Intended and Unintended Consequences of a Publish-or-Perish Culture

van Dalen, H.P.; Henkens, C.J.I.M.

Publication date:
2012

No. 2012-003

Intended and Unintended Consequences of a Publish-or-Perish Culture: A Worldwide Survey

By

Hendrik P. van Dalen, Kène Henkens

January 2012

ISSN 0924-7815

Intended and Unintended Consequences of a Publish-or-Perish Culture: A Worldwide Survey

Hendrik P. van Dalen[1,2] and Kène Henkens[1,3]

(1) Netherlands Interdisciplinary Demographic Institute (NIDI)
P.O. Box 11650
NL-2502 AR The Hague
The Netherlands

(2) Tilburg University
Tilburg School of Economics and Management (TISEM) and CentER
P.O. Box 90153
NL-5000 LE Tilburg
The Netherlands
Email: h.p.vandalen@uvt.nl

(3) Tilburg University
Department of Sociology
P.O. Box 90153
NL-5000 LE Tilburg
The Netherlands

JEL codes: A12, J4, M52

Keywords: Incentives, productivity, science, publications, university

January 3, 2012

Abstract:
How does publication pressure in modern-day universities affect the intrinsic and extrinsic rewards in science? By using a worldwide survey among demographers in developed and developing countries, we show that the large majority perceive the publication pressure as high, but more so in Anglo-Saxon countries and to a lesser extent in Western Europe. However, scholars see both the pros (upward mobility) and cons (excessive publication and uncitedness, neglect of policy issues, etc.) of the so-called "publish-or-perish" culture. By measuring behavior in terms of reading and publishing, and perceived extrinsic rewards and stated intrinsic rewards of practicing science, it turns out that publication pressure negatively affects the orientation of demographers towards policy and knowledge of the population facts. There are no signs that the pressure affects reading and publishing *outside* the core discipline.

1. Introduction

The competition among universities and the drive toward higher scientific productivity has many faces and consequences. To boost competition among scientists and give taxpayers value for their money, universities shifted over time from an input to an output focus in their finance methods and reward structures. The exact timing of this change of culture differs by region, country and discipline. The US and Canada have a long history of using incentives for faculty to publish (Fulton & Trow, 1974; Stephan & Levin, 2001). The first mention of the term "publish or perish" has been traced by Garfield (1996) to the sociologist Wilson (1942, p. 63), who reviewed American academic life. American history of using publications as the basis of monetary rewards predates that of Western European countries and certainly that of emerging economies. But also European universities and policymakers were captured by the idea to "incentivize" the production of science starting in the 1980s and 1990s, thereby stimulating an internationalization process (e.g., Coats, 2000, for the case of economics). The tacit reward system of the distant past in which educational qualities, public service and research qualities were assessed in an informal manner and where priority in discovery offered non-market incentives for scholars (Merton,1957) was replaced by an explicit and formal reward system in which individual and measurable performance is rewarded. In other words, the non-market competitive forces that characterized scientific discovery have been to some extent crowded out by systems of funds and rewards that mimic market competition.

The advent of this publish-or-perish culture has been discussed and criticized by scholars in various disciplines (e.g., Anderson, Ronning, De Vries & Martinson, 2007; Adler & Harzing, 2009; Bornmann 2011; Fanelli, 2011; Feller, 2002; Frey & Eichenberger, 1997, Frey, 2010). The publication pressure has clearly become visible and has materialized in a number of practices. Over time the productivity of scientists and universities in terms of publications and citations have become more important as the determinants of individual and organizational rewards (Walker, Sykes, Hemmelgarn & Quan, 2010). Substantial individual cash bonuses have been introduced to stimulate publication and incidence has increased substantially over the last ten years, especially in emerging economies like China and South Korea (Franzoni, Scellato & Stephan, 2011).

University rankings abound in which publications and citations indicate to faculty and students where the "best" research is carried out and in some cases what you can earn and how much you have to "produce" in order to be hired and attain tenure (Fishe, 1998; Zivney & Bertin, 1992). Hiring, promotion and tenure decisions are increasingly based on publication records and so are grants and other subsidies. In case of promotions, for example in the UK one can come across advice to candidates to inform committees of their work by supplying bibliometric measures on their curriculum vitae: "Candidates may wish to provide impact factors, citation rates or other bibliometric information, where appropriate." (Source: promotions annexure B of University College London). The "publication bias" — the tendency to publish only confirmatory evidence — is another prominent effect. This bias has always been an issue in science, but the pressure to publish in academia might conflict with the objectivity and integrity of research, because — as Fanelli (2010) makes clear — "it forces scientists to produce 'publishable' results at all costs."

In short, in the age of the attention economy visibility is an important part of the equation of academic success (Klamer & Van Dalen, 2002; Leahey, 2007; Van Dalen & Klamer, 2005). In attaining this visibility the content of publications seems to be taking a backseat in academia as the message to aspiring researchers has evolved into the publication rule that it no longer matters *what* you write, but only *how often*, *where* and *with whom* you write. Or as one post-doctoral fellow in a study by Anderson et al. (2007, p. 443) puts it: "You can fail to do everything else as long as you have lots and lots of papers." The focus on publication records has given rise to academic professionals who seem to become extremely specialized and have lost contact with the core of their science, and in the case of economists who turn their back on reality and policy issues (Klamer & Colander, 1990). The struggle for research funds and the character of science as a winner-takes-all competition makes it ever more profitable to engage in fraud or other unethical behavior (Bedeian, Taylor & Miller, 2010). In short, modern-day science has become increasingly the terrain of rankings and peer assessments in which citations, publications and other measurable output play a dominant role. The old, tacit reward system had its drawbacks, as hiring and promotion decisions depended to a large extent on whether one had connections to those who made the decisions within the hierarchy. With hindsight

one can understand the embrace of publications and citations as measures of output in the 1970s and 1980s: the reliance on indicators such as citations and publications had the benefit that it could break up the deadlock that an old-boys' network might have on a university or a university system by improving the upward mobility of outsiders, whose qualities merit such moves. In short, the reliance on citations and publications as output indicators of scientific productivity had some *intended consequences*: individual productivity and aggregate output has increased. But it may have *unintended consequences* when workers face multiple tasks and multiple principals, and when the indicator of scientific productivity is measured only imperfectly and may crowd out other duties that are traditionally ascribed to academic institutions. At the time of introduction, the carrot-and-stick logic behind the publish-or-perish culture was thought to have a simple and universal application.[1]

This paper examines the *perceived* publication pressure and its impact on the practice of science on a worldwide scale. In this paper we will measure the attitudes of scholars toward publishing and their own conduct within science, and try to examine whether publication pressure has affected individual views and behavior in science, in particular within the science of demography. We do so by looking at three distinct academic activities:

(1) multidisciplinary orientation as measured by frequency of reading and publishing outside the home discipline;
(2) the perceived academic reward system as measured by qualities that are rewarded within science; and
(3) the rewarding nature of academic activities and appreciation.

