	4
07	AGRONOMY	5	3	2
08	ENGINEERING, CIVIL	6	3	2
09	TELECOMUNICATION	4	2	1
11	PSYCHOLOGY, BIOLOGICAL	5	2	1
13	BUSINESS, FINANCE	5	2	1
14	SOCIAL WORK	3	1	1

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.The indicators chosen for the VQR 2004-2010 are the following:

1.An indicator of the impact of the journal on which the research product has been published, such as Scimago Journal Rank or the Journal Impact Factor. Such an indicator provides information on the quality of the publication linked to:

- a)Referee procedure
- b)Reject rate
- c)Diffusion of the journal
- d)Reputation of the Journal

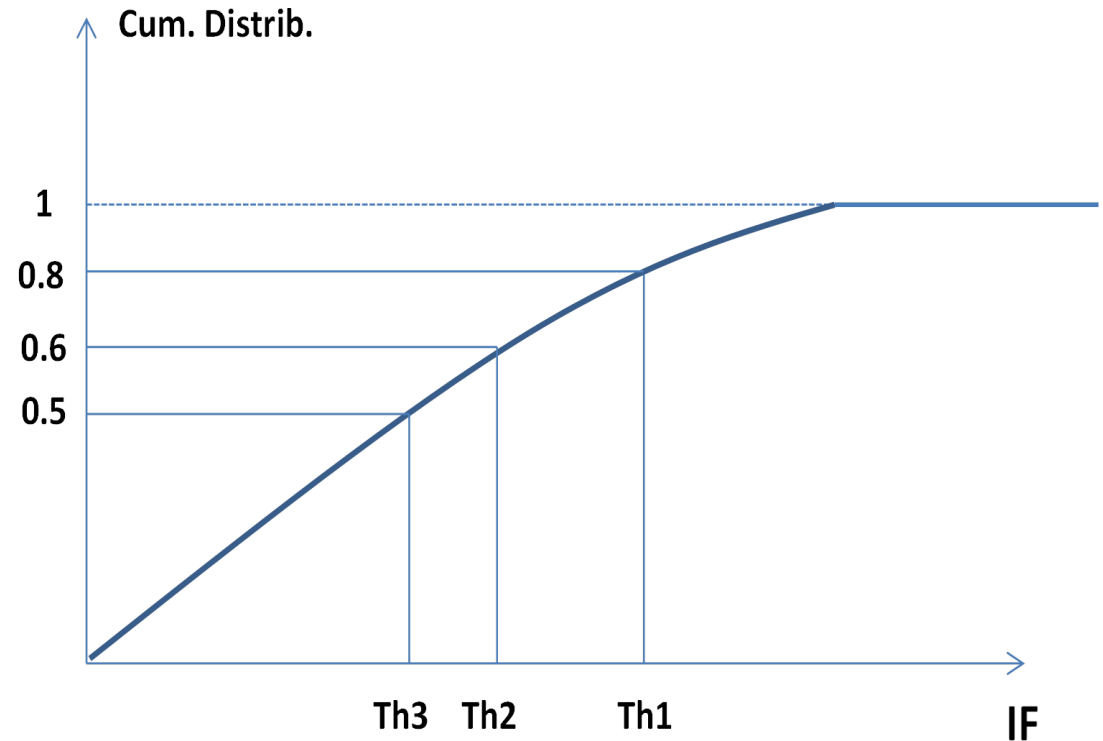
1.The number of citations received by the research product

The bibliometric algorithm - 1

.For each article, we first identify the Journal, the year of publication and the scientific field

.We then calculate the empirical cumulative distribution of the SJR for all the Journals in a given scientific field in a given year

