

Research and Teaching Efficiency Analysis (DEA)

Matthias Klumpp (ild)

Stephan Zelewski (PIM)

Alexandra Saur (PIM)

16th International Working Seminar
on Production Economics

Innsbruck, 05.03.2010



1. Research Questions
2. Data and DEA
3. Results
4. Conclusions

Higher Education

- HE specifics in production function
- HE specifics in output (measurement) with assumed synergies between research & teaching (*Humboldt Principle*)

Research Questions

- Are there economies of scale in research?
- Are there economies of scale in teaching?
- Are there synergies between research and teaching?

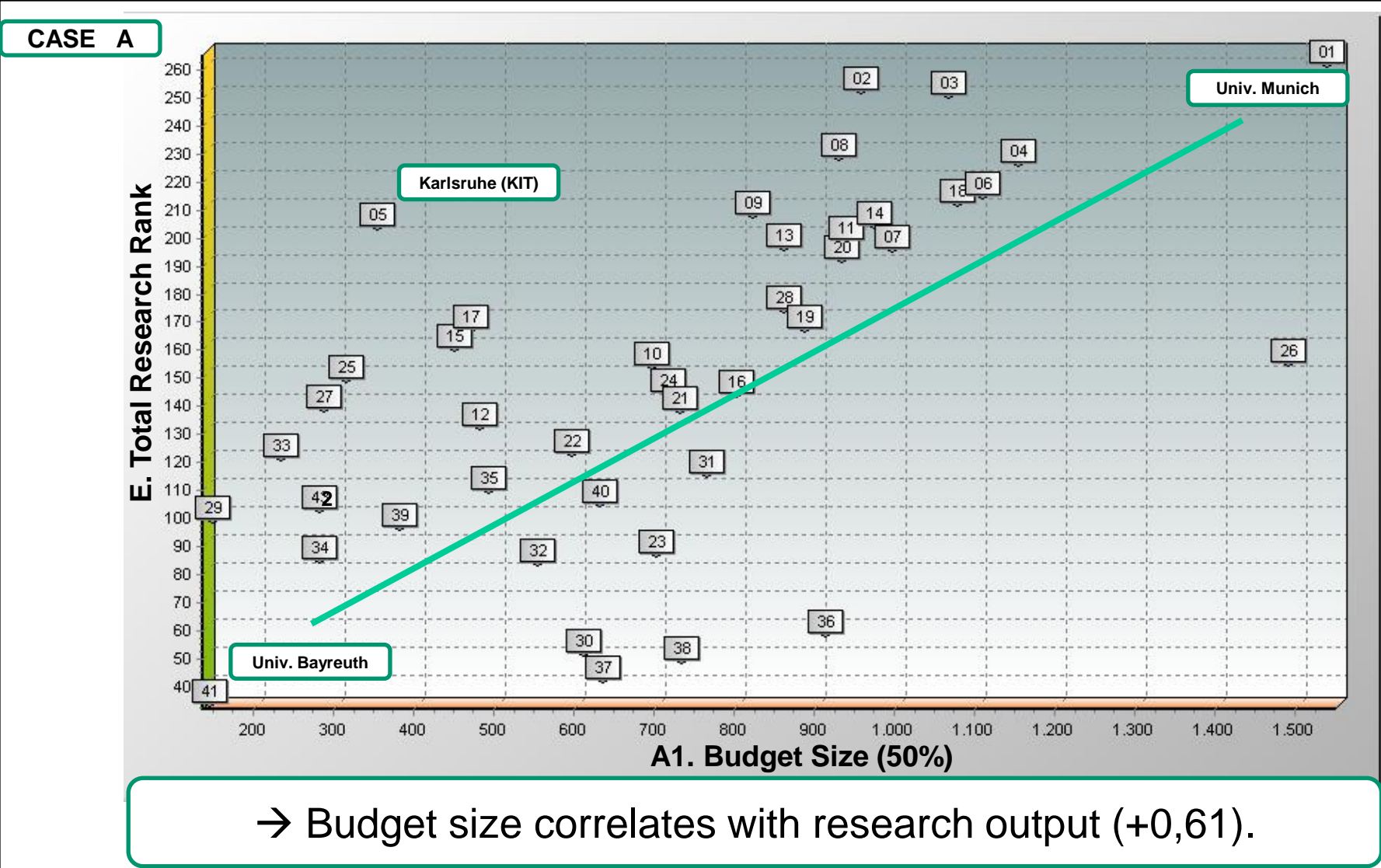
- Example data set for the first 10 out of 42 universities as DMU

