An evidence-based reform process of EU Universities?

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* The views expressed here do not necessarily commit the EC

See also Veugelers & van der Ploeg (2008) in Higher Education in a Globalised World, Edited by Dewatripont, Thys-Clément, Wilkin
And CESifo, special issue, edited by van der Ploeg & Veugelers (2008) on Higher Education Reforms;

The conventional “discours” on university reforms in Europe

- Universities are important for a knowledge-based economy
- Europe’s universities underperform
  - Output wrt graduates, publications, citations, industry science links (patents, spin-offs…)
- The causes for Europe’s universities’ low performance
  - bad governance, underfunding and fragmentation
- EU University reform requires package of
  - Funding (public/private), governance/autonomy, integration

How well funded is this “discours” on (empirical) economic analysis? Is there a case for a more evidence-based reform policy process?

Towards a more evidence based university reform process:

Taking a closer look at evidence and analysis of performance of EU universities and their drivers

1. Performance of EU universities (degrees, publications, ISL)
2. Funding, govenance and fragmentation
3. Reform Agenda: role of the EU

NB: Surprisingly limited good data and analysis available

1. Performance of EU universities

Beyond Shanghai:

Quantity / Quality of performance:

graduates, publications, citations, patents, licenses, spin-offs

Educational Performance of Universities in EU: a more nuanced picture

- The proportion of the population in the EU that has graduated from higher education is relatively low
- Relatively few young people in the EU enrol in higher education but enrolment is growing strongly
- The European Union produces a higher number of PhDs than its major competitors
- The EU produces more mathematics, science and technology graduates than the USA
- The EU has fewer researchers in the labour market
- Tertiary Education leads to higher employment, lower unemployment and higher earnings, also in the EU

The EU "production" of PhDs in the OECD:

The EU produces more PhDs than other OECD countries combined

Trends in shares of OECD Doctoral Degrees Awarded

	Share in OECD total Doctoral Degrees Awarded		Share in OECD total S&E Doctoral Degrees	
	2000	2004	2000	2004
EU-19	47%	50%	50%	57%
USA	30%	27%	27%	25%
JAPAN	15%	8%	15%	9%

Source: OECD, STI Scoreboard, various issues

The EU production of PhDs in the World:

rise of non-OECD countries: China

COUNTRY	Share in world PhD degrees awarded 2004
USA	14.7%
Japan	5.9%
UK	5.3%
GER	9.1%
Russia	10.4%
China	8.2%
India	4.8%
REGION	**Share in world PhD degrees awarded 2004**
EU-27	33.7%
Asia	23.3%
N America	16.1%
Other former USSR	13%
Near East/Africa	6.7%
C/S America	3.9%
RoWest	3.2%

	Number of doctoral degrees awarded 2003*	AAGR 1995-2005**
USA	40740	0.4%
GER	23043	1.5%
CHN	18806	18.7%
JAP	16314	2.9%
UK	14870	4.4%
INDIA	13733	4.2%
S KOR	7172	5.8%

Source: On basis of NSF, S&E Indicators 2008

The demand for EU graduates

A quality/mismatch problem?

* *Unemployment rate improves with tertiary degree, but still higher in EU relative to US*
* *Fewer EU graduates end up in research*
* *International mobility: brain drain to US?*

Foreign scholars in US universities:30-40%: Among foreign scholars: 44% Asian (20% China), >20% EU (GER (5%), FR, UK, IT (3%)..) .
Foreign scholars in US universities as share of university researchers at home: 2-4% in OECD countries (8% NL, 6% PT, 4.5% IT) (OECD (2007))

Number of graduates (ISCED 5 and 6) in mathematics, science and technology and number of researchers (in 1000) in 2001

Region	MST graduates		Growth per year in 2001-03 (%)	Researchers 2001	Number of researchers per 1000 labour force 2003
	2001	2003			
EU25	**681**	**740**	**+4.2**	**1084**	**5.5**
USA	380	431	+6.5	1261	9.0
China	464	810	+32.1	743	1.0

