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LINKING RESEARCH, POLICY AND PRACTICE

Bundesministerium für Bildung und Forschung

HELENA

Higher Education Global Efficiency Analysis

European Universities Efficiency Benchmarking

Matthias Klumpp, HELENA Project, PIM, University of Duisburg-Essen

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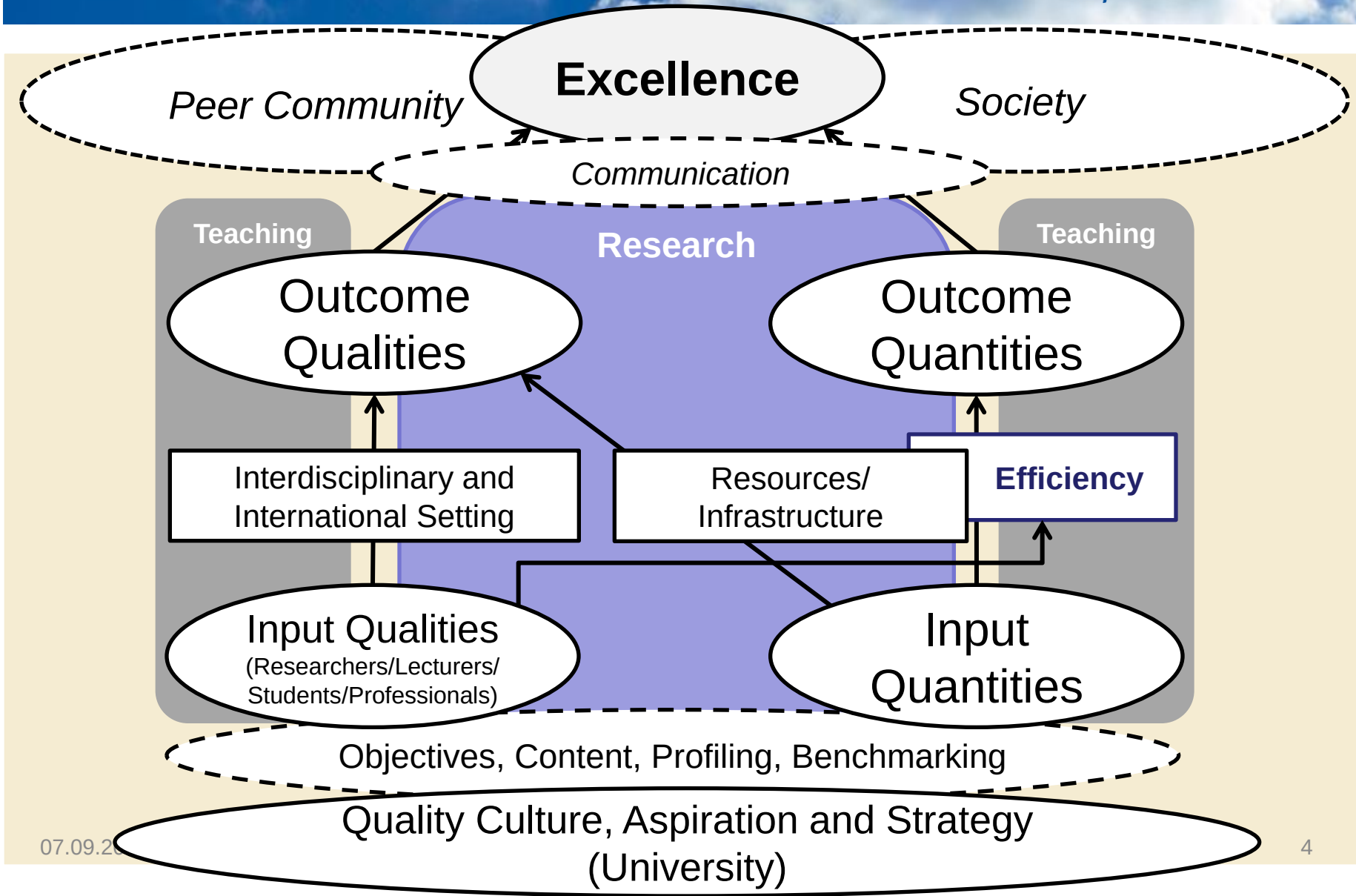
Agenda

