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The Internationalization of the Polish Academic Profession. A European Comparative Approach

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1. Introduction

The need for more intense internationalization of Polish higher education was one of the major themes in a recent (2008-2012) wave of reforms. In particular, two aspects were focal points in recent policy debates: internationally visible publications as part of "internationalization at home", and international research cooperation as part of "internationalization abroad", to refer to Jane Knight's (2012: 34-37) two "pillars of internationalization". Recent international assessments of internationalization of Polish higher education were highly critical: both the OECD and the World Bank national reports of the 2000s criticize low levels of international academic cooperation and disappointingly low international research output.

In this paper, we shall use a micro-level (individual) approach which relies on primary academic attitudinal and behavioral data voluntarily provided by academics in a consistent, internationally comparable format, with only some references to macro-level secondary data (widely available from national and international statistics). The individual academic is the unit of analysis, rather than national higher education systems or individual institutions. A new "data-rich" research environment in the international comparative academic profession studies allows for the first time to analyze the internationalization of Polish academics in a comparative quantitative European context.

The data used in this study are drawn from eleven European countries involved in the CAP ("Changing Academic Profession") and EUROAC ("Academic Profession in Europe:

Responses to Societal Challenges") projects: Austria, Finland, Germany, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Switzerland, and the United Kingdom, subsequently cleaned, weighted and integrated into a single European data set by the University of Kassel team.[1] The total number of returned surveys was 17,211 and included between about 1,000 and 1,700 surveys in all European countries studied except for Poland where it was higher (see Table 1).

Table 1. Sample characteristics, by country.

	N	Universities %	Other HEIs %	Full-time	Part-time
Austria	1,492	100.0	0.0	65.8	34.2
Finland	1,374	76.5	23.5	82.4	17.6
Germany	1,215	86.1	13.9	70.7	29.3
Ireland	1,126	73.3	26.7	91.2	8.8
Italy	1,711	100.0	0.0	96.9	3.1
Netherlands	1,209	34.4	65.6	56.0	44.0
Norway	986	93.3	6.7	89.7	10.3
Poland	3,704	48.3	51.7	98.0	2.0
Portugal	1,513	40.0	60.0	90.3	9.7
Switzerland	1,414	45.6	54.4	58.5	41.5
UK	1,467	40.8	59.2	86.5	13.5

* In Austria and Italy there was no distinction between "universities" and "other higher education institutions".

Individual data files were produced in all participating countries but all specifically national categories (faculty rank structures, institutional type structures etc.) were reduced to internationally comparable categories. An international codebook was created and a number of coding modifications was introduced in national data files, in particular the dichotomization into "senior" and "junior" faculty and into faculty employed in "universities" and in "other higher education institutions". The data cleaning process included the use of "survey audits " prepared by national teams. In the process of international data coordination, sample values were weighted so that the national samples in the countries studied were broadly representative of national academic populations for most independent variables,

[1] The final data set dated June 17, 2011 and created by René Kooij and Florian Löwenstein from the International Centre of Higher Education and Research – INCHER-Kassel was used. The EUROAC project was coordinated by Professor Ulrich Teichler from INCHER and the CAP project was coordinated by Professor William Cummings from George Washington University. The Polish research team was led by the present author and included also Dr. Dominik Antonowicz, chiefly responsible for collecting qualitative material through 60 in-depth semi-structured interviews with Polish academics.

especially gender, academic fields, institutional types and institutional ranks (national-level sampling techniques are described for the CAP European countries in RIHE 2008: 89-178, and for the EUROAC countries in Teichler and Höhle 2013: 6-9). For our analysis, we have used a subsample of 9,536 European academics who were employed full-time in universities (as defined by national research teams) only. The details of the sample are given in Table 2.

Table 2. Proportion of faculty by clusters of academic fields and sample size (N).

