

HELENA



Higher Education Global
Efficiency Analysis

European Patent Registrations: Measuring Research Efficiency in Higher Education

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Rotterdam, 30.08.2013

- 1. Introduction**
- 2. DEA Method**
- 3. Results**
- 4. Critical Reflection**
- 5. Outlook**

What do Higher Education Institutions (HEIs) do?

Mostly Teaching and Research

How are they supposed to do it?

Stakeholders: Efficiently!

Efficiency: Input → Output (Outcome)

Problem: HEIs produce knowledge, an intangible good!

How to measure it!?

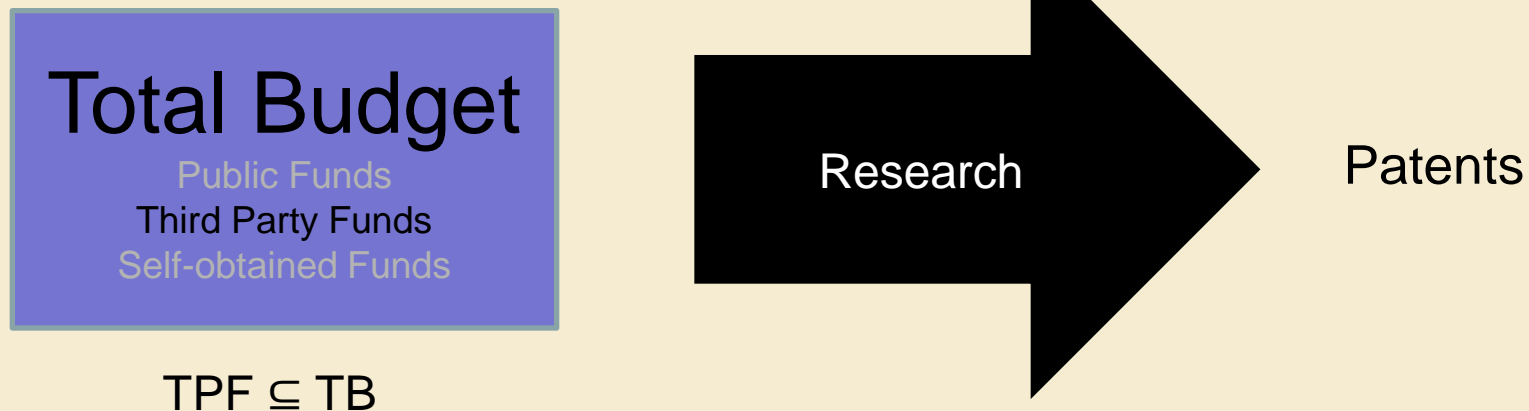
- Possible indicators:
 - Number of Publications
 - Number of Citations
 - Third party funds
 - Number of PhDs
 - Promotion of young researchers
 - *Patents?*

Weighed?

Unweighed?

2. DEA Method

- Patents (P) = **Output**
- Total Budget (TB) = **Input**
- Third Party Funds (TPF) = **Input**



2. DEA Method

Data of 10 German Universities

#	Higher Education Institution
1	University of Aachen
2	University of Bonn
3	University of Bielefeld
4	University of Dortmund
5	University of Düsseldorf
6	University of Hannover
7	University of Hohenheim
8	University of Mannheim
9	University of Münster
10	University of Siegen

2. DEA Method

Input

Output

Total Budget
Third Party Funds



Research

Patents

e.g. 2008, 2009, 2010

2011

2. DEA Method

4 calculations to compute

Calculation	TB	TPF	P
1	2005, 2006, 2007	2005, 2006, 2007	2008
2	2006, 2007, 2008	2006, 2007, 2008	2009
3	2007, 2008, 2009	2007, 2008, 2009	2010
4	2008, 2009, 2010	2008, 2009, 2010	2011