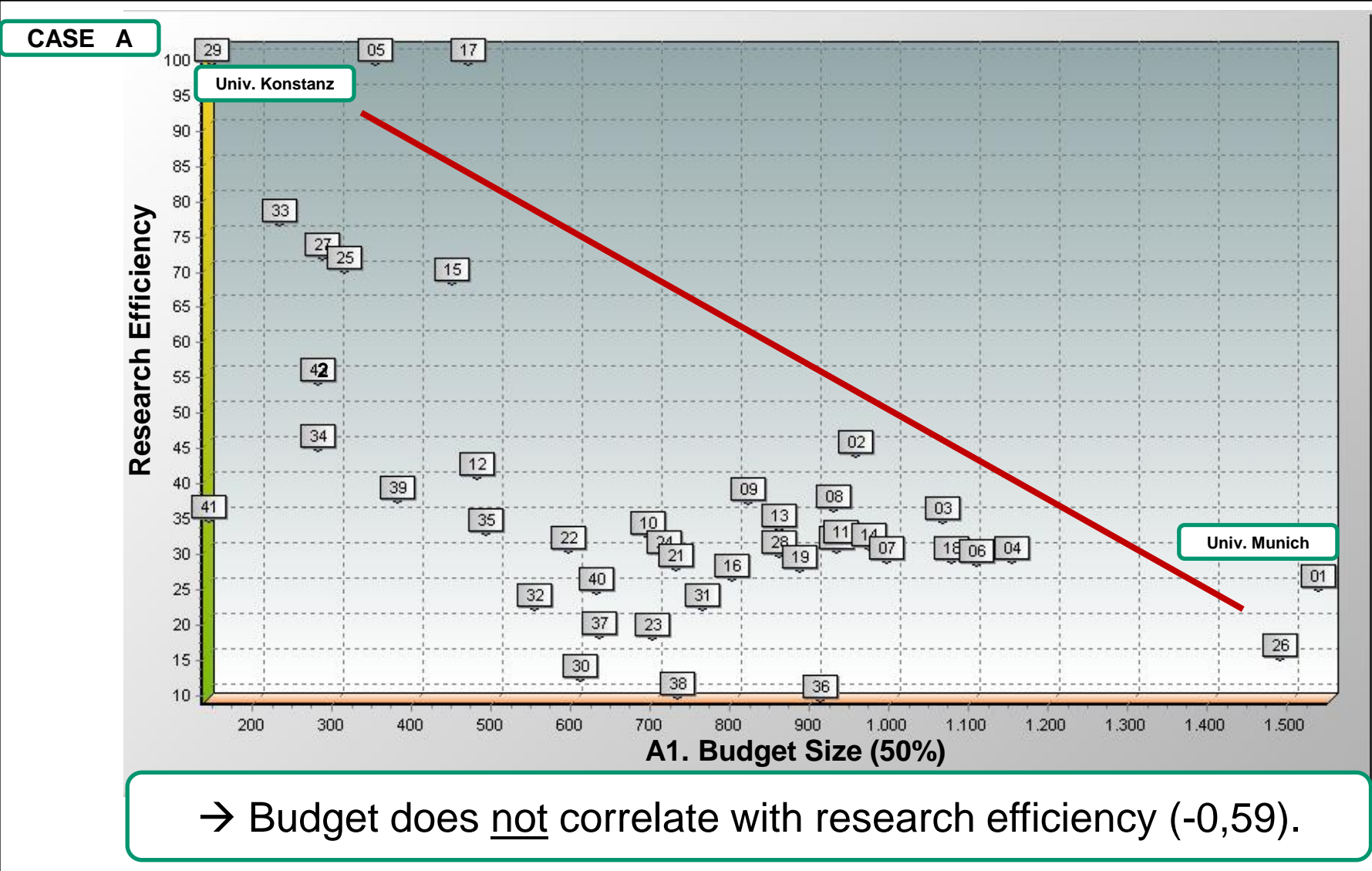
No	University (DMU)	A. Budget	B. Research (DFG Rank)	C. Research (SJTU Rank)	D. Research (WUR Rank)	E. Total Research Rank	F. Research EIT KIC Selection	G. Students 2009	H. Students Growth 06-09
1	Univ Munich	3082,6	98,0	89,0	75,6	262,6	0,0	45344,0	273,0
2	Tech Univ Munich	1917,6	94,0	88,6	70,4	253,0	50,0	23323,0	3369,0
3	Univ Heidelberg	2136,5	96,0	87,4	68,2	251,6	0,0	24863,0	481,0
4	Tech Univ Aachen	2313,3	100,0	50,0	77,4	227,4	0,0	31327,0	3218,0
5	Univ Karlsruhe	708,9	88,0	50,0	66,8	204,8	50,0	18470,0	2157,0
6	Univ Bonn	2222,1	76,0	80,4	59,4	215,8	0,0	26036,0	-3258,0
7	Univ Goettingen	1996,4	84,0	82,0	30,6	196,6	0,0	23009,0	-1173,0
8	Univ Freiburg	1861,7	90,0	74,8	64,4	229,2	0,0	21016,0	121,0
9	Univ Frankfurt	1646,9	78,0	74,8	56,2	209,0	0,0	33286,0	-1173,0
10	Univ Wuerzburg	1396,7	68,0	74,8	12,0	154,8	0,0	19861,0	1345,0