In order to assess the effects of the publish-or-perish culture we have designed a survey that was distributed among the members of an international association for demographers (IUSSP). This survey has the advantage over comparable surveys that its focus is international and it covers a social science that is itself a mixture of other social sciences. By adopting a worldwide focus one can gain for the first time some insight into the practice of science in both developing and developed countries. Of course, there is ample insight into the publication and citation practices across the world as revealed by

bibliometric studies (cf. Leydesdorff & Wagner, 2009; Veugelers, 2010), but the perceptions and reactions of scientists themselves are rarely recorded. The use of a survey not only has the obvious benefit of examining the impact of scholars on the way science is conducted, but compared to ISI and other databases it has the extra benefit of investigating a neglected participant in science: those who do *not publish* and are *not cited*.

The reason why demographers may be of interest to the literature of science studies is that the discipline of demography covers a wide variety of disciplines, ranging from highly mathematical theories as used by formal demographers and economists to highly descriptive and qualitative research as practiced by anthropologists and sociologists. In short, demography may well be a discipline that offers an insight into the social sciences and adjacent disciplines, like epidemiology and biology. The multidisciplinary nature of the science has been a strength as it offers a meeting place for the various disciplines around a well-defined subject (Coleman, 2000; Morgan & Lynch, 2001; Van Dalen & Henkens 1999), but according to insiders it is also a weakness as the core of its subject is eroding (McNicoll, 1992, 2007; Tabutin, 2007). Although demography and its practitioners may possess certain unique features (Guest, 1994), in terms of publication and citation practices demography seems to function like many other social sciences (Van Dalen & Henkens, 2001, 2004 and 2005).

The structure of this paper is as follows: In section 2 we present the set-up of the worldwide survey. Section 3 presents some perceived reality of publication pressure and the consequences of the publish-or-perish culture. These consequences are put to the test in section 4, where we use reading and publishing behavior, perceived academic success factors and the rewarding nature of academic activities, examining whether the presence of a publication pressure affects perceptions of scientific rewards and behavior. Section 5 concludes.

2. Data and method

During the year 2009 we organized a worldwide survey among demographers in cooperation with the IUSSP (International Union for the Scientific Study of Population). Most science studies take a look at local or national practices, and this is one of the few

that takes a survey on a worldwide basis. The underlying assumption of using the IUSSP membership database as basis for our sample is that the IUSSP has (1) a worldwide coverage of demographers; (2) its members are — as like Guest (1994) once said — a mixed crowd of both academics and practitioners who are involved in setting up family planning programs, organize censuses, or keep account of the state of the national population; (3) the IUSSP encompasses other associations of demographers or population scientists: most IUSSP members are also members of national or regional demography associations like the PAA (Population Association of America) or EAPS (European Association of Population Scientists). The survey was internet-based and the link was sent out via email through the secretariat of IUSSP to all its members in April 2009. To obtain a higher response the survey was set up in the two languages used within the IUSSP: English and French; 85 percent of respondents used the English version.[2] We sent out two reminders to members and the survey was closed in September 2009.

The overall response rate was 46 percent, which we consider to be satisfactory given that the survey was carried out by means of an internet survey, and secondly on a worldwide scale. In total 970 demographers responded out of the total set of 2009 IUSSP members who were registered at the time of the start of the survey in April 2009. It should be noted that not all the questions were answered by all respondents. The questionnaire covered 35 questions and numerous sub-questions. A total of 730 respondents completed the questionnaire. Based on those numbers of completed surveys the response rate is still 35 percent, which is well-above response rates for similar surveys among academics (cf. Klein & Stern, 2005).

The average age of respondents was 48, and 36 percent of respondents were female (which corresponds well with the IUSSP membership statistic of 39 percent being female). The sample consisted of relatively highly educated respondents, as exactly two-thirds of them had a PhD degree. Not everyone is a thoroughbred demographer though, as 53 percent graduated in demography and the remaining “demographers” come mainly from sociology, economics, geography and mathematics/statistics.

HERE **Figure 1: Distribution of respondents across regions by country of residence**

Figure 1 summarizes the regional background of respondents by country of residence. The response across regions fits more or less the membership list of the IUSSP,[3] suggesting no selective non-response with respect to region of residence. More importantly, the high number of responses within each region allows us to make some comparisons by region. In the remainder of this paper we will use a specific distribution of countries to test for the presence of the effect of an "Americanization" of science through an adoption of the reward and evaluation system of the American university system (cf. Borghans & Cörver, 2010). On many fronts, including demography, the United States is the country where most leading demographic centers are situated, where the most influential scholars currently work and live, and where the most influential journals like *Demography* and *Population and Development Review* are based (Van Dalen & Henkens, 1999). On some points of specialization the US is closely followed by centers in Australia, Western Europe and Canada. Still, our hypothesis is that the US sets the standard in demography and in the professionalization of science, and by looking at region-specific effects one may be able to trace elements of such Americanization. We have used four types of countries that are relevant for the case of demography

(1) *the US* as the scientific leader;

(2) other *Anglo-Saxon countries*: the competitors from Australia, Canada and the UK;

(3) *Western Europe* (excluding the UK); and

(4) *Emerging economies*: competitors in emerging economies and developing countries (which includes, Africa, Asia, Latin America and Eastern Europe and New Zealand).

In the appendix to this paper we present a ranking based on publication records in the top-10 demography journals over the years 2000-2010. The leadership status of the US is quite clear, as 61 percent of all publication records are produced with the involvement of authors affiliated with US-based institutions.

3. Perceived Publication Pressure and Consequences

Perceived publication pressure

How do scientists perceive the publish-or-perish culture? As a first step in getting a grip on it, we asked whether respondents agrees or disagrees with the statement "The pressure to publish in my organization is high". This straightforward question already provides us with a clear picture of the publication pressure around the world. In the US and its Anglo-Saxon competitors the pressure is felt to be quite high: 74 percent of US scholars agree that it is high, and 71 percent of scholars residing in other Anglo-Saxon countries agree with the statement. This is considerably higher than in Western Europe (59 percent agrees) or the emerging economies (52 percent). To see more clearly who feels the pressure of publication we have regressed the perceived publication pressure by a number of plausible explanatory factors (see Table 1).

HERE **Table 1: Who feels the pressure to publish-or-perish? Explaining agreement on publication pressure in academics' own organization and publication productivity**

The first column shows that regional differences are quite large and seem to suggest that the Americanization of demography has not yet affected Western Europe and emerging economies in terms of pressure. The coefficients for the latter two regions suggest substantial differences, but a formal test of coefficients suggest that this difference is not significant. Scholars residing in (non-US) Anglo-Saxon countries feel more or less the same level of pressure as US scholars. The publication pressure is primarily an academic affair, as those working outside academia feel substantially less pressure than those situated at research institutes and universities.