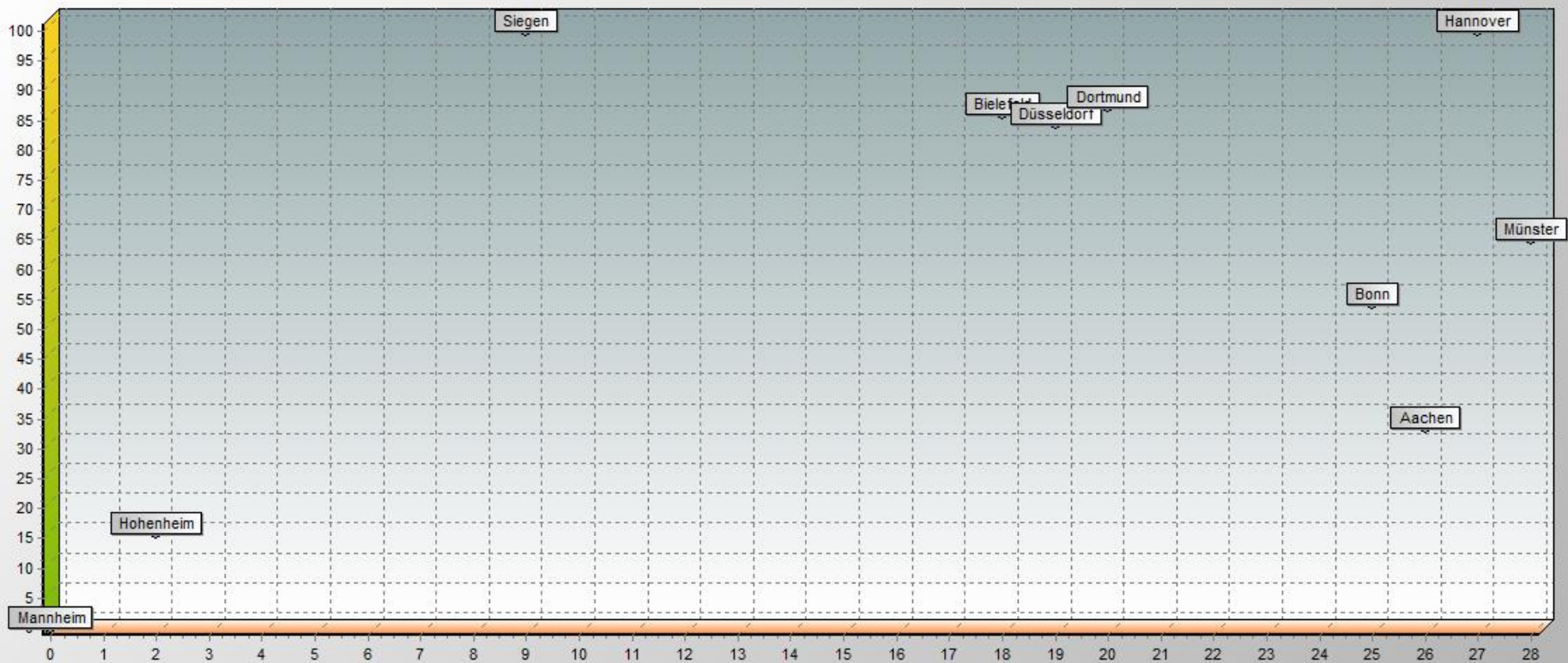
2. DEA Method

Calculation 1 (2005-2007):

HEI	TB	TPF	P (2008)
Aachen	1.392.497.287	458.545.059	26
Bonn	1.185.675.000	239.117.000	25
Bielefeld	548.442.500	107.668.500	18
Dortmund	629.540.000	115.297.000	20
Düsseldorf	495.461.276	124.632.976	19
Hannover	226.472.593	184.261.000	27
Hohenheim	345.832.000	63.738.000	2
Mannheim	197.170.493	48.801.000	0
Münster	866.700.000	246.237.000	28
Siegen	304.291.442	39.931.442	9

3. Results

Calculation 1:



