# UNDERSTANDING ACADEMICS' POPULAR SCIENCE PUBLISHING: INSTITUTION CULTURE AND MANAGEMENT STYLE EFFECTS

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**Abstract**

Most universities and higher education systems have formally taken up a third mission, which involves various public outreach and engagement activities. Little is known regarding how higher education institutions' organisations interact with academic's level of public outreach. This article examines to which extent the perceptions academics have of their institutions' culture and management style, as well as some of their own individual and statutory characteristics interact with their level of public outreach. Using the Academic Profession in Europe comparative and quantitative research database, this article focuses on two countries on the extremities of the spectrum – Switzerland and the United Kingdom.

**Keywords:** university third mission, popular science publishing, academics' perceptions of institution, United Kingdom, Switzerland

## 1. INTRODUCTION

For a long time, scientists have interacted with society: contributing to local, regional and national development, answering societal needs, moving at the forefront of the public sphere for informing, explaining or debating on scientific issues, etc. Since the 1980s, in a general context of higher education massification, shifts in the relationship between science and society, particularly in line with controversial scientific developments, have led the academic profession to reconsider its role in society. The new social contract with science implies that “science must leave the ivory tower and enter the agora,” that is to say “the public space in which 'science meets the public'” (Gibbons 1999: 84). The related new production of knowledge implies producing knowledge in the context of its applications, in particular to problems in society (Gibbons, Novotny & Limoges 1994). These changes drive many scientific institutions or countries to encourage scientists to be more open towards society.

The development of this third mission appears as part of a broader rethinking of the roles of higher education and raises at least two issues. The first concerns the responsibility of this engagement, responsibility that appears to vary depending on the national contexts and traditions between an institutional one (as in the Danish case) and an individual one (as in the Norwegian one). The second issue deals with its potential consequences on the (re)definition of academic activities.

Academics are expected to accomplish many tasks in their work; if the tasks related to teaching and research are increasingly defined by the specification of formal and informal norms, the tasks related to society are more vague.

How does the affirmation of the third mission as a necessary mission of higher education institutions and academics impinge on the organisation of the academic profession and on the division of labour? Are some academics more likely to engage compared to others? In addition, which organisational contexts appear more favourable to the development of such activities?

In the context of science communication, studies analysing barriers and incentives of engagement and factors affecting willingness to engage have flourished (Royal Society 2006; Polyakoff & Webb 2007; Jensen et al 2008; Bentley & Kyvik 2011; Crettaz von Roten 2013, Culum, Turk & Ledic 2014). However, the range of research questions and hypotheses studied can be nourished by adopting an interdisciplinary approach, in particular by involving the higher education field, considering that

> *As systems of higher education become more complex, the academic profession inescapably becomes more differentiated. […] The academic profession is thereby systematically layered. […] In all cases, the sectors differentiate the work and careers of academics. (Clark 1987: 377-378).*

This article is an attempt to bridge the disciplinary gap by bringing together questions related to science communication, sociology of work and sociology of organisations. Based on the European quantitative project, the Academic Profession in Europe (EuroAC), which includes an item on popular science publishing, this article is aimed at questioning what the profile of scientists doing popular publications reveals of the third mission inner dynamic and how the higher education institutions as organisations impinge on the possibility to do public outreach activities is.

In this article, we first document the national diversity with statistics related to popular articles and then relate the practice with attitude towards Gibbon's mode 2 knowledge. In a second stage, we select two countries on the extremities of the spectrum of public outreach – Switzerland (CH) and the United Kingdom (UK) – to examine the influence of new factors: the views academics have of their institution, in particular considering institutional culture and management style.

## 2. MATERIAL AND METHOD

### Procedure

This article is based on a survey of academics conducted between 2007 and 2010 in twelve European countries (Austria, Croatia, Finland, Germany, Italy,

Ireland, the Netherlands, Norway, Poland, Portugal, UK and Switzerland) (Höhle & Teichler 2012). These countries implemented a large-scale online survey of scientists, composed of academics who were employed for at least 50% of their working time at an institution of higher education for teaching and/or research purposes.

**Measures**

Practices of public outreach were measured by the number of popular articles for newspapers or magazines written by the respondent in the last three years. Attitude towards Gibbon's mode 2 knowledge was measured by one variable – obligation – recoded as 1 if the respondent agreed that the "Faculty in my discipline has a professional obligation to apply their knowledge to problems in society", as zero elsewhere.