1. Introduction and Research Question
2. Dataset and DEA Method
3. DEA Results
4. Interpretation and Discussion
5. Conclusion and Further Research

1. Introduction

- In general **efficiency questions** in higher education have been increasingly discussed in literature (Cohn et al. 1989; Johnes and Johnes 1993; Ramsden 1994; Hashimoto & Cohn 1997; Sarrico et al. 1997; Glass et al. 1998; McMillan & Datta 1998; Stahl et al. 1998; Koshal & Koshal 1999; Jongbloed & Vossensteyn 2001; Korhonen et al. 2001; Kocher et al. 2006; Sarrico 2010; Opitz & Röbken 2011).
  - Background I: *New Public Management* – productivity improvement and accountability of public institutions (Madden et al. 1997; Sarrico et al. 2009).
  - Background II: *Within* institutions of higher education questions especially between different disciplines arise as to how *funds* are used most efficiently to contribute to overall strategy objectives.
- Usual **research gap** and **problem** regarding efficiency analysis in universities: *Definition and availability of data* representing accepted university objectives; → see also HE ranking discussions and critic.

1. Introduction



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Core Research Question

- What international research results can be found regarding **efficiency in higher education** research, teaching & third mission?

Specific Research Questions and Hypotheses

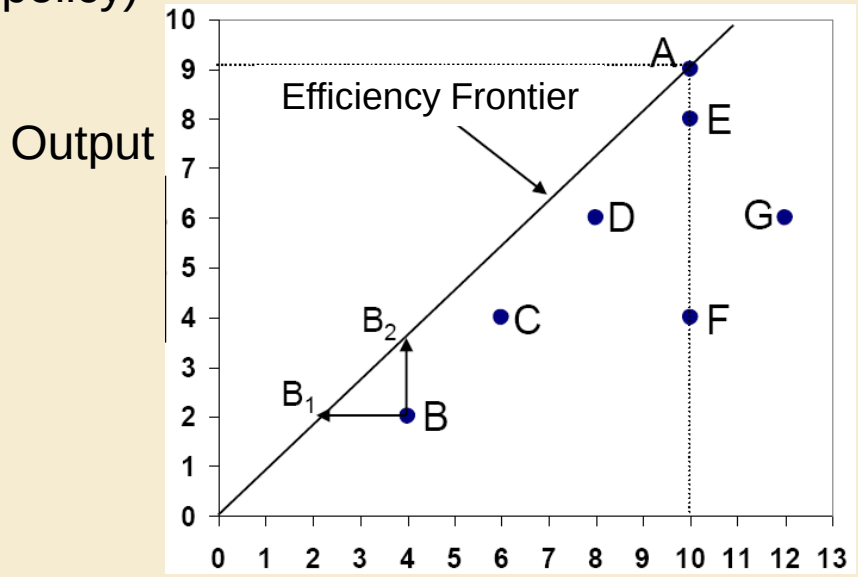
- [H1] The EUMIDA dataset can be used for efficiency analysis.
- [H2] Mid-size unversities are most efficient in a size-related comparison.
- [H3] Different strategies for HE objectives can be found among European universities.
- [H4] The fixed weightings feature in the DEA method can be used to simulate specific policy frameworks e.g. in performance-based funding.

2. Data Scource

- Data Source **EUMIDA project (European University Micro Data)** for European Universities (>2.300) from 27 countries (EU-27 minus France and Denmark plus Norway and Switzerland).
- Data from national statistics offices but not officially „approved/authorized“.
- **University selection** by doctorates awarded annually (>10), staff (> 100) and students (>10,000); exclusioin of distance learning universities
  → All selected universities „research active“ and leading in their countries.
- For altogether **370 universities** a complete dataset with these minimum quality requirements are available and were used.
- Specific universities/countries as e.g. Czeck Republic had to be excluded due to missing data (International Students „0“).