	Life sciences and medical sciences	**Physical sciences, mathematics**	**Engineering**	**Humanities and social sciences**	**Professions**	**Other Fields**	**Total**
Austria	20.2	9.8	11.9	41.3	8.7	8.2	1,492
Finland	15.7	9.7	21.5	18.6	12.1	22.4	1,374
Germany	29.3	15.2	14.8	15.6	11.1	13.9	1,215
Ireland	23.0	11.5	8.8	23.8	20.5	12.4	1,126
Italy	28.6	23.3	11.1	17.5	13.6	5.9	1,711
Netherlands	12.6	10.9	10.7	22.3	34.7	8.8	1,209
Norway	29.0	14.1	7.4	27.5	8.9	13.1	986
Poland	24.6	8.4	21.5	23.0	12.5	10.0	3,704
Portugal	16.9	7.9	20.4	10.5	20.6	23.7	1,513
Switzerland	30.8	10.2	12.7	16.9	23.9	5.5	1,414
UK	21.9	11.6	6.3	18.6	11.0	30.7	1,467

2. Internationalization: a general overview

Thirteen variables deemed most relevant have been selected (three publication-related variables were used at two separate thresholds). From among all internationalization-related activities (or, in some cases, attitudes), at the aggregated European level there are six which are clearly most common (see Table 3 below). Between a half and two-thirds of all European academics (the mean percentage of the country means for the total sample of 9,536) report publishing their works in a foreign language and putting emphasis on international perspectives or content in their courses. And in terms of research, they report collaborating with international colleagues in research, report their primary research to be international in scope or orientation, publishing in a foreign country (at least one-fourth of their publications) and employing in their research mainly English. Also almost a half (47 percent) of all European academics published at least fifty percent of their publications in a foreign country in the last three years prior to the survey. Additionally, more than one-fourth of European academics (27 percent) report publishing at least 25 percent of their works as co-authored

with colleagues located in other countries and about 12 percent of them report publishing at least 50 percent of their works as co-authored with colleagues located in other countries. There is a powerful cross-country and cross-disciplinary differentiation in internationalization, though.

Table 3. European academics' engagement in various international activities, full-time academics employed in universities only, all countries combined (some answers from 1 to 5 on a five-point Lickert scale, combined answers 1 and 2, "strongly agree" and "agree", "very much" and "much"), sample size – 9,536 academics, in percent.

The percentage of European academics…

	%	N
publishing in a foreign language (>25%)**	64.6	4675
who emphasize international perspectives or content in their courses	64.0	4597
collaborating with international colleagues in research	63.8	5141
whose primary research is international in scope or orientation	63.1	4659
publishing in a foreign country (>25%)	59.7	4318
who employ in research primarily English	59.1	4064
publishing in a foreign language (>50%)	53.1	3845
publishing in a foreign country (>50%)	47.2	3417
Teaching any courses in a foreign language	32.9	2588
publishing works co-authored with colleagues located in other countries (>25%)	27.2	1965
who spent in other countries since the award of their first degree at least two years**	25.8	1991
Teaching any courses abroad	16.1	1269
whose research external funding comes from international organizations	15.0*	8886
publishing works co-authored with colleagues located in other countries (>50%)	12.4	895
who employ in teaching primarily English	11.9	793
whose most graduate students are currently international	8.1	592

* mean ** "foreign language" in all tables is used as an equivalent to "a language different from the language of instruction at the current institution", "in other countries" is used as an equivalent to "outside the country of their first degree and current employment", for the sake of brevity.

Considering scarce research resources available and the relatively recent (only two decades) unrestricted opening of Polish universities to global and European academic communities, the Polish academic community seems relatively well internationalized today. The initial assumption of this research, based on previous research and policy literature, was that there is a substantial, structural lagging behind of Polish academics compared with the ten comparator, Western European countries. Surprisingly, as Table 4 below shows, Polish academics rank the lowest only in four out of 16 parameters of internationalization studied. All of them are research-related, and strongly correlated with the availability of resources. The areas of lagging-behind are the following: international research orientation (Poland is the only country in which the majority of academics is *not* internationally oriented in

research); intense publishing in a foreign country (at least a half of one's academic works – but not at least a quarter of one's academic works); publishing in a foreign language; and employing in research primarily English.[2]

In most parameters, Poland scores below the European mean. In teaching, Poland is one of the three countries in which less than 60 percent of academics emphasize international perspectives or contents, together with Finland and Germany. Also the share of Polish academics whose most graduate students are international is one of the lowest in Europe (together with Italy and Portugal). In research, Poland is the only country in which less than a half of academics indicate that their primary research is international in scope or orientation. Only slightly more than a half of Polish academics report collaborating with international colleagues in research (compared with the European average of about two-thirds).

[2] Here and below, the UK and Ireland are sometimes disregarded as comparator countries due to the predominance of Anglophone journals and books in the channels of international research distribution.

Table 4. Various international activities, academics employed full-time in universities, by country (some answers from 1 to 5 on a five-point Lickert scale, answers 1 and 2, “strongly agree” and “agree”, “very much” and “much” combined), in percent.