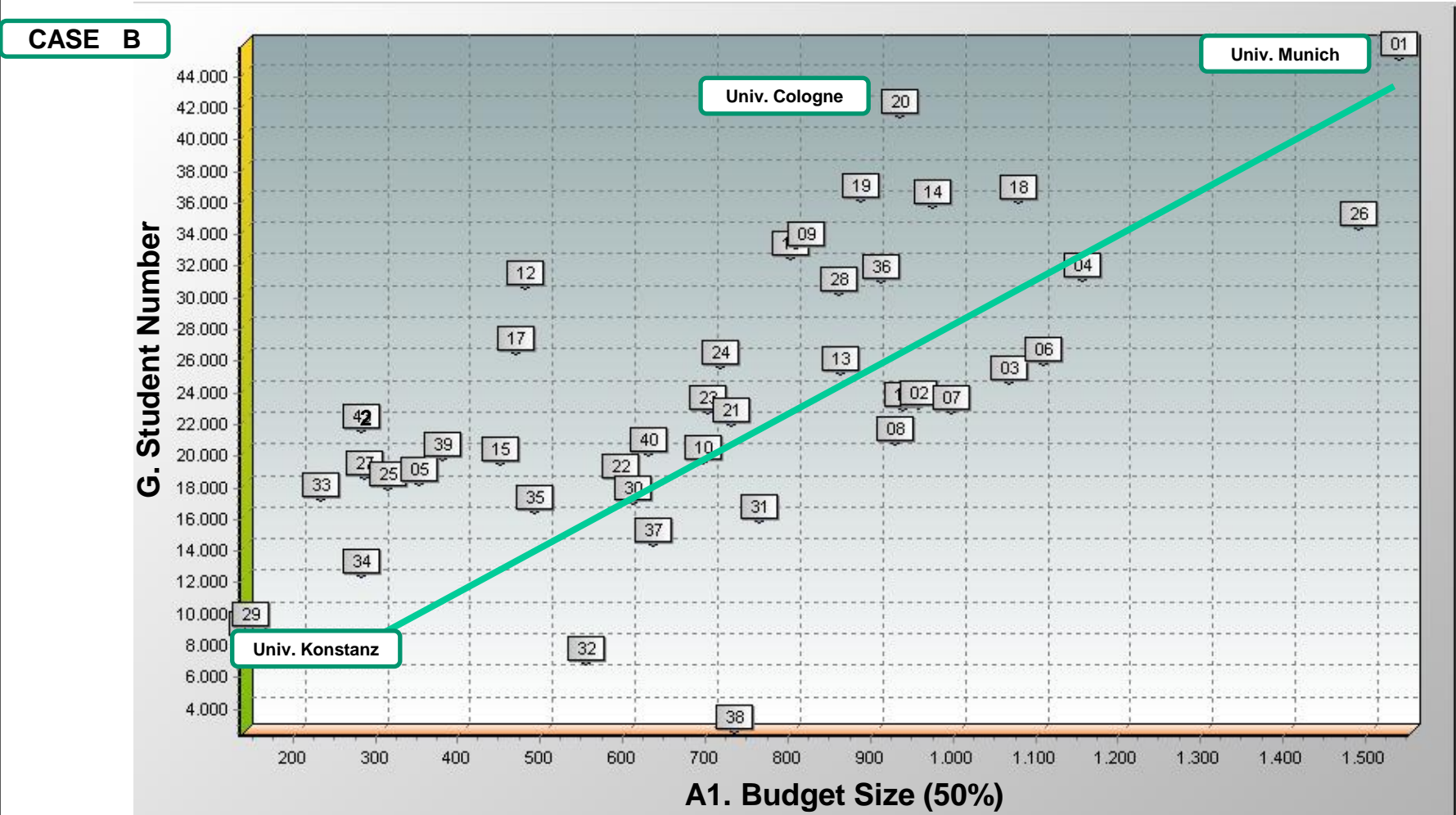
- DEA as established method in efficiency analysis (see Abbott, M., Doucouliagos, C., 2003; Ahn, H., Dyckhoff, H., Gilles, R., 2007; Ahn, T., Charnes, A., Cooper, W.W., 1998; Avkiran, N.K., 2001)

- DEA results are presented in six cases A, B1, B2 (variable returns to scale), C, D, E
- Efficiency leaders are changing but altogether a stable „group“