Source: EC-DG EAC

Unemployment rates for tertiary educated

(among population aged 25-64, 2002)

Country	Unemployment rate of tertiary relative to upper secondary	Unemployment rate of tertiary educated
Belgium	0.55	3.1
Denmark	1.06	3.6
Germany	0.49	4.3
Spain	0.78	7.4
France	0.77	5.0
Italy	0.83	5.3
Netherlands	0.89	1.7
Austria	0.51	1.6
Finland	0.47	4.0
Sweden	0.60	2.6
United Kingdom	0.64	2.4
EU25 average	0.53	4.2
Switzerland	0.92	2.2
Japan	0.73	3.9
United States	0.52	3.0

Source: EU, EEA: Eurostat. Others: OECD, Employment Outlook 2004 and Education at a Glance (2004)

EU's Share in World Scientific Publications

- *EU is larger than US, since 1995*
- *EU's share is slowly declining*
- *Rise of non-Triad countries (China)*

	1995	2000	2005
USA	34%	31%	29%
EUROPEAN UNION	35%	35%	33%
JAPAN	8%	9%	8%
RoWEST*	6.5%	6.2%	6.8%
ASIA	13.6%	17.0%	20.6%
C/SAMERICA	1.7%	2.4%	2.9%
RoWORLD**	1.2%	0.6%	0.3%

	Share 2005	AAGR 95-05
UK	6.4%	0.0%
GER	6.2%	1.6%
FRA	4.3%	0.5%

	Share 2005	AAGR 95-05
China	5.9%	16.5%
India	2.1%	4.5%

Source: On basis of NSF, S&E Indicators 2008

* RoWest= Canada and other Western Europe; **RoWorld is the residual;

Fastest growing EU countries in scientific publications:

evidence of convergence?

	SHARE IN EU-25 2005	AACH% 95-05
EU-15		
ITA	12.0%	3.3%
ESP	8.9%	4.9%
BEL	3.3%	2.8%
AUSTRIA	2.2%	2.9%
GREECE	2.1%	7.6%
PORTUGAL	1.4%	11.4%
IRE	1.0%	5.7%
EU-10		
POLAND	3.3%	4.2%
CZECH	1.5%	5.0%
HUN	1.3%	4.0%
SLO	0.5%	9.1%

Source: On basis of NSF, S&E Indicators 2008

Intra-EU convergence:

the ERA becoming a reality?

Decomposing the EU scientific inequality: EU15 vs NMS

Intra-EU inequality decreases

Intra-EU15 inequality decreased

Inequality bt EU15 & NMS decreased

Intra-NMS: no convergence

	Relative T= T_{EU-27}/MaxT	T_{EU-27} =	$T_{between}$ +	T_{within}	$Share_{EU-15}$	T_{EU-15}	Rel T_E U-15	T_{EU-12}	Rel T_{EU-12}
1995	0.258	0.819 =	0.329 +	0.489	0.939	0.491	0.186	0.461	0.200
2000	0.243	0.773 =	0.317 +	0.456	0.933	0.457	0.173	0.443	0.192
2005	0.228	0.726 =	0.312 +	0.414	0.931	0.408	0.155	0.502	0.218

Source: Own calculations on the basis of NSF, S&E Indicators, 2008

Quantity / Quality of scientific output

- *EU's larger share is mostly in Bottom 50*
- *Asia10 catching up is strongest in Bottom 50*
- *US dominance in Top1 remains, but slow catch-up by EU and Asia, also here*

Trends in publications shares across the quality distribution

	Share in articles in TOP1 citation pc			Share in articles in TOP10 citation pc			Share in articles in BOTTOM50 citation pc		
	1995	2000	2005	1995	2000	2005	1995	2000	2005
USA	62	60	55	50	45	42	32	28	26
EU	25	26	29	32	35	34	33	35	34
ASIA10	5	6	7.5	7	9	12	14	17	21

Source: NSF, S&E Indicators 2008

Note: Top1: 99th percentile of citations received (>21); Top10: 90th percentile (>6); the Bottom50 contains the publications with 0 or 1 citations; 1995 are all 91-93 articles cited by 1995 articles; 2000 are all 96-98 articles cited by 2000 articles; 2005 are all 2001-2003 articles cited by 2005 articles.