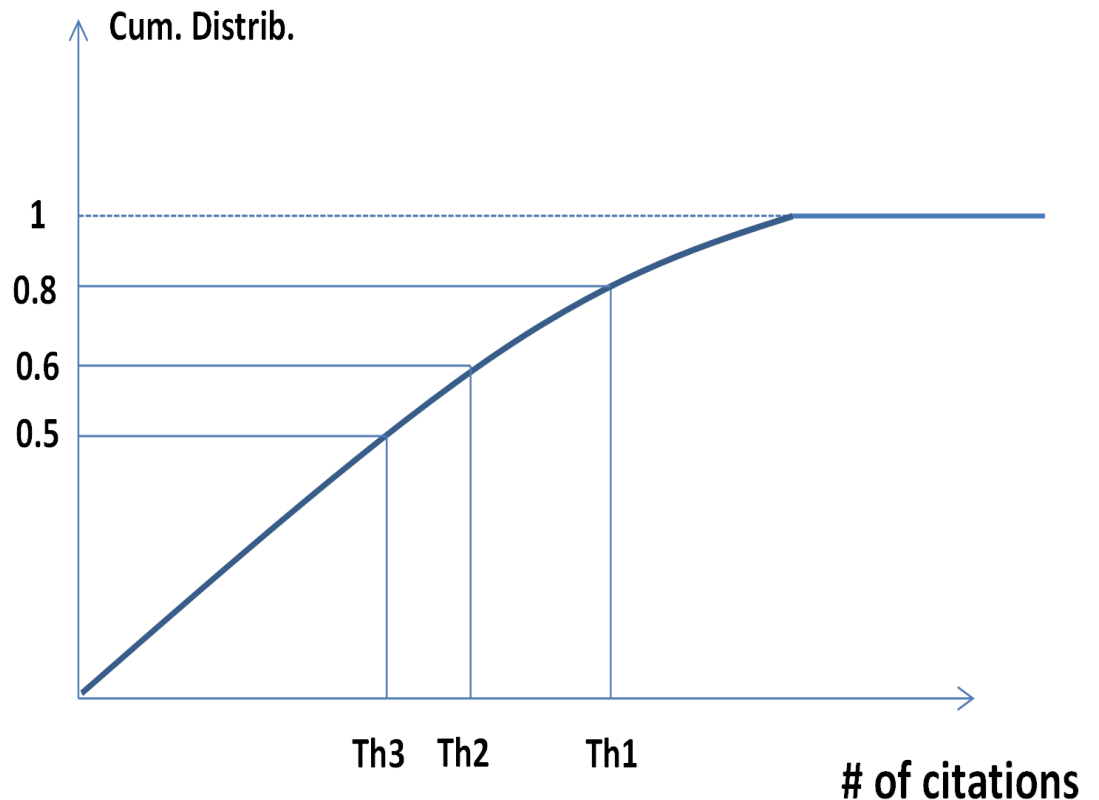
.The distribution is divided up in four areas, with probability of inclusion respectively equal to 0,2; 0,2; 0,1 and 0,5



The bibliometric algorithm - 2

.We then calculate the empirical cumulative distribution of the number of citations for all the articles in a given scientific field in a given year

.Also this distribution is divided up in four areas, with probability of inclusion respectively equal to 0,2; 0,2; 0,1 and 0,5



The bibliometric algorithm - 3

- .As a result, we have two different classifications respectively based on the quality of the Journal (as measured by the SJR) and the number of citations of the paper
- .Starting from these information, we build up the 4x4 matrix showed here
- .When the two indicators give equal indications, the class is settled
- .When the two indicators give diverging signals, we may choose to give an higher weight either to the impact or to the citational indicator

Citations

		Bibliometry (SJR)			
		1	2	3	4
# Citations	1	A			
	2		B		
	3			C	
	4				D

The bibliometric algorithm - 4

.If classification according to the two criteria diverges, the final class may depend:

–On choosing whether to give more emphasis to one of the two criteria

–On the value of the difference among the two different classifications

.As an example, the matrix on the right present a possible classification for older articles, in which more emphasis is given to the number of citations criteria

.The “U” cell will be attributed with “informed peer review”

.The choice about the allocation of undetermined cells is left to the responsibility of each group of experts for each scientific discipline

		Bibliometry (IF,...)			
		1	2	3	4
# Citations	1	A	A	U	U
	2	B	B	B	U
	3	U	C	C	C
	4	U	U	D	D

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- Law n. 240/2010 has innovated the recruitment procedures for Italian Academia
- Candidates aspiring to become Professor in Italy are now selected through a two stage procedure:
 - In a first stage, they apply to be granted a National Habilitation to become either Associate or Full Professor in their specific scientific field
 - Only those being granted the National Habilitation may participate to local selection procedures promoted by Universities
- In 2012, Ministerial Decree n. 76 has established criteria and parameters for the National Habilitation
- In July 2012, the Italian Ministry of Education has started the selection procedure for the National Habilitation Program

The National Habilitation Program

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- According to the Ministerial Decrees, ANVUR:
- Defines parameters and criteria to be used for the selection of both Full Professors participating to the Commissions and of candidates in the National Habilitation Program
- Selects the Italian and Foreign candidates to be member of the sector-specific Commissions in charge of granting the National Habilitation

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The National Habilitation Program: parameters and indicators

