ANALYSIS OF SCIENTIFIC OUTPUT IN COLLABORATION BETWEEN SPAIN AND THE UNITED STATES OF AMERICA. 2005 - 2014
INTRODUCTION

Scientific collaboration is a multidimensional phenomenon that is usually the result of the multiple social interactions researchers have over the course of their everyday work. These are identified using the patterns of co-authorship of the articles published. Although there are many kinds of research collaborations (e.g., collaboration within a single research center or between institutions within the same country), this report focuses on international collaboration, which continues increasing; driven by high-speed internet connection and funding programmes that boost cross-border relations; while articles written by a single author are becoming less and less frequent, the number of publications produced in international collaboration is growing.

This report is a first approximation to the scientific collaboration between the United States of America and Spain, and offers a quantitative and qualitative analysis of the collaborative scientific relationship between Spain and the United States of America (USA in the graphs) over the 2005-2014 period.

This analysis focuses specifically on measuring the number of peer-reviewed documents published in scientific journals (articles, reviews and proceedings of the most important science conferences) that are the result of international scientific collaboration. The term ‘international collaboration’ refers to all documents whose list of authors includes, at least, affiliations from both countries, i.e. a scientific publication made jointly between Spain and the USA is considered to be a collaboration between both countries if at least one of its authors has Spanish affiliation and another one a USA affiliation.

The analysis set out in this report provides elements for comparing the USA and Spain, with the aim of contributing to debates on the scientific and technological capabilities of both countries, and above all, to help identifying the main trends and differences that exist in terms of scientific output.

The source used to characterize the results presented here is Elsevier, based on data from Scopus.

The document provides the main bibliometric indicators of the scientific output of the USA and Spain, as well as the collaborative output between both countries for the 2005-2014 period.

The study breaks down into the following five sections:
I. Spain and the USA in the international context;
II. USA’s scientific output through international collaboration;
III. Spain’s scientific output through international collaboration;
IV. Main indicators of scientific collaboration between Spain and the USA;
V. Thematic distribution of scientific collaboration between Spain and the USA.

The annexes presents the ten centers in Spain that collaborate most with the USA and the 10 US centers that collaborate most with Spain, taking into consideration the highly cited articles produced through this collaboration, broken down by thematic area.
The first section of the study allows us to situate the scientific outputs of these two countries within the top global producers. The USA has the highest output in the world and Spain has the tenth highest. Regarding the research quality indicators, the USA’s percentages are higher than Spain’s in terms of documents published in the most important journals (a country’s output of articles published in the 25% journals with the highest impact), excellence (a country’s output of articles among the 10% most frequently cited), and excellence with leadership (a country’s output of articles among the 10% most frequently cited led by an author of that same country).

The second and third sections describe the scientific output of both countries from the perspective of international collaboration, from which we can note that in the 2010-2014 period, the USA is Spain’s top collaborator while Spain is the tenth partner for the USA.

If we analyze in periods of five years (2005-2009 and 2010-2014), we see that in the 2010-2014 period there was a major increase in scientific collaboration between the two countries (55%) compared to the previous five years, as well as similar growth (72%) in the number of articles produced in collaboration within the 10% most frequently cited articles worldwide (excellence).

In the fourth section, we highlight the main indicators of scientific cooperation between the two countries. In the 2005-2014 period, the number of collaborative documents between Spain and the USA was of 66,445. The excellence rate in collaborative publications reached 25.9% in 2014, while the individual excellence rates for Spain and the USA in the same year were 13.4% and 15% respectively.

The field-weighted citation impact of collaborative publications is also much higher than that of the two countries separately (2.69). The quality of the scientific production indicators reached by Spain-USA collaboration should support the idea of pushing this scientific cooperation even further. This section also shows the main Spanish institutions that collaborate with the USA and vice versa in terms of output, ranked by the number of collaborative documents with the other country. Here we find large research performing organizations, as well as the top universities in each of the two countries.
In the final section, an overall vision of the thematic distribution of scientific collaboration between the USA and Spain is presented, which in both cases is very similar to what we see at global level.

The highest number documents produced in collaboration can be found in the area of Medicine, followed by Physics and Astronomy.