The percentage of academics...

	PL	**DE**	**AT**	**FI**	**IE**	**IT**	**NL**	**NO**	**PT**	**CH**	**UK**	**Mean**
who emphasize international perspectives or content in their courses	58.0	57.0	74.6	51.4	84.5	61.1	62.7	64.1	81.5	-	61.8	65.7
whose most graduate students are currently international	2.0	4.4	9.0	8.8	20.5	1.9	33.1	9.4	1.8	20.1	36.7	13.4
who employ in teaching primarily English	6.0	5.1	11.6	18.5	-	4.0	46.8	9.2	2.6	16.6	98.0	21.8
teaching any courses abroad	15.8	9.4	23.3	15.0	19.1	13.7	14.9	22.1	7.4	22.2	12.8	16.0
teaching any courses in a foreign language	35.6	24.0	42.2	50.0	6.5	23.9	60.0	61.5	18.0	43.9	3.6	33.6
whose primary research is international in scope or orientation	45.8	53.7	65.7	62.5	72.0	75.1	81.7	66.6	57.4	64.8	64.1	64.5
collaborating with international colleagues in research	51.1	50.8	78.7	73.0	79.7	59.6	80.8	61.4	52.2	75.4	69.1	66.5
who employ in research primarily English	37.1	51.7	64.9	69.9	-	64.9	75.2	55.6	63.5	75.5	96.7	65.5
publishing in a foreign country (>25%)	58.7	57.2	71.7	64.9	66.6	55.4	-	67.6	68.3	64.4	38.2	61.3
publishing in a foreign country (>50%)	38.9	42.1	59.9	53.8	53.2	46.3	-	57.6	51.9	55.2	20.2	47.9
publishing in a foreign language (>25%)	71.8	75.3	72.7	69.9	2.9	67.3	90.2	85.3	65.9	68.6	2.9	61.2
publishing in a foreign language (>50%)	50.7	59.9	61.1	59.3	1.4	58.4	82.5	74.5	48.1	57.1	2.0	50.5
publishing works co-authored with colleagues located in other countries (>25%)	24.1	24.0	35.6	26.3	28.8	21.3	41.7	29.6	25.7	38.6	22.3	28.9
publishing works co-authored with colleagues located in other countries (>50%)	12.3	9.1	16.4	12.4	12.4	9.9	21.2	13.0	8.8	19.4	7.7	13.0
whose research external funding comes from international organizations	24.1	9.8	19.9	11.6	15.4	12.4	20.8	8.5	21.2	10.2	16.7	15.5
who spent in other countries since the award of their first degree at least two years	20.6	14.9	28.3	20.0	48.2	24.6	29.7	27.7	17.9	39.9	30.2	27.5

“-“ – missing data; “mean” is the average of the country means.

For three publication-related variables of internationalization, two separate thresholds were used in the analysis: at least 25 percent and at least 50 percent of one's academic works. The variables refer to publishing in a foreign country, publishing in a foreign language, and publishing works co-authored with international colleagues. The results for Poland are far better than expected: low research orientation does not seem to lead to low international research production, with strong disciplinary variations, as discussed below.

Polish academics report the lowest share of intense (more than 50 percent of their works) publishing abroad; but in terms of less intense (more than 25 percent of their work) publishing abroad, they on average do better than both German and Italian academics. They also do relatively well in less intense publishing in a foreign language (at least 25 percent of their works): they on average do better than German, Italian, Portuguese, as well as Finnish and Swiss academics; they lag behind in intense publishing in a foreign language (at least 50 percent of their works), together with Portuguese academics. In the case of the proportion of academics who are publishing at least one fourth and at least a half of their works as co-authored with colleagues from other countries, Poland scores better than Germany, Italy, and Portugal, although is slightly below the European average. In the case of intense international co-authorship, Poland fares relatively well (12.3 percent of academics), and better than the United Kingdom, Germany, Italy, and Portugal, the only four European countries with the proportion below 10 percent. Polish academics are also well-internationalized in terms of their international experiences abroad: slightly more than one fifth of all Polish academics spent at least two years abroad since their graduation, more than academics in Germany (14.9 percent), Portugal (17.9 percent) and equal to Finland (20 percent).

