

Komitet Naukoznawstwa PAN

Szkoły wyższe – bazy danych

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Politechnika Gdańska

22 listopada 2024

Historia



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journal homepage: www.elsevier.com/locate/respol



Research paper

An evaluation and explanation of (in)efficiency in higher education institutions in Europe and the U.S. with the application of two-stage semi-parametric DEA

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ARTICLE INFO

JEL classifications:

I23

C14

I22

Keywords:

Higher education institutions

Efficiency

Two-stage DEA

European-US comparison

ABSTRACT

In this study the technical efficiency of number of public European and American HEIs is assessed over a decade. Efficiency scores are determined using nonparametric DEA with different input-output sets and considering different frontiers: global frontier (all HEIs pooled together), regional frontier (Europe and the U.S. having their own frontiers) and country-specific ones. The external factors affecting the degree of HEI inefficiency are also investigated, e.g. institutional settings (size and department composition), location and funding structure. Specifically, the results indicate a positive association between both regional GDP per capita and number of departments and an institution's efficiency (for both the European and U.S. samples). On average, older European HEIs are more efficient, but this is not confirmed for American ones. Finally, government funding seems to have a negative effect on the efficiency of universities in Europe, which again is not confirmed for the U.S. However, some country heterogeneity at the European level is found through intensive sensitivity analysis.

Wykorzystane dane na poziomie indywidulanych uczelni:

- **Liczba studentów**
- **Liczba absolwentów**
- **Liczba nauczycieli akademickich**
- **Przychody całkowite**
- **Przychody podstawowe (Core revenues)**
- **Opłaty/czesne za studia**
- **Liczba publikacji indeksowanych w WoS**

Źródła:

- **Krajowe urzędy statystyczne (AUT, GER, CHE)**
- **Strony ministerialne (FIN, SWE)**
- **Inne, specyficzne dla poszczególnych krajów:**
 - PL: *Szkoły Wyższe – dane podstawowe* (MNiSW)
 - Spanish Rectors Conference (CRUE)
 - Association of Netherlands Universities (VSNU)
 - ITA: National Agency for the Evaluation of Universities (ANVUR)
 - UK: Higher Education Statistics Agency
 - USA: The Integrated Postsecondary Education Data System (IPEDS)
- **Raporty/sprawozdania finansowe uczelni**
- **Strony uczelni**
- **Web of Science - publikacje**

Table A3. Detailed description of variables used in first and second step analysis together with their sources