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- .In the bibliometric areas defined before, the indicators considered in the National Habilitation Program are:
 - .Number of articles published either in the Scopus or ISI-Web of Science databases in the last 10 years
 - .Number of citations received over the entire academic career of the candidate from all indexed sources
 - .H-index
- .All the above indicators are normalised for the academic age of the candidate
- .The academic age is defined as the number of years since the first publication included in the submission

The National Habilitation Program: parameters and indicators

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- For each indicator, the Median values of the distributions for the two entire Populations of Italian Associate and Full Professors are calculated
- According to the Decree, to be part of the Commissions granting the National Habilitation an Italian or Foreign Full Professor should fall in the top 50% of the distribution in two out of three indicators, calculated for the Population of Italian Full Professors (only one for Humanities and Social Sciences)
- The same criterium applies for the selection of candidates to be appointed as Associate or Full Professors, respectively
- However, according to the Decree, Judging Commissions are allowed to grant Habilitation also to candidates not fully complying to these requirements, provided that the decision is adequately motivated ex ante (= before opening the list of candidatures)

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- .The information set on which the indicators are calculated is obtained from the combination of:
 - .The Archive of all the Italian Associate and Full Professors
 - .Bibliometric information obtained from the Scopus and ISI-Web of Science databases
- .Distributions are calculate separately for Associate and Full Professors, with reference to the each specific Italian Scientific Sector (SSD, i.e. Sector Specific Scientific Sector)

The National Habilitation Program: calculation of indicators

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- .On the basis of the archive of Italian Professors, on July 15, 2012, the number of publications in bibliometric sectors was equal to 1,316,000 research products
- .The procedure of calculation of the aforementioned indicators can be divided in three major steps:
 1. Matching of authors listed in the Italian archive with the Scopus database, on the basis of the surname, initial of the name and affiliation. A specific algorithm was used in order to:
 - a) Minimize errors due to mistakes in the Italian archive
 - b) Minimize errors due to mistakes in the Scopus database (in particular, with reference to the author' surname)
 - c) Minimize errors due to ambiguity in surnames (especially for composite surnames)
 - d) Maximize identification of authors not recognised in the Scopus database
 2. Extracting bibliometric information from the matched dataset

The National Habilitation Program: calculation of indicators

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3. Calculating the three bibliometric indicators:

- a) On the period 2002-2012, given that it has been impossible to correctly distinguish the papers published after July 2002, as it was originally requested from the Decree
 - b) For each Scientific Sector, separately for Associate and Full Professors
 - c) For the citation indicators, it has been chosen the max number of citations available for each article on the basis of the two available datasets
- .At the end of the procedure, the percentage of articles contained in the Italian archive correctly identified in the bibliometric datasets was equal to 96%
- .Correct identification is lower for conference proceedings (32%, with higher levels where proceedings are particularly relevant, such as mathematics – 52% - and engineering – 45%)

The National Habilitation Program: selection of the Commissions

- ANVUR has also been responsible for ascertain the scientific qualification of Italian and Foreign Full Professors aiming to become part of the Commissions granting the National Habilitation
- ANVUR activities in this field may be distinguished according to the affiliation (National or International) of the candidates
- For National candidates ANVUR took care of:
 - ¹.Calculation of individual indicators on the basis of the information contained in the dataset on July 21st, 2012
 - ².Communication to the candidate of a first assessment (“green” or “red” light) on the basis of this information, leaving the possibility to withdraw the candidature before August 28, 2012
 - ³.New calculation of the indicators on the basis of the information available on August 28, 2012
 - ⁴.In case of a negative assessment, candidates have been notified of the decision and informed about the calculations. Candidates had the possibility of appealing to the decision and ANVUR has re-calculated the indicators for those providing new evidence about their publication activities

The National Habilitation Program: selection of the Commissions

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- .For Foreign candidates ANVUR activities were the following:
- .Creation of a list of candidates for the position, following the publication of an invitation to apply on *Nature*
- .Manual calculation of the bibliometric indicators: only those with a value of two out of three indicators above the median of the sector have been admitted to a random draw selecting the Foreign Member of the Commission

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- .ANVUR will deliver in February 2014 its first Report on the Italian Research System
- .The Report will contain detailed analysis of the situation of the Italian Research system, in terms of demand and supply for higher education, academic staff, labor market outcomes and other indicators
- .The Report will also contain a chapter devoted to the analysis of the position of the Italian research system in the international scenario
- .The benchmarking analysis will be based on standard bibliometric information stemming from the major international databases in the field
- .In this respect, choices have been made regarding:
 - .The level of aggregation of the analysis
 - .The countries involved in the comparison
 - .The indicators used in the analysis
 - .The period covered in the report

The ANVUR Report on the Italian Research System: level of aggregation

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The report will analyse the position of Italian research at 3 different levels of aggregation:

- At the level of the Scopus Subject Areas

- At the level of the Italian “Aree CUN”

- For all the scientific sectors considered together

- In order to be able to gather relevant information at the level of the Italian «Aree CUN», ANVUR has realised a mapping of the Scopus subject areas into the Italian classification

- The mapping has been based on information provided within the VQR 2004-2010:

- We exclude from the calculation the subject areas in which less than 10 products have been submitted for evaluation

- We calculate the number of publications presented in each Scopus subject area from each Italian “Area CUN”

- We assign each Scopus subject area to the “Area CUN” with the highest share in that Scopus s.a.