		Case A <i>Research Efficiency:</i> Input A (50%), Outputs E and F)	Case B1 <i>(Teaching Efficiency:</i> Input A (50%), Outputs G and H)	Case B2 <i>(Teaching Efficiency:</i> Input A (50%), Outputs G and H)	Case C <i>(Integrated Efficiency:</i> Input A, Outputs E & H)	Case D <i>(Integrated Efficiency:</i> Inputs A and E, Output G)	Case E <i>(Integrated Efficiency:</i> Inputs A and G, Output E)
	Input or Output Orientation	Input Orientation	Input Orientation	Input Orientation	Input Orient.	Output Orient.	Output Orient.
	Constant or variable Returns to Scale	Constant	Constant	Variable	Constant	Constant	Constant
No	University (DMU)						
1	Univ Munich	25,40%	38,20%	100,00%	25,40%	59,00%	50,30%
2	Tech Univ Munich	44,50%	33,20%	100,00%	39,30%	38,40%	92,70%
3	Univ Heidelberg	35,10%	30,30%	32,80%	35,10%	39,10%	86,10%
4	Tech Univ Aachen	29,30%	35,20%	100,00%	29,30%	50,40%	62,60%
5	Univ Karlsruhe	100,00%	73,70%	100,00%	86,00%	67,70%	100,00%
6	Univ Bonn	28,90%	30,50%	33,80%	28,90%	43,90%	70,60%
7	Univ Goettingen	29,30%	30,00%	31,00%	29,30%	42,90%	72,60%
8	Univ Freiburg	36,70%	29,30%	29,50%	36,70%	37,10%	92,50%
9	Univ Frankfurt	37,80%	52,50%	70,70%	37,80%	65,30%	55,80%
10	Univ Wuerzburg	33,00%	38,20%	42,60%	33,00%	49,50%	67,60%