Variable	Country	Definition	Source
Academic staff	Austria	Professors, assistants and other academic staff, full-time equivalent. Persons with several employment relationships are counted only once.	Federal Ministry of Science Research and Economy www.bmwf.gv.at/unidata
	Finland	Professors, associate professors, senior assistants, assistants, lecturers, teachers and research personnel, full time equivalent	Finnish Ministry of Education and Culture 2000 – 2009: https://kotapluus.csc.fi/online/Haku.do Since 2010: http://vipunen.csc.fi/
	Germany	Professors, lecturers, scientific assistants, scientific and artistic employees, teaching personnel, full time employment	Federal Statistical Office (Destatis) www.destatis.de Publication: <i>Beirte</i> (Series) 4.4 "Personal an Hochschulen" (personnel at institutions of higher education).
	Italy	Professors (1st and 2nd category) researchers, registered at the end of the year, who in December received at least 95% of the salary typical for the post at the full-time employment level	National Agency for the Evaluation of Universities (ANVUR)
	Netherlands	The personnel files contain only data of persons appearing in the personnel records of the Dutch universities. That is, the data excludes staff hired through third parties. Without hospitals faculty staff who transferred from the university as an employer to the university medical center as an employer. FTE, as recorder on the 31 st Dec. including student assistants	Association of Universities in the Netherlands (VSNU) http://www.vsnunl/en_GB
	Poland	Professors, docents, adjuncts, assistants, senior lecturers, lecturers and specialist librarians, full time employment	Ministry of Science and Higher Education.
	Spain	Academic staff excluded graduate students employed for teaching assistance or research	Spanish Rectors Conference (CRUE), www.crue.org
	Sweden	The number of teaching and research staff in FTE. The figures include professors, senior lecturers, lecturers, post-doctoral research appointments, visiting lecturers, part-time lecturers and other research and teaching staff	Swedish Higher Education Authority http://www.uk-ambetet.se/
	Switzerland	Professors, adjuncts and lectures, full time equivalent, referring to the last day of each year. The counting method is function-based for the FTEs but is based on single attribution for HC. An individual is counted once within each institution but, if he/she works for two or more institution, he/she is counted twice or more times, once for each institution. When the person is active in more than one field, he/she is counted only in the field with the higher percentage of activity.	Swiss Federal Statistic Office: https://www.bfs.admin.ch/bfs/en/home/statistics/education-science.html
	UK	Academic contract staff defined as professionals holding a contract for planning, directing and undertaking academic teaching and research within HE providers. Examples of such contracts include those for vice-chancellors, medical practitioners, dentists, veterinarians and other health care professionals who undertake lecturing or research activities. Full and part-time expressed in full-persons equivalents (FPE), excluding atypical staff: whose contracts involve working arrangements that are not permanent, involve complex employment relationships and/or involve work away from the supervision of the normal work provider.	Higher Education Statistics Agency http://www.heidi.ac.uk/
	US	All full-time faculty (Instruction/Research/Public Service). Persons identified by the institution as such and typically those whose initial assignments are made for the purpose of conducting instruction, research or public service as a principal activity (or activities). They may hold academic rank titles of professor, associate professor, assistant professor, instructor, lecturer or the equivalent of any of those academic ranks. Graduate, instruction, and research assistants are not included in this category.	Integrated Postsecondary Education Data System (IPEDS) http://nces.ed.gov/ipeds/ run by the National Center for Education Statistics

Inicjatywy Komisji Europejskiej stworzenia ujednoliconej bazy danych ze statystykami dla indywidualnych uczelni

- Advances Quantitative Methods for the Evaluation of the Performance of Public Sector Research (Aquameth) – **dostęp tylko dla członków konsorcjum**
- EUMIDA European University Data Collection – **dostęp tylko dla członków konsorcjum**
- Research Infrastructure for Science and Innovation (RISIS)
- **The European Tertiary Education Register (ETER)**
 - Otwarty dostęp do danych
 - <https://eter-project.com/>
 - > The European Higher Education Sector Observatory (EHESO)

RISIS

← → ↺ https://www.risis2.eu/risis-datasets/ Szukaj



[ABOUT RISIS](#) [MEMBERS](#) [RESOURCES](#) [TRAINING](#) [SEMINARS](#) [OUTPUTS](#)

Otwórz menu aplikacji

RISIS Datasets



CHEETAH

company; fast-growing;
medium-sized; firm; growth

Cheetah is a database featuring
geographical, industry and
accounting information on



CIB/CinnoB

corporation; invention; patent

CIB/CinnoB provides data and
indicators at the firm level for
the worldwide largest R&D
corporate performers (about 4



CWTS Publication Database

academic publishing; journals;
articles; web of science

The CWTS publication database
is a full copy of Web of Science
(WoS) dedicated to bibliometric



RISIS

Bazy danych:

- CWTS Publication Database
- EUPRO
- MORE
- RISIS-ETER
- RISIS Patent
- **OrgReg** - *register of public-sector research and higher education organizations*

Otwarty dostęp lub potrzebny *research project*

Zaleta: możliwość łączenia danych na poziomie indywidualnych uczelni: ETER_id

ETER/EHESO

← → ↻ https://eter-project.com/data/data-for-download-and-visualisations/database/ Szukaj

 **The European Higher Education Sector Observatory** RESULTS DATA LEARN NEWS ABOUT

Search 1 Select your Variables 2 Search HEI Data Sign up Login

Export All Years and Countries Select and continue ?