The most noteworthy points made in each section are:

**I. Spain and the USA in the international context**
- In 2014, the United States has the highest scientific output followed by China, both of which considerably exceed the rest of countries of reference.
- In 2014, Spain occupies the tenth position in scientific production, with China, the United Kingdom, Germany, Japan, France, Canada, Italy and India ranking between the USA and Spain.
- The percentage of international collaboration in the USA is 28.2% for the 2005-2014 period.
- Spain is in sixth position among the countries with the highest output through of international collaboration (39.8%).
II and III. USA’s and Spain’s scientific output through international collaboration

• The USA is Spain’s top partner representing up to 26% of Spanish scientific output in international collaboration as of 2014. Spain is the tenth highest collaborator for the USA, being present in 5% of its scientific output.

• The great increase in the number of joint publications between Spain and the USA is significant in the 2010-2014 period (40,397 publications), representing 55% more than in the previous five years.

• This increase in joint publications in 2010-2014 is matched with a very large increase in publications of excellence compared with the previous five years (+72%).

• The countries with the highest collaboration rate with USA as share of their total international collaboration production are Israel (55.1%), South Korea (51.9%) and Taiwan (48.4%).

• Countries in Central America and South America, as well as Portugal have the highest collaboration rate with Spain as share of their total international collaboration production.

IV. Main indicators of scientific collaboration between Spain and the USA

• Between 2005 and 2014, joint output increased from 4,720 to 8,837, a compound annual growth rate of 8.4%.

• Since 2005, the excellence rate of documents published by Spain in collaboration with the USA is, on average, the double Spain’s individual excellence share. As for the USA, in the 2010-2014 period the collaboration with Spain increased its scientific excellence rate, on average, by 10 percentage points. Between 2005 and 2014, the rate of collaborative excellence increased by four percentage points (25.9% in 2014).

• In 2014, the field-weighted citation impact is 1.45 for the USA and 1.31 for Spain, which means that the publications of the two countries are cited respectively 45% and 31% more than the global average. The field-weighted citation impact of joint publications in the same year was 3.69, meaning that this output is cited 169% more than the global average, which clearly shows the benefit of scientific collaboration for both countries.

• The main institutions having joint collaborations include large research performing organizations and the top universities in both countries.
V. Thematic distribution of scientific collaboration between Spain and the USA

- The thematic distribution of scientific publications is very similar in the USA and Spain, with Medicine and Engineering as the areas of largest output in both countries along the 2005-2014 period. This is in line with the global trend.
- The areas in which the USA and Spain collaborated most along this period are Medicine, Physics and Astronomy; and Biochemistry, Genetics and Molecular Biology.
- Both the excellence share and the field-weighted citation impact of collaborative output between the USA and Spain, in all areas, increased considerably compared with the excellence and impact obtained by both countries separately.
Spain and the USA in an international context
Countries with highest output by number of documents and % of international collaboration, 2005-2014

- United States: 5,087,956 documents, 28.2% international collaboration
- China: 3,267,683 documents, 14.4% international collaboration
- United Kingdom: 1,372,883 documents, 44.5% international collaboration
- Germany: 1,333,959 documents, 43.6% international collaboration
- Japan: 1,228,261 documents, 22.4% international collaboration
- France: 944,025 documents, 46.6% international collaboration
- Canada: 775,686 documents, 43.4% international collaboration
- Italy: 761,829 documents, 39.3% international collaboration
- India: 737,562 documents, 39.8% international collaboration
- Spain: 637,011 documents, 42.6% international collaboration
- Australia: 585,370 documents
- South Korea: 566,987 documents
- Brazil: 459,682 documents

Legend:
- Number of documents
- % international collaboration
ESP and USA main bibliometric indicators, 2005-2009 and 2010-2014

Spain
- Exc. 2005-2009: 6.5%
- Exc. 2010-2014: 8.2%
- InterCol 2005-2009: 15.9%
- InterCol 2010-2014: 26.0%

United States
- Exc. 2005-2009: 10.9%
- Exc. 2010-2014: 12.7%
- InterCol 2005-2009: 15.4%
- InterCol 2010-2014: 30.2%
USA’s scientific output through international collaboration
USA’s scientific output through international collaboration

Scientific output in collaboration between the USA and its 30 main collaborating countries

- China: 20,000
- United Kingdom: 60,000
- Germany: 40,000
- Canada: 50,000
- France: 30,000
- Japan: 31,000
- Italy: 31,000
- Australia: 50,000
- South Korea: 42,000
- Spain: 55,000
- Netherlands: 43,000
- Switzerland: 39,000
- India: 55,000
- Brazil: 46,000
- Sweden: 37,000
- Taiwan: 21,000
- Israel: 19,000
- Russia: 2,000
- Belgium: 42,000
- Denmark: 63,000
- Mexico: 29,000
- Austria: 58,000
- Poland: 28,000
- Singapore: 56,000
- Turkey: 40,000
- Finland: 40,000
- Norway: 44,000
- Greece: 29,000
- South Africa: 69,000
- New Zealand: 41,000