Thus in general terms: in their teaching, Polish academics more often (16 percent) teach courses abroad than their German, Finnish, Italian, Dutch, Portuguese and British colleagues and more often teach courses at home in foreign languages than their German, Italian, and Portuguese colleagues. In their research, they are less internationally research-oriented but they fare relatively well in both international publishing and international co-authorship of publications. Poland is not lagging behind in the lower concentration of publishing in a foreign language (threshold: 25 percent), in both the lower and the higher concentration of internationally co-authored publications (thresholds: 25 and 50 percent), and in long-term international experience. These are dimensions of internationalization on which Poland can build in the future.

3. Internationalization: “hard” and “soft” clusters of academic fields

Burton Clark’s matrix (1983: 28ff.) emphasizes that the academic work is embedded in both institutional and disciplinary settings. There are powerful linkages between academic cultures (the “tribes”) and disciplinary knowledge (their “territories”), and individual’s powerful sense of belonging to his or her academic tribes (Becher and Trowler 2001).

In our cross-disciplinary analysis, all academic fields used in the survey instrument were grouped into two broad clusters: “soft” and “hard” fields (following Rostan 2012). Soft fields include “teacher training and education science”, “humanities and arts”, “social and behavioral sciences”, “business and administration, economics”, and “law”; and hard fields include: “life sciences”, “physical sciences, mathematics, computer sciences”, “engineering, manufacturing and construction, architecture”, “agriculture”, “medical sciences, health related sciences, social services”, and “personal services, transport services, security services” (all cases indicating “other” as a current academic unit were removed from the analysis).

Cross-disciplinary differences for Poland in various aspects of internationalization are striking. We shall discuss them briefly using 11 variables, three of them in two versions: for the 25 and 50 percent thresholds. Consistently with research literature on disciplinary differences in academic collaboration in general (Lee and Bozeman 2005, Shin and Cummings 2010), and in international academic collaboration in particular (Abramo et al. 2011, Smeby and Trondal 2005), and following a clear pattern for all other European countries, Polish academics in soft fields are much more internationalized in teaching than in research. The proportion of Polish academics who are teaching courses abroad is twice as high in soft fields compared with hard fields: about two in ten academics in soft fields are teaching abroad, in contrast to only about one in ten in hard fields. Also a three times higher proportion of academics in soft fields are teaching primarily in English. In research, while Polish academics in hard fields are actually collaborating more intensively with international colleagues, as in the vast majority of the countries studied, and are using English as a language for research much more intensively, their international research orientation is actually lower than the orientation of academics in soft fields.

In terms of differences in international publishing, the Polish publishing pattern fits perfectly European patterns as shown in our research and it is consistent with results from previous research (Shin and Cummings 2010 for South Korea, Cummings and Finkelstein 2012 for the USA, Lewis 2013 for Australia, New Zealand and the UK, and Abramo et al. 2009 for Italy). Polish academics from hard fields are consistently more internationalized than their colleagues from soft fields across all three parameters (publishing abroad, publishing in a foreign language, and publishing with international colleagues) and at both lower (25 percent) and higher (50 percent) thresholds. The difference between hard and soft fields is in the 25-30 pp. range in the case of publishing abroad, in the 30 pp. range in the case of publishing in a foreign language, and in the 15-25 pp. range in the case of international co-authorship. In particular, the proportion of academics whose at least 25 percent of publications and at least 50 percent of publications are internationally co-authored is more than three times higher in hard fields. While about 19 percent of Polish academics show high intensity of international co-authorship, the same parameter for soft fields is only 5.6 percent. The differences are striking but not different than in other European countries studied. Surprisingly in the context of low international research orientation, in all three publication-related parameters, Polish academics in hard fields are almost at the European average or above it, and in soft fields Polish academics are about the average.

4. Internationalization, research productivity and publication co-authorship across academic fields: “internationalists” and “locals”

The relationship between international cooperation and research productivity have been widely discussed, with a general assumption that collaborative activities in research increase research productivity (Teodorescu 2000, Godin and Gingras 2000, Lee and Bozeman 2005, He et al. 2009, Shin and Cummings 2010, and Abramo et al. 2011). But as Sooho Lee and Barry Bozeman (2005: 673) pointed out, “despite the ubiquitous nature of collaboration in science, the benefits of collaboration are more often assumed than investigated. … Do those who collaborate more tend to have more publications?”. Very much so, as we shall show. We shall analyze two specific aspects of internationalization in research: first, the correlation between international academic cooperation in research and academic productivity (following Teodorescu’s 2000: 206 definition of research productivity as a “self-reported number of journal articles and chapters in academic books that the respondent had published in the three

years prior to the survey") and, second, the correlation between international academic cooperation in research and the co-authorship of publications with international colleagues, both at the aggregated European level and at a Polish national level, across five major clusters of academic fields.[3]