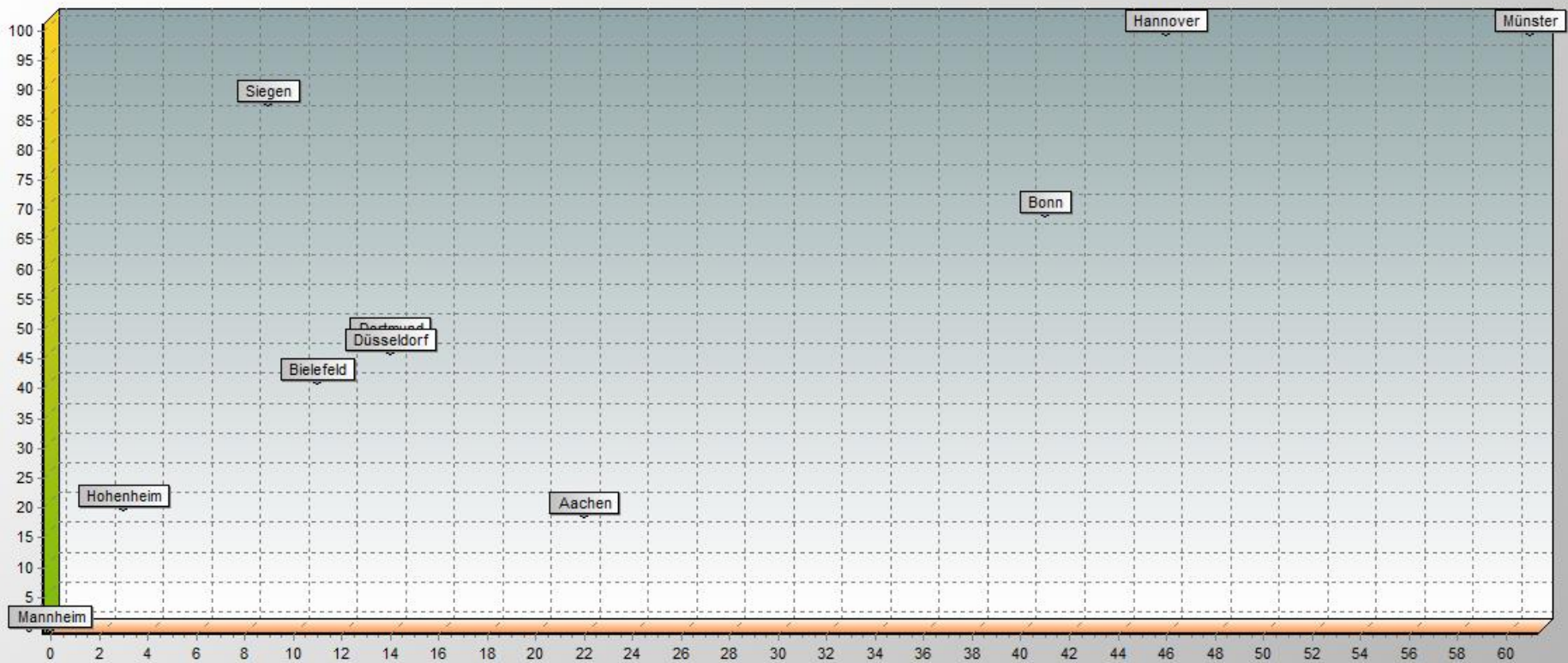
2. DEA Method

Calculation 2 (2006-2008) :

HEI	TB	TPF	P (2009)
Aachen	1.390.498.408	509.630.111	22
Bonn	1.334.851.000	260.029.000	41
Bielefeld	535.872.300	116.613.300	11
Dortmund	655.997.000	127.741.000	14
Düsseldorf	504.889.287	132.682.987	14
Hannover	256.760.881	205.649.000	46
Hohenheim	343.367.000	65.105.000	3
Mannheim	205.412.906	46.188.000	0
Münster	913.300.000	269.038.000	61
Siegen	307.233.389	44.976.389	9

3. Results

Calculation 2:



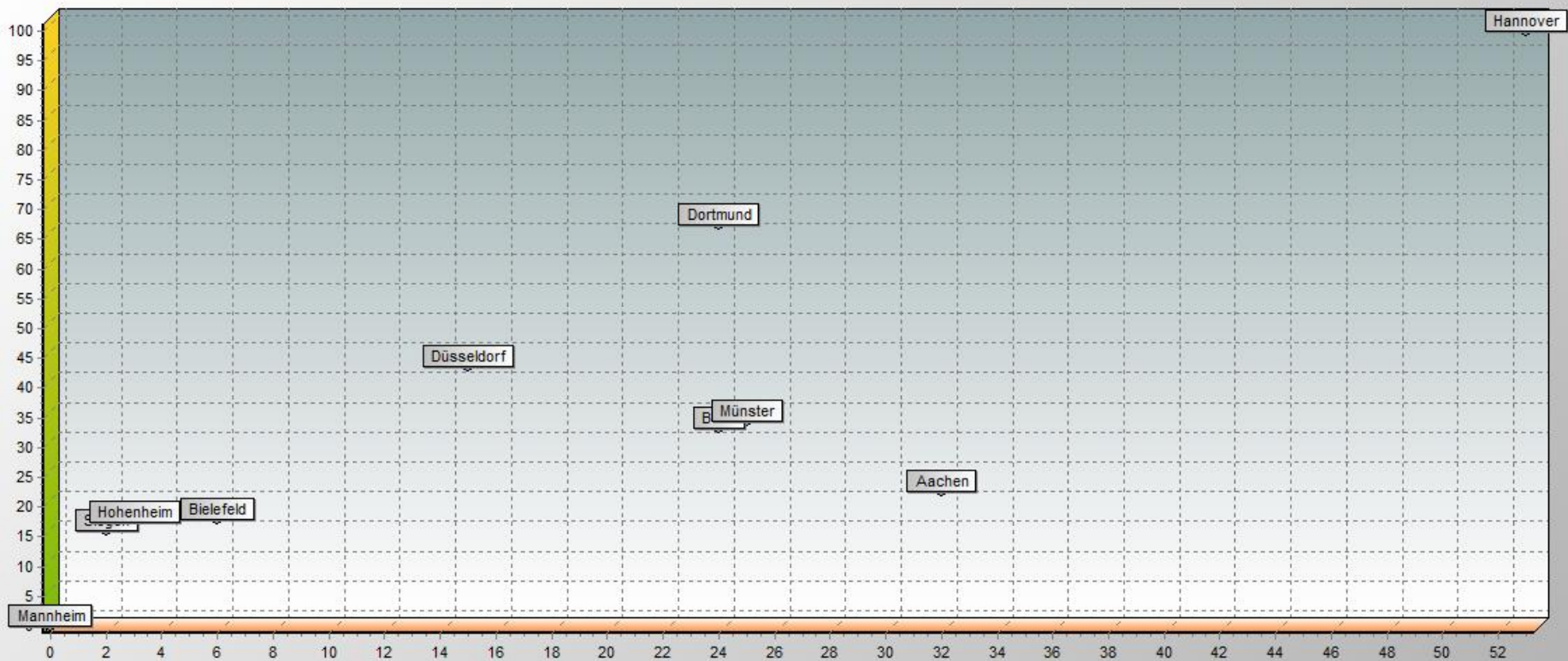
2. DEA Method

Calculation 3 (2007-2009): :

HEI	TB	TPF	P (2010)
Aachen	1.503.286.037	582.317.315	32
Bonn	1.530.886.000	297.116.000	24
Bielefeld	567.547.000	138.224.000	6
Dortmund	689.240.000	146.470.000	24
Düsseldorf	513.546.543	141.683.943	15
Hannover	269.975.170	218.163.000	53
Hohenheim	359.961.000	70.951.000	3
Mannheim	213.232.002	42.202.000	0
Münster	998.400.000	299.311.000	25
Siegen	315.079.387	51.454.387	2

3. Results

Calculation 3:



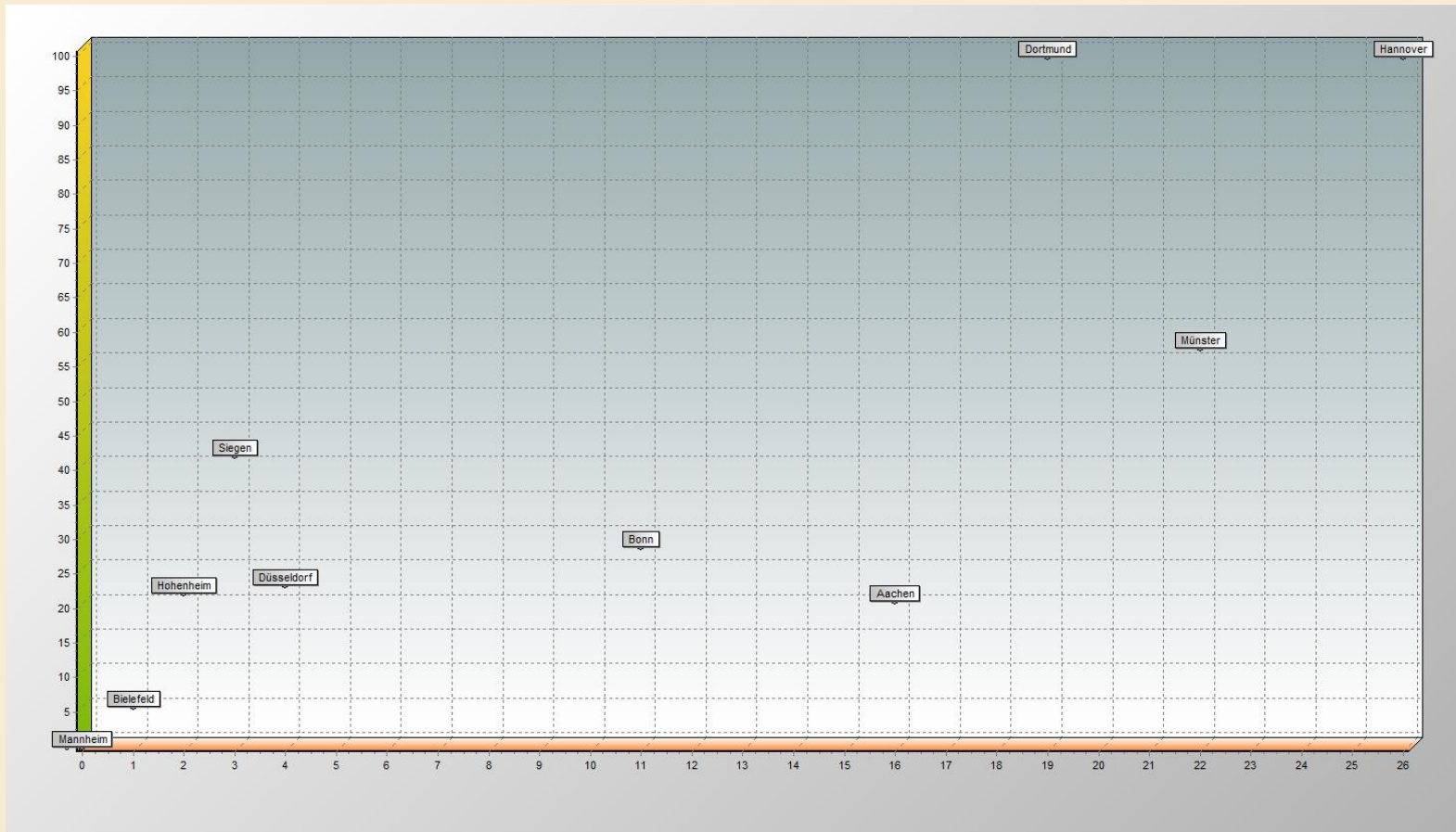
2. DEA Method

Calculation 4 (2008-2010): :

HEI	TB	TPF	P (2011)
Aachen	1.636.199.070	678.803.408	16
Bonn	1.737.312.000	335.591.000	11
Bielefeld	590.324.800	151.424.800	1
Dortmund	732.828.000	167.957.000	19
Düsseldorf	523.547.509	151.693.509	4
Hannover	286.421.897	233.888.000	26
Hohenheim	368.665.000	79.108.000	2
Mannheim	212.952.700	44.858.000	0
Münster	1.075.600.000	338.844.000	22
Siegen	329.482.943	62.775.943	3

3. Results

Calculation 4:



3. Results

Efficiency scores

HEI	Calculation 1	Calculation 2	Calculation 3	Calculation 4
Aachen	33,6 %	19,1 %	22,6 %	21,1 %
Bonn	86,1 %	41,6 %	17,9 %	5,9 %
Bielefeld	54,3 %	69,5 %	33,2 %	29 %
Dortmund	87,3 %	48,3 %	67,4 %	100 %
Düsseldorf	84.5 %	46.5 %	43.6 %	23.4 %
Hannover	100 %	100 %	100 %	100 %
Hohenheim	15.8 %	20.3 %	17.4 %	22.3 %
Mannheim	0 %	0 %	0 %	0 %
Münster	65,1 %	100 %	34,4 %	57,8 %
Siegen	100 %	88,3 %	16 %	42,2 %

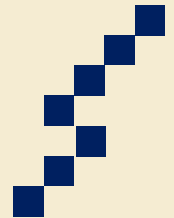
- TB and TPF are highly correlated with each other (between 0,84 and 0,87)
- TPF is more correlated with P than TB in every single year

Year (P)	TPF	TB
2008	0,72	0,63
2009	0,54	0,46
2010	0,61	0,35
2011	0,54	0,35

- Patents relevance is faculty based (engineering e.g.)
Example: University of Mannheim (0 patents)
- quantity vs. quality
- *“Not Every patent is the same.”*
- No impact of patent itself.

- Instead of cumulative measuring quality scoring
e.g. 3 different types of patents
- Faculty based measuring in engineering etc.

**Thank you for
your attention!**



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Support Code: 01PW11007