2. DEA Method

- Data envelopment analysis (**DEA**) as established research method for **non-parametric** efficiency analysis (e.g. Taylor/Harris 2004; Worthington/Higgs 2011).
- Advantage of DEA is the **combination of different output indicators** for research, teaching and third mission in an individual weighting (profiling strategies of universities and HE policy)



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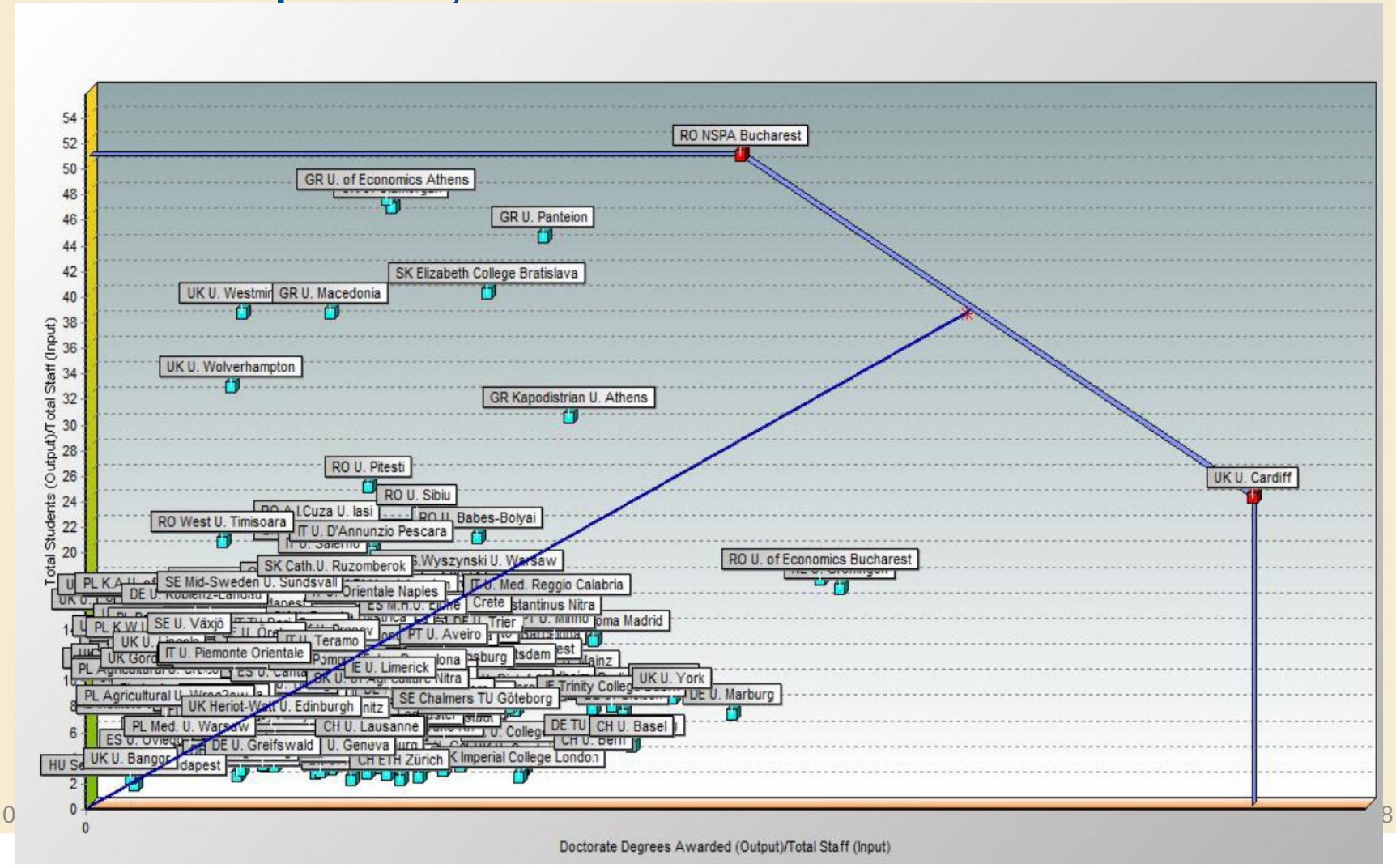
CASE A: Input Staff, Outcome Students and Doctorates