ISL performance of EU universities:

very poor internationally comparable data

Comparison of ASTP and AUTM performance in 2004

	ASTP EU	•AUTM US
Average research expenditures (million US)	*153.2*	*215.7*
Correction for inputs (efficiency)		
1. Invention disclosures per million	0.56	0.40
2. Patent applications per million	0.14	0.33
3. Patent grants per million	0.06	0.09
4. Licenses executed per million	0.13	0.11
5. Start-ups established per million	0.02	0.01

NOTE: ASTP results are limited to respondents that provide data for both the indicator and for research expenditures. The number of eligible respondents is therefore 59 for invention disclosures, 59 for patent applications, 49 for patent grants, 55 for license agreements, and 61 for start-ups.

Source: Arundel & Bordoy (2006), ASTP report;

EU universities with less research money, more "efficient" in ISL?

To be investigated further with better data

2. What explains university's performance?

Evidence and analysis on

funding, governance

Linking governance and funding to (research) performance of European universities

Very few empirical studies, esp cross country

Aghion, P., M. Dewatripont, C. Hoxby, A. Mas-Colell and A. Sapir, 2007, Why reform Europe's Universities, Bruegel Policy Brief.

- Budget per student affects positively research performance
- Governance indicator affecting performance: budget autonomy.
- The positive effects of having larger budgets per student are higher when the institutes enjoy a higher degree of budget autonomy
- Important to correct for other determining factors: **Size**, age

- Policy should tackle simultaneously funding and governance.
- More research is needed to pin down the drivers of university performance

(i) Funding of EU universities:

underfunded?

- Total investment in higher education in the EU is below the level of key competitors, especially private funding
  - The differences in the level of private investment are a result of differences in tuition fees, in the share of private institutions, in philanthropic funding and in the level of funding provided by enterprises.
- No clear evidence of underfunding of research at universities as compared to the US
  - But differences between the EU and the US in who and how funds are allocated, with the US having a more competition based funding system.

Spending on Research in Universities

- No evidence of underspending in the EU on average;
- No evidence of lower share of Industry in HE R&D funding
- Heterogeneity inside the EU on funding;

US	JAP	EU25	FIN	DK	SWE	UK	GER	FRA
Expenditures on R&D by Higher Education Sector, as % of GDP								
0.36	0.42	0.40*	0.69	0.61	0.87*	0.40*	0.41	0.41
Total Expenditures on R&D as % of GDP 4)								
2.68	3.13	1.81*	3.51	2.48	3.95*	1.88*	3.13	2.16
Share of Higher Education Sector in total R&D								
13.6	13.4	22.1*	19.8	24.4	22.0*	21.4*	16.3	19.1
Higher Education Sector R&D financed by industry								
5.0	2.8	6.5 *	5.8	3. 0	5.5*	5.5*	12.8	2. 7*
Data are for 2004, unless * (=2003)								

Source : OECD, STI indicators 2007

(ii) University governance structures in EU

- Different dimensions of governance:
  - public/private ownership, external/internal stakeholder involvement, professional management,
  - Input autonomy: selection of students, budget (sources of funding, structure of spending), staff policy (hiring, wages)
  - Output autonomy: course content ..
  - Accountability: evaluation, funding rules
  - …

- Empirical evidence finds a high variance in university governance across countries, as well as a difference in country dispersion across different dimensions of governance: different dimensions of autonomy and accountability not necessarily correlated;

- Is there an optimal governance structure?
- Which dimensions of governance matter for performance?

