

Academic Ranking of World Universities



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Outline

- **History**
- **Methodology**
- **Results and Analysis**
- **Features and Impact**
- **Future**



HISTORY



Chinese Dream of WCU

- **World-Class University (WCU) is a dream for generations of Chinese. It's not only for pride, but also for the future of China.**
- **Since 1990s, Chinese government has launched several initiatives for research universities. The best-known one is specially designed to build WCU (985 Project).**
- **Many top Chinese universities had setup their strategic goals as WCU. Most of them have also set time tables for reaching the goals.**



Questions About WCU

- What is the **definition and criteria** for a WCU
- **How many** WCU should there be in the world?
- What are **the positions of top Chinese universities** in the world?
- How can Chinese universities improve themselves to reach the goal of WCU?



Academic Ranking of World Universities (ARWU)

✓ 2003

✓ 2004

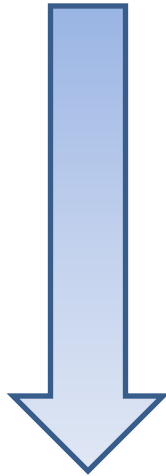
✓ 2005

✓ 2006

✓ 2007

✓ 2008

✓ 2009



Find out the positions of top Chinese Universities in the world higher education system

Provide one source of information for the global comparison of universities

- **Transparent methodology**
- **Objective indicators**
- **Third-party data**



Academic Ranking of World Universities by Broad Subject Fields (ARWU-FIELD)

2007, 2008, 2009

Five Broad Subject Fields

- **Natural Sciences and Mathematics (SCI)**
- **Engineering/Technology and Computer Sciences (ENG)**
- **Life and Agriculture Sciences (LIFE)**
- **Clinical Medicine and Pharmacy (MED)**
- **Social Sciences (SOC)**



Academic Ranking of World Universities by Subject Fields (ARWU-SUBJECT)

2009

Five Subject Fields

- **Mathematics**
- **Physics**
- **Chemistry**
- **Computer Sciences**
- **Economics / Business**