Groups of Variables

- ☐  **Identifying Variables**
0 of 7 variables selected
This group of variables includes all variables needed to identify HEIs. Use this group as basis for further selections.
- ☐  **Core Set of Data**
0 of 42 variables selected
The ETER core dataset is a collection of totals in order to give quick access to the most relevant variables. Additionally, key descriptors are included in order to support data analysis.
- ☐  **Core Set of Data (+ flags and remarks)**
0 of 80 variables selected

☐ Select All Variables ☐ Select all Filtered Variables Filter variables Clear Selection Variables selected: 0

Basic institutional descriptors	Geographic information	Expenditures	Revenues
☐ Select All	☐ Select All	☐ Select All	☐ Select All
☐ ETER ID Year	☐ Region of establishment (NUTS 2)	☐ Personnel expenditure (NC)	☐ Basic government allocation (NC)
☐ ETER ID	☐ Region of establishment (NUTS 3)	☐ Personnel expenditure (EURO)	☐ Basic government allocation (EURO)
☐ National identifier	☐ Sub-Country	☐ Personnel expenditure (PPP)	☐ Basic government allocation (PPP)
☐ ROR ID	☐ Notes on region of establishment	☐ Flag Personnel expenditure	☐ Flag Basic government allocation
☐ WHED ID	☐ Name of the city	☐ Non-personnel expenditure (NC)	☐ Other core budget (NC)
☐ Institution Name	☐ Geographic coordinates - latitude	☐ Non-personnel expenditure (EURO)	☐ Other core budget (EURO)
☐ English Institution Name	☐ Geographic coordinates - longitude	☐ Non-personnel expenditure (PPP)	☐ Other core budget (PPP)
☐ Reference year	☐ Postcode	☐ Flag Non-personnel expenditure	☐ Flag other core budget
☐ Institution Acronym	☐ Multi-site institution	☐ Expenditure unclassified (NC)	☐ Total core budget (NC)
☐ Country Code	☐ NUTS 3 codes of other campuses	☐ Expenditure unclassified (EURO)	☐ Total core budget (EURO)
☐ Legal status	☐ Multi-site institution - City	☐ Expenditure unclassified (PPP)	☐ Total core budget (PPP)
☐ Notes on institution name	☐ Multi-site institution - Latitude	☐ Flag Expenditure unclassified	☐ Flag Total core budget

Obecnie dane dla lat 2011-2020, 3474 uczelni z 40 krajów, 42 statystyki

OrgReg

← → ↻ https://register.orgreg.joanneum.at/#/indicators/0 Szukaj

RISIS OrgReg Register Indicators Match your data Information about OrgReg HTTP API doc [logout](#) [jwo@zie.pg.gda.pl](#)

☰ Toggle side bar

Search Variables

Indicator per Year

Indicator variables

- ☒ Select all
- ☒ Entity ID
- ☒ Entity current name (English)
- ☒ Reference year
- ☒ Number of publications (WoS)
- ☒ Number of publications in the top10% cited
- ☒ Number of publications with international collaboration
- ☒ Number of priority patent applications
- ☒ Number of transnational patent applications
- ☒ Number of EU-FP participations
- ☒ Number of EU-FP coordinations

Search the OrgReg Indicators

Export Display and Export Settings

Indicators Entities Characteristics Demographics Linkages

Showing 2783 of 2783 search results.