2005-2009: Blue bars
2010-2014: Red bars

116% ▲1
USA'S SCIENTIFIC OUTPUT THROUGH INTERNATIONAL COLLABORATION

30 main countries with which the USA collaborates by number of documents
2005-2009 and 2010-2014

1. United Kingdom
2. Germany
3. Canada
4. China
5. Japan
6. France
7. Italy
8. South Korea
9. Australia
10. Netherlands
11. Spain
12. Switzerland
13. Sweden
14. Brazil
15. India
16. Taiwan
17. Israel
18. Russia
19. Belgium
20. Mexico
21. Denmark
22. Poland
23. Austria
24. Singapore
25. Turkey
26. Greece
27. Finland
28. Norway
29. New Zealand
30. South Africa
### Scientific collaboration with the USA as a percentage of the total international collaboration of the collaborating country

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Publications of excellence in collaboration between the USA and its 30 main collaborating countries

- China: 131% ▲1
- United Kingdom: 37%
- Germany: 36%
- Canada: 39%
- France: 52%
- Japan: 62%
- Italy: 25%
- Australia: 27%
- South Korea: 52%
- Spain: 55%
- Netherlands: 43%
- Switzerland: 73%
- India: 64%
- Brazil: 50%
- Sweden: 26%
- Taiwan: 32%
- Israel: 32%
- Russia: 49%
- Belgium: 76% ▲3
- Denmark: 39%
- Mexico: 75%
- Austria: 62%
- Poland: 73%
- Singapore: 54%
- Turkey: 54%
- Finland: 40%
- Norway: 40%
- Greece: 49%
- South Africa: 89% ▲2
- New Zealand: 58%

2003-2009  2010-2014
USA’s Scientific Output Through International Collaboration

Main USA collaborators and excellence share of collaboration

- China: 27.4%
- United Kingdom: 26.1%
- Germany: 24.0%
- Canada: 25.4%
- France: 26.4%
- Japan: 26.6%
- Italy: 25.6%
- Australia: 30.3%
- South Korea: 29.7%
- Spain: 28.4%
- Netherlands: 28.4%
- Switzerland: 25.7%
- India: 19.1%
- Brazil: 16.1%
- Sweden: 15.1%

Spain’s scientific output through international collaboration
SPAIN’S SCIENTIFIC OUTPUT THROUGH INTERNATIONAL COLLABORATION

Scientific output in collaboration between ESP and its 30 main collaborating countries

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SPAIN’S SCIENTIFIC OUTPUT THROUGH INTERNATIONAL COLLABORATION

30 main countries with which ESP collaborates by number of documents
2005-2009 and 2010-2014

1. United States
2. United Kingdom
3. France
4. Germany
5. Italy
6. Netherlands
7. Portugal
8. Switzerland
9. Canada
10. Belgium
11. Mexico
12. Sweden
13. Argentina
14. Brazil
15. Russia
16. Japan
17. Denmark
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Publications of excellence in collaboration between ESP and its 30 main collaborating countries

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<td>Australia</td>
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<td>India</td>
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</table>

Main collaborators with ESP and excellence share of collaboration
Main indicators of scientific collaboration between Spain and the USA
MAIN INDICATORS OF SCIENTIFIC COLLABORATION BETWEEN SPAIN AND THE USA

Field-weighted citation impact of ESP and USA and documents in collaboration

- Field-weighted citation impact (No. of docs. in col. ESP – USA)
- Field-weighted citation impact ESP
- Field-weighted citation impact USA

![Graph showing the field-weighted citation impact for ESP and USA from 2005 to 2014. The impact for ESP and USA increases generally over the years, with some fluctuations.](image-url)
10 main ESP institutions that collaborate with the USA, 2005-2014

- CSIC: 11,141
- Universidad Autónoma de Barcelona: 6,364
- Universidad Autónoma de Madrid: 5,329
- Universidad Complutense: 4,131
- Universidad de Valencia: 4,017
- Universidad Politécnica de Cataluña: 3,804
- Universidad de Granada: 2,518
- Universidad de Oviedo: 2,077
- Universidad de Santiago de Compostela: 1,801
- Universidad de Murcia: 1,773

number of documents in collaboration
10 main USA institutions that collaborate with ESP, 2005-2014