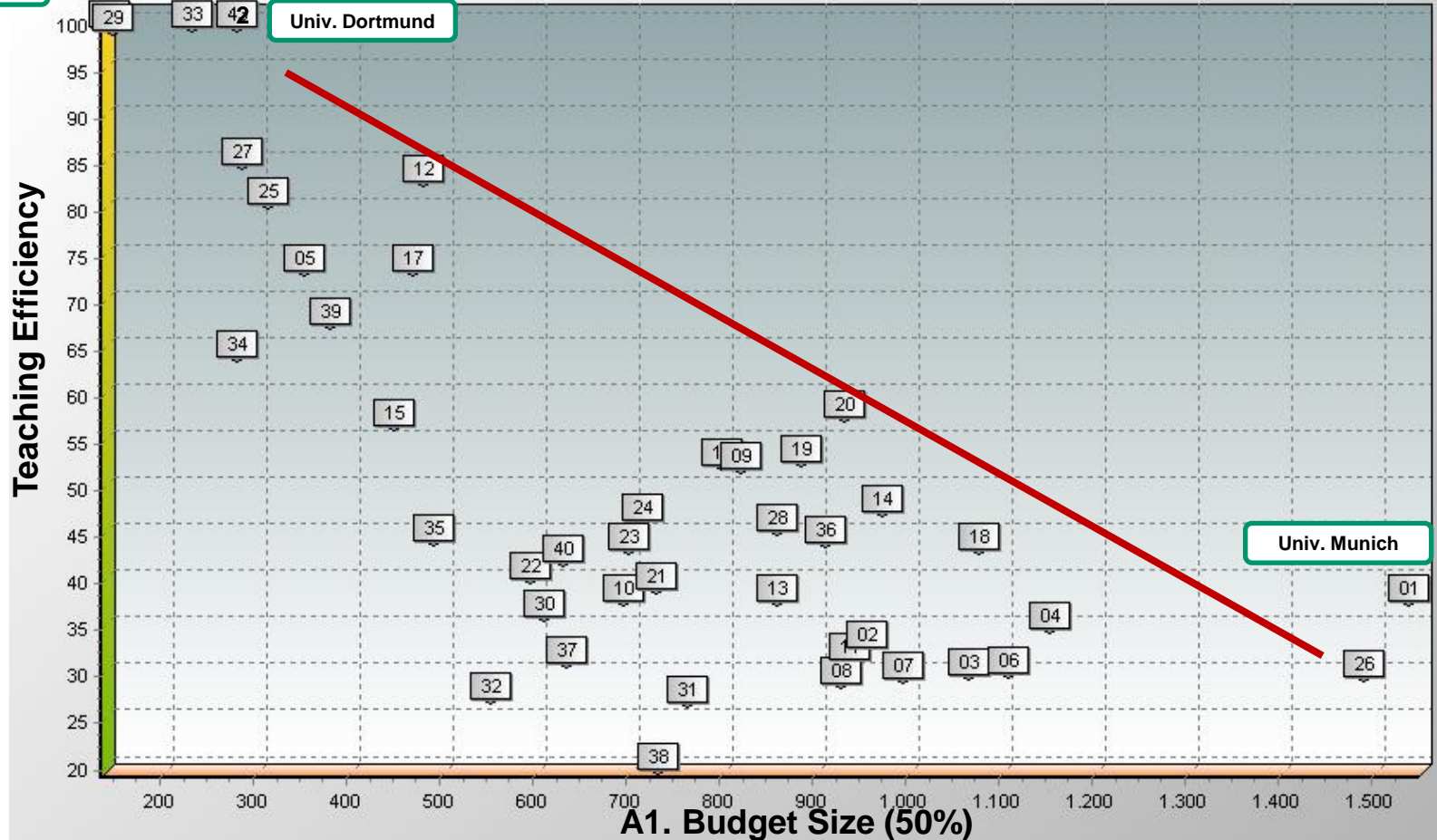






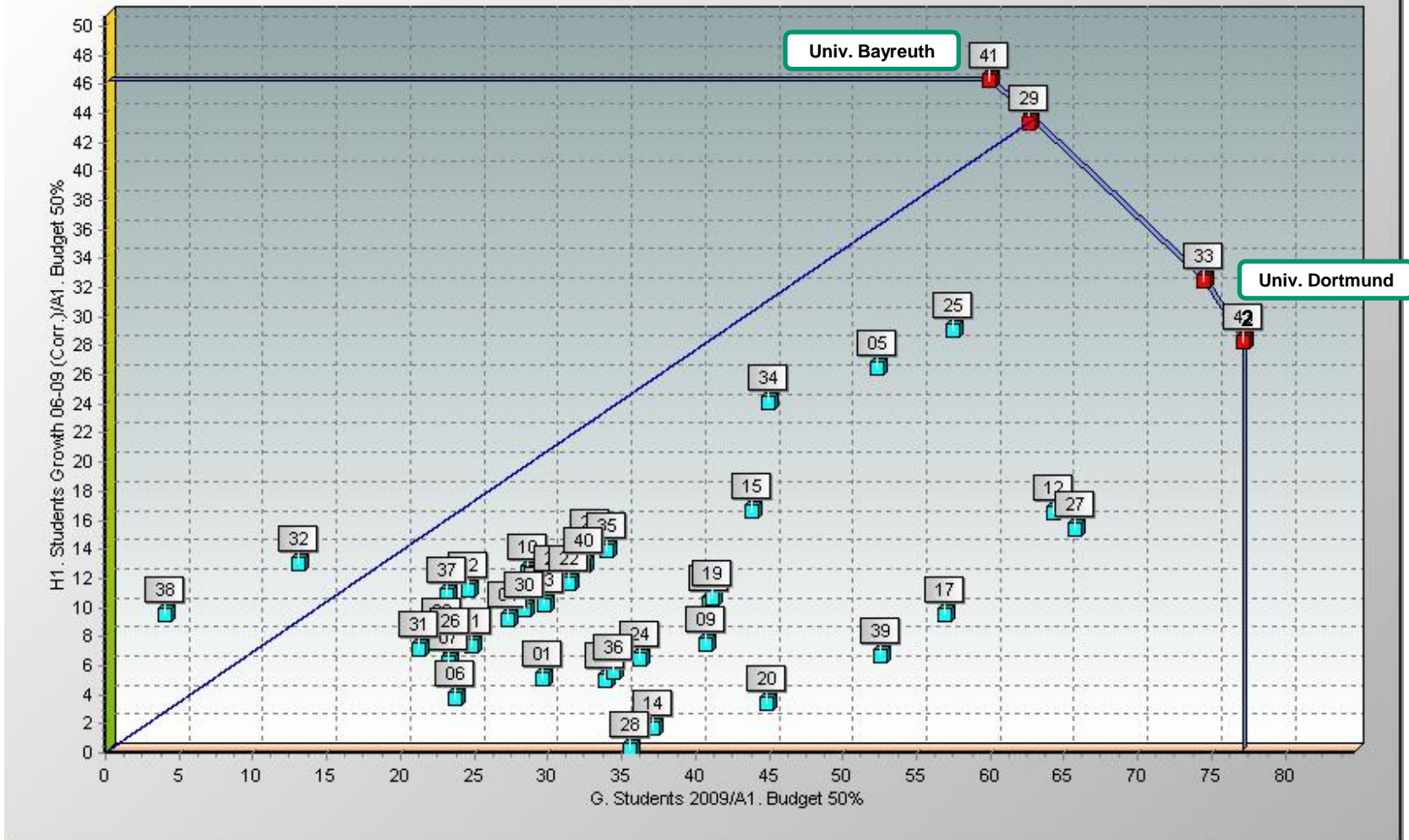
→ Budget size correlates with teaching output (+0,68).