Diversity in governance structures across OECD

	US	JAP	UK	SWE	DK	FIN	GER	FRA	ES	IT
Autonomy										
Selection of students	7.8	6.6	6.7	8.9	7.0	7.1	2.8	2.8	10	3.7
Budget flexibility	8.5	8.2	6.8	6.2	6.2	7.7	7.2	6.8	7.9	7.0
Staff Policy flexibility	10	10	10	10	10	7.5	7.5	1.8	4.9	7.9
Hiring/Firing	10	10	10	10	10	10	10	0.9	3.8	10*
Wage/ non-wage conditions	10	10	10	10	10	5	5	2.7	5.9	5.7
Course content	10	10	10	5.5	10	10	5.5	10	10	5.5
Accountability										
Evaluation Mechanisms	6.6	6.2	7.7	6.5	4.6	4.0	6.9	5.6	6.5	6.8
Funding Rules	3.6	3.9	5.5	4.6	5.3	6.2	5.2	6.6	4.8	5.9

Source: Oliveira Martins et al., OECD (2007)

Intra-EU heterogeneity in preferences on governance issues:

some survey evidence

6000 randomly selected faculty of universities across all 27 Member States

% disagree

Universities should be allowed to select and refuse students

UK	FI	DE	EU-27	NL	FR	AT	IT	ES	SE	BE
1.6%	2.5%	8.3%	13%	17.3%	19.2%	19.5%	21.5%	21.9%	32%	38%

Universities should be publicly funded and not seek more private funding

UK	AT	SE	DK	DE	EU-27	IT	FR	ES
24%	26.5%	26.9%	27.5%	32.3%	40%	42.4%	45.2%	59.2%

Student fees are acceptable as a source of extra income for universities

ES	DE	EU-27	BE	FR	UK	EL	FI	SE	DK
18.6%	23.1%	26%	27.6%	28.8%	34%	46.5%	58.4%	62.3%	66.7%

Source: Eurobarometer 198 on Higher Education Reform, The Gallup Organisation

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some survey evidence

6000 randomly selected faculty of universities across all 27 Member States

% disagree

Universities need more autonomy from public authorities

EL	DE	PT	EU-27	IE	BE	NL	ES	AT	FR	IT
