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Publish or Perish? The Increasing Importance of Publications for Prospective Economics Professors in Austria, Germany and Switzerland

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Abstract. *Tenure decisions depend, among other factors, on a candidate's career age and publication record. We associate publications with journal articles indexed in EconLit and measure publication output in equivalents of both top-5 journal articles and* European Economic Review *(EER) articles. We find that the average age of a professor in the year of his/her first appointment is 38, i.e. he or she is appointed approximately 8 years after completing the PhD. Between 1970 and 2006, the average publication record at the time of the first appointment is equivalent to 1.5 standardized top-5 articles or 2.3 standardized EER articles. Publication records vary across subfields and have become more substantial over time. We predict that someone aspiring to a tenured position after 2011 should aim at an equivalent of 4 standardized top-5 articles or 6 standardized EER articles.*

JEL classification: *A*11, *A*14, *J*4.

Keywords: Academic labour market; tenure; Germany; Austria and Switzerland.

1. INTRODUCTION

A university career appears to be an attractive option for many successful PhDs. One important question that arises for each post-doc at some point in

time is 'what does it take to get a tenured position?' Obviously, the number and quality of publications play a role. In addition, the post-doc should have developed teaching skills, certain 'soft-skills', and he or she should not be too old. The objective of this paper is to explore the importance of the publication record by quantifying the average size and quality of the scientific output of successful candidates for first professorships at universities in Austria, Germany and the German-speaking part of Switzerland.[1] Our goal is to provide results that help post-docs in their career decisions.

In 2006, 703 tenured professors of economics and finance (including econometricians and statisticians) were employed at 87 universities in Austria, Germany and Switzerland. Of 74% of these professors we know how old they are, where and when they have obtained their doctoral degrees, and when they were first appointed to a tenured position. We collect publication records reflecting the oeuvre in the year of the first appointment for all those professors who have obtained their doctoral degree in 1970 or later and who have accepted their first professorship from an Austrian, German or Swiss university.

We associate publications with journal articles indexed by EconLit, the database provided by the American Economic Association. By aggregating these publications in various ways, we are able to identify average quantity and quality levels of first-time appointees. Using a regression analysis we also predict how these levels will most likely develop in the future. On the basis of these predictions any current post-doc can then assess whether he or she can reach these levels within a reasonable time frame. To facilitate this assessment we have designed an internet site – http://www.HowToGetTenured.de – where, by providing information about their publications, individuals can easily compute an index that reflects their research standing.[2]

The average age of a first-time appointed professor in Austria, Germany and Switzerland is 38 years. This age has basically remained constant since the 1980s. First-time appointments usually take place roughly 8 years after completion of the PhD. In our observation period, which begins in 1974, the youngest newly appointed professor is 29 years old, the oldest one is 54. In terms of publications, we find a significant increase in quantity and quality over time. While the average newly appointed professor had only the equivalent of 0.93 standardized *European Economic Review* (EER) articles in 1990, this number rises to 5.2 in 2006 (the reference article is assumed to be 20 pages long and written by two authors). According to our preferred regression specification, this number is expected to reach almost 6 in 2011. Given our quality-weighting scheme, 3 standardized EER articles correspond

1 Henceforth 'Switzerland' refers exclusively to the German-speaking part of Switzerland.

2 We acknowledge that the name of our website is somewhat misleading. In this study we present descriptive statistics of professors in the year of their first appointment. We thus do not *analyze* the process of 'how to get tenured'. To do so, one would need information on how appointment committees work and what their members attach importance to. We shall return to this issue in the conclusion.

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to 2 standardized articles in top-5 journals. This means that publishing the equivalent of 6 standardized EER articles is tantamount to publishing 4 standardized articles in top-5 journals (or, say, 7 to 8 lower quality articles). For single-authored publications, these numbers should be divided by $\sqrt{2} \approx 1.4$. Keeping the number of authors and journal quality constant, an article (half) twice as long counts (half) twice as much.