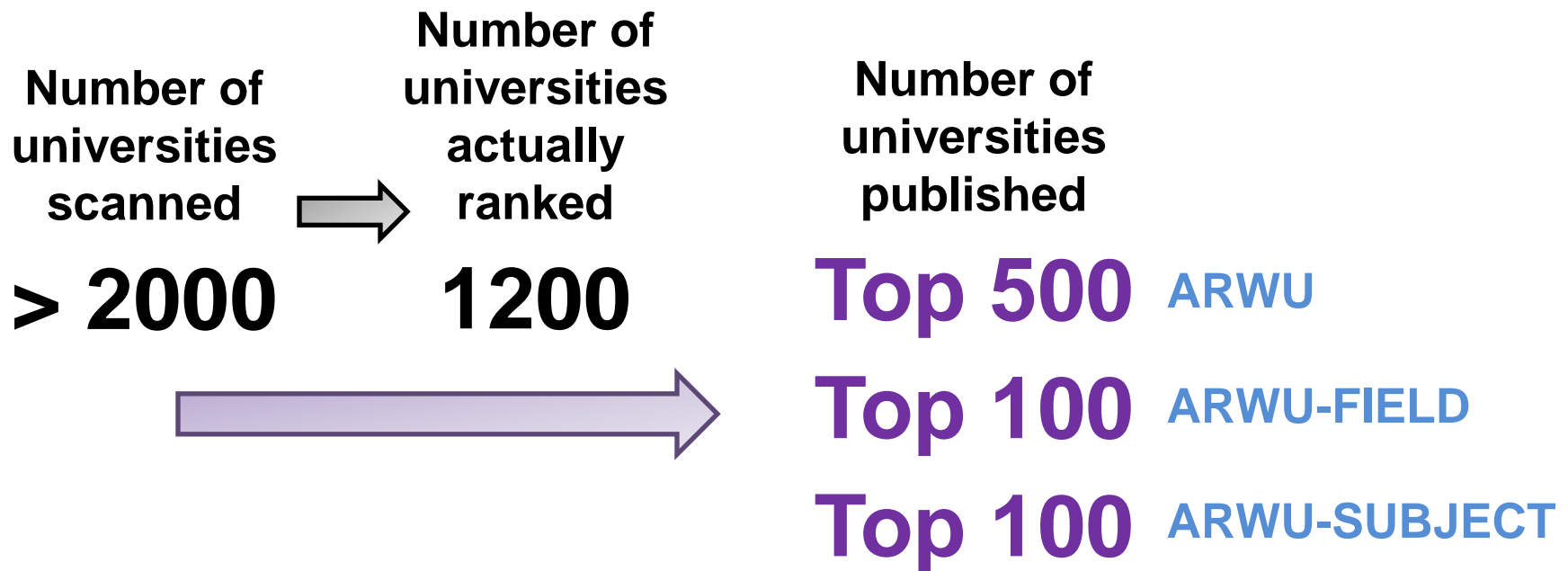


METHODOLOGY



Selection of Universities

- Any university that has any Nobel Laureates, Fields Medals, Highly Cited Researchers, or papers in *Nature* or *Science*
- Major universities of every country with significant amount of papers indexed by Citation Indexes of Thomson





Criteria and Weights of ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	<i>Alumni</i>	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	<i>Award</i>	20%
	Highly cited researchers in 21 broad subject categories	<i>HiCi</i>	20%
Research Output	Papers published in Nature and Science*	<i>N&S</i>	20%
	Papers indexed in Science Citation Index-expanded and Social Science Citation Index	<i>PUB</i>	20%
Per Capita Performance	Per capita academic performance of an institution	<i>PCP</i>	10%

*: For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered and the weight of N&S is relocated to other indicators

Criteria and Weights of ARWU-FIELD



	<i>Alumni</i>	<i>Award</i>	<i>HiCi</i>	<i>PUB</i>	<i>TOP</i>	<i>Fund</i>
SCI	10%	15%	25%	25%	25%	/
ENG	/	/	25%	25%	25%	25%
LIFE	10%	15%	25%	25%	25%	/
MED	10%	15%	25%	25%	25%	/
SOC	10%	15%	25%	25%	25%	/



Criteria and Weights of ARWU- SUBJECT

	<i>Alumni Award</i>	<i>HiCi</i>	<i>PUB</i>	<i>TOP</i>	
Mathematics	10%	15%	25%	25%	25%
Physics	10%	15%	25%	25%	25%
Chemistry	10%	15%	25%	25%	25%
Computer Science	10%	15%	25%	25%	25%
Economics / Business	10%	15%	25%	25%	25%



Definition of Indicator: Award as an Example

- **The weighted number of the staff of an institution winning Nobel prizes in Physics, Chemistry, Medicine and Economics and Fields Medal in Mathematics.**
- **Staff is defined as those who work at an institution at the time of winning the prize.**
- **Different weights are set according to the periods of winning the prizes. The weight is 100% for winners since 2001, 90% for winners in 1991-2000, 80% and so on.**
- **If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions.**
- **For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of prize.**

Main Sources of Data

- **Nobel laureates:**
<http://www.nobelprize.org>
- **Fields Medals:**
<http://www.mathunion.org/medals/>
- **Highly-cited researchers:**
<http://www.isihighlycited.com>
- **Papers published in *Nature* and *Science*:**
<http://www.isiknowledge.com>
- **Papers indexed in SCIE and SSCI:**
<http://www.isiknowledge.com>



RESULTS & ANALYSIS



Results - <http://www.ARWU.org>

ARWU

Top 500 universities

ARWU-FIELD

Top 100 universities in

- Natural Sciences and Mathematics
- Engineering/Technology and Computer Sciences
- Life and Agriculture Sciences
- Clinical Medicine and Pharmacy
- Social Sciences