The first question is thus how strongly international collaboration in research is correlated with higher than average research productivity and whether the relationships hold across all academic disciplines? Responses to the question "How many of the following scholarly contributions have you completed in the past three years?" with the number of "articles published in an academic book or journal" were analyzed. The analysis was conducted with reference to two separate groups of academics, termed "internationalists" and "locals" here. One group was academics indicating their involvement in international research collaboration and the other group was academics indicating their lack of involvement in it. The independent samples t-Test was used: it is a parametric statistical test used for testing a null hypothesis of equality of the means in two independent subpopulations (if a hypothesis concerns more than two subpopulations, one-way ANOVA is used).

Across all clusters of academic fields, the difference in productivity rates between European "internationalists" and "locals" is statistically significant (see Table 5 below). "Internationalists" had published on average substantially more articles in academic books or journals than their colleagues in the same academic field who were recently *not* collaborating internationally. "Internationalists" across all academic fields had published on average about twice as many articles as "locals", with a large differentiation between academic fields. In some academic fields, "internationalists" produced on average about 140 percent (engineering) and about 120 percent (physical sciences, mathematics) more articles, while in others (humanities and social sciences, and professions), they produced about 70 percent more articles in the reference period.

[3] The clusters of academic fields studied here are the following: "life sciences and medical sciences" (termed "life sciences" and "medical sciences, health-related sciences, social services" in the survey instrument), "physical sciences and mathematics" ("physical sciences, mathematics, computer sciences"), "engineering" ("engineering, manufacturing and construction, architecture"), "humanities and social sciences" ("humanities and arts" and "social and behavioral sciences"), and "professions" ("teacher training and education science", "business and administration, economics", and "law").

Table 5. Articles published by **European** academics in an academic book or journal by international collaboration and academic fields.

Academic field	International collaboration	N	Mean no. of articles	SE	95% confidence interval for mean		t-test for Equality of Means	df	p-value
					LB	UB			
Life sciences and medical sciences	Yes	1542	8.80	0.28	8.26	9.34	11.27	2293.69	<0.001
	No	837	4.91	0.21	4.50	5.32			
Physical sciences. mathematics	Yes	887	8.13	0.34	7.46	8.80	10.17	1069.66	<0.001
	No	301	3.74	0.26	3.22	4.25			
Engineering	Yes	502	6.97	0.54	5.92	8.03	6.76	696.67	<0.001
	No	335	2.91	0.27	2.38	3.44			
Humanities and social sciences	Yes	1249	6.61	0.27	6.09	7.13	8.24	1936.99	<0.001
	No	749	3.89	0.20	3.50	4.27			
Professions	Yes	503	6.85	0.35	6.15	7.54	6.04	901.80	<0.001
	No	455	4.12	0.28	3.35	4.60			

Table 6. Articles published by **Polish** academics in an academic book or journal by international collaboration and academic fields**.**

Academic field	International collaboration	N	Mean no. of articles	SE	95% confidence interval for mean		t-test for Equality of Means	df	P
					LB	UB			
Life sciences and medical sciences	Yes	290	4.56	0.37	3.83	5.28	3.06	524.44	0.002
	No	239	3.07	0.32	2.45	3.69			
Physical sciences, mathematics	Yes	123	3.64	0.49	2.67	4.62	4.33	168.14	<0.001
	No	47	1.15	0.30	0.56	1.75			
Engineering	Yes	11	8.42	2.85	2.05	14.78	2.19	11.20	0.050
	No	30	1.95	0.76	0.41	3.5			
Humanities and social sciences	Yes	262	5.28	0.38	4.52	6.03	4.07	480.06	<0.001
	No	290	3.36	0.27	2.83	3.9			
Professions	Yes	57	5.70	0.94	3.82	7.59	1.13	93.37	0.262
	No	92	4.47	0.55	3.39	5.56			

An analysis of the Polish subsample (Table 6 above, N = 1,441) shows an almost identical cross-disciplinary pattern of research productivity being strongly correlated with international research collaboration. Across four out of five clusters of academic fields, the difference in productivity rates between Polish "internationalists" and Polish "locals" is statistically significant, although at different levels. The only academic field that does not statistically follow the pattern at a significant level is professions (defined as comprising "teacher training and education science", "business and administration, economics", and "law" in the survey instrument). Polish academics are less internationalized in all academic fields but cross-disciplinary differences in internationalization are much higher than in comparator countries. Only academics in physical sciences and mathematics are collaborating with international colleagues to an almost equal degree (on average about three fourth of the subsample). In life sciences and medical sciences, the proportion is about 55 percent and in humanities and social sciences about 48 percent. The two most internationalized clusters of fields are the same in Europe and in Poland: "physical sciences, mathematics" and "life sciences and medical sciences".