5.4%	12.7%	14.3%	19%	18.8%	20.7%	21.5%	21.9%	25%	26.4%	26.6%

Universities are in need of better internal management

EL	IT	ES	PT	EU-27	DK	FR	SE	BE	UK	NL
1.8%	3.6%	4.2%	7.5%	12%	15.2%	16.4%	16.5%	20.7%	22.4%	27.7%

Source: Eurobarometer 198 on Higher Education Reform, The Gallup Organisation

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some survey evidence

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% disagree

Competition between universities will lead to improvement of quality

PT	ES	DE	EU-27	FI, IT, SW	NL	BE	IE	DK	FR	UK
18.8%	19.2%	27%	28%	28%	37.4%	40.9%	41.6%	42.6%	45.6%	48%

Source: Eurobarometer 198 on Higher Education Reform, The Gallup Organisation

Political economy of the reform process

Involvement of University leadership in reforms: % Full confidence

EL	AT	IT	FI	EU-27	DK	PT	BE	IE	UK	FR
52%	50%	50%	49%	42%	36%	32%	29%	24%	18%	14%

Involvement of National or Regional authorities in reforms: % No confidence

DK	FI,SW	BE	PT	IT	NL	EU-27	AT	DE	UK	EL
5%	8%	12%	13%	15%	16%	19%	21%	21%	22%	46%

Source: Eurobarometer 198 on Higher Education Reform, The Gallup Organisation

(iii) Fragmentation

A larger integrated market: EHA and ERA

Allows for more differentiation/specialization

Allows for a more effective competition

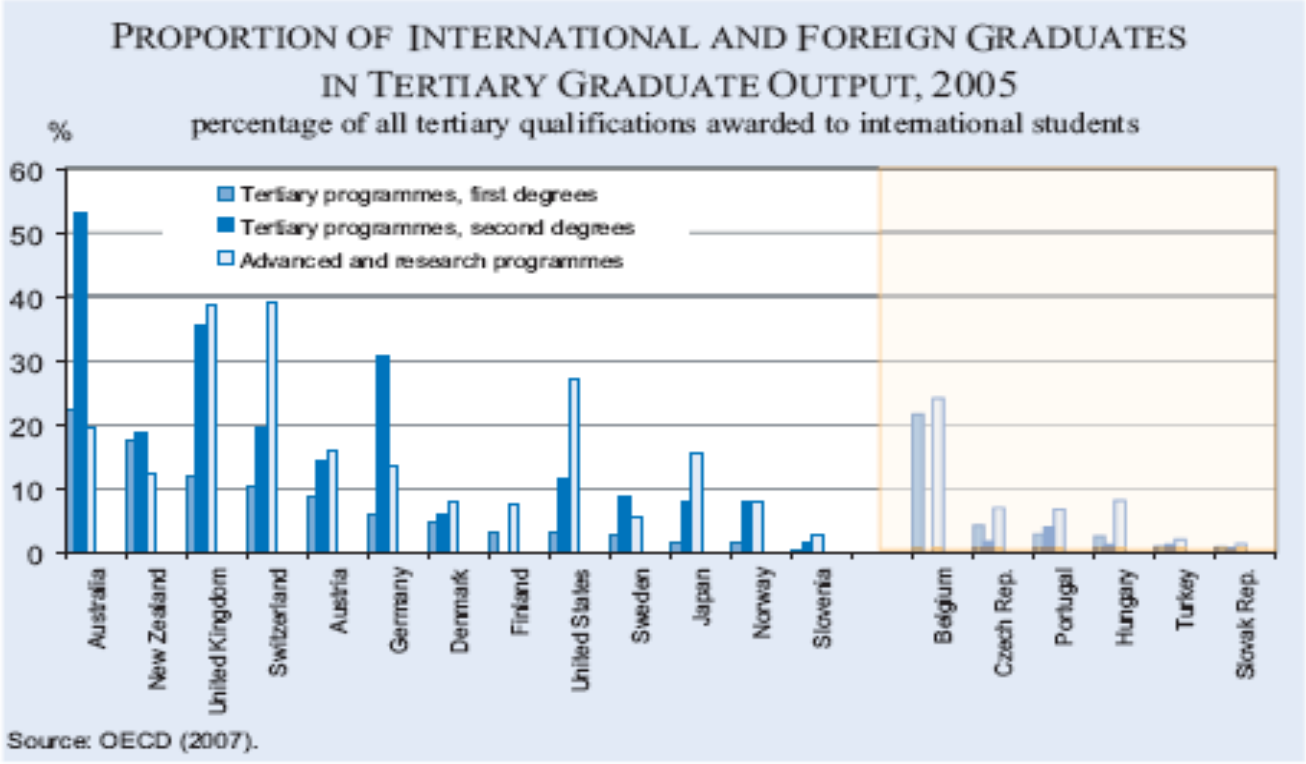
But high heterogeneity in preferences across MS is countervailing force;

- Is EU an integrated area for higher education and research?
  - International mobility of students
  - International mobility of researchers
  - International funding of universities
  - International collaboration in research
  - International exploitation of science