ARWU-SUBJECT

Top 100 universities in

- Mathematics
- Physics
- Chemistry
- Computer Sciences
- Economics / Business

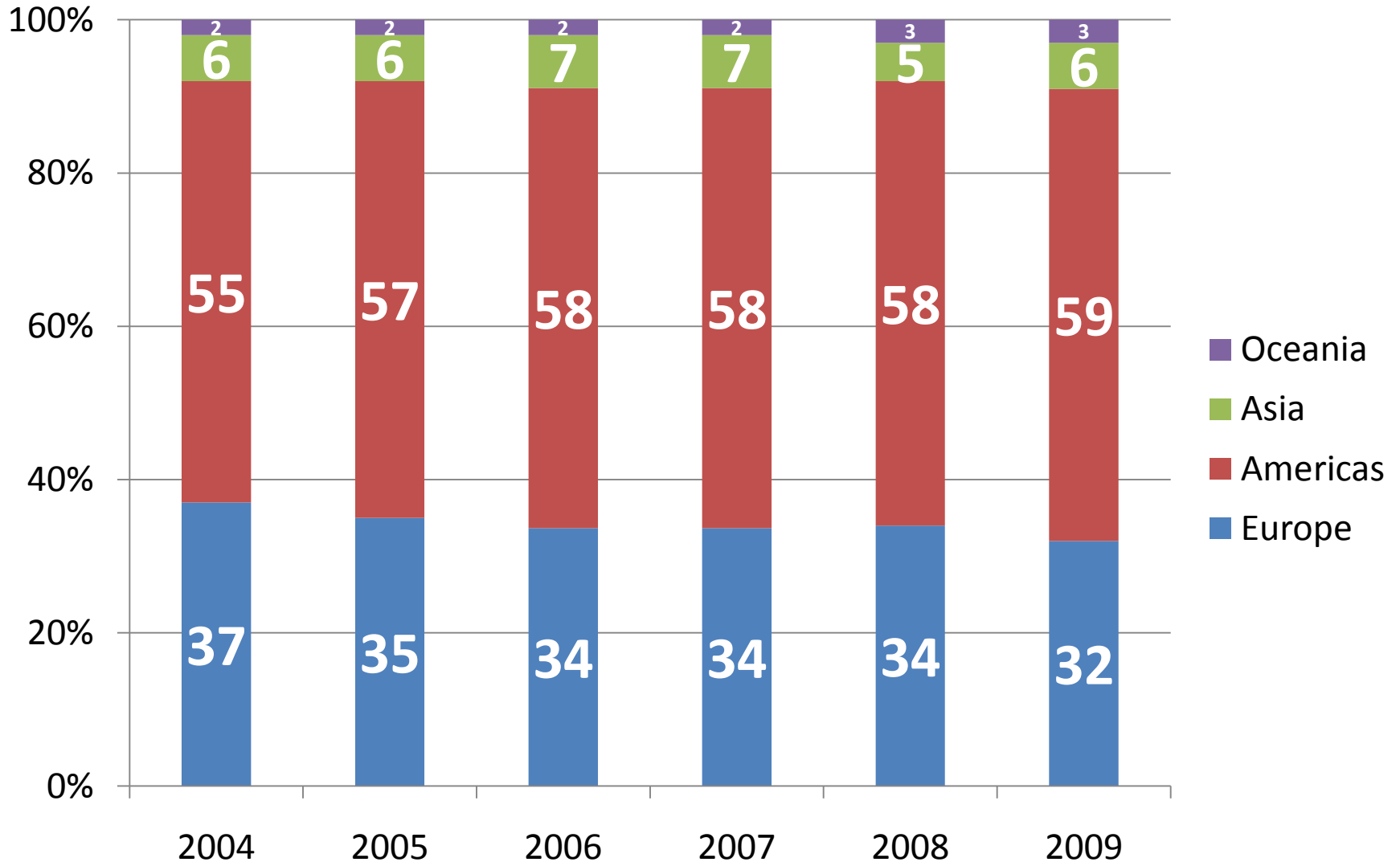


Average Performance by ARWU Indicators