Notice, however, that these results vary across fields. Competition is higher in microeconomics and public finance, followed by a group consisting of macroeconomics, international/monetary economics, econometrics and economic policy. Whereas an average of 7.6 papers may be required by 2011 in microeconomics and public finance, only 6.3 papers should be expected for international economics, etc. Economic history and finance constitute the least competitive fields with an expected average of 2.5 EER standard articles by 2011.

There exists a well-established literature on research productivity of economists in Germany.[3] Bommer and Ursprung (1998) ranked departments in Germany on the basis of journal articles weighted according to journal quality.[4] Rauber and Ursprung (2008a) have extend this analysis to control for cohort effects and Ursprung and Zimmer (2007) compare citation-based rankings with traditional rankings based on quality-weighted journal articles. Schulze *et al*. (2008) suggest journal rankings that include business economics journals and discuss their relative merits. The paper most closely related to ours is by Heining *et al*. (2007) who run various Cox regressions to identify determinants of success in the academic job market. Our results are more focused on one particular determinant, to wit publications. We provide, however, additional information on differences across fields of specialization and recommendations concerning the size and quality of the scientific oeuvre that is likely to be required in order to obtain tenure in 2011–13.

2. THE DATA

We use three types of data sources: CVs, publication records from EconLit, and journal-quality weighting schemes. From the CVs we glean personal information relating to 703 economics professors in Germany (85.2%), Austria (8.7%) and Switzerland (6.1%). The publication records were collected between 2006 and 2007 and adjusted for double entries.

Table 1 shows that if personal information is available at all, it usually contains the standard information that we need for our study. In 2006 the median age of the professors was 52 years, the 33rd percentile amounting to 46 years. Because we need to exclude those professors who obtained their PhDs before 1970 (due to availability of publication data), we are left with a

3 A recent a wave of comparisons of economics departments across Europe was published in a special issue of the *Journal of the European Economic Association* in 2003.

4. Quality rankings of journals date back at least to Diamond (1989).

Table 1 Data availability for each variable

Data	Coverage (%)	Data	Coverage (%)
Gender (male: 94%)	100	Date of birth	76
Field	99	Date of Habilitation	74
Date of PhD	90	Date of application to first professorship	74
University granting PhD	84	University granting Habilitation	72
		University granting first professorship	55

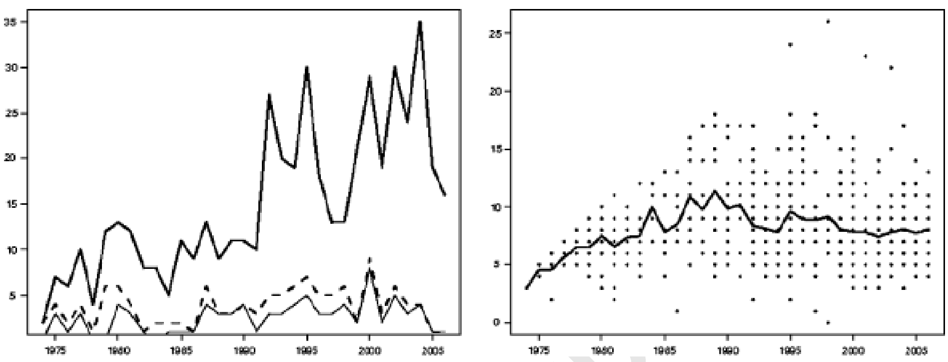

Figure 1 Number of newly appointed professors with and without EconLit publications (left) and career age at the time of the first appointment (right) Q5

total of 672 professors. The bottleneck for our analysis is the information about the university granting the first professorship. This restriction leaves us with sample sizes of at least 339 for all of our subsequent analyses.