Very little analysis and poor data on this

Limited available evidence gives mixed picture

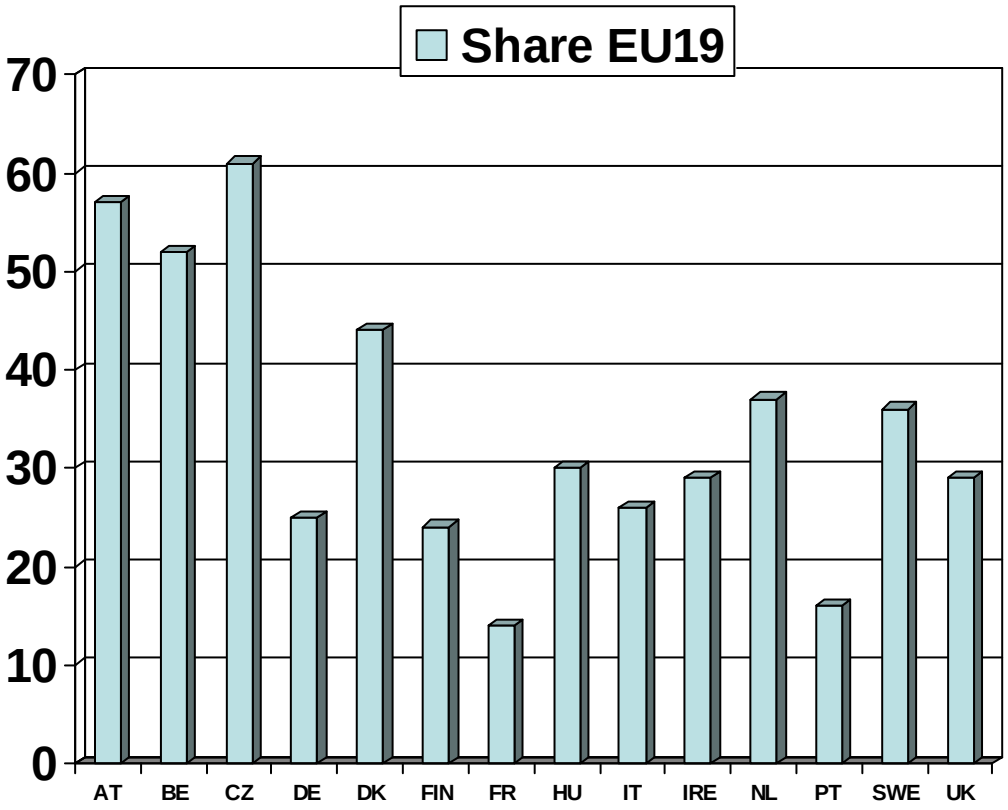
International mobility of tertiary students



EU countries typically less international/foreign graduates:
excl UK, GER (Masters), BEL
International Mobility at Master and PhD level

Intra-EU mobility of tertiary students

Intra-EU share in total international tertiary student population



Source: OECD (Education at a glance (2007))

International mobility of researchers

- Foreign scholars represent currently about 30% to 40% of total university researchers in the United States and this percentage has grown over time (NSF, S&E Indicators) 2008
- For comparison, the percentage of foreign researchers in the higher education sector is 5.0% in Portugal, 7.5% in France and 10.5% in Norway. In Switzerland, 35% of foreign researchers in its universities. (OECD (2007)).

International funding of universities

- Very little data; results from EUA survey (2005), n=40
  - Among sources of funding for research at universities: international is not important (7% average)
  - International funding is mostly public/EU funding *(??private, other MS public funding??)*
    - *EU research funding is 5% of total MS research funding*
  - High expectations: majority report international (EU) funding as « most » or « very » important for future research funding

Government range is 0-100%	(average 56%)
Other national sources range is 0-85%	(average 21%)
Business sector range is 0-46%	(average 10%)
International funding range is 0-29%	(average 7%)
Other range is 0-42%	(average 4%)

International co-publications

- EU countries are more engaged in International co-publications (swICP/swP)
  - Highest: BEL, AT
  - Lowest: SWE, IT, GR, ESP
- With whom? intra-EU preference

s_wICP/s_wP

EU(17)	2.93
US	1.51
Japan	1.28
China	1.40

International Collaboration Index of EU

ICPij/ICPj)/(ICPi/ICP with j=EU(17)