Fourteen five-point items ranging from "strongly disagree" to "strongly agree" measured visions of the institutions. At my institution, there is […] "a strong emphasis on the institution's mission", "a strong performance orientation", etc. Individuals with four or more "Don't know" answers in the series were excluded from the multivariate analysis.

The explanatory factors are gender, age recoded into three categories – up to 30 years, 31 to 40 and older than 41 years (reference category) –, status recoded into junior and senior researchers[1] (with a more detailed categorisation for the two countries' comparison) and discipline recoded in medical sciences, social sciences, humanities, technology and natural sciences (reference category).

**Analyses**

First, we carried out descriptive statistics. Then, to grasp the visions Swiss and UK academics have of their institutions, we compared the results on the fourteen items related to the institution and finally we undertook a logistic regression to stress the difference of visions between engaged and non-engaged Swiss scientists, with an iterative process (backward, likelihood ratio) to select the best subset of explanatory factors. SPSS 19.0 was used for the statistical analyses.

## 3. RESULTS

*Huge discrepancies related to engagement among countries*

Analysis of the data reveals a discrepancy between the rhetoric of public outreach and reality: popular science publishing is carried out by roughly a third of scientists but with wide national differences. Some countries stood out as very active: the Netherlands (49% of engaged academics and an average

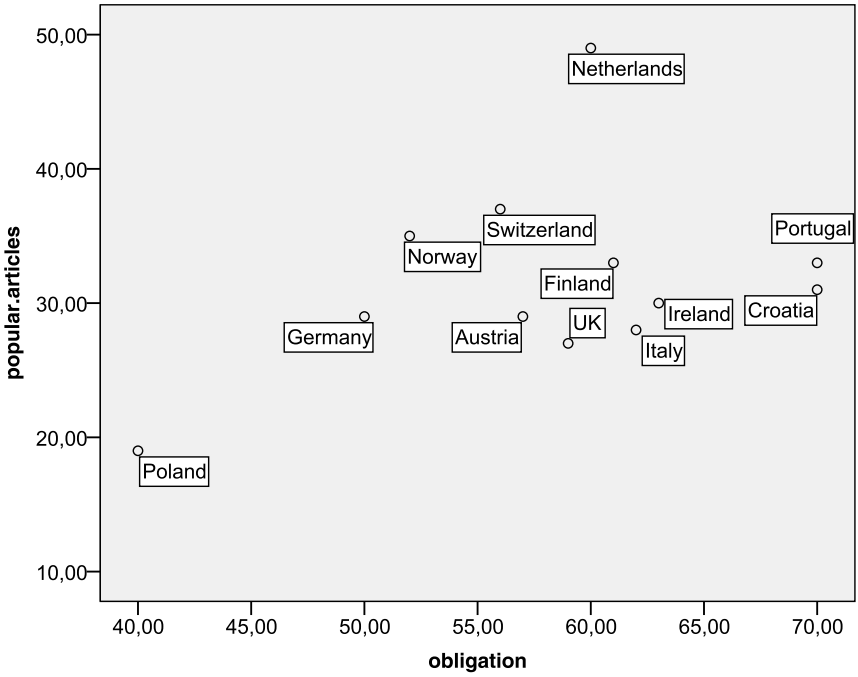
[1]The only possible common recoding of status among the different countries studied differentiates only junior and senior status.

of 1.8 popular articles per academic), Switzerland (37%, average of 1.2), whereas other countries have far fewer engaged academics: Italy (28%, average of 1.9) or UK (27%, with the lowest average, i.e. 0.7).

There is a pyramidal structure of popular science publishing in each country, with half of all popular articles being published by around 5% of scientists. The most active group of scientists is the smallest in Italy (2.5%) but the largest in Switzerland (7.3%). With percentages of academics publishing popular articles lower than 50%, we could estimate that we are far from achieving proper engagement. However, articles written by scientists represent only one type of public engagement activity. For example, in a survey realised by a Swiss university, a similar level for newspaper and magazine activities was found (around 40%) but when seventeen public outreach and engagement activities were taken into consideration, 88% of scientists fulfilled at least one activity (Crettaz von Roten 2011a). This result illustrates the influence of the activities included in the definition of public engagement.

Practice of popular science publishing may be more forward when scientists do research that has a close relationship with society. This relationship may be effective or only virtual. Some studies have focused on the classical link between attitudes and behaviours (Royal Society 2006; Crettaz von Roten 2011a). Figure 1 illustrates such a relationship at national level.