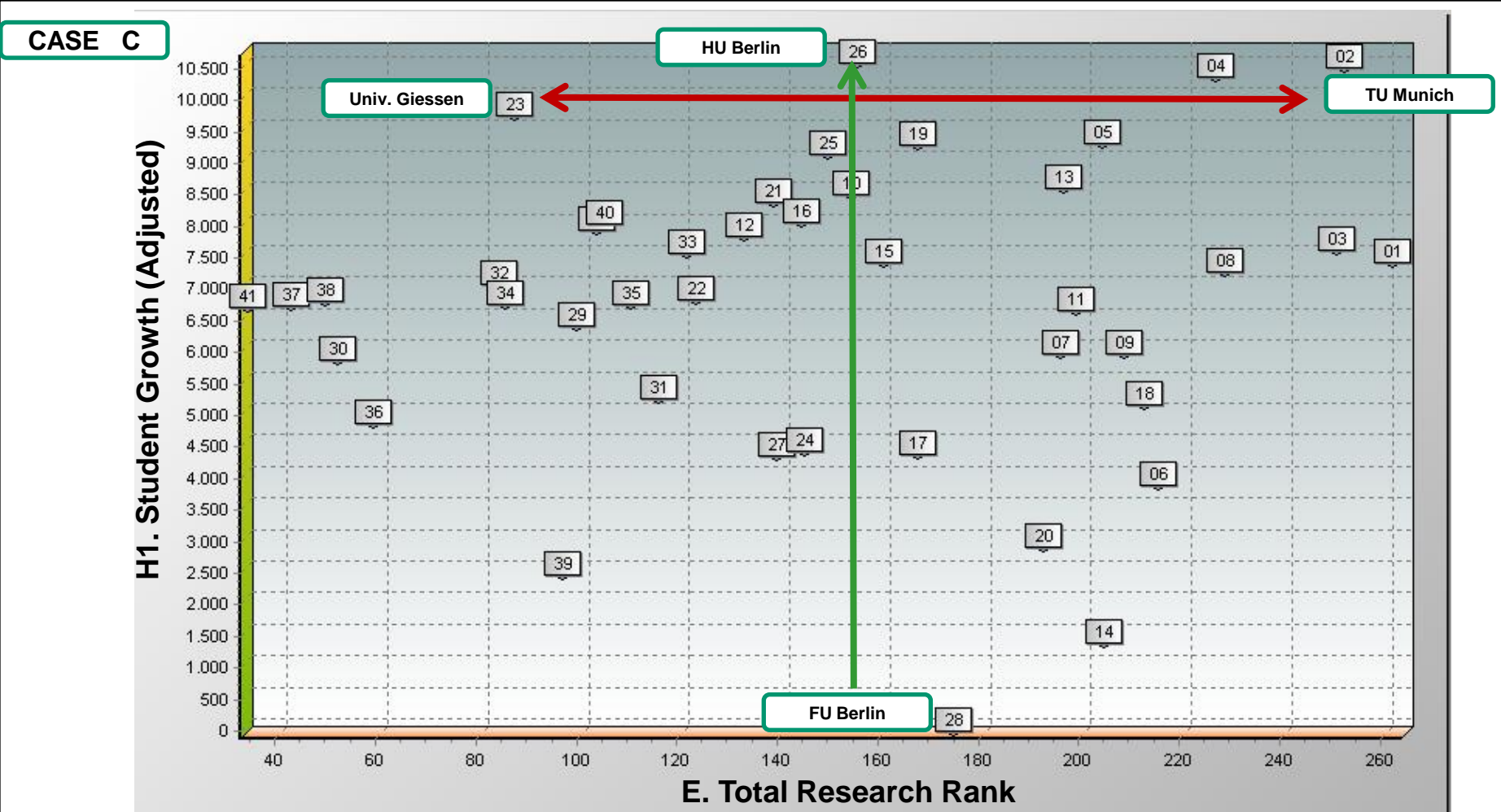
CASE B



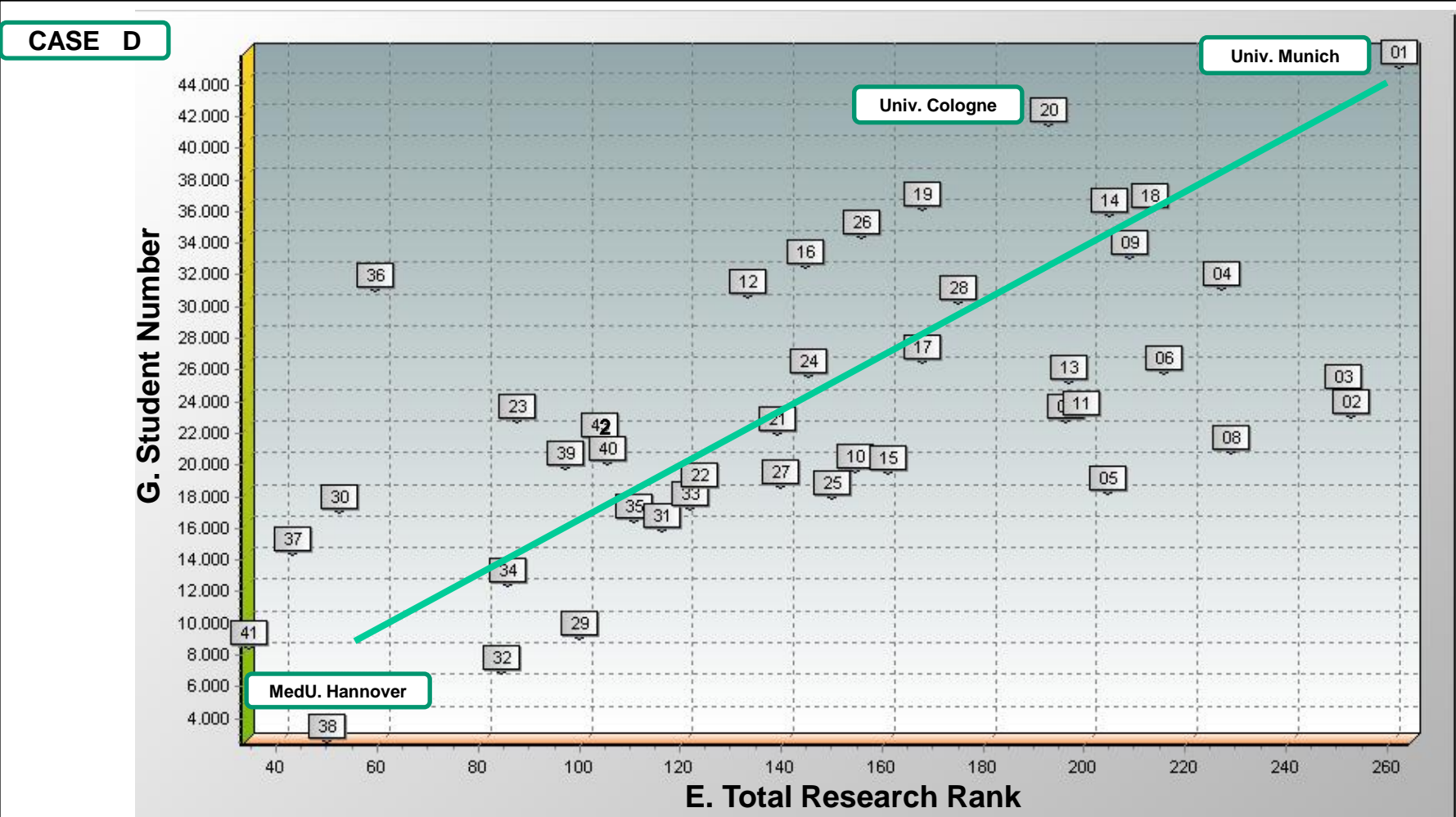
→ Budget does not correlate with teaching efficiency (-0,73).