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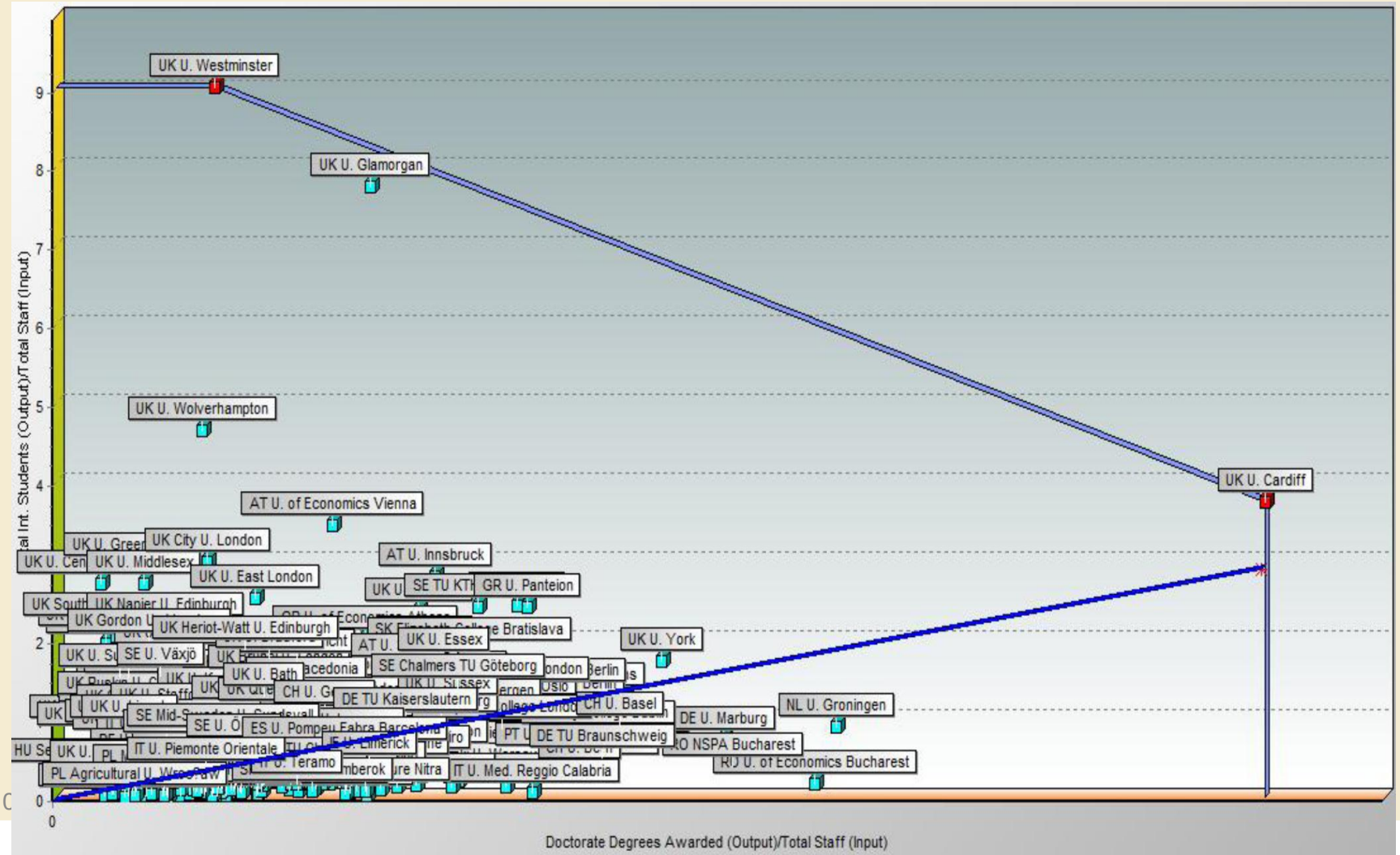
CASE B: Input Staff, Outcome Intern. Students and Doctorates