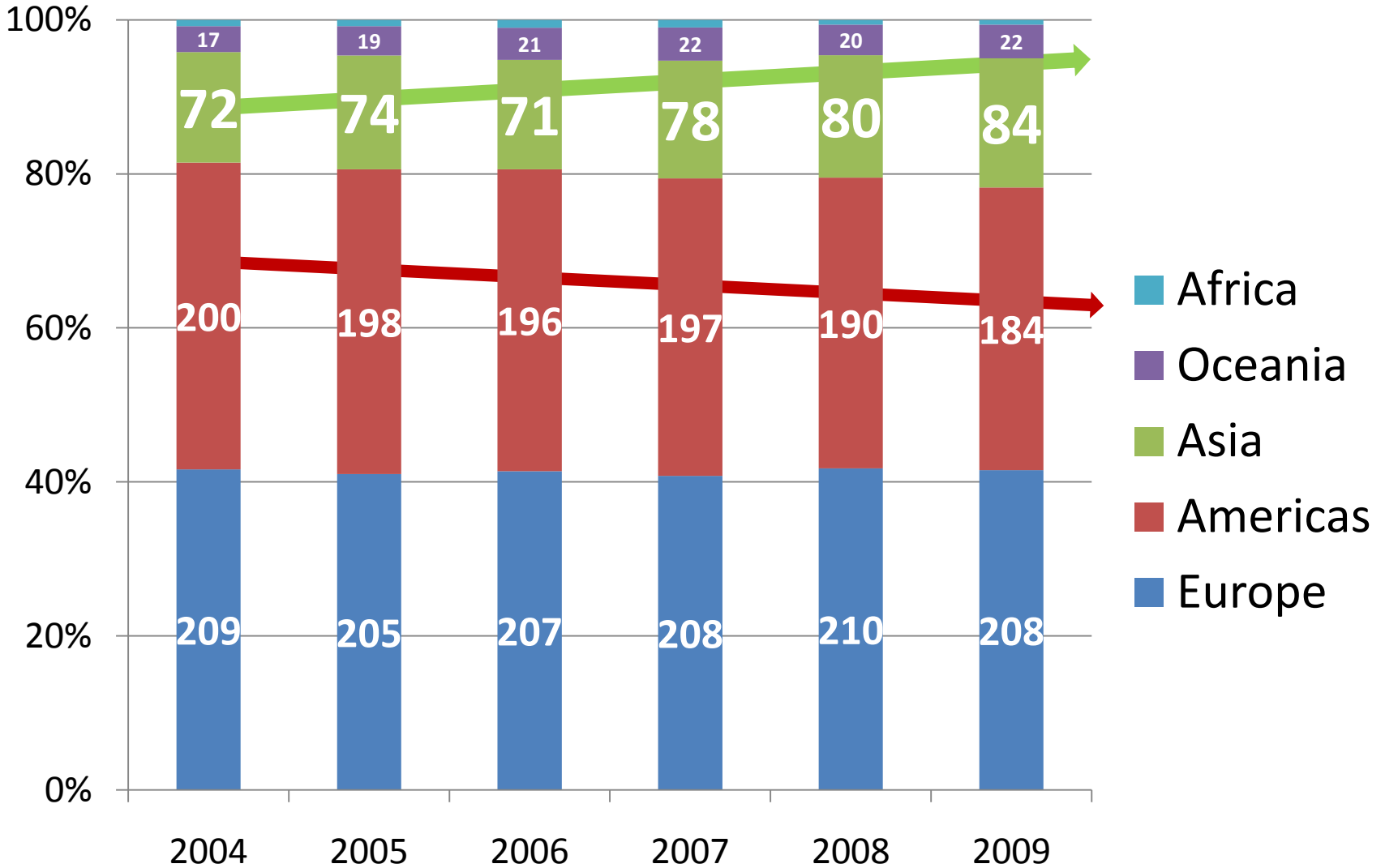
Indicator	Alumni	Award	HiCi	N&S	PUB
Top 100	3.36	1.47	29.2	11.2	3600
101-200	0.50	0.12	6.9	2.8	2000
201-300	0.27	0.02	2.8	1.4	1550
301-400	0.19	0.03	1.9	0.7	1000
401-500	0.04	0.01	0.9	0.5	900