The second column of Table 1 relates the same set of factors of column I to the self- reported publication productivity (in terms of articles published in international refereed (ISI) journals in the past year). Two results stand out. First, the publication productivity of scholars across regions is significantly different. The Anglo-Saxon world (US, UK, Australia and Canada) reveals a similar level of productivity, which is

significantly higher than that in the rest of the world. Scholars in emerging economies are less productive than their Western European counterparts. Second, productivity of scholars working in academic surroundings (university and research institutes) differs significantly by their position in the hierarchy. PhDs rank lowest and full professors the highest. The low rank of PhDs is understandable, as they still have to learn how to craft papers and navigate the hurdles of the review system. Assistants' and associate professors' research is more productive than PhDs', but the difference between assistants and associates is not statistically significant. These findings give a clue as to why in our cross-sectional setup one finds a positive association between pressure and publication productivity. To attain promotion within academia and in the end full professorship, one must have a solid publication record. Even after attaining full professorship, the ambition shifts to securing a position at a more prestigious university. The higher productivity of full professors combined with the observation that they do not feel less pressure than lower-ranked professors suggests that self-selection mechanisms are at work. Low-productivity scholars move to institutes or universities that do not put too much pressure on them, whereas highly productive scholars move to higher-ranked universities where productivity standards are also higher. Due to this treadmill effect, scholars can arrive at the conclusion that in order to stay in the same place one must continuously run harder. The publication pressure apparently works like the Red Queen principle in *Alice in Wonderland*: "In this place it takes all the running you can do, to keep in the same place." To rephrase this to university conditions: in order to keep one's place or stay ahead in the hierarchy, one has to keep on publishing.[4] The end result may be the paradoxical situation depicted in Figure 2, which shows how the publication record of respondents (measured by number of publications in ISI journals) and their evaluation of the publication pressure in their own organization are positively related.

HERE **Figure 2: Perceived publication pressure by individual publication productivity**

To put these percentages into perspective, the distribution of respondents with publication records is also depicted: 42 percent of the sample has not published an article in an ISI journal in the past year and 6 percent has written four or more articles.

Perceived consequences of pressure

Because most respondents perceive the pressure as high, they must have some experience or view on the intended and unintended consequences of the focus on publications. The diverse experiences and institutional settings across the globe offer a unique opportunity to see the effects of the publish-or-perish culture. Table 2 gives an overview of the opinions and perceptions in a number of world regions.

HERE **Table 2: Consensus on the presence and consequences of publication pressure, by regions of residence (% (fully) agree)**

Where the pressure is relatively low, scholars see the sunny side of a publish-or-perish culture. However, scholars living in countries where the pressure is relatively high (US and other Anglo-Saxon countries) are not as optimistic about the pressure to publish in peer-reviewed journals. For instance, nearly two-thirds of these respondents (57-62 percent) agree with the proposition that the publication pressure leads to an excessive number of unread papers. By contrast, only 40 percent of scholars in emerging economies hold this view. Still, respondents around the globe do see the benefits of the reward system based on publications, as it is by and large beneficial for upward mobility within academia. Hence publications are a sign of quality, and those scholars who are highly productive (and thereby skilled) will also reach higher positions in the university hierarchy.

But how does the perceived pressure affect academic performance in general? Does it indeed stress the focus on academic publications and make scholars move away from public policy debate? The statements in Table 2 are each analyzed in some depth by a multivariate regression analysis in Table 3, where the focus lies on the perceived pressure in academics' own organization and the publication culture of the country of residence.

HERE **Table 3: Perceived consequences of publication pressure and publication pressure**

By and large, the publication pressure is positively associated with the various perceived consequences of a publish-or-perish culture. To sum up: a higher publication pressure is associated with more and more researchers turning their back on policy issues, less incentives to publish in domestic-oriented journals, an excessive number of unread publications, as well as with improved upward mobility in academia. The regional dummy variables reveal that the consequences of the publication pressure are not perceived in the same manner over the entire world. For instance, in emerging economies scholars see more than in the US that the publication pressure brings out the best in researchers and improves upward mobility, and are not so negative about the effects this reward system may have on the number of unread publications. Another noteworthy effect is the effect the pressure may have on publishing in domestic-oriented journals. Scholars working in both the (non-US) Anglo-Saxon countries and Western Europe are far more worried than US scholars that the publication pressure will negatively affect the contribution to these type of journals. In other words, the reward system is perceived to discourage the production of local knowledge in these countries.

4. Revealed Consequences of Publication Pressure

So far we have only presented the *perceived* consequences and presence of a publish-or-perish culture. However, the main debate revolves around the real incentive effects which go beyond the measurement of publications and citations. In other words, it will not come as a surprise that when a university or a country designs a reward system that is highly geared toward rewarding certain publications, the productivity measured in those publications will increase in subsequent periods. What is at stake is whether there are any negative or positive spillover effects from such a reward system. It is the classic folly of "rewarding A while hoping for B" (Kerr, 1975). Universities reward A (publications) while hoping that its employees will turn out creative and path-breaking publications. The danger with badly designed reward systems is that they may backfire, and psychological

research about the power of rewards has shown that this is indeed the case (see Ariely, Gneezy, Loewenstein & Mazar, 2009). For scientific publications, this may imply that scientists back away from high-risk projects, apply "salami tactics" (slice up an idea into small pieces and publish them in many journals), or practice outright fraud or plagiarism.

Below we will evaluate the perceived pressure to publish in terms of a number of measurable reactions that scholars might have. We will look at whether a publication pressure is associated with (1) a monodisciplinary orientation in reading and publishing; (2) a change in the perceived reward system; and (3) the intrinsic motivation to do various academic duties. The central variable is the level of publication pressure, and to isolate this effect we control for a number of influences that might explain variation in effects. The control variables include age, gender, region of residence, and position in the hierarchy of (research) institute or university.

4.1 Monodisciplinary orientation

Scholars who are open-minded and innovative may very well be the ones who do not see the boundaries of their own discipline as binding and therefore may trade ideas with other sciences, and at least import ideas produced elsewhere. However, when the publication pressure is high in a university system, employees may choose the strategy to specialize in order to benefit as much as possible from the economies of scale that may be involved in carrying out research. Transcending boundaries involves setting up new networks, getting acquainted with the ongoing discourse and research practices, etc. The time and money involved in moving across boundaries could have been invested in staying close to the research terrain. In other words, the hypothesis we test is the following: *Scholars working in environments with a high publication pressure are more apt to specialize within one discipline than those who work under less pressure.*

To measure the relationship with neighboring sciences we will use two measures: reading and publishing behavior of demographers across disciplinary boundaries. Table 4 gives a straightforward presentation of the frequency with which journals in neighboring disciplines are consulted by "demographers". It does not come as a surprise that demography journals are consulted with the highest frequency. However, journals from

other disciplines are the focus of interest and it is in this ranking that one can clearly see which disciplines/sub-disciplines demographers are most closely aligned with.

HERE **Table 4: Multidisciplinary *reading* behavior of demographers, ranked by frequency of consultation of journals in other disciplines[a]**

The conclusions reached on reading behavior (of Table 4) also apply to some extent the *publication* behavior of demographers. Table 5 shows the frequencies with which a subgroup of demographers — those in university and research institutes — publishes in different trade journals.