**Figure 1: Scatterplot between attitude (obligation to apply to societal problems) and behaviour (popular articles), in percent at country level**



Countries where a larger percentage of respondents feel they have an obligation to apply their knowledge to societal problems tend to have a higher percentage of respondents that write popular articles, and vice versa. However, with a similar percentage of academics feeling an obligation to apply (59% in the UK and 56% in CH), the percentage of academics who actually adopt that behaviour is much lower in the UK (27% against 37%). This heterogeneity of practices with similar appreciations of obligation, signals the influence of other factors.

To widen the understanding of scientists' popular science publishing, Crettaz von Roten (2013) has tested the influence of classical factors – gender, age, status, discipline – and shown that some countries have many significant factors (CH 4 factors) but other countries have fewer (UK 1 factor). This difference can be related to both the small size of the Swiss elitist HE system – and, consequently, of the academic profession – and the strong statutory differentiation of the latter, by comparison with the wide, massified and complex UK Higher Education sector. Indeed, the previous models explain a small part of the variation in the data (R2 reaches 0.05 for the UK and 0.21 for CH). Therefore, other explanatory factors must be found.

These results have reinforced our will to understand the differences in behaviours and have driven us to focus on two (particular) countries – one with a high percentage of scientists doing popular science publishing, the other with a lower percentage of scientists doing popular science publishing: Switzerland[2] and the UK.

*New explanation for willingness to do popular science publishing in two countries: the role of scientists' perception*

Academic institutions and professions are continuously changing and scientists have to cope with it in their daily lives. One would expect that these changes affect scientists' views of their institutions. Do these views (more specifically, on the management, administration and faculty involvement) influence scientists' popular publications practice?

Firstly, the global picture of scientists' perceptions in the two countries is depicted in table 1, which shows a broader consensus amongst UK academics regarding the characteristics of their higher education institutions compared with the Swiss one. In the former, four items received between 61 and 76% of agreement, while only two items obtained a slight majority (51%) in the latter. UK academics also differentiate collectively from their Swiss colleagues on the fact that they more often collectively disagree with the proposed characterisation of their institution: nearly half of them disagree that there is good communication between management and academics, and collegiality in the decision-making process.

[2]In the previous analyses, gender, discipline, age and status were significant in Switzerland when only discipline was significant in the UK.

This can be put in perspective with the development of a strong national policy, implemented in the UK since the 80s, while cantonal regulation and thus institutional organisation remains diverse in Switzerland.

**Table 1:** Scientists' perceptions of their institution, in percent in Switzerland and UK

| | Switzerland | | | UK | | |
|---|---|---|---|---|---|---|
| | Agree | Neither nor | Disagree | Agree | Neither nor | Disagree |
| A strong emphasis on the institution's mission | 40.7 | 30.1 | 21.1 | 61.6 | 28.1 | 9.8 |
| Good communication between management and academics | 31.6 | 28.6 | 37.5 | 22.8 | 28.3 | 48.8 |
| A top-down management style | 47.0 | 25.2 | 23.0 | 71.7 | 19.6 | 8.2 |
| Collegiality in decision-making processes | 36.3 | 29.0 | 32.9 | 20.6 | 30.9 | 47.9 |
| A strong performance orientation | 51.5 | 26.6 | 19.3 | 67.6 | 22.9 | 8.9 |
| A cumbersome administrative process | 47.1 | 25.3 | 22.8 | 76.1 | 17.5 | 5.8 |
| A supportive attitude of administrative staff towards teaching activities | 39.4 | 27.2 | 25.5 | 42.4 | 28.3 | 27.1 |
| A supportive attitude of administrative staff towards research activities | 50.9 | 23.0 | 21.5 | 32.5 | 34.8 | 29.4 |
| Professional development for administrative/management duties for individual faculty | 42.9 | 25.0 | 22.2 | 40.6 | 39.5 | 18.0 |
| Top-level administrators are providing competent leadership | 34.9 | 25.1 | 33.6 | 26.1 | 33.0 | 40.9 |
| I am kept informed about what is going on at this institution | 47.2 | 25.5 | 26.4 | 40.6 | 24.9 | 34.5 |
| Lack of problem | 26.4 | 26.6 | 37.1 | 41.7 | 39.1 | 18.3 |
| Students should have a stronger voice in determining policy that affects them | 24.0 | 36.0 | 35.9 | 30.1 | 38.8 | 29.7 |
| The administration supports academic freedom | 44.7 | 25.6 | 24.6 | 39.8 | 33.6 | 26.2 |

Category “Don't know”: difference to 100%.