Polish academics involved in international collaboration on average publish more articles than those not involved, across all academic fields. In particular, in engineering, they publish on average more than four times more (332 percent) articles, in physical sciences and mathematics three times more (217 percent), and in life sciences and medical sciences almost 50 percent more than their internationally-non collaborating colleagues. The difference between average publication rates for "internationalists" and for "locals" is much higher in the case of Polish academics: consequently, it can be inferred that international collaboration has a more powerful impact on productivity in countries which are only entering European and global research communities.

The second aspect of internationalization studied here is the difference in the proportion of internationally co-authored publications between the subsample of "internationalists" and the subsample of "locals", both in Europe and in Poland. In our analysis, the difference is statistically significant at a high level (p-value< 0.001) across all clusters of academic fields. While research productivity was analyzed above in correlation with international collaboration across different academic fields, here the intensity of international publication co-authorship is analyzed in correlation with international collaboration across academic fields.

At an aggregated European level, the differences between “internationalists” and “locals” are consistent across all clusters of academic fields. To sum them up: “no international collaboration, no international co-authorship”. The average proportion of internationally co-authored publications for “internationalists” differs across academic fields (see Table 7 below): consistently with previous research which links international research collaboration with higher research productivity across disciplines (Shin and Cummings 2010), it is the highest for physical sciences and mathematics and the lowest for humanities and social sciences and professions. There is a powerful relationship between being involved in international cooperation in research and international co-authorship of articles in books and journals. The difference between “internationalists” and “locals” is huge: the average proportion of internationally co-authored publications for “internationalists” is 5-7.5 times higher. The pattern is consistently similar for all academics across all academic fields studied. Those not collaborating internationally produce only a marginal percentage of their publications as co-authored with colleagues from other countries. Only a negligible fraction of publications from nationally isolated science (produced by “locals”) can be internationally co-authored, and internationally co-authored publications are strictly related to collaborative activities with international colleagues.

An analysis of the Polish subsample (Table 8 below, N= 935), as in the case of research productivity correlated with international cooperation above, shows an almost identical cross-disciplinary pattern for international publication co-authorship correlated with international collaboration. Across all five clusters of academic fields, the difference in percentages of internationally co-authored publications between “internationalists” and “locals” is statistically significant mostly at a very high level (p-value< 0.001). Academics in all academic fields follow the pattern of a substantial “internationalists”/”locals” differential.

Amazingly, Polish “internationalists” are more internationalized (that is, have a higher proportion of internationally co-authored publications) than European “internationalists” in all academic fields except humanities and social sciences where they are slightly below the European average. There are also no big differences between Polish and European averages for “locals” except that Polish “locals” in physical sciences and mathematics have on average twice as high a proportion of internationally co-authored publications as their European colleagues. Thus the European pattern not only holds in Poland, it is even stronger there:

while the multiplication factor between “internationals” and “locals” for European academics is on average between 4 and 7.5, the same factor for Polish academics is between 4 in physical sciences and mathematics and 12.5 in life sciences and medical sciences.

Table 7. Percentage of articles by **European** academics published in an academic book or journal coauthored with colleagues located in other (foreign) countries, by international collaboration and academic field (in percent).

Academic field	International collaboration	N	Mean percentage of articles	SE	95% confidence interval for mean		t-test for Equality of Means	df	p-value
					LB	UB			
Life sciences and medical sciences	Yes	1373	34.67	0.89	32.92	36.42	24.24	2029.05	<0.001
	No	699	6.69	0.73	5.25	8.13			
Physical sciences. mathematics	Yes	818	41.00	1.23	38.60	43.40	20.48	833.11	<0.001
	No	266	6.16	1.18	3.85	8.47			
Engineering	Yes	479	25.02	1.34	22.40	27.64	10.29	743.83	<0.001
	No	283	6.57	1.19	4.23	8.91			
Humanities and social sciences	Yes	1109	14.20	0.70	12.83	15.57	13.86	1698.49	<0.001
	No	594	2.39	0.49	1.43	3.35			
Professions	Yes	461	19.14	1.25	16.70	21.58	12.00	654.00	<0.001
	No	374	2.54	0.60	1.36	3.72			

Table 8. Percentage of articles by **Polish** academics (universities only) published in an academic book or journal coauthored with colleagues located in other (foreign) countries, by international collaboration and academic fields.