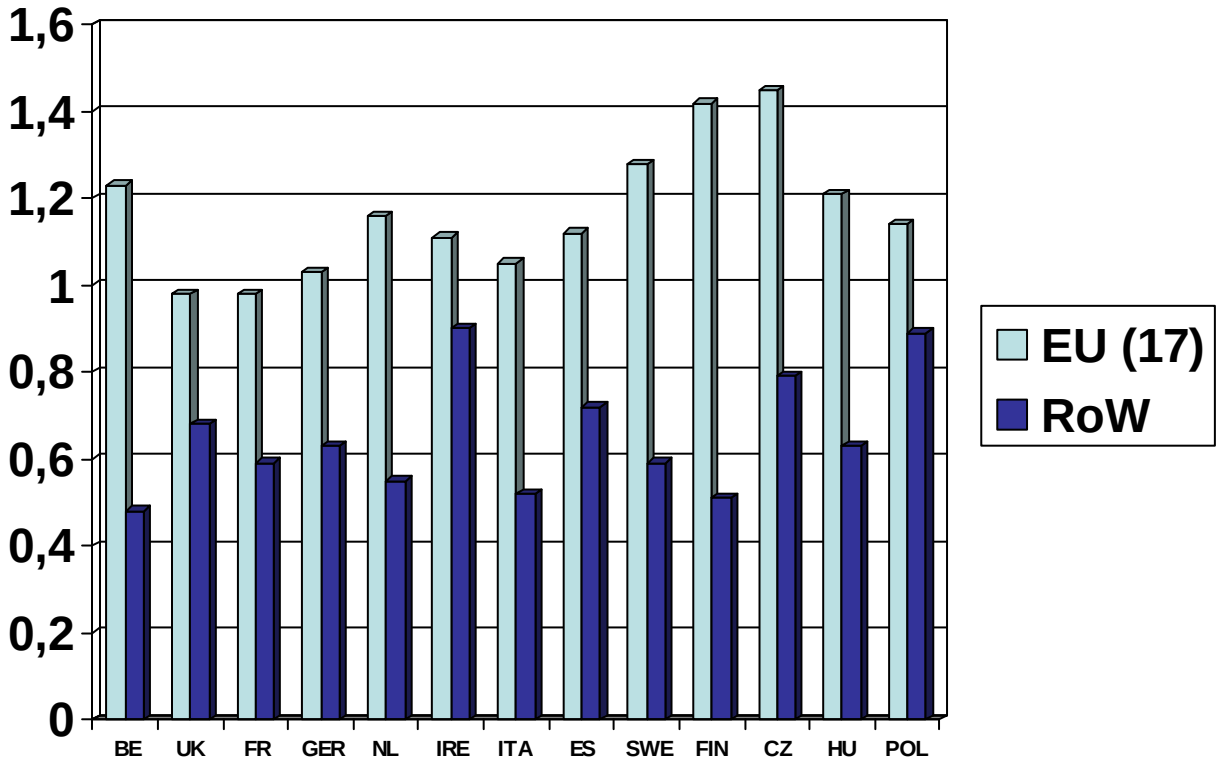
EU(17)	1.17
Associated	1.02
RoW	0.62

Source: On basis of NSF, S&E I 2008

Intra-EU co-publications

International Collaboration Index of EU countries with other EU/RoW

ICPij/ICPj)/(ICPi/ICP



Source: On basis of NSF, S&E I 2008

International cross-referencing

EU on average more internationally open when referencing, but not necessarily intra-EU

The three most preferred "partners" for cross-references (2000-2002)
Countries from TOP10, BRICs and other Emerging Science Countries
Countries ordered according to highest "domesticity" of references

	First	Second	Third
USA	JAP	CAN	UK
JAP	KOR	USA	CHN
IND	TWN	CHN	TUR
CHN	SGP	TWN	KOR
UK	USA	IRE	SAF
GER	USA	AUT	RUS
FRA	USA	ESP	BEL
ESP	ARG	POR	MEX
ITA	USA	ESP	GRE
CAN	USA	AUS	UK

Source: Schubert & Glanzel (2006)) & Glanzel & Schuber (2005)

3. The reform agenda for universities in Europe

A role for the EU?

A role for evidence based policy?

Reforming Universities in Europe:

some principles likely to hold

- More funding: beyond size
  - More performance based public funding
  - More concentration of funding on excellence
  - More private funding
  - Better fee and subsidy structure
  - Addressing “access” through income-contingent loans
- Better governance of universities: finding the right mix of
  - autonomy and accountability
- A larger integrated market: EHA and ERA

In need of more analysis to have the mix and details right

Scope for EU in university reform

- Support for evidence-base:
  - collection of data, methodologies on performance, governance and funding, comparable across countries and institutions
- Internal Market: EHA and ERA
  - Mobility of students, researchers, funds
- EU funding (small, but able to leverage? Cf ERC)
- Other: eg EU scale capacity building…