Secondly, the perceptions displayed in table 1 suggest that both countries witness a strengthening of management and the administration process, an increase in pressure to perform and some discontent with the management style. A large majority of the academics in the UK identify a cumbersome administrative process, a top-down management style, a strong performance orientation and a strong emphasis on the institution's mission as characterising their institution. In Switzerland, a majority of scientists acknowledge a strong performance orientation and a supportive attitude of administrative staff towards research activities.

The smaller number of items agreed upon by Swiss academics, as well as the smaller share of the population agreeing; suggests that the strengthening of management and administration governance has been stronger in the UK, leading to some discontent with management style. This is consistent with the results of previous research on higher education governance that underlined a strong trend towards New Public Management in the UK, with the implementation of evaluation policies starting in the 80s, characterised by the introduction of the Research Assessment Exercise in 1986 and competition for student recruitment (Ferlie & Andresani 2009). As for Switzerland, governance changes have provided institutions with more autonomy, freeing them partly from their cantonal public authority. More precisely, we observe simultaneously *a reinforcement of an individual Higher Education Institutions' direction regarding academic activities and […] the redefinition of Higher Education and Research activities as a collective and political issue (Baschung et al. 2009: 153-154).*

Do the perceptions that academics have of their institutions as organisations impinge on their probability to do popular science publishing? In addition and more generally, if one considers that their perception echoes a reality of the organisation, does the organisation influence popular science publishing?

To answer these questions, we performed a logistic regression with eighteen explanatory factors[3] – four classical factors and the fourteen items linked to perceptions of institutions.

The first information that provides table 2 concerns the characteristics of the academic population that impinges on popular science publishing.

[3]To compare the two countries, we used the original status variable: five categories in Switzerland and four in the UK

## Table 2: Factors affecting scientists' popular science publishing

| | Switzerland | | | UK | | |
|---|---|---|---|---|---|---|
| | A | Exp(B) | Sig. | | | |
| Gender (1=male) | 0.374 | 1.454 | 0.027 | n.s. | | |
| Discipline | — | — | 0.001 | — | — | 0.011 |
| Medical sciences | 0.612 | 1.843 | 0.009 | -0.537 | 0.584 | 0.231 |
| Social sciences | 0.849 | 2.337 | 0.000 | 0.322 | 1.380 | 0.189 |
| Humanities | 0.757 | 2.131 | 0.0.02 | 0.044 | 1.045 | 0.873 |
| Technology | 0.333 | 1.395 | 0.181 | 1.340 | 3.821 | 0.000 |
| Status[a] | — | — | 0.015 | — | — | 0.026 |
| Status(1) | 1.266 | 3.548 | 0.000 | 0.699 | 2.011 | 0.061 |
| Status(2) | 0.506 | 1.658 | 0.152 | -0.098 | 0.907 | 0.783 |
| Status(3) | 0.618 | 1.855 | 0.012 | -0.239 | 0.787 | 0.496 |
| Status(4) | 0.732 | 2.079 | 0.018 | 0.053 | 1.054 | 0.886 |
| Status (5) | 0.584 | 1.794 | 0.044 | — | — | — |
| Age recoded | — | — | 0.001 | n.s. | | |
| low thru 30 years old | -1.104 | 0.331 | 0.000 | | | |
| 31 thru 40 years old | -0.292 | 0.747 | 0.152 | | | |
| Good communication between management and academics | -0.246 | 0.782 | 0.003 | n.s. | | |
| A top-down management style | n.s. | | | -0.254 | 0.776 | 0.014 |
| Collegiality in decision-making processes | n.s. | | | n.s. | | |
| A strong performance orientation | n.s. | | | 0.281 | 1.324 | 0.012 |
| A supportive attitude of administrative staff towards research activities | 0.255 | 1.290 | 0.001 | n.s. | | |
| Professional development for administrative/management duties for individual faculty | -0.163 | 0.849 | 0.023 | n.s. | | |
| The administration supports academic freedom | 0.144 | 1.154 | 0.056 | n.s. | | |

n.s.: not selected by the iterative process of the logistic regression in this country.
– : not available.