Entity ID	Entity current name (English)	Reference year	Number of publications (WoS)	Number of publications in the top10% cited	Number of publications with intern
PL0001	University of Economics in Katowice	2001	1	0	
PL0001	University of Economics in Katowice	2002	2	0	
PL0001	University of Economics in Katowice	2003	3	0	
PL0001	University of Economics in Katowice	2004	8	0	
PL0001	University of Economics in Katowice	2005	12	0	
PL0001	University of Economics in Katowice	2006	5	0	
PL0001	University of Economics in Katowice	2007	13	0	
PL0001	University of Economics in Katowice	2008	11	0	
PL0001	University of Economics in Katowice	2009	14	1	
PL0001	University of Economics in Katowice	2010	7	0	
PL0001	University of Economics in Katowice	2011	11	1	
PL0001	University of Economics in Katowice	2012	10	1	
PL0001	University of Economics in Katowice	2013	30	0	

Obecnie dane dla lat 2000-2022, uczelnie z 41 krajów, dane demograficzne (rok założenia), publikacje, patenty, liczba projektów europejskich

A dataset on knowledge creation and patenting by European Higher Education Institutions (**KC-HEI**)

Parteka, A., Płatkowski, P., Szymczak, S., & Wolszczak-Derlacz, J. (2024).

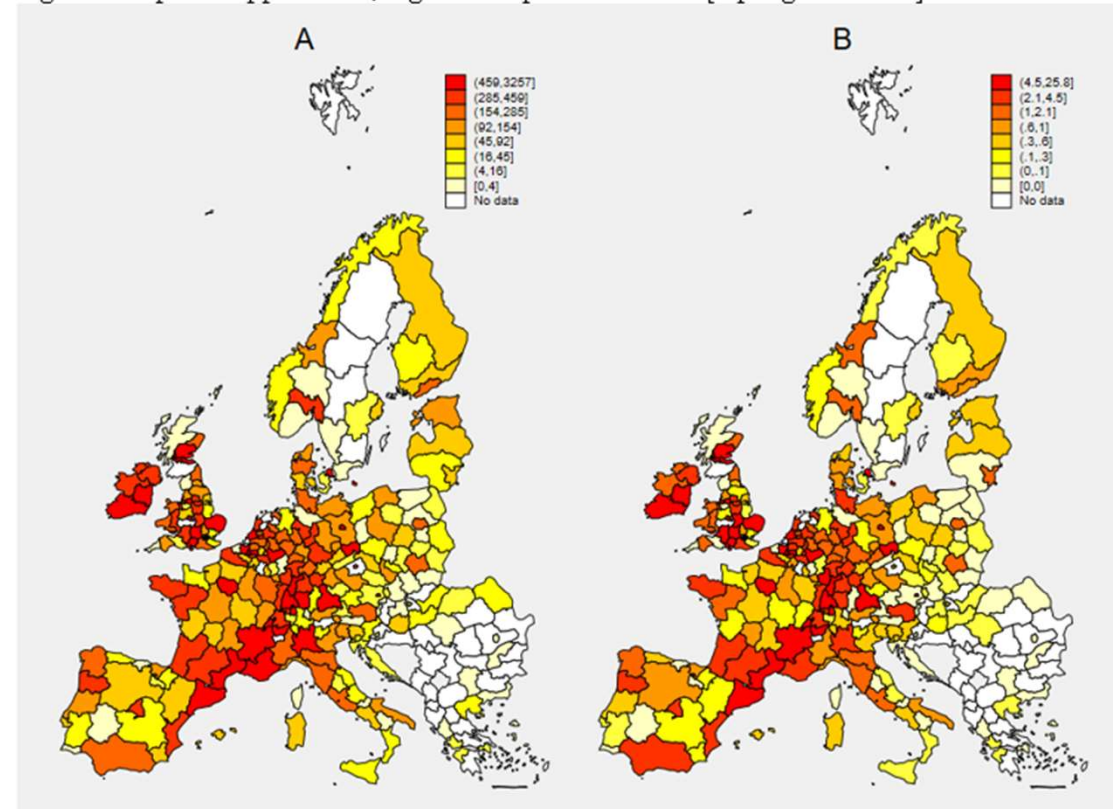
- Dane z PATSTATu: 333 495 patentów „university”
- Cytowania patentów, indeksy jakości OECD Patent Quality Indicators database
- ETER
- RISIS Patents
- WIPO: PATENTSCOPE Artificial Intelligence Index
- Eurostat Regional Statistics