- Harvard University: 5,674
- Massachusetts Institute of Technology: 2,990
- The Ohio State University: 2,707
- Johns Hopkins University: 2,680
- Stanford University: 2,653
- University of Wisconsin: 2,484
- University of California at Los Angeles: 2,459
- University of Michigan: 2,360
- California Institute of Technology: 2,215
- University of California at San Diego: 2,288

Number of documents in collaboration.
Thematic distribution of scientific collaboration between Spain and the USA
Thematic distribution of the USA's scientific output, 2005-2014
Thematic distribution of ESP’s scientific output, 2005-2014
Thematic distribution of collaborative output between ESP and USA, 2005-2014
THEMATIC DISTRIBUTION OF SCIENTIFIC COLLABORATION BETWEEN SPAIN AND THE USA

Excellence share by area of knowledge in ESP and USA and in collaboration, 2005-2014

- ESP
- USA
- ESP-USA

Agricultural and Biological Sciences
- Veterinary 35%
- Chemistry 30%
- Psychology 25%
- Health Professions 20%
- Dentistry 15%
- Neuroscience 10%
- Business, Management and Accounting 5%
- Medicine
- Mathematics
- Immunology and Microbiology
- Chemical Engineering
- Engineering
- Physics and Astronomy
- Energy
- Nursing
- Pharmacology, Toxicology and Pharmaceutics
- Decision Sciences
- Environmental Science
- Computer Science
- Earth and Planetary Sciences
- Social Sciences
- Economics, Econometrics and Finance
- Materials Science
- Biochemistry, Genetics and Molecular Biology
- Arts and Humanities

ESP-USA
Field-weighted citation impact by area of knowledge in ESP and USA and in collaboration, 2005-2014
Annex 1

Main Spanish research centers that collaborate with centers in the USA for each thematic area
Below is a graph for each thematic area. Centers are shown from left to right according to the number of collaborative documents between the center and the United States of America.
Excellence share of the 10 ESP centers that collaborate most with the USA in Arts and Humanities, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Biochemistry, Genetics and Molecular Biology, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Materials Science, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Environmental Science, 2005-2014
Excellence share of the 10 ESP centers that collaborate most with the USA in Decision Sciences, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Computer Science, 2005-2014

- Universidad Politécnica de Cataluña
- Universidad Politécnica de Madrid
- CSIC
- Universidad Carlos III de Madrid
- Universidad de Granada
- Universidad Politécnica de Valencia
- Universidad Complutense
- Universidad Pompeu Fabra
- Universidad Autónoma de Barcelona
- Universidad de Sevilla
Annex 1

Main Spanish research centers that collaborate with centers in the USA for each thematic area.

Excellence share of the 10 ESP centers that collaborate most with the USA in Earth and Planetary Sciences, 2005-2014.

- CSIC
- Instituto de la Laguna
- Universidad de Complutense
- Universidad de Barcelona
- Universidad Autónoma de Madrid
- Universidad de Valencia

EXC of the center
EXC COL ESP-USA
Excellence share of the 10 ESP centers that collaborate most with the USA in Social Sciences, 2005-2014
Excellence share of the 10 ESP centers that collaborate most with the USA in Economics, Econometrics and Finance, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Energy, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Physics and Astronomy, 2005-2014

- EXC of the center
- EXC COL ESP-USA
Annex 1

Main Spanish Research Centers that Collaborate with Centers in the USA for Each Thematic Area

Excellence share of the 10 ESP centers that collaborate most with the USA in Engineering, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Physics and Astronomy, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Chemical Engineering, 2005-2014
Excellence share of the 10 ESP centers that collaborate most with the USA in Immunology and Microbiology, 2005-2014

- CSIC
- Universidad de Barcelona
- Universidad Autónoma de Madrid
- Universidad de Salud Carlos III
- Universidad Pompeu Fabra
- Universidad de Valencia
- Universidad de Zaragoza
- Universidad de Navarra

Legend:
- EXC of the center
- EXC COL ESP-USA
Excellence share of the 10 ESP centers that collaborate most with the USA in Mathematics, 2005-2014
ANNEX 1
MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Medicine, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Multidisciplinary, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Business, Management and Accounting, 2005-2014