[a] *In Switzerland, the dichotomic variable status(1) differentiates Professor from other status, status(2) Professor of other types (assistant, associate, etc.), status(3) Researcher, status(4) Teacher, status(5) Higher mid-level faculty. In UK the dichotomic variable status(1) differentiates Professor from other status, status(2) Senior lecturer, researcher and reader, status(3) Lecturer, status(4) Researcher.*

In Switzerland, the four classical factors are significant. Male scientists are more likely to do popular publications than female ones, even when one controls status, discipline, age, etc. The chances of popular science publishing for academics under 30 years of age are also lower than for those over 40. Finally, the chances of professors ordinarius, researchers, teachers and higher mid-level faculty doing popular science publishing are higher than those of lower mid-level faculty. In the UK, only the status and the discipline are significant.

Indeed, when it comes to institutional organisation, in Switzerland, three items have a significant influence on the chance to engage. Agreeing that there is good communication or that there is professional development for administrative/management duties increases the chance to engage. However, agreeing that administration staff have a supportive attitude towards research activities decreases the chance to engage. This could suggest the importance of good interaction with the administration but also an increased pressure to do research that diverts academics from communication towards society.

In the UK, two items have a significant influence on engagement: agreeing that there is a top-down management style increases the chance of engagement but agreeing that there is a strong performance orientation decreases the chance of engagement. This last dimension has to do with the fact that engagement has little formal value in the academic's individual evaluation and, consequently engagement is perceived as conflicting with the other professional tasks for a large number of academics. In essence, two of the four views identified in table 1 as characteristics of the UK academics' institutional organisation appear to be significant regarding the probability to engage. Institutional organisation and engagement activities are therefore related. These results are consistent with those obtained by Burns and Squires (2011: 19, 22) on the UK case, underlying that the “slow moving bureaucratic”, the “tension between the increasing centralisation of university systems and the discretion to manage at the departmental level” weigh on the probability to engage.

How can one explain these differences? Why are some characteristics impinging on the probability to do popular science publishing in one country but not in the other? Several hypotheses can be made to conclude.

## 4. CONCLUSION

The research at the base of this article had the goal to widen the understanding of factors affecting willingness to do popular publications by adopting an interdisciplinary approach, mixing factors related to science communication studies and to higher education studies. Our analyses of EuroAC study have found promising results.

Firstly, public outreach is performed by scientists with huge variations in profile according to the country, which corroborates the findings of Bentley and Kyvik (2011). In every country, popular article writing displays a pyramidal structure that influences the visibility of scientists in the media (Bucchi 2002). These results have driven us to try to find explanations for the discrepancy for two cases, the UK and Switzerland. With 27% of scientists doing popular articles, the UK lies at the bottom of the hierarchy of countries, whereas with 37% Switzerland lies at the top. This difference may be due to different roles of higher education systems that could impinge on academic practices. Differences may have been smaller if we had compared academics from the small group of UK elitists' universities with those coming from Swiss Universities. The Swiss system is much more gendered than the UK system (Goastellec & Pekari 2013). It is thus not a surprise that being a woman influences the probability to do public outreach in Switzerland while this is not the case in the UK. Second, the Swiss Higher Education sector is also characterised by the inheritance of a chair system, with late access to the full professorship and thus correlation between status and age (Goastellec & Benninghoff 2011). At another level, the small size of the system limits the interaction between institutional belonging and individual characteristics: institutional diversity between universities is probably smaller than academics' individual characteristics. At the other end of the scale, the UK system is extremely complex and the diversity of institutions' history and positions within the system may partly neutralise the readability of individual characteristics. At a fourth level, it may have to do with the broader role devolved to the HE system. The Swiss system remains quite elite regarding one age group, in particular with regard to universities, while since the 80s UK universities have been largely massified. In this context, it is not surprising that the diversity of institutional situations in the UK clouds the reading of the academic's individual characteristics.

Secondly, the relation between disciplines and public outreach varies from country to country. In Switzerland, scholars from medical sciences, social sciences and humanities departments are significantly more likely to do public outreach than those in the natural sciences. In the UK, scholars from technology sciences are significantly more likely to do public outreach than those in natural sciences. This may have to do with a different history of the disciplines in each society but also with the fact that the pressure on the different disciplines to legitimate the spending of public funds has been more accurate in Switzerland during the last two decades. In a context in which universities only serve a small proportion of the population, they are under more public and media scrutiny. Indeed, in Switzerland, the relationship between science and society was put at stake more and more in the last forty years, by various initiatives concerning science (Crettaz von Roten 2011b). For example, in 1998 an initiative on genetic engineering gave rise to controversial public debates and strongly mobilised the scientific community to participate more actively in science communication.