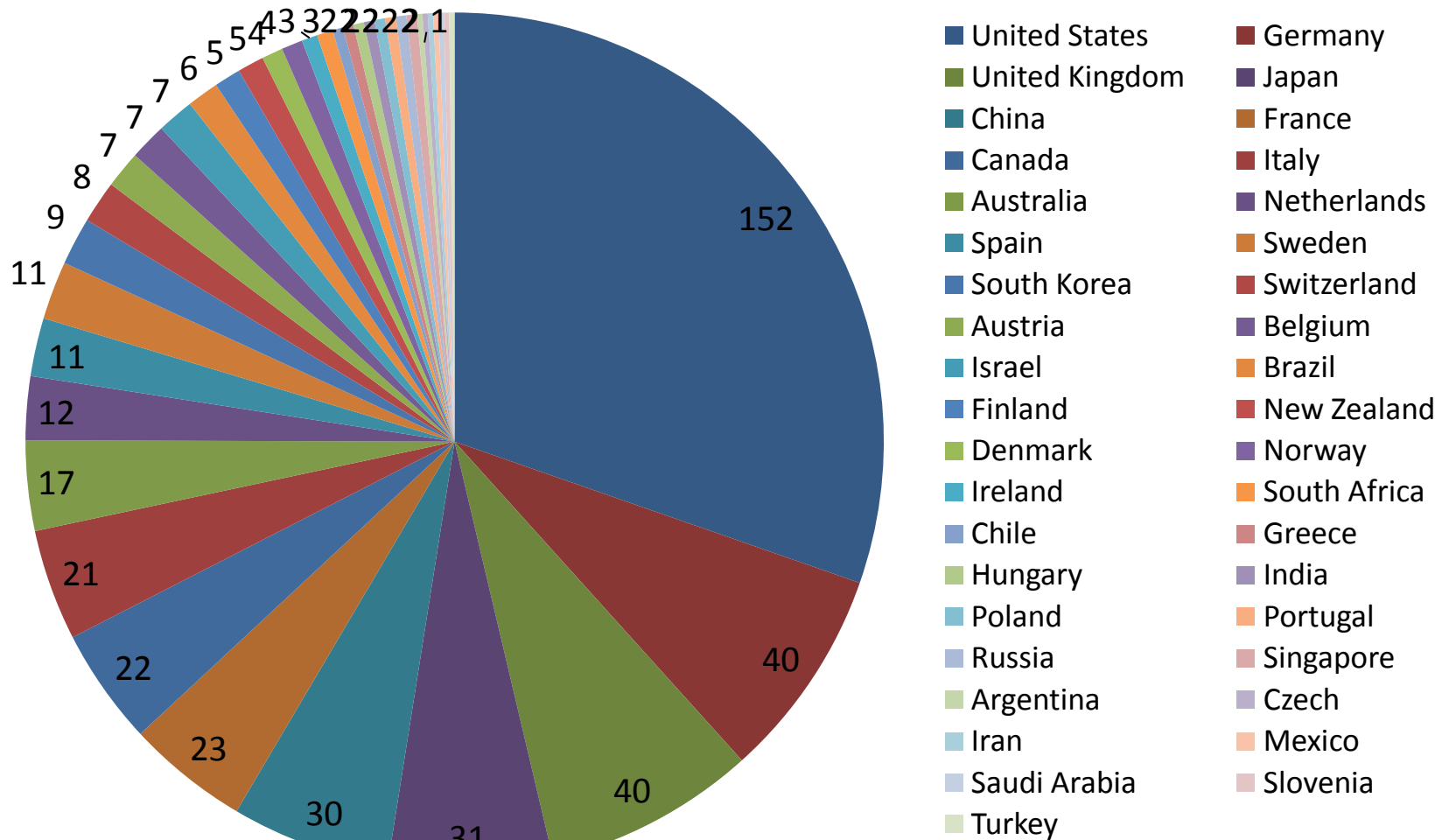
Distribution of Top 100 Universities



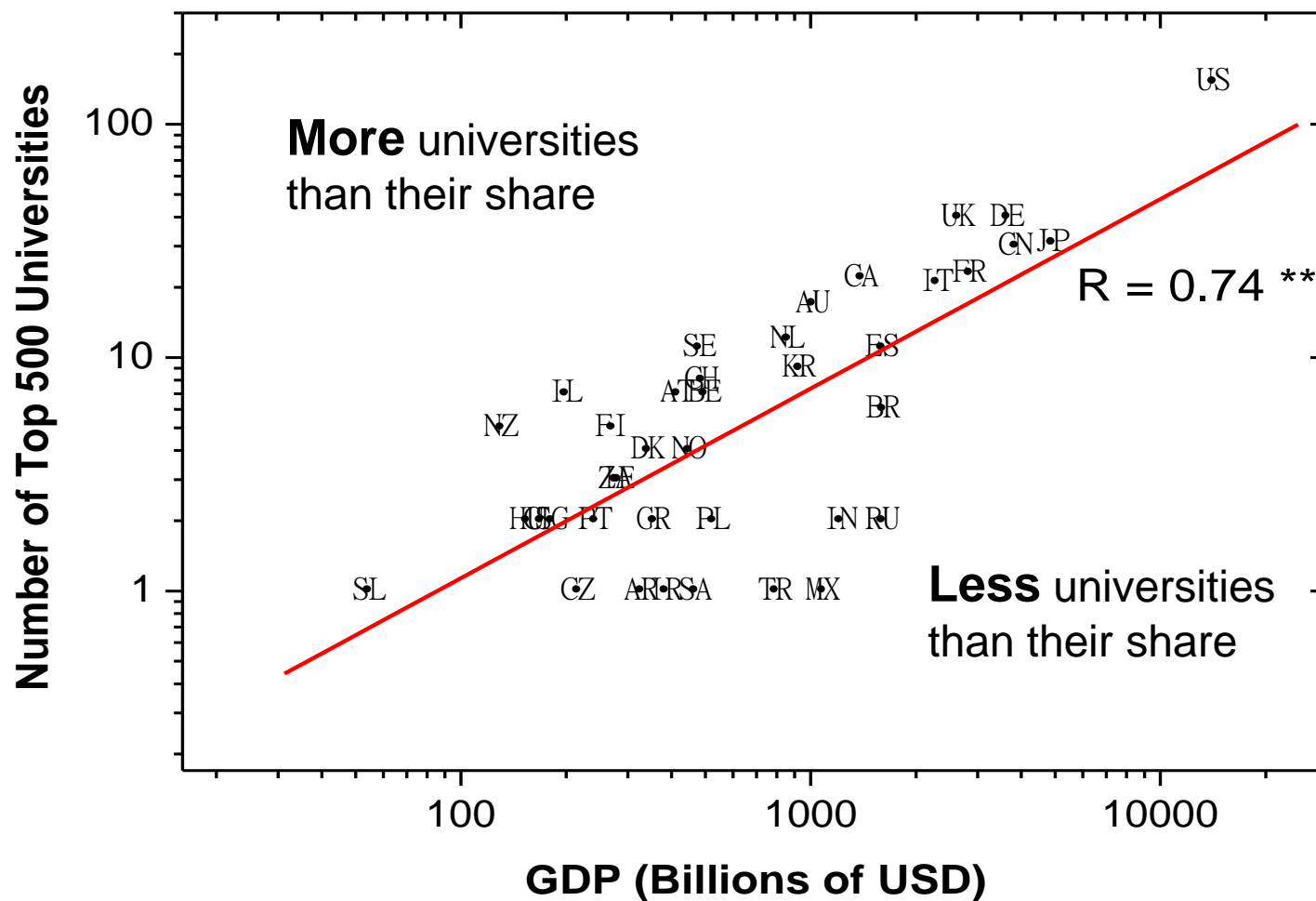