HERE **Table 5: Multidisciplinary *publication* behavior of demographers, ranked by frequency of publication in journals in other disciplines[a]**

The ranking of this list resembles that in Table 4. Two observations can be made with respect to Table 5. First, geography journals are far more important as publication outlet than as reading source. This may partially be explained by the fact that migration research, certainly when it concerns internal migration, has a large overlap with geography and economic research. Second, most of the journals outside demography, sociology and epidemiology are seldom if ever used by the large majority of demographers as a publication outlet. In other words, when it comes to the actual integration of demographers into other disciplines, little action has been taken or perhaps barriers of entry into other disciplines are quite high.[5]

The central question of this subsection is whether the publication pressure has affected these patterns. In order to operationalize the multidisciplinary behavior of scholars we denote someone as an active participant in *another discipline* if they consult or publish in journals of a particular discipline regularly or often. By summing up all 10 disciplines *outside* demography we arrive at an index of multidisciplinary publication or consultation as independent variables. In Table 6 the hypothesis is tested of whether publication and reading behavior are affected by the publication pressure of scholars'

own organization. The values of variables vary from 0 to 10 and are analyzed by means of OLS.

HERE **Table 6: The effect of publication pressure on frequency of multidisciplinary publication and reading behavior**

The results in Table 6 show that the publication pressure is not associated with a specialized monodisciplinary *reading* and *publishing* pattern. Of course, there are specialized patterns in reading behavior, as was to be expected. For instance, experts on mortality, migration and family relations generally have to rely on insights from epidemiology, geography and sociology, and well-established journals outside demography are of interest to them. But as one can see, specialists working on labor markets, methods and models are more apt to focus on reading within the discipline of demography.

4.2 Perceptions of academic success

Another way of evaluating the effect of the publication pressure is to discover which characteristics or qualities of a scholar are rewarded and pave the way to academic success. In designing questions that approximate the bundle of qualities the academic "in the fast lane" possesses we have used and extended a questionnaire used earlier by Klamer & Colander (1990) among American PhDs in economics. The list of qualities consists of a set of pure research qualities, next to social and more applied research qualities. Table 7 gives an idea how demographers perceive the success factors of making the grade in demography. By merely looking at those factors demographers find "very important", things become quite clear: the successful demographer is one who is good at empirical research, is broad-minded, publishes in top-ranked journals, knows his facts and knows how to communicate with the world of policy. Especially the appreciation for being able to connect with policymakers is a noteworthy factor, as most other social scientists may have strong opinions on policy, but in their day-to-day operations policy-oriented work is mostly considered a disdainful activity (Klamer & Colander, 1990). And

as Table 7 shows on a separate success factor, the writing of policy reports is considered as moderately to very important by 75 percent of the demographers.

HERE TABLE 7: **Perception of factors of academic success in demography**

The obvious question is whether the publish-or-perish culture affects the view of success or implicit reward system. In other words: if one wants to achieve academic success, which qualities should one focus on? We assume that respondents situated in high publication pressure environments are more likely to stress qualities that enhance academic publication productivity than those working in a low-pressure environment. The hypothesis to be tested is therefore: *Scholars working in environments with a high publication pressure will focus on those qualities that enhance their publication record and neglect qualities that hinder their publication productivity compared to those who work under less pressure*.

To put this thesis to the test we analyzed only a subset of the qualities of Table 7 *separately* by means of ordered logit analysis. The "don't know" category was dropped from the statistical analysis. We focused on the separate qualities and not some grouping or cluster of qualities because a principal component analysis of the list of qualities did not yield a clear and significant grouping of variables. The estimation results are presented in Table 8 for two variables that are the focus of interest: the publication pressure variable and the regional dummy variable in order to control for region-specific elements. The results are controlled for intervening influences as summarized by the variables: age, gender, level of function in the organization, applied level of work.

HERE Table 8: Relationship between factors of perceived academic success and publication pressure

Based on the estimation results one can see that academics in a high-pressure environment are led to focus more on publishing in top-ranked journals, although this tendency is not so strong in emerging economies. In order to achieve success one should invest less in policy-related work and in knowing the facts that are the core subject of the

discipline. To rephrase this last finding: academics in high-pressure environments find knowledge of population facts less important than those working in low-pressure environments. If the region dummies are an approximation of the different publish-or-perish cultures, then it becomes evident that outside the US there is still a strong tendency to be more involved in policy-related work and in making the insights of the discipline visible and known to policymakers.

4.3 Intrinsic rewards of practicing science

Finally, we take a look at how publication pressure affects the intrinsic rewards of the job. We asked respondents how they valued tasks and elements of their job, if applicable. The tasks range from purely individual (e.g. publishing papers or writing policy reports) to tasks serving a group of people (e.g. writing a referee report) and to being respected by different spheres of work (among scientists, policymakers or the general public). Table 9 presents an overview of the results. Clearly population scientists find publishing in international refereed journals and being cited by other scholars the most rewarding element in their job. Writing referee reports and making insights visible by writing articles for newspapers rank among the least appreciated elements of their work.

HERE Table 9: The intrinsic value of various academic activities and recognition (percentages)

The intrinsic reward hypothesis to be tested is the following: *Scholars working in environments with a high publication pressure will find tasks and appreciation related to their publications more rewarding and tasks and appreciation not related to their academic publications less rewarding than those who work under less publication pressure.* To test this hypothesis the same strategy was chosen as in the previous section. Hence individual tasks and elements of work are analyzed separately, using ordered logit analysis.

Table 10 presents the regression results for the two variables of interest: publication pressure and region of residence. Again, the results suggest that scholars in high-pressure environments appreciate the tasks that benefit or glorify the individual

(publishing internationally, being cited by other scholars) more than those working in low-pressure working environments. What's more, tasks that benefit larger groups, like writing referee reports, are less appreciated by those working in high-pressure environments than by their "low-pressure" colleagues. Writing an article for a newspaper is also negatively appreciated, which fits the logic of the rational ambitious academic as it defies the theory of comparative advantages. With such a mind frame, writing a newspaper article is time ill-spent that could be better devoted to working on academic papers, a task for which the academic is more equipped.

HERE Table 10: Interaction between intrinsic rewards and publication pressure

The regional effects shed some light on differences in intrinsic rewards around the world. In emerging economies scholars appreciate tasks that benefit a collective group significantly more than in developed countries. Especially the task of publishing of policy reports or writing referee reports are more appreciated. Of course, there may be other institutional sources which may cause these regional differences, but considering the number of detailed control variables we surmise that these differences are largely a reflection of the publish-or-perish culture that exists as a stronger force in Europe (especially in the UK and the Netherlands) and the United States.

5. Conclusions and discussion

How does the publication pressure in modern-day universities affect the intrinsic and extrinsic rewards in science? By using a worldwide survey among demographers and population scientists in developed and developing countries, we have shown that the large majority of these scholars perceive the publication pressure as high, but significantly more so in the US and its Anglo-Saxon competitors. However, scholars see both the pros (upward mobility) and cons (excessive publication and uncitedness, burdens placed on the peer review system, monodisciplinary bias in research, neglect of policy issues, etc.) of the publish-or-perish culture.