Institutions were created to pursue the debate between science and society and many initiatives were proposed (Swiss science festival, consensus conferences, science cafés, etc.).

Of course, the UK is not exempt from such questioning. Since the 1980s, scientific institutions in the UK worried about negative public perceptions regarding science (Bodmer report 1985; House of Lords 2000) and set up national discussions about how to restore public confidence in science and how to build engagement in sciences through various activities. In 2009, five independent groups of experts were created to extend the analysis on issues revealed by these discussions (Gaskell & Holden 2011). A number of deliberative projects were implemented to foster engagement with the public upstream. However, both the size of the HE system and the NPM governance trend may have more powerful effects than the discussions on engagement, as illustrated by the impact of the views academics have of their HEI organisation on their probability to do public outreach.

Thirdly, some organisational context appears more favourable to the development of public outreach, which corroborates the finding of Culum et al. (2014), showing more broadly that academic engagement in community service is linked with the institution's organisation. As we have shown, supportive attitude of administration staff towards research activities decreases the chance to do public publications, which suggests a possible division of labour between the administration and academics, the latter focusing on research and the former being in charge of communication. However, the division of labour also takes place between academics. What is observed in the Swiss case can be analysed as the emanation of a Matthew effect (Merton 1968): most of the academics who do public outreach are at the very top of the academic hierarchy, i.e. old male, ordinary professors. This can be explained at two levels: first, because media tends to principally contact academics depending on their status and gender, thus reinforcing the structure of the academic profession and the domination of a happy few. The significant gender effect is in line with the gendered logic of the Swiss media reported amongst others by Durrer, Jufer and Pahud (2009). Secondly, research on recruitment processes have shown that engagement towards society tends to be valued in the case of a male portfolio but criticised when part of a woman's portfolio (Bureau de l'égalité 2007). In the division of labour, people of status keep higher status tasks at the core of jurisdiction. According to Abbott (1988), the converse is also true. In this sense, our results indicate that public outreach is not considered culturally peripheral.

Finally, the public outreach of academics can be hypothesised as linked to several intertwined elements of the HE system that allows us to generalise our findings:

1. The size of the system; the larger the system is the smaller the proportion of scientists that do public outreach. This could have to do with a reduced public visibility of academics in the UK in comparison with Swiss academics that may be considered more as public personages. In relation with both the smaller size of the academic profession (very small numbers of ordinary professors, high prestige) and the geographical proximity to the HE public authority: Swiss academics are considered accountable by both the Cantonal authorities and the Cantonal societies.

2. The type of public authorities: as recalled by Laredo (2007: 450) "More often than not, expectations about the third mission are linked with local development issues". This could add an explanation to the UK-Swiss divide, Switzerland being characterised by a regional public authority and thus, institutional control, while the UK has since 1992 turned the formally regional polytechnics into nationally managed universities, leading to an increased nationalisation of the HE system.

3. The position of the academic profession in its society can add to the understanding of the probability to engage. This also relates to their social and economic prestige that appears to vary when it comes to salaries. Although UK academic salaries have been increased during the last decades, Swiss academics remain much better paid, when comparing the average academic salary at public universities by rank in percentage of the GDP per capita. In Switzerland, top rank academics have an average salary that constitutes 315% of the GDP per capita compared with 263% in the UK and the difference is even higher when comparing the other academic ranks (Altbach et al. 2012; NZZ, 2012).

4. The time dedicated to the other tasks attributed to the academic profession. We have shown elsewhere (Goastellec & Pekari 2013) that the time devoted to teaching per week tended to be higher in the UK, while research was allocated more time in Switzerland. Furthermore, the percentage of academics who served as members of national/international scientific committees/boards/bodies is twice as high in Switzerland in comparison to the UK.

As a final remark, we should probably point out the limits of this study. First, the third mission was measured solely by the number of popular articles written in the media, so it is unclear whether the same factors had been significant for other types of activities. We cannot exclude that media have their own logic in these two countries and that it can influence the results. Future research should cover that point. Second, results from a single study mixing higher education and science communication issues cannot be generalised.

However, the interesting results encourage us to continue this study by integrating the evolution of scientific and academic policies as well as the evolution of the relationship between science and society in each country.

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