The second data source is EconLit, which indexes publications in all relevant economics journals. Because EconLit does not record publications before 1969, we only take journal publications between 1969 and 2006 into account. We found that around 80% of the 672 professors have at least one journal publication indexed by EconLit. The number of professors without any EconLit publication by the year of their first appointment is shown in the left panel of Figure 1. The bold solid line represents the total number of newly appointed professors for a given year. The dashed line shows the number of newly appointed professors without any EconLit publications up to their year of appointment, while the thin solid line indicates the number of professors (appointed in the respective year) without any EconLit publications as of 2006. We see that there are still a considerable number of professorships offered to and accepted by individuals without EconLit publications even though the respective share clearly decreases.

Our third data source is a weighting scheme for journal quality. Our aim is to take into account not only the quantity but also the quality of

publications. We use the weighting scheme of Combes and Linnemer (2003) to measure journal quality.[5] The original CL scheme provides weights for 798 journals, which are classified into six groups. The first group contains five top journals with a weight equal to one. The second group consists of 16 journals with a weight equal to two-third. The next 39 journals are weighted one half, 68 journals one-third, 138 journals one sixth and the remaining 532 journals one-twelfth. The extended version of the CL scheme increases the number of classified journals by approximately 30% and gives all journals not classified by CL a weight of one-twelfth.

3. CAREER FACTORS

We focus on three criteria that we believe affect the probability of obtaining a professorship: age, career age and publications. We present not only information about the means of the respective distributions but also about the distributions themselves. Of particular interest are of course changes over time.

3.1. Age and career age

How old are professors when they are appointed for the first time? The right panel of Figure 1 illustrates career age of newly appointed professors, i.e. the difference between the year of the first appointment and the year of PhD completion. The career age is shown on the vertical axis while the horizontal axis shows the year of the corresponding appointment. Each dot corresponds to one appointment. The scatter diagram indicates that the career age of newly appointed professors averages around 8 years and has remained fairly constant since the 1980s.

The age of the youngest appointee in our sample was 29 years (i.e. this person became 29 in the year of his appointment), the two oldest appointees were 54. The observed increase in career age in the 1970s might be due to incomplete coverage of careers for this time period in our data set or it might be a consequence of the expansion of the universities at the end of the 1960s and the beginning of the 1970s.

The right panel of Figure 1 also suggests a career time by which prospective professors should begin to apply. Given that the delay between application and appointment is at least one year, the average job applicant should start applying 6 years after completing the PhD.[6] For the representative job market candidate this would be at the age of 35 or 36.

5. Following the suggestion of one of the referees, we would like to stress that there is considerable uncertainty about how appointment committees evaluate quality. One would need much more information about the decision making process of appointment committees to deduce weighting schemes that reflect the committees' appreciation of the various types of publication outlets.
6. On average, tenure is obtained two years after Habilitation.

3.2. Publications

3.2.1. How important are publications?

3.2.1.1. The number of publications

Any economics professor would probably agree that publications are the most important criterion for judging research success. Most would also agree that publications were less important some 2 or 3 decades ago. To investigate this issue, Figure 2 describes the distribution of individual research productivities of currently active professors by cohorts.

The left panel of Figure 2 shows the distribution in terms of the number of publications per year. With n_i denoting the number of publications authored by professor i, and p_i the year in which professor i received his or her PhD, we measure average career productivity as $n_i/(2006 - p_\mathrm{i})$. In order to check whether younger professors publish more per year than older professors, we split our sample into four cohorts by year of appointment (1970–78, 1979–87, 1988–96 and 1997–2006). Our compilation clearly shows that the youngest cohort was more productive than the second cohort, which in turn was more productive than the third and fourth cohorts. Asking, for example, how many individuals have one publication or less per year, the left panel of Figure 2 shows that this is the case for about 50% for the youngest cohort (point A), about 75% of the second cohort (point B), and more than 90% for the two oldest cohorts. Phrased differently, half of the young professors have published 1 paper or more per year in contrast to only 25% or even only 10% of the older cohorts. On average, the members of the youngest cohort have published 1.1 articles per year, compared with 0.7 for the second cohort and 0.44 and 0.47 for the older cohorts.