Perception may affect behavior and the present paper has examined how perceived publication pressure is of influence on scholarly activity and the appreciation

for it. By measuring scholarly behavior in terms of reading and publishing, and perceived extrinsic rewards and stated intrinsic rewards of practicing science, it turns out that publication pressure negatively affects the orientation of population scientists toward policy and knowing facts, stressing the orientation toward publication and citation within academic circles. Traditional tasks of scholars and members of a scientific community, such as writing referee reports, translating research outcomes for the general public or policymakers, are negatively affected by the drive toward individual productivity. There are no signs that this pressure affects the tendency to focus on monodisciplinary research in terms of reading or publishing activity.

The results presented in this paper show that the publish-or-perish culture can have both beneficial and detrimental effects, according to members of the demographers community. A consensus can be detected on the benefits of publications, as they improve the upward mobility of scientists. However, the detrimental effects revealed are the widening gap between science and policy, and especially for those scholars working outside the US the incentive to publish in peer-reviewed journals is perceived to discourage the production of local knowledge.

The number of effects of the publish-or-perish culture is far greater than is detected or measured in this paper (see for different approach, Miller, Tayler & Bedeian, 2011). To name just two important elements of science that have not been covered and which are best dealt with in a more focused research setup, one could take a look at unethical behavior and the functioning of the peer-review system. The issues of fraud and unethical behavior have not been dealt with, as surveying such behavior is extremely difficult and prone to a number of pitfalls. A separate element of science that needs closer scrutiny is the way publication pressure affects the peer-review system. In many countries questions are asked about how sound this system still is, as in the case of the House of Commons Science and Technology Committee (2011). The strong growth in publications has made journal editors aware that their review system is coming under pressure. It increases the workload of editors and referees, and the task of finding referees able to review specialized papers may become ever more difficult, making mistakes in judgments sometimes inevitable.

In spite of these limitations, the present paper makes one consequence quite clear, which is that a strong focus on academic publications tends to crowd out activities that may increase the information of policymakers and the general public. Certainly for a science such as demography, which has a strong tradition of making insights and information available for policymakers (see Van Dalen & Henkens, 2011), this result is a tell-tale sign that the publish-or-perish culture may not only have positive intended consequences but also negative unintended ones.

Appendix

Here Table A1

References

Adler, N.J., & Harzing, A.W. (2009) When knowledge wins: transcending the sense and nonsense of academic rankings, *Academy of Management Learning & Education*, 8(1), 72-95.

Anderson, M.S., Ronning, E.A., De Vries, R. & Martinson, B.C. (2007) The perverse effects of competition on scientists' work and relationship, *Science and Engineering Ethics*, 13, 437-461.

Ariely, D., Gneezy, U. , Loewenstein, G.& Mazar, N. (2009) Large stakes and big mistakes, *Review of Economic Studies*, 76(2), 451-469.

Bedeian, A.G., Taylor, S.G. & Miller, A.N. (2010) Management science on the credibility bubble: cardinal sins and various misdemeanors, *Academy of Management Learning & Education*, 9(4), 715-725.

Borghans, L.& Cörvers, F. (2010) The Americanization of European higher education and research. In C.T. Clotfelter (ed.): *American Universities in a Global Market*, (pp. 231-267). Chicago, University of Chicago Press.

Bornmann, L. (2011) Mimicry in Science?, *Scientometrics*, 86, 173-177.

Coats, A.W. (2000) *The Development of Economics in Western Europe since 1945*. London, Routledge.

Colander, D. (2007) *The Making of An Economist, Redux*, Princeton, NJ, Princeton University Press.

Cole, S. (1983) The hierarchy of the sciences?, *American Journal of Sociology*, 89(1), 111-139.

Coleman, D. (2000) Demography in an intellectual context: a subject in search of a home. In: Z. Pavlík (ed.), *Position of Demography Among Other Disciplines*, (pp. 27-35). Prague.

Dasgupta, P. & David, P.A. (1994) Toward an new economics of science, *Research Policy*, 23(5), 487-521.

Dixit, A.K. (2002) Incentives and organizations in the public sector: an interpretative review, *Journal of Human Resources*, 37(4), 696-727.

Fanelli, D. (2010) Do pressures to publish increase scientists' bias? An empirical support from US states data. *PLoS ONE* 5(4): e10271. doi:10.1371/journal.pone.0010271

Fanelli, D. (2011) Negative results are disappearing from most disciplines and countries, *Scientometrics*, forthcoming.

Feller, I. (2002) Performance measurement redux, *American Journal of Evaluation*, 23(4), 435-452.

Fishe, R.P.H. (1998) What are the research standards for full professor of finance, *Journal of Finance*, 53(3), 1053-1079.

Franzoni, C., Scellator, G., & Stephan, P. (2011) Changing incentives to publish, *Science*, 333, 702-703.

Frey, B.S. (2010) Withering academia?, CESifo working paper, no. 3209, Zürich.

Frey, B.S. & Eichenberger, R. (1997) Economists: first semester, high flyers and UFOs. In: P.A.G. van Bergeijk et al. (eds.), *Economic Science and Practice – The Role of Academic Economists and Policy-Makers* (pp. 15-48). Cheltenham, Edward Elgar.

Fulton, O., & Trow, M. (1974), Research activity in American higher education, *Sociology of Education*, 47(1), 29-73

Garfield, E. (1996) What is the primordial reference for the phrase ‘publish or perish’? *The Scientist*, 10(12), 11-12.

Guest, A.M. (1994) Gatekeeping among the demographers. In R.J. Simon & J.J. Fyfe (Eds.), *Editors as Gatekeepers – Getting Published in the Social Sciences* (pp. 85-106). Maryland, Rowman & Littefield.

House of Commons Science and Technology Committee (2011) Peer review in scientific publications, Eighth Report of Session 2010–12, House of Commons, London, The Stationery Office Limited.

Kerr, S. (1975) On the folly of rewarding A, while hoping for B, *Academy of Management Journal*, 18(4), 769-783.

Klamer, A. & Colander, D. (1990) *The Making of an Economist*, Boulder, Westview Press.

Klamer, A. & Van Dalen, H.P. (2002) Attention and the art of scientific publishing, *Journal of Economic Methodology*, 9(3), 289-315.

Klein, D.B. & Stern, C. (2005) Professors and their politics: the policy views of social scientists, *Critical Review*, 17(3-4), 257-303.

Leahey, E. (2007) Not by productivity alone: how visibility and specialization contribute to academic earnings, *American Sociological Review*, 72(4), 533-561.

Leydesdorff, L. & Wagner, C. (2009) Is the United States losing ground in science? A global perspective on the world science system, *Scientometrics*, 78(1), 23-36, DOI: 10.1007/s11192-008-1830-4

McNicoll, G. (1992) The agenda of population studies: a commentary and complaint, *Population and Development Review*, 18(3), 399- 420.