Procedura

- Problematyczna identyfikacja uniwersytetów w PATSTAT
- Wiele identyfikatorów *psn_id* w PATSTAT w rzeczywistości odnosi się do jednej uczelni:
 - Federal Institute of Technology Zurich lub Trinity College Dublin opisane nawet 80 lub więcej różnymi nazwami w PATSTAT
- Nasz wkład: **przejsiówka pomiędzy PATSTAT i ETER**
 - metryki podobieństwa słów (algorytm Levenshteina) + sprawdzanie ręczne
 - unikalna korespondencja między *psn_id* i *eter_id*
 - Wysoki wskaźnik dopasowywania identyfikatorów PATSTAT i ETER: **87%**, dla 0.65-0.87 sprawdzanie ręczne
 - **W konsekwencji dwie próby**
 - Próba 1: 866 patentujących uczelni europejskich z 31 krajów 1980-2019
 - Próba 2: 785 patentujących uczelni i 2102 niepatentujących (2011-2019)

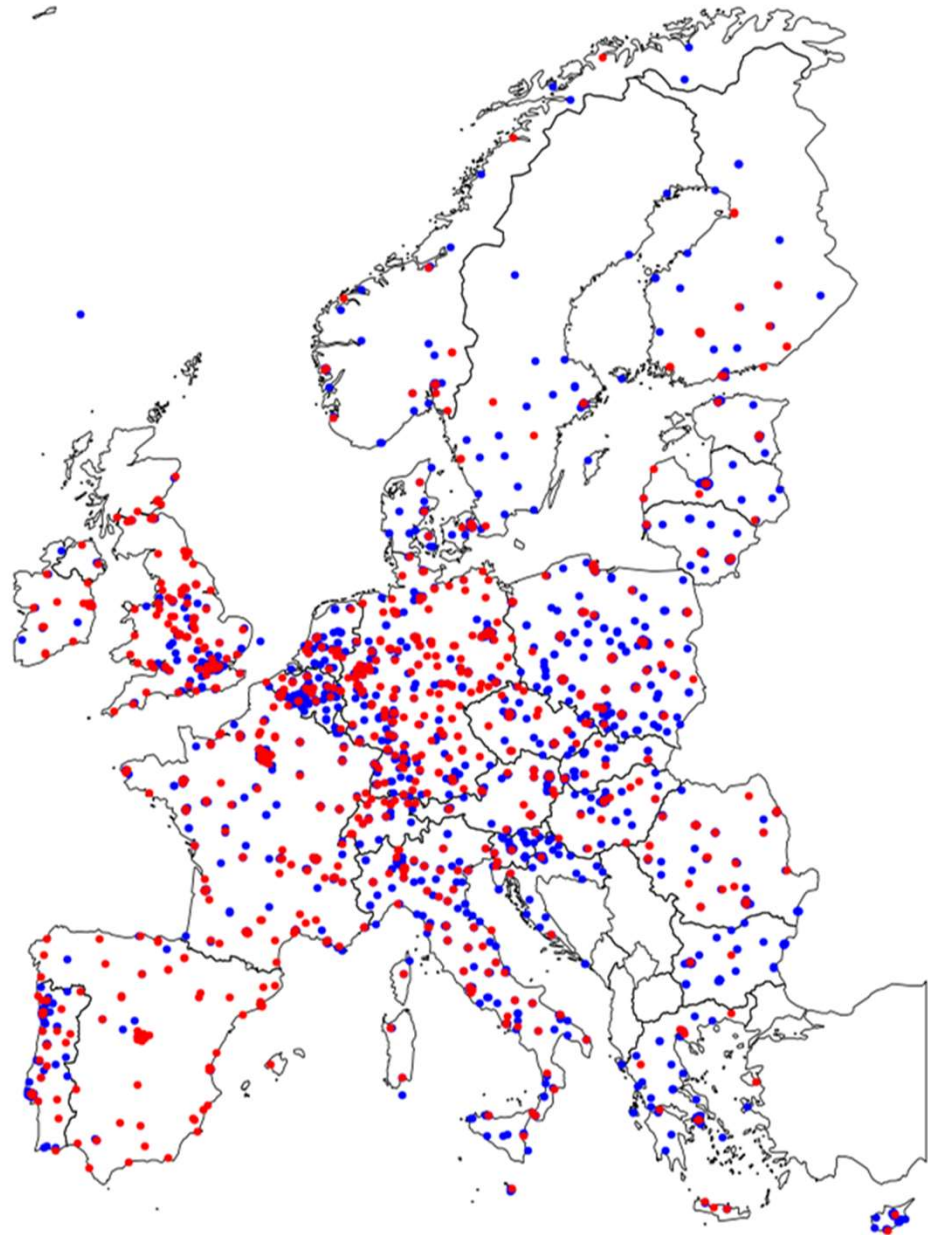
Figure 6. Regional distribution of university patents and citations, NUTS2 regions (1980-2019)