Distribution of Top 500 Universities



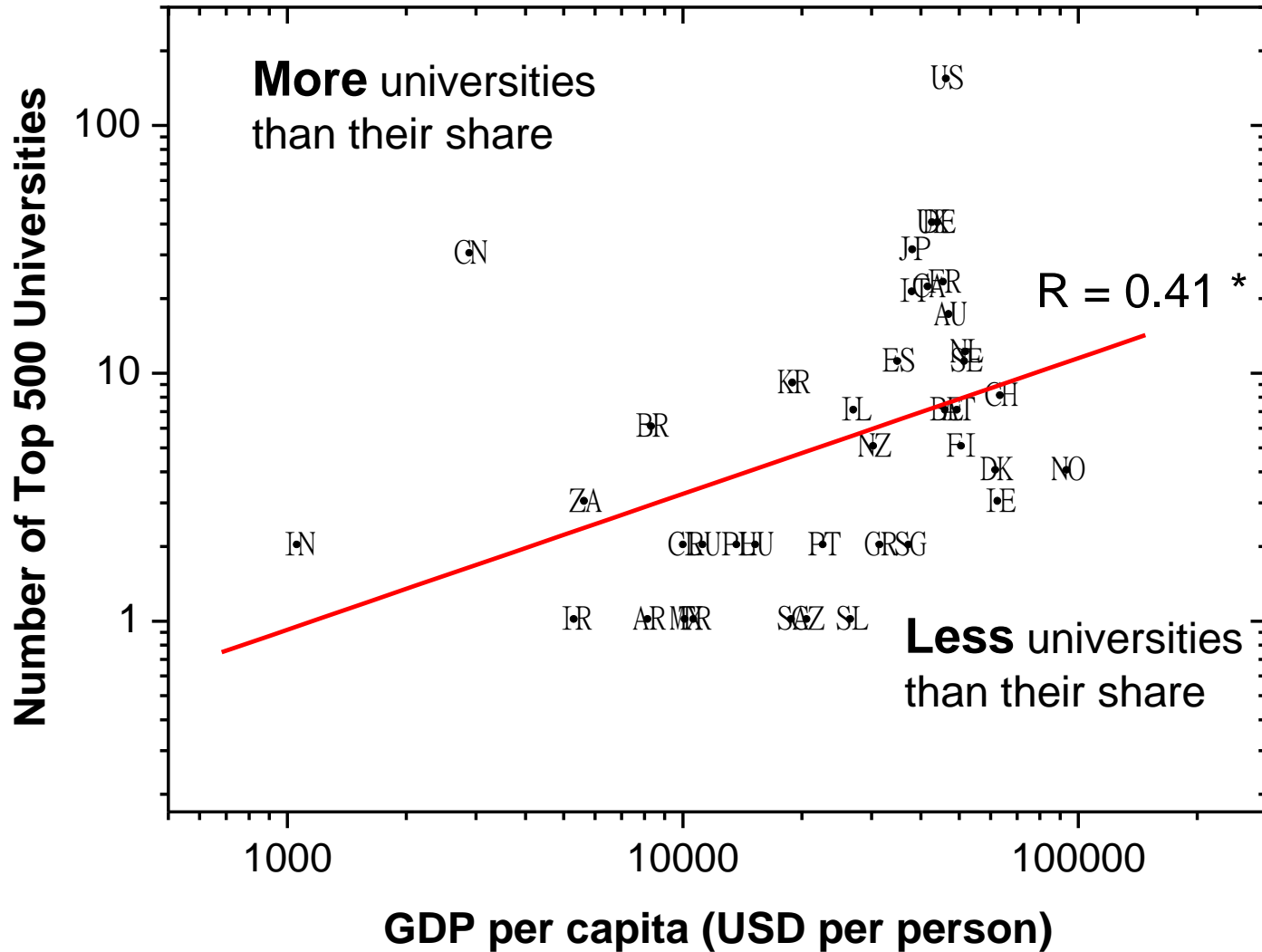
TOP 500 Universities by Country



Number of Top 500 Universities vs GDP



Number of Top 500 Univ vs GDP per Capita



Which Countries Could Have More in Top 500?