Universidad de Navarra
Universidad Carlos III de Madrid
Universidad Pompeu Fabra
Universidad de Valencia
Universidad Complutense
Universidad Autónoma de Madrid
Universidad Raimon Llull
Universidad de Granada
Universidad de Oviedo
Universidad Autónoma de Barcelona
EXCELLENCE SHARE OF THE 10 ESP CENTERS THAT COLLABORATE MOST WITH THE USA IN NEUROSCIENCE, 2005-2014
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Dentistry, 2005-2014

- EXC of the center
- EXC COL ESP-USA

Universidad de Granada
Universidad Complutense
Universidad de Barcelona
Universidad de Murcia
Universidad de Santiago de Compostela
Universidad de Sevilla
Universidad Rey Juan Carlos
Universidad Europea de Madrid
Universidad del País Vasco
Universidad de Valencia
Excellence share of the 10 ESP centers that collaborate most with the USA in Health Professions, 2005-2014
Excellence share of the 10 ESP centers that collaborate most with the USA in Psychology, 2005-2014

- UNIVERSIDAD DE BARCELONA
- UNIVERSIDAD AUTÓNOMA DE MADRID
- UNIVERSIDAD DE GRANADA
- UNIVERSIDAD DE VALENCIA
- UNIVERSIDAD COMPLUTENSE
- UNIVERSIDAD AUTÓNOMA DE BARCELONA
- UNIVERSIDAD POMPEU FABRA
- UNIVERSIDAD DE OVIEDO
- UNIVERSIDAD DEL PAÍS VASCO
- UNIVERSIDAD JAUME I

- EXC of the center
- EXC COL ESP-USA
ANNEX 1

MAIN SPANISH RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN THE USA FOR EACH THEMATIC AREA

Excellence share of the 10 ESP centers that collaborate most with the USA in Chemistry, 2005-2014

- CSIC
- Universidad de Barcelona
- Universidad Complutense
- Universidad Autónoma de Madrid
- Universidad de Santiago de Compostela
- Universidad de Valencia
- Universidad de Zaragoza
- Universidad Autónoma del País Vasco
- Politécnica de Cataluña

Bar chart showing the percentage of excellence shared between Spanish and US centers.
Annex 2

Main USA research centers that collaborate with centers in Spain for each thematic area
Below is a graph for each thematic area. Centers are shown from left to right according to the number of collaborative documents between the center and Spain.
Excellence share of the 10 USA centers that collaborate most with ESP in Arts and Humanities, 2005-2014
MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

ANNEX 2

Excellence share of the 10 USA centers that collaborate most with ESP in Biochemistry, Genetics and Molecular Biology, 2005-2014

- Harvard University
- National Institutes of Health
- University of California at San Francisco
- Johns Hopkins University
- Stanford University
- Columbia University
- University of California at Los Angeles
- University of Washington
- University of Southern California
- Memorial Sloan-Kettering Cancer Center

EXC of the center
EXC COL ESP-USA
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Materials Science, 2005-2014

- Exc of the center
- Exc Col ESP. USA
Excellence share of the 10 USA centers that collaborate most with ESP in Environmental Science, 2005-2014
Excellence share of the 10 USA centers that collaborate most with ESP in Computer Science, 2005-2014

- University of Illinois at Urbana-Champaign
- Massachusetts Institute of Technology
- Carnegie Mellon University
- University of Texas at Austin
- Stanford University
- Northwestern University
- University of California at Berkeley
- Intel
- University of New Mexico

Legend:
- EXC of the center
- EXC COL ESP-USA
Excellence share of the 10 USA centers that collaborate most with ESP in Earth and Planetary Sciences, 2005-2014
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Social Sciences, 2005-2014
MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

ANNEX 2

Excellence share of the 10 USA centers that collaborate most with ESP in Economics, Econometrics and Finance, 2005-2014

- New York University
- University of Pennsylvania
- National Bureau of Economic Research
- World Bank
- University of California at Berkeley
- University of Illinois at Urbana-Champaign
- Columbia University
- Federal Reserve Bank
- Harvard University
- University of California at Los Angeles

Graph showing the percentage of excellence share for each center.
ANNEX 2
MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Energy, 2005-2014

- Massachusetts Institute of Technology
- Brookhaven National Laboratory
- University of Wisconsin
- Oak Ridge National Laboratory
- Pennsylvania State University
- National Renewable Energy Laboratory
- Princeton University
- Lawrence Berkeley National Laboratory
- University of California at San Diego
- University of California at Berkeley