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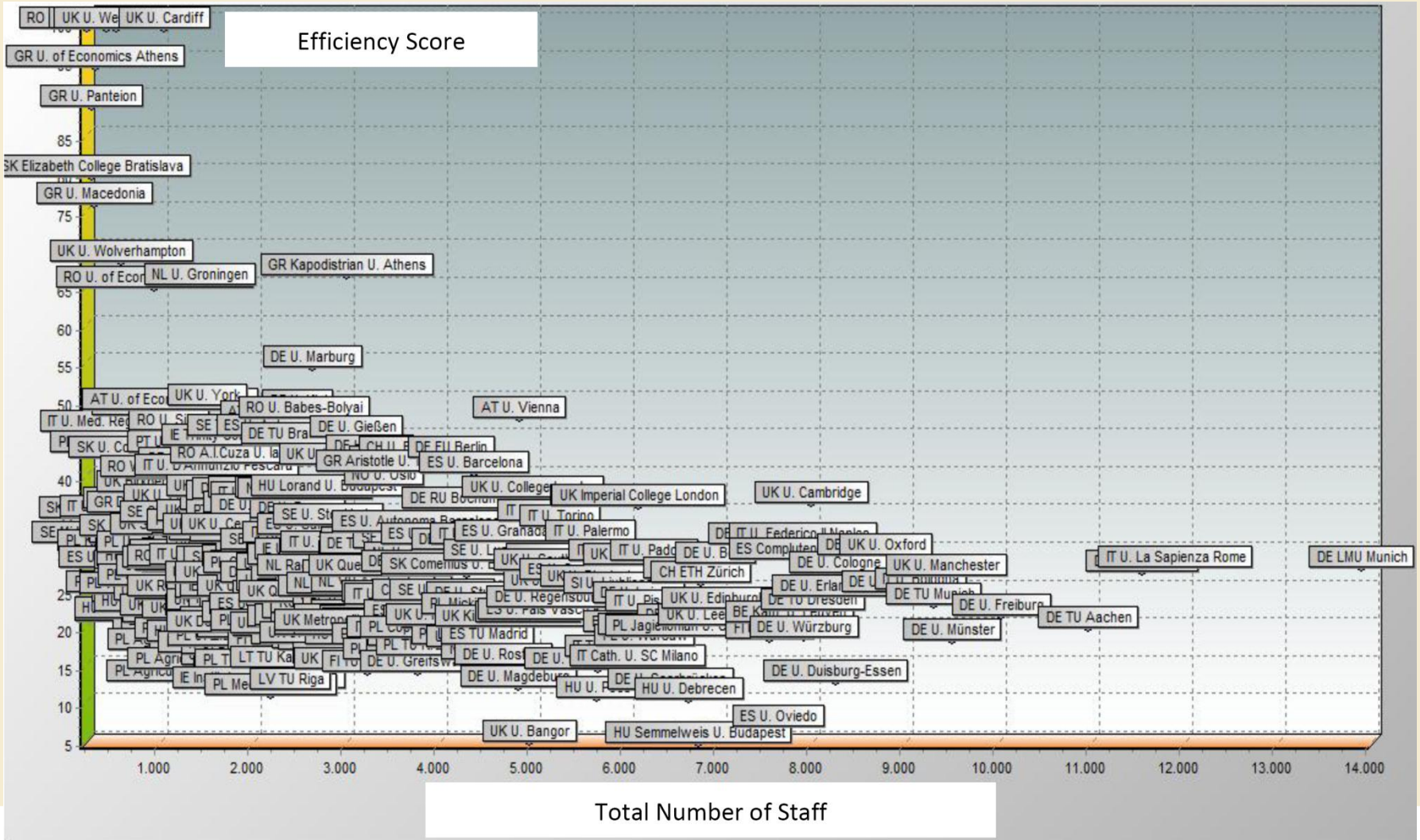
CASE C: Input Staff, Outcome Int. Students, Students & Doctorates