CASE B



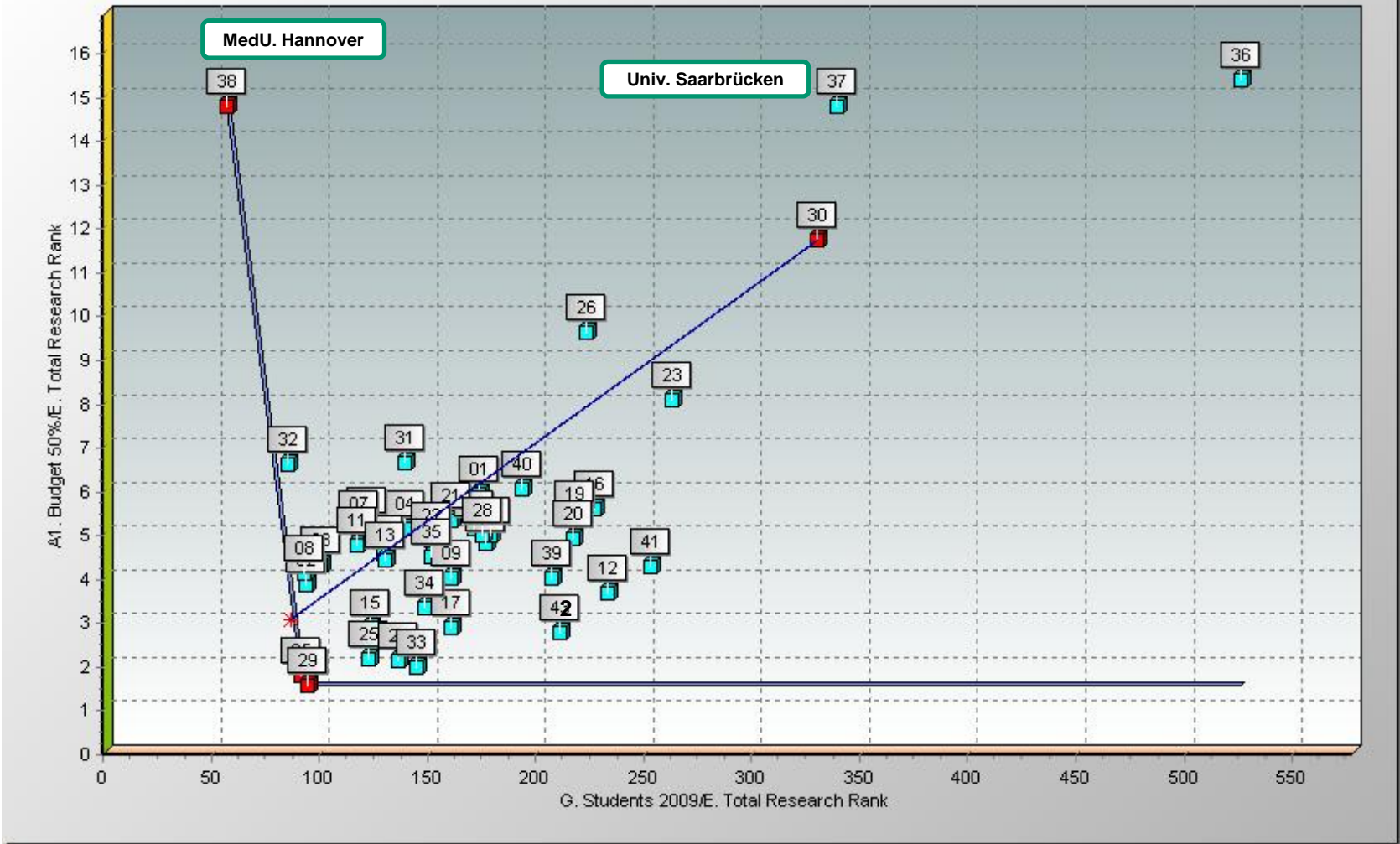


→ Research doesn't solely increase attractiveness/attract students.

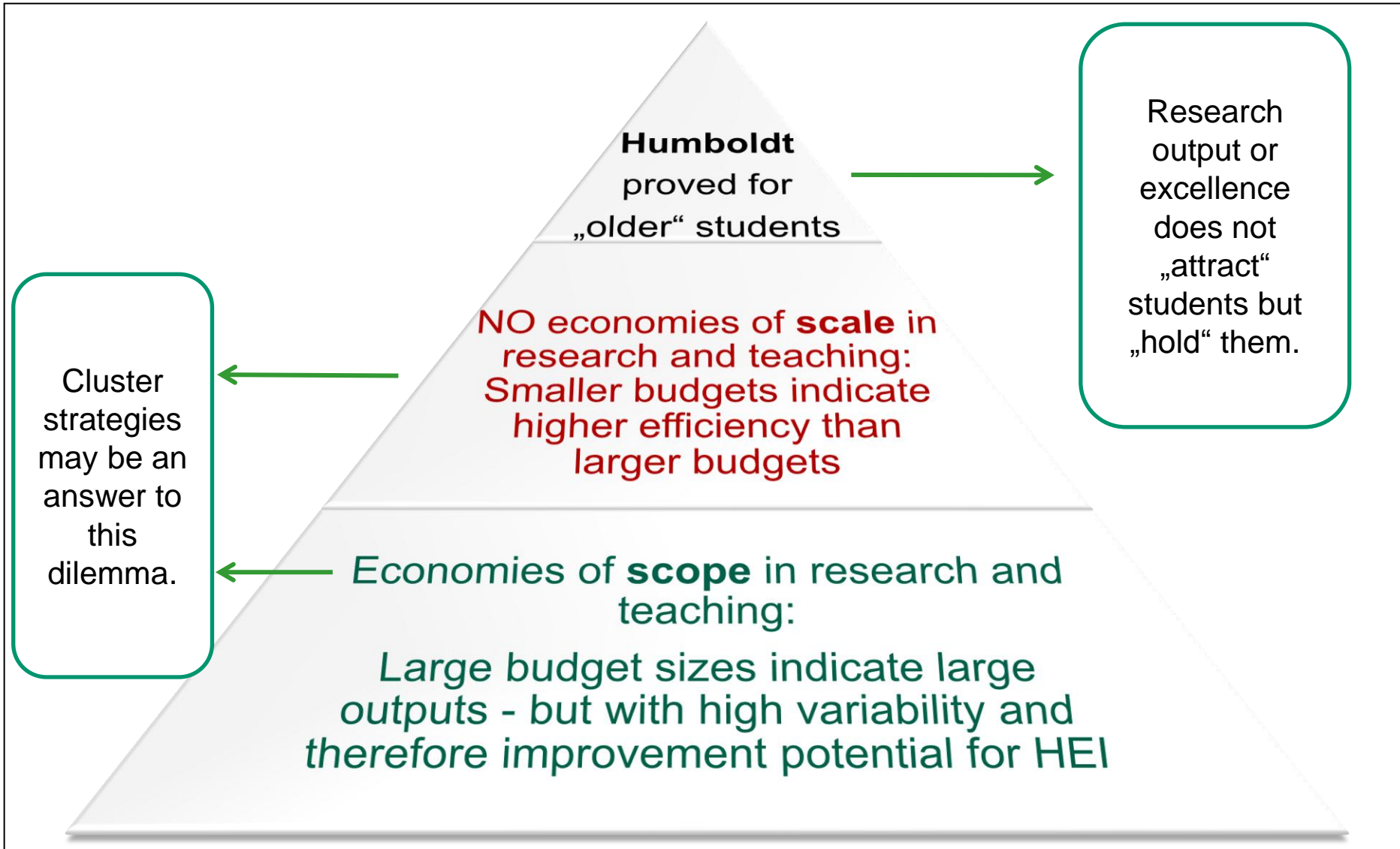


→ But research does correlate with student body (+0,63).

CASE E



4. Conclusions



Research and Teaching Efficiency Analysis (DEA)

Matthias Klumpp (ild)

Stephan Zelewski (PIM)

Alexandra Saur (PIM)

Thank you for your
kind attention.

Innsbruck, 05.03.2010