McNicoll, G. (2007) Taking stock of population studies: a review essay, *Population and Development Review*, 33(3), 607-615.

Merton, R.K. (1957) Priorities in scientific discovery: a chapter in the sociology of science, *American Sociological Review*, 22(6), 635-659.

Miller, A.N., Taylor, S.G., & Bedeian, A.G. (2011) Publish or perish: academic life as management faculty live it, *Career Development International*, 16(5), 422-445.

Morgan, S.P. & Lynch, S. (2001) Success and future of demography, *Annals of the New York Academy of Sciences*, 954, 35-51.

Stephan, P.E., & Levin, S.G. (2001) Career stage, benchmarking and collective research, *International Journal of Technology Management*, 22(7-8), 676 - 687

Tabutin, D. (2007) Whither demography? Strengths and weaknesses of the discipline over fifty years of change, *Population*, 62, 15-32.

Van Dalen, H.P. & Henkens, K. (1999) How Influential Are Demography Journals?, *Population and Development Review*, 25(2), 229-251.

Van Dalen, H.P. & Henkens, K. (2001) What makes a scientific article influential? The case of demographers, *Scientometrics*, 50(3), 455-482.

Van Dalen, H.P. & Henkens, K. (2004) Demographers and their journals: who is uncited after ten years?, *Population and Development Review*, 30(3), 489-506.

Van Dalen, H.P. & Henkens, K. (2005) Signals in science - On the importance of signaling in gaining attention in science. *Scientometrics* 64 (2), 209-233.

Van Dalen, H.P. & Henkens, K. (2011) What's on a demographer's mind? A world-wide survey, working paper, The Hague, NIDI.

Van Dalen, H.P. & Klamer, A. (2005) Is science a case of wasteful competition? *Kyklos* 58 (3), 395-414.

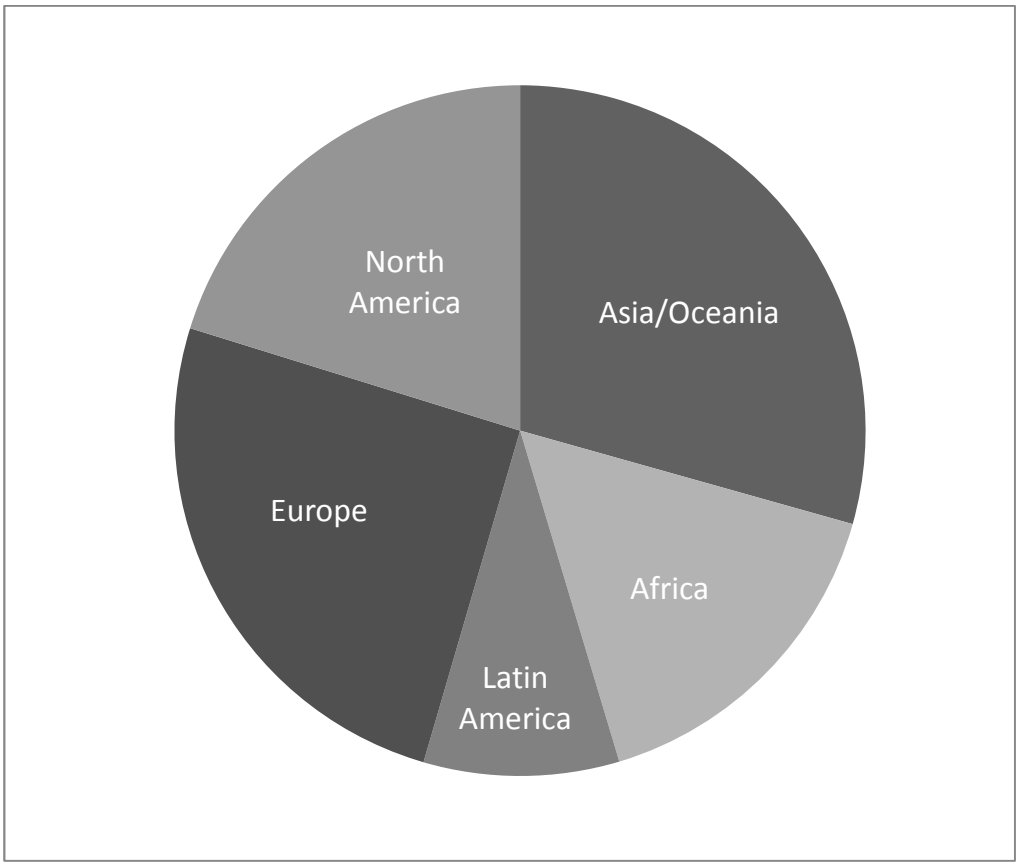
Walker, R.L., Sykes, L., Hemmelgarn, B.R., & Quan, H. (2010) Authors' opinion on publication in relation to annual performance assessment, *BMC Medication Education*, 10, 21.

Wilson, L. (1942) *The Academic Man: A Study in the Sociology of a Profession*, London: Oxford University Press.

Veugelers, R. (2010) Towards a multipolar science world: trends and impact, *Scientometrics*, 82(2), 439-456.

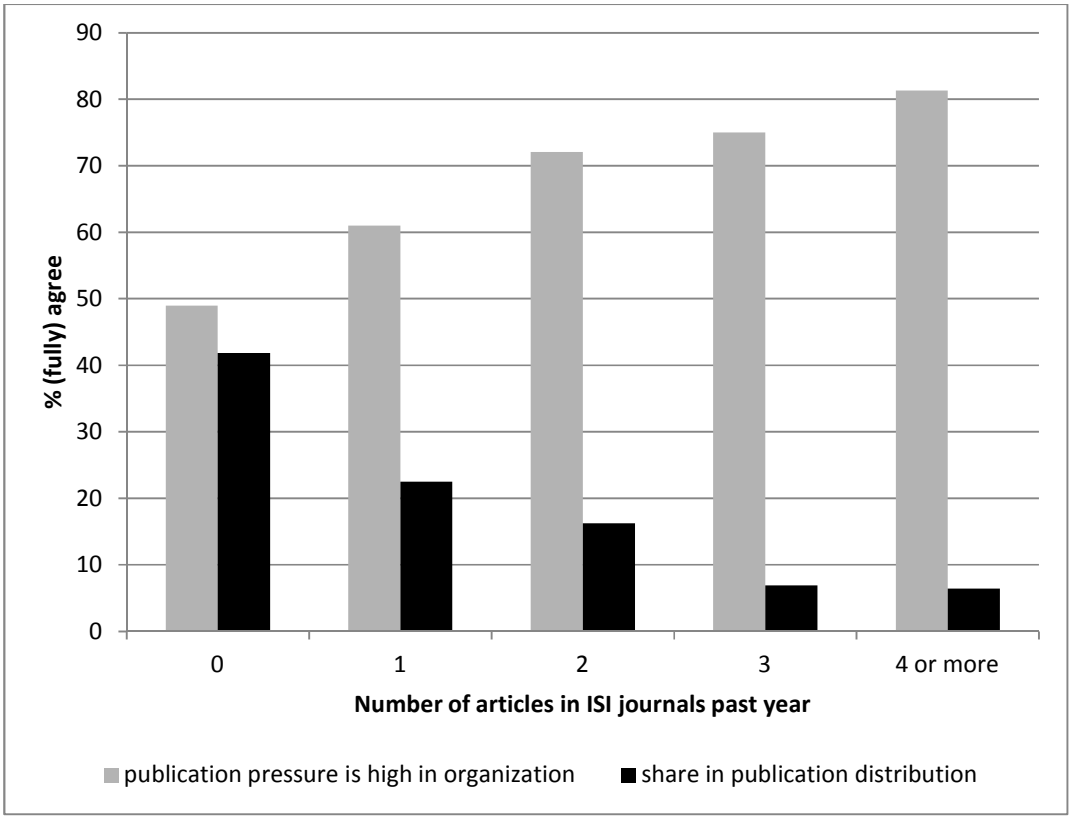
Zivney, T.L., & Bertin, W.J. (1992) 'Publish-or-perish': what the competition is really doing, *Journal of Finance*, 47(1), 295-329.