Academic field	International collaboration	N	Mean percentage of articles	SE	95% confidence interval for mean		t-test for Equality of Means	df	P
					LB	UB			
Life sciences and medical sciences	Yes	174	42.77	2.63	37.61	47.93	13.46	247.87	<0.001
	No	156	3.43	1.27	0.94	5.92			
Physical sciences. mathematics	Yes	72	44.42	4.48	35.64	53.20	4.54	65.54	<0.001
	No	30	11.38	5.74	0.14	22.62			
Engineering	Yes	7	66.07	16.92	32.91	99.23	3.62	6.51	0.010
	No	18	3.12	4.10	-4.91	11.15			
Humanities and social sciences	Yes	174	13.55	2.24	9.16	17.94	5.16	207.08	<0.001
	No	199	1.43	0.71	0.04	2.82			
Professions	Yes	39	21.58	5.30	11.18	31.98	3.23	50.91	0.002
	No	66	3.16	2.11	-0.98	7.30			

5. Conclusions

Our study clearly shows that the Polish academic community is relatively well internationalized today: there are no substantial differences between Poland and the ten European comparator countries. Poland is the least internationalized system in only several research-related parameters but the differences are not dramatic. Polish international publishing patterns fit well European patterns: Polish academics from hard fields are consistently more internationalized than their colleagues from soft fields across all major publishing parameters, and this pattern is not different from other European countries studied. While in terms of research productivity, both Polish "internationals" and "locals" are less productive than their European colleagues, somehow surprisingly in the context of the overall low international research orientation, in terms of the share of internationally co-authored publications, Polish academics in hard fields are above the European average, and in soft fields they are about the average.

Our study also shows that research productivity of Polish academics (again following European patterns) is strongly correlated with international research collaboration: the average research productivity rate of Polish academics involved in international collaboration ("internationalists") is consistently higher than the rate of Polish "locals" in all academic fields (by between 60 and 140 percent). Polish academics are less internationalized in research than the European average but the productivity rate of Polish "internationalists" on average is much higher than the productivity rate of Polish "locals". The impact of international collaboration on average productivity rates across all academic fields is much higher in Poland than in the European countries studied. International publication co-authorship is also powerfully correlated with international research collaboration: the average international co-authorship rate is between five and seven and a half times higher for Polish "internationalists" than for Polish "locals", depending on the academic field. Surprisingly, regarding international co-authorship, Polish "internationalists" are more internationalized than the European average in almost all academic fields. The European pattern of a higher proportion of internationally co-authored publications for academics collaborating internationally in research compared with those not collaborating internationally holds strongly in Poland: while the multiplication factor between "internationals" and "locals" for

European academics is on average between 4 and 7.5, the same factor for Polish academics is considerably higher, from 7 to 13.

In the context of Polish reforms which highlight the role of international publications, the results of the present study imply a powerful policy conclusion: more international cooperation is the best way to have more internationally visible national research output. And in a specific case of publishing in co-authorship with international colleagues, the policy lesson is even simpler: "no international collaboration, no international co-authorship". Polish academics involved in international collaboration differ much less from their European colleagues involved in international collaboration in terms of patterns of research productivity than commonly assumed; the problem is the lower research productivity of academics not involved in international collaboration and a very high percentage of consistent non-publishers in the university sector (43 percent). Recent reforms (2009-2012) resort strongly to new internationalizing mechanisms, though: through revised institutional research assessment exercises (termed "parametrization") closely linked to an institutional funding stream, through revised preconditions of access to individualized competitive research funding, and through changed requirements for academic promotions. In all three areas, the internationalization of research as analyzed above is as important as never before.

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References

Abramo, Giovanni, Ciriaco Andrea D'Angelo and Flavia di Costa (2009). "Research Collaboration and Productivity: Is There Correlation?". *Higher Education.* 57. 155-171.