- In case the highest share is below the 75% threshold, we considered the possibility of multiple assignment if the second highest share is equal or superior to 20% (N.B: a subject area is assigned at most to 2 Aree CUN)

The ANVUR Report on the Italian Research System: countries involved in the comparison

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The analysis will be referred to the following countries and aggregation of countries:

European countries and aggregates

•Eu 15 aggregate

- Italy
- France
- Germany
- Netherlands
- Spain
- United Kingdom
- Sweden

•European Union (EU 27) aggregate

•Other European: Switzerland

The ANVUR Report on the Italian Research System: countries involved in the comparison

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The analysis will be referred to the following countries and aggregation of countries:

OECD

•OECD aggregate

- Australia
- Canada
- Japan
- South Korea
- US

Non-OECD

•BRIC aggregate

- Brasil
- China
- India
- Russia

World total

The ANVUR Report on the Italian Research System: indicators

The analysis will be based on the following indicators:

- .Indicators measuring research productivity:

- .Publications (whole)

- .Publications (fractional)

- .Indicators measuring the impact of published research:

- .Citations (whole)

- .Citations (fractional)

- .Citations per paper

- .Field weighted citation impact

- .Indicators measuring the level of national and international collaboration:

- .Collaborations – single authorship

- .Collaborations – domestic collaborations

- .Collaborations – international collaborations

- .Collaborations – cross sector collaborations

- .Indicators measuring the quality of publication activities in terms of excellence:

- .The full percentile distribution of the number of publications with respect to the most cited publications.

- .All the information will be available for the period 1996-2012

The ANVUR Report on the Italian Research System: indicators

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The Report will try to answer the following questions:

- .What is the position of the Italian research system vis-à-vis its main competitors in terms of:
 - .Scientific production (number of products)
 - .Scientific impact (number of citations)
- .How Italy compares with its main competitors in terms of publications in top rated journals?
- .How Italy compares in terms of collaborating activity?
- .What has been the evolution of relative scientific specialisation in Italy in the last 20 years

The ANVUR Report on the Italian Research System: indicators

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In order to answer those questions, bibliometric indicators will be combined with information stemming from official sources in order to calculate appropriate productivity indicators

More specifically, research production and impact will be assessed in terms of:

- Production and impact per capita, dividing by (active) population
- Production and impact per researcher, dividing by the number of (public and private) researchers
- Production and impact per euro invested in R&D activity, dividing by R&D (Private, Government, Higher Education) expenditures

Indicators of relative specialisation will also be calculated in order to investigate on the pattern of specialisation of the Italian research system

The report is due for publication in February, 2014.

Classification of journals

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In Humanities and Social sciences the indicators required the identification of:

- scientific journals (as opposed to popular, professional, cultural or other journals)
- A-rated journals

Classification of journals has been done in several waves:

- startup (based on lists of journals on the personal website of professors and researchers)- appr. 20,000 items, of which 15,000 considered scientific
- new journals included by candidates to the Habilitation in their publication list- appr. 5,000, of which 3,000 considered scientific
- revision of rating- a procedure aimed at allowing journals to apply for upgrade- 550 applications, for 2,200 positions overall. Evaluation largely based on peer review
- new journals included by candidates to the Habilitation in their publication list- appr. 3,000 new items- under progress.

Robustness of the A-classification

Legal controversies

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Humanities and Social Sciences do not have bibliometric indicators.

Special projects at ANVUR:

- support HSS Italian journals wishing to apply for admission into WoS or Scopus
- create a Database of Italian journals aimed at extracting citational information

Technical feasibility for a Database:

- IT platform
- delivery of full text
- current issues + backlog (10 years)
- automatic extraction of citations from the text of articles, via sophisticated computational linguistics system of rules
- indicators: (a) production (b) use (c) citations
- Altmetrics under experimentation
- test to be carried out on A-rated journals

Workshop January 20, 2014

**THANK YOU FOR YOUR
ATTENTION!**