Figure 1: Distribution of respondents across regions by country of residence



Source: SurveyDemographers around the world (2009)

Figure 2: Perceived publication pressure by individual publication productivity



Source: Survey Demographers around the world (2009)

Table 1: Who feels the pressure to publish-or-perish and who is productive? Explaining agreement on publication pressure in academics' own organization and publication productivity

	Agreement to "The pressure to publish is high in my organization"		Number of publications (last year)	
	I		II	
	Coefficient	t-value	Coefficient	t-value
Regions: (US = 0)				
Canada, UK, Australia	-0.34	1.22	-0.25	0.91
Western Europe (excl. UK)	-0.89**	3.67	-0.66**	2.70
Asia, Africa, Latin America, Eastern Europe	-1.08**	5.10	-1.16**	5.35
Age	-0.02**	3.11	-0.02*	2.35
Gender (male = 0)	0.30*	2.08	-0.12	0.77
Level of applied/fundamental work (applied = 0)				
Equally applied/fundamental	0.10	0.63	-0.01	0.05
Fundamental	0.33	1.74	0.16	0.84
Level of function (PhD graduate =0)				
Assistant professor/researcher	-0.01	0.03	1.17**	4.21
Associate professor/researcher	0.35	1.40	1.26**	4.39
Full professor	0.27	0.96	1.85**	5.75
Other (outside academia/retired)	-0.97**	3.55	-0.13	0.41
University (no = 0, yes =1)	0.93**	5.79	0.25	1.49
N =	748		699	
Pseudo R^2	0.08		0.07	

(a) Method of analysis ordered logit of five categories: fully disagree; disagree; neither agree nor disagree; agree; fully agree; * $p < 0.05$; ** $p < 0.01$

Table 2: Consensus on the presence and consequences of publication pressure, by regions of residence (% (fully) agree)

Statements	USA	Australia, Canada, UK	Western Europe (excl. UK)	Asia, Latin America, Africa, Eastern Europe
The pressure to publish in my organization is high	74	71	59	52
The pressure to publish in peer-reviewed international journals:				
Brings out the best in researchers	57	44	48	66
Makes researchers turn their back on policy issues	35	48	42	37
Reduces the incentive to publish in domestic-oriented journals	32	70	70	48
Improves upward mobility in academia	63	64	56	78
Leads to excessive number of unread papers	57	62	56	40
N =	112	86	142	416

Table 3: Perceived consequences of publication pressure and publication pressure

Consequences on researchers of the pressure to publish in peer-reviewed international journals:					
	Brings out the best in them	**They turn their back on policy**	**Less domestic-oriented**	**Improves upward mobility**	**Excess of unread papers**
Publication pressure	0.02 (0.38)	0.12* (2.07)	0.23** (3.92)	0.30** (4.78)	0.14* (2.31)
Place of residence (US = 0)					
Canada, UK, Australia	-0.59* (2.22)	0.26 (0.98)	1.12** (4.24)	-0.08** (0.27)	0.32 (1.19)
Western Europe	-0.36 (1.54)	0.27 (1.16)	1.31** (5.42)	-0.35 (1.41)	0.12 (0.48)
Emerging economies	0.46* (2.25)	-0.04 (0.19)	0.38 (1.90)	0.63** (2.89)	-0.59** (2.82)
Controls	Yes	Yes	Yes	Yes	Yes
N =	738	731	732	731	725
Pseudo R^2	0.03	0.01	0.03	0.03	0.03

Control variables: age, gender, level of function in organization, level of applied/fundamental nature work, position at university or not. Ordered logit analysis of the categories: fully disagree; disagree; neither agree nor disagree, agree, fully agree.

* $p < 0.05$; ** $p < 0.01$

Table 4: Multidisciplinary *reading* behavior of demographers, ranked by frequency of consultation of journals in other disciplines[a]

Journals in disciplines:	Never	Seldom	Regularly	Often	Total
1. Demography	0	10	48	42	100
2. Sociology	6	29	42	23	100
3. Epidemiology/Public health	10	35	34	21	100
4. Economics	9	49	28	14	100
5. Mathematics/Statistics	22	44	25	9	100
6. Geography	21	50	19	10	100
7. Anthropology	26	50	17	7	100
8. History	38	44	11	7	100
9. Psychology	44	43	10	3	100
10. Gerontology	45	39	10	6	100
11. Biology	51	39	8	2	100

(a) Question posed: How often do you consult journals in the following disciplines?

Source: Survey Demographers around the world (2009)

Table 5: Multidisciplinary *publication* behavior of demographers, ranked by frequency of publication in journals in other disciplines[a]

Disciplines	Never	Seldom	Regularly	Often	Total
1. Demography	13	29	41	17	100
2. Sociology	39	34	20	7	100
3. Epidemiology/Public health	48	28	18	6	100
4. Geography	70	18	9	3	100
5. Economics	69	22	7	2	100
6. Mathematics/Statistics	77	18	4	1	100
7. Gerontology	80	12	6	2	100
8. History	82	12	3	2	100
9. Anthropology	82	13	4	1	100
10. Biology	88	9	3	1	100
11. Psychology	92	5	2	1	100

(a) Question posed: How often do you publish your work in journals in the following disciplines?

Source: Survey Demographers around the world (2009)

Table 6: The effect of publication pressure on frequency of multidisciplinary publication and reading behavior

	Publishing frequency outside demography		Reading frequency outside demography	
	I		II	
	Coefficient	t-value	Coefficient	t-value
Publication pressure	0.02	0.66	0.05	0.80
Regions: (US = 0)				
Australia, UK, Canada	-0.26	1.61	-0.27	0.90
Western Europe	-0.28	1.89	-0.19	0.68
Emerging economies	-0.16	1.33	0.19	0.87
Knowledge level of:				
Fertility	-0.06	0.93	0.01	0.07
Mortality	0.18**	2.75	0.38**	3.11
Migration	0.02	0.31	0.28**	2.71
Family relations	0.19**	3.17	0.59**	5.20
Population aging	0.01	0.10	0.10	0.88
Labor market	0.05	0.68	0.08	0.60
Methods/models	0.07	1.12	0.23*	1.96
Controls[b]	Yes		Yes	
R^2	0.08		0.11	

(a) N = 622; method of analysis OLS; * p < 0.05; ** p < 0.01.
(b) Control variables: age, gender, level of function in organization, specialization within demography, and applied/fundamental nature work. Ordered logit analysis of the categories: fully disagree; disagree; neither agree nor disagree, agree, fully agree.