**Based on
GDP**

- RU IN PL GR PT
MX TR SA IR AR
CZ BR (12)

**Based on
GDP per
capita**

- CH AT BE BR FI
NZ NO DK IE SG
GR PT HU PL RU
CL SL CZ SA TR
MX AR IR (23)

10 Countries

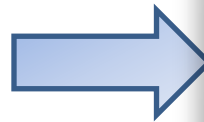
Russia
Poland
Greece
Portugal
Czech
Turkey
Saudi Arabia
Iran
Argentina
Brazil
Mexico

Which countries could have at least one Top 500 University?

GDP > **85** Billions

and

GDP per capita > **1200**



Asia: Indonesia, Thailand, Malaysia, Philippines, UAE, Kuwait, Kazakhstan

Europe: Romania, Slovak, Ukraine

Americas: Colombia, Venezuela, Peru

Africa: Algeria, Egypt, Morocco, Nigeria, Libya



FEATURES & IMPACT

Features

First multi-indicator global university ranking.

Independent research for academic interests

Transparent and stable methodologies

Objective indicators and third-party data

Verifiable results

Reports

- Reported by mainstream media in major countries
 - USA *The New York Times*
 - UK *The Times*
 - Germany *Deutsche Welle*
 - France *Le Figaro*
 - Australia *The Australian*
 - Japan *The Yomiuri Shimbun*
- Reported by hundreds of universities worldwide
 - Campus news
 - Annual reports
 - Promotional brochures



Comments

**The
Economist**

“the most widely used annual ranking of the world's research universities”

A world of opportunity. (2005). *Economist*, Vol. 376. Issue 8443, p14-16.

THE CHRONICLE
of Higher Education

“the most influential international ranking”

Bollag, Burton (2006). International group endorses principles for ranking of higher-education institutions. *Chronicle of Higher Education*, June 1, 2006

Chris Patten
Chancellor of
Oxford University

“it looks like a pretty good stab at a fair comparison”

Chris Patten's speech. (2004, February 5). Guardian

Ian Chubb
President of ANU

“they offer an important comparative view of research performance and reputation”

Chubb, I. (2007). Distinguishing (between) universities.



Applications



To analyze the comparative advantages of Western Europe and US

Destler, B. (2008) A new relationship. *Nature*, 453, 853-854, Dec 2008

“France's poor showing in the Shanghai rankings--helped trigger a national debate about higher education that resulted in a new law, passed last month, giving universities more freedom.”

Enserink, M. (2007). Who Ranks the University Rankers? *Science*, Vol. 317. no. 5841, p 1026-1028.



The Pursuit of Excellence. A European Institute of Technology

Available at: https://rand.org/pubs/working_papers/2006/RAND_WR346.pdf



FUTURE



Limitations of Ranking

- Ranking is controversial, there are limitations and problems in any ranking.
- However, there are university rankings in almost every major country of the world.
- Whether universities and other stakeholders agree with rankings, they are clearly here to stay.
- The key issue then becomes how to improve rankings by rankers and how to wisely use the rankings by various stakeholders.



Updating ARWU

➤ **ARWU**

➤ **ARWU-FIELD**

➤ **ARWU-SUBJECT**

– more subjects every year



Improving ARWU

- **Including more international scientific awards**
 - possibly one from each subject area
- **Including more internationally renowned scholars**
 - plenary speakers etc.
- **Including more internationally renowned alumni**
 - executives in top companies and intl. organizations
- **Including more products of social science research**
 - books, etc.



Diversifying ARWU

- **Ranking of specialized universities**
 - engineering, medicine, etc. (classification)
- **Ranking emphasizing per capita performance**
 - comparable definition and data of academic staff
- **Ranking according to university missions**
 - teaching universities, entrepreneur universities, etc.
- **Ranking considering history, budget etc.**



Profiling Universities

- Building databases of world research universities with as many indicators as possible
- Profiling and analysis of world-class universities at faculty/school level
- Benchmarking with top research universities at departmental/program level
- Annual report of world-class universities
- -----

Thanks for Your Attention!



<http://www.ARWU.org/>