Abramo, Giovanni, Ciriaco Andrea D'Angelo and Marco Solazzi (2011). "The Relationship between Scientists' Research Performance and the Degree of Internationalization of Their Research". *Scientometrics*. 86. 629-643.

Becher, Tony and Paul R. Trowler (2001). *Academic Tribes and Territories.* Second edition. Maidenhead: Open University Press.

Clark, Burton R. (1983). *The Higher Education System. Academic Organization in Cross-National Perspective*. Berkeley: University of California Press.

Cummings, William. K and Martin J. Finkelstein (2012). *Scholars in the Changing American Academy. New Contexts, New Rules and New Roles.* Dordrecht: Springer.

Godin, Benoit and Yves Gingras (2000). “Impact of Collaborative Research on Academic Science”. *Science and Public Policy*. 27(1). 65-73.

He, Zi-Lin; Geng, Xue-Song; Campbell-Hunt, Colin (2009). “Research collaboration and research output: A longitudinal study of 65 biomedical scientists in a New Zealand university”. *Research Policy*. 38(2). 306-317.

Knight, Jane (2012). “Concepts, Rationales, and Interpretive Frameworks in the Internationalization of Higher Education”. In: Darla K. Deardorff, Hans de Wit, John D. Heyl and Tony Adams, eds. *The SAGE Handbook of International Higher Education*. London: SAGE. 27-42.

Kwiek, Marek (2001a). “Social and Cultural Dimensions of the Transformation of Higher Education in Central and Eastern Europe”. *Higher Education in Europe*, vol. XVI, no. 3, Fall 2001. 399-411.

Kwiek, Marek (2001b). “The Internationalization and Globalization of Higher Education in Central and Eastern Europe”. *Society for Research into Higher Education International News*, No. 47. 3-5.

Kwiek, Marek (2011). “Creeping Marketization: Where Polish Public and Private Higher Education Sectors Meet”. In: Roger Brown, ed. *Higher Education and the Market*. New York: Routledge. 135-145.

Kwiek, Marek (2012a). “Universities and Knowledge Production in Central Europe”. *European Educational Research Journal*. 11(1). 111-126.

Kwiek, Marek (2012b). “Changing Higher Education Policies: From the Deinstitutionalization to the Reinstitutionalization of the Research Mission in Polish Universities”. *Science and Public Policy*. Vol. 39. 641-654.

Kwiek, Marek (2013a). *Knowledge Production in European Universities. States, Markets, and Academic Entrepreneurialism*. Frankfurt and New York: Peter Lang.

Kwiek, Marek (2013b). “From System Expansion to System Contraction: Access to Higher Education in Poland”. *Comparative Education Review.* 57(3). 553-575.

Lee, Sooho and Barry Bozeman (2005). “The Impact of Research Collaboration on Scientific Productivity”. *Social Studies of Science*. 35(5). 673-702.

Lewis, Jenny M. (2013). *Academic Governance. Disciplines and Policy*. New York: Routledge.

RIHE (2008). *The Changing Academic Profession over 1992-2007: International, Comparative, and Quantitative Perspective.* Hiroshima: RIHE.

Rostan, Michele (2012). "Beyond Physical Mobility: Other Ways to Internationalise the Academic Profession". In: Vukasovic, M., Maassen, P., Stensaker, B., Nerland, M., Pinheiro, R. and A. Vabø, eds. *Effects of Higher Education Reforms: Change Dynamics*. Rotterdam, Sense. 241-260.

Rostan, Michele, Flavio A. Ceravolo and Amy Scott Metcalfe (2014). “The Internationalization of Research”. In: Futao Huang, Martin Finkelstein and Michele Rostan, eds. *The Internationalization of the Academy. Changes, Realities and Prospects*. Dordrecht: Springer: 119-144.

Shin, Jung Cheol and William K. Cummings (2010). “Multilevel Analysis of Academic Publishing Across Disciplines: Research Preference, Collaboration, and Time on Research”. *Scientometrics.* 85. 581-594.

Smeby, Jens-Christian and Jarle Trondal (2005). “Globalisation or Europeanisation? International Contact among University Staff”. *Higher Education*. 49. 449-466.

Teichler, Ulrich and Ester Eva Höhle (2013). *The Work Situation of the Academic Profession in Europe: Findings of a Survey in Twelve Countries*. Dordrecht: Springer.

Teodorescu, Daniel (2000). “Correlates of faculty publication productivity: A cross-national analysis”. *Higher Education*. 39. 201-222.