Table 7: Perception of factors of academic success in demography

Answer Options	Unimportant	Moderately important	Very important	Don't know	Total
Good at solving mathematical puzzles	24	50	20	6	100
Good at empirical research	1	17	81	1	100
Being highly specialized	15	42	39	4	100
Excellence in mathematics	18	60	19	3	100
Ability to make connections with prominent scholars	7	37	52	4	100
Having published in top-rank journals	6	32	59	3	100
Ability to communicate with policymakers	9	29	59	3	100
Broad knowledge of the scientific literature	4	32	62	2	100
Regularly writing policy reports	21	42	33	4	100
Knowing population facts and figures	8	32	57	3	100

(a) Question posed: Which characteristics *will* most likely place a population scientist on the fast track in their field? (Note: we are *not* asking which characteristics *should* place them at the forefront)

Source: Survey Demographers around the world (2009)

Table 8: Relationship between factors of perceived academic success and publication pressure

	Perceived academic success factors				
	Specialization	**Publication in top-rank journals**	**Communication skills with policymakers**	**Writing policy reports**	**Knowing the facts**
Publication pressure	-0.02 (0.39)	0.22** (3.26)	-0.21** (2.87)	-0.11 (1.75)	-0.18** (2.60)
Place of residence (US = 0)					
Canada, UK, Australia	0.33 (1.14)	-0.40 (1.14)	0.70* (2.43)	0.70* (2.47)	0.79** (2.75)
Western Europe	0.81** (3.18)	-0.46 (1.46)	0.53* (2.03)	0.53* (2.10)	1.12** (4.32)
Emerging economies	0.67** (2.99)	-1.14** (4.16)	1.73** (7.24)	1.50** (6.62)	1.91** (7.99)
Controls	Yes	Yes	Yes	Yes	Yes
N =	702	717	708	699	713
Pseudo R^2	0.04	0.07	0.11	0.07	0.08

Control variables: age, gender, level of function in organization, level of applied/fundamental nature work, position at university or not. Ordered logit analysis of the categories: fully disagree; disagree; neither agree nor disagree, agree, fully agree.
* $p < 0.05$; ** $p < 0.01$

Table 9: The intrinsic value of academic activities and appreciation (percentages)

Academic activities	**1 = not rewarding**	**2**	**3**	**4**	**5 = highly rewarding**	**Total**
1. Publishing policy reports	8	19	26	30	18	100
2. Publishing in international scientific journals	2	6	15	27	50	100
3. Writing a referee report for a journal	8	18	33	27	15	100
4. Publishing articles in newspapers	10	18	27	26	18	100
5. Being appreciated and cited by policymakers	6	14	24	27	29	100
6. Being cited by other scholars	2	6	18	32	42	100

(a) In the table the percentages apply only to those for whom the task is applicable.

Source: Survey Demographers around the world (2009)

Table 10: Interaction between intrinsic rewards and publication pressure

	Intrinsic value of academic activities					
	Policy reports	**Academic papers**	**Referee report**	**Newspaper article**	**Cited by policymakers**	**Cited by other scholars**
	1	2	3	4	5	6
Publication pressure	0.02 (0.46)	0.13** (3.96)	-0.04 (1.03)	-0.07 (1.80)	0.06 (1.65)	0.13** (4.10)
Place of residence (US = 0)						
Canada, UK, Australia	0.03 (0.17)	0.05 (0.34)	0.24 (1.42)	0.38* (1.97)	0.32 (1.77)	0.05 (0.31)
Western Europe	-0.25 (1.52)	0.07 (0.53)	0.13 (0.89)	0.43** (2.51)	-0.40** (2.52)	-0.08 (0.63)
Emerging economies	0.29* (1.99)	-0.03 (0.28)	0.48** (3.68)	0.32* (2.09)	0.02** (0.17)	-0.04 (0.32)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N =	653	704	655	646	675	704
Pseudo R^2	0.05	0.05	0.05	0.04	0.06	0.02

Control variables: age, gender, level of function in organization, level of applied/fundamental nature work, position at university or not. Ordered logit analysis of the categories: fully disagree; disagree; neither agree nor disagree, agree, fully agree.
** p < 0.05; ** p < 0.01*

Table A1: Top-10 countries of residence of authors contributing to top-10 demography journals, 2000-2010[a]

1.	USA	1,560	60.6
2.	England	201	7.8
3.	Germany	141	5.5
4.	The Netherlands	105	4.1
5.	Canada	85	3.3
6.	Italy	72	2.8
7.	France	63	2.4
8.	Australia	59	2.3
9.	Austria	51	2.0
10.	China	42	1.6
Total publications		2,576	

(a) This ranking is based on the number of publications (articles and papers in proceedings) appearing in the top-10 demography journals (measured by their 5-year impact factor in 2011) over the years 2000-2010. The distribution in line with the categories presented in this paper are: 1. USA (61%); (2) Australia, Canada, UK (Scotland, England, Wales, Northern Ireland) (14%); Western Europe (excluding UK) (25%); and all remaining countries (19%). Note: the percentages do not sum up to 100 % because of multi-country authored papers.

Source: ISI Web of Science

Endnotes:

[1] The negative consequences of a simple incentives structure was known in an intuitive sense (see Kerr, 1975). The refinements of the simple carrot-and-stick logic behind the reward structure in various public sector environments appeared with a considerable time lag (see Dixit, 2003), as well as attention to the specific nature of science as opposed to more commercial R&D spheres (Dasgupta & David, 1994).

[2] Among the respondents of the *French* questionnaire were of course a large number of French (30), but also — to note the largest groups — demographers from Algeria (8), Belgium (7), Burkina Faso (7), Benin (6), Cameroon (6), Canada (13) and Ivory Coast (5).

[3] To wit, we present here the distribution of IUSSP for the regions: Africa (15.4%), Asia (21.7%), Europe (27.1%), North America (23.1%), Oceania (2.9%) and South America (9.8%). This fits well with survey figures for Africa (16.0%), Asia (26.8%), Europe (25.3%), North America (20.1%), Oceania (2.5%) and South America (9.2%). It is mainly Asia which seems a bit overrepresented and North America slightly underrepresented.

[4] This also demonstrates that to unravel the causality between reward structure and behavior one would need a truly longitudinal setup over a considerable number of years.

[5] We tested to see whether demographic experts have different publication propensities, and again it is the family relations experts who tread mostly on foreign grounds.