3. DEA Results – All Cases A-D

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EUMI-DA ID	University Name	Found. Year	Univ. Hospital	Staff (Input)	Doctorate Degrees Awarded (Output)	Total Students (Output)	Total Int. Students (Output)	Efficiency (Case A without Int. Students)	Efficiency (Case B without Total Stud.)	Efficiency (Case C - all Output Indic.)	Efficiency (Case D - Restricted Weights 25%)
RO052	RO NSPA Bucharest	1991	No	282	50	14319	110	100.0%	56.0%	**100.0%**	18.4%
UK135	UK U. Cardiff	1883	Yes	1105	350	26587	4143	100.0%	100.0%	**100.0%**	88.4%
UK137	UK U. Glamorgan	1913	No	487	40	22710	3777	91.8%	95.1%	**100.0%**	100.0%
UK126	UK U. Westminster	1838	No	604	25	23224	5446	75.7%	100.0%	**100.0%**	70.3%
GR016	GR U. Patras	1964	Yes	1324	127	22089	1123	93.2%	36.2%	**95.0%**	58.4%
GR013	GR U. of Economics Athens	1920	No	371	30	17557	744	87.4%	48.6%	**89.7%**	71.3%
SK011	SK Elizabeth Coll. Bratislava	2003	Yes	333	36	13304	619	78.7%	40.0%	**80.4%**	58.3%
GR010	GR U. Macedonia	1948	No	367	24	14086	500	75.6%	26.6%	**76.8%**	42.7%
UK128	UK U. Wolverhampton	1932	No	653	25	21305	3044	64.3%	55.0%	**69.1%**	58.6%
GR020	GR Kapodistrian U. Athens	1837	Yes	3070	401	93004	3931	65.3%	41.2%	**67.3%**	44.7%
NL006	NL U. Groningen	1614	Yes	1498	306	25322	1321	66.1%	64.5%	**66.1%**	31.0%
RO034	RO U. Sibiu	1844	No	1166	104	26415	157	65.7%	62.8%	**65.7%**	8.4%
DE052	DE U. Marburg	1527	No	2704	473	19142	1956	55.2%	55.2%	**55.2%**	21.9%
UK132	UK U. York	1963	No	1576	250	13184	2725	50.1%	50.1%	**50.1%**	36.1%
AT001	AT U. Vienna	1365	No	4924	594	67457	11962	36.5%	49.2%	**49.5%**	53.4%

4. Discussion (I)

- (Smaller) UK universities seem to be **efficiency leaders** in Europe, especially regarding doctorates (research) and international students (third mission) as output objectives.
- Southern European universities seem to be very efficient in terms of teaching (large student numbers, low staff levels).
- German an Skandinavian universites are medium efficient and focused on research (doctorates) output.
- **Quality aspects** are not included here – assumption: all degrees (PhD) & study conditions are at the same quality level in Europe (EHEA).

4. Discussion (II)

- **Mid-size universities** have higher chances to operate efficiently though there are also efficient large university operations (Athens, Vienna).
- **Fixed Weighting schemes** as tested here with fixed weightings of 25% for all three output areas are severely **punishing „focused“ universities** - therefore inadequate for e.g. performance based funding; a non-parametric DEA approach seems to be needed for „fair“ policy and funding schemes in Europe (national/university budget allocation).
- **EUMIDA data** has to be re-evaluated for e.g. staff numbers: Cardiff U. homepage reports 6,154 staff total and 2,149 full-time academic staff compared to 1,105 staff reported in EUMIDA (Cardiff University, 2012).

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Research Results

[H1] The EUMIDA dataset can be used for efficiency analysis. Only partny approved: Specific data about staff & some countries has to be re-checked.

[H2] Mid-size unversities are most efficient in a size-related comparison. → Approved in this dataset.

[H3] Different strategies for HE objectives can be found among European universities. → Profiling is working, between countries and within countries.

[H4] The DEA fixed weightings feature shows severe disadvantages for fixed weightings e.g. in performance-based funding schemes.

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University Efficiency Research …

… The role of university hospitals in reporting output numbers is highly discussed and could be validated in further research (correlation analysis).

… Interestingly the 370 universities sorted by doctorates awarded seemed to match existing league tables for Europe – correlation research seems very promising: possibly the number of PhD graduates is a sufficient indicator for excellence in higher education – this would severely ease ranking operations and seems plausible as most university objectives are connected to PhD completions.

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PIM

Thank you for your patience and interest.

HELENA

Higher Education Global Efficiency Analysis

Contact: Phone +49 201 183 4943

matthias.klumpp@pim.uni-due.de

http://www.helena.wiwi.uni-due.de

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