Graph showing the excellence share of the 10 USA centers that collaborate most with ESP in Energy, 2005-2014.
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Nursing, 2005-2014
Excellence share of the 10 USA centers that collaborate most with ESP in Pharmacology, Toxicology and Pharmaceutics, 2005-2014
Excellence share of the 10 USA centers that collaborate most with ESP in Physics and Astronomy, 2005-2014

- Massachusetts Institute of Technology
- Harvard University
- The Ohio State University
- California Institute of Technology
- University of Wisconsin
- Stanford University
- University of Maryland
- Johns Hopkins University
- University of California at Santa Barbara
- University of Michigan

Legend:
- EXC of the center
- EXC COL ESP-USA
Excellence share of the 10 USA centers that collaborate most with ESP in Engineering, 2005-2014

- Massachusetts Institute of Technology
- Harvard University
- Stanford University
- The Ohio State University
- University of Wisconsin
- University of California at San Diego
- University of Illinois at Urbana-Champaign
- California Institute of Technology
- New Mexico State University
- University of California at Irvine

Legend:
- EXC of the center
- EXC COL ESP-USA
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Chemical Engineering, 2005-2014
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Immunology and Microbiology, 2005-2014

- Harvard University
- Oklahoma State University
- National Institutes of Health
- Johns Hopkins University
- University of California at San Francisco
- U.S. Department of Agriculture
- Mount Sinai School of Medicine
- University of California at Los Angeles
- University of Washington
- University of Pennsylvania

EXC of the center
EXC COL ESP-USA
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Mathematics, 2005-2014

- Massachusetts Institute of Technology
- University at California at San Diego
- University at California at Los Angeles
- University at Wisconsin
- Harvard University
- The Ohio State University
- University at California at Berkeley
- University of Pennsylvania
- University at Texas at Austin

EXC of the center
EXC COL ESP-USA
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Medicine, 2005-2014.
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Multidisciplinair, 2005-2014
Excellence share of the 10 USA centers that collaborate most with ESP in Business, Management and Accounting, 2005-2014
Excellence share of the 10 USA centers that collaborate most with ESP in Neuroscience, 2005-2014

- Harvard University
- Columbia University
- National Institutes of Health
- University of California at San Diego
- University of Pennsylvania
- University of Johns Hopkins University
- University of California at San Francisco
- New York University
- University of California at Los Angeles
- Mount Sinai School of Medicine

Legend:
- EXC of the center
- EXC COL ESP-USA
EXCELLENCE SHARE OF THE 10 USA CENTERS THAT COLLABORATE MOST WITH ESP IN DENTISTRY, 2005-2014

- University of Michigan
- Medical College of Georgia
- University of Minnesota
- New York University
- University of Washington
- University of Southern California
- SUNY Stony Brook
- University of Florida
- University of Tennessee Health Science Center
- University of Texas Health Science Center at Houston

**ExC of the center**

**ExC COL ESP-USA**
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Health Professions, 2005-2014

- Harvard University
- University of Wisconsin-La Crosse
- Virginia Commonwealth University
- University of Florida
- University of Connecticut
- Johns Hopkins University
- Appalachian State University
- University of Virginia
- University of New Jersey, New Brunswick
- University of North Carolina

Legend:
- EXC of the center
- EXC COL ESP-USA
ANNEX 2

MAIN USA RESEARCH CENTERS THAT COLLABORATE WITH CENTERS IN SPAIN FOR EACH THEMATIC AREA

Excellence share of the 10 USA centers that collaborate most with ESP in Psychology, 2005-2014

- Harvard University
- Columbia University
- The Ohio State University
- SUNY Stony Brook
- University of California at Davis
- University of California at Los Angeles
- University of California at San Diego
- University of Pittsburgh
- University of North Carolina
- SUNY Albany
Excellence share of the 10 USA centers that collaborate most with ESP in Chemistry, 2005-2014

- Lawrence Berkeley National Laboratory
- University of Minnesota
- Brookhaven National Laboratory
- Massachusetts Institute of Technology
- University of California at Berkeley
- University of Texas at Austin
- University of California at Davis
- Youngstown State University
- Harvard University
- Northwestern University
Excellence share of the 10 USA centers that collaborate most with ESP in Veterinary, 2005-2014

- Oklahoma State University
- University of California at Davis
- U.S. Department of Agriculture
- Harvard University
- Pfizer
- University of Minnesota
- The Ohio State University
- University of Wisconsin
- University of Pennsylvania
- North Carolina State University

**EXC of the center**
**EXC COL ESP-USA**