Figure 6A - patent applications; Figure 6B - patent citations [top regions in red]



Note: Sample of 866 patenting HEIs from 31 European countries. In Sweden, Norway and Finland the values are likely to be underestimated due to the “professor’s privilege” - [Caviggioli et al., 2023a, 2023b](#)). Iceland, Cyprus and overseas regions not shown on the graph. Figure 6A: patent applications filed to IP5. Patents allocated to HEIs using fractional apportionment (FA) by applicant share. Figure 6B: patent citations measured by the number of forward citations of EPO patents in a 5-years period, normalised by the maximum number of citations in the corresponding technological field.

Próba 2: (2011-2019)
785 **patentujących** +
2101
niepatentujących**
uczelni



**universities present in ETER (Lepori et al., 2023) but having no patent application filed in any of the three databases (KC-HEI, OrgReg, Risis Patents) in 2011-2019

Potencjalne zastosowania **KC-HEI**

- **Analizy dla liczby patentów versus wskaźniki jakości**
 - cytowania patentów, przełomowe patenty (najlepszy 1% cytowanych patentów)
- **Determinanty działalności patentowej uczelni**
 - Obciążenie dydaktyczne
 - Finansowanie (całkowite przychody, według źródła pochodzenia)
 - Wielkość uczelni (liczba studentów, liczba NA)
 - Lokalizacja
 - Środowisko instytucjonalne (professors' privilege)
- **Analizy regionalne :**
 - wzorce tworzenia wiedzy centralno-peryferyjne
 - związek między patentowaniem uniwersyteckim a wzrostem gospodarczym i rynkami pracy
- **Patenty uniwersyteckie według dziedzin technologii**
- **Patenty AI**

Wykorzystanie baz danych w dotychczasowych publikacjach

- Parteka, A., Płatkowski, P., Szymczak, S., & Wolszczak-Derlacz, J. (2024). A dataset on knowledge creation and patenting by European Higher Education Institutions (KC-HEI) (No. 2/2024 (73)). GUT FME Working Paper Series A.
- Wolszczak-Derlacz, J. (2024). The determinants of European universities patenting and co-patenting with companies. *The Journal of Technology Transfer*, 1-17.
- Avenali, A., Daraio, C., Di Leo, S., & Wolszczak-Derlacz, J. (2024). Heterogeneity of national accounting systems, world-class universities and financial resources: What are the links?. *Journal of Informetrics*, 18(2), 101502.
- Avenali, A., Daraio, C., & Wolszczak-Derlacz, J. (2023). Determinants of the incidence of non-academic staff in European and US HEIs. *Higher education*, 85(1), 55-83.
- Wolszczak-Derlacz, J., Strzebońska, A., Szuflita-Żurawska, M., & Mazurkiewicz, R. (2022). Korelacja ujemna: publikacje w MDPI a wskaźnik sukcesu w grantach NCN. *Forum Akademickie* (pp. 52-55).