In principle, this finding could be entirely driven by life-cycle effects. If economists are more productive while young, it is obvious that older economists have lower average career productivity. Rauber and Ursprung (2008b) have shown, however, that cohort-effects do play a major role in the

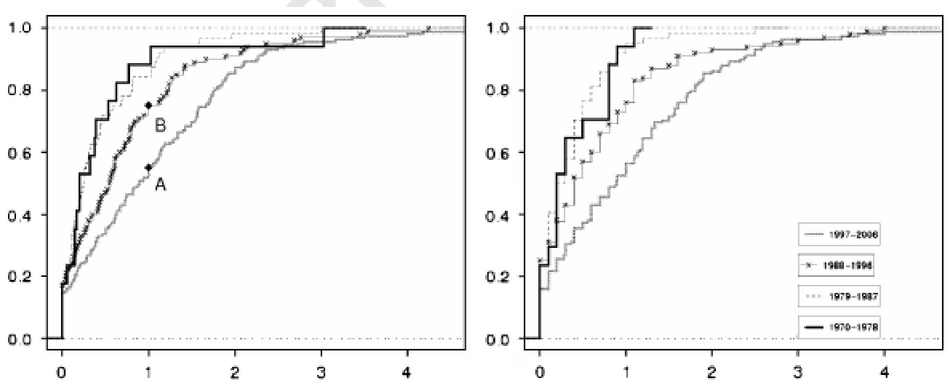

Figure 2 Number of publications per year: career averages (left) and averages over the first 10 career years (right)

German economics profession: economists who, for example, completed their PhD in the 1990s publish on average more during the 10 post PhD years than economists who completed their PhD in the 1980s. To rule out that our findings in the left panel of Figure 2 are entirely driven by life-cycle effects, the right panel reports the number of publications per year as an average of the first 10 years after having received the PhD.[7] Again, the figure indicates that the younger cohorts are more productive than the older ones. Because life-cycle effects are now excluded, this result implies that younger economics professors are indeed more productive than their older peers.

3.2.1.2. The quality of publications

It is well understood that publications in a frequently cited journal are usually of higher quality than publications in a journal that does not receive as much attention. Similarly, a publication of 30 pages is usually worth more than a short note of 4 pages. Accepting these arguments creates many practical problems: How should quality and quantity be measured? Should the number of words in a publication be counted, should the number of co-authors be taken into account? What about differences in quality between articles published in the same journal?[8]

We sidestep these problems (or cut the Gordian knot) by simply postulating a scheme that adjusts publications in terms of both quality (type of journal) and quantity (number of pages and co-authors). We define our research output index q_i by

$$q_i \equiv \sum_{k=1}^{n_i} \frac{p_k}{\sqrt{a_k}} w^k \tag{1}$$

The output index is a sum over all the n_i articles published by individual i in and before a certain year. An article k has p_k pages, is written by a_k authors (including the author under consideration)[9] and is published in a journal with quality weight w^k. The weights w^k are taken from the extended CL list described in Section 2.

Because the index q_i is hard to interpret, we use two transformations: the top-5 standard and the EER standard.[10] The idea is to transform the output

7. This extends the analysis by Rauber and Ursprung (2008b) who focus on means and do not analyze distributions.
8. All these aspects have been discussed extensively in the bibliometric literature; see for example, Bauwens *et al.* (2003), Combes and Linnemer (2003), Diamond (1989) and Kalaitzidakis *et al.* (2003). The common denominator of these studies is that they all employ journal-weighting schemes, which, in turn, are usually based on a citation analysis. A somewhat different approach to evaluate the quality of journals was applied by Bräuninger and Haucap (2001, 2003) who derive their weighting scheme from a survey of the members of the German Economic Association.
9. We are well aware of the fact that dividing by the square root of the number of coauthors may give rise to incentive incompatibilities (see Ursprung and Zimmer, 2007).
10. The top-5 journals according to the CL-scheme are the *American Economic Review*, *Econometrica*, *Journal of Political Economy*, *Quarterly Journal of Economics* and *Review of Economic Studies*. Journals that have the same weight as the EER are *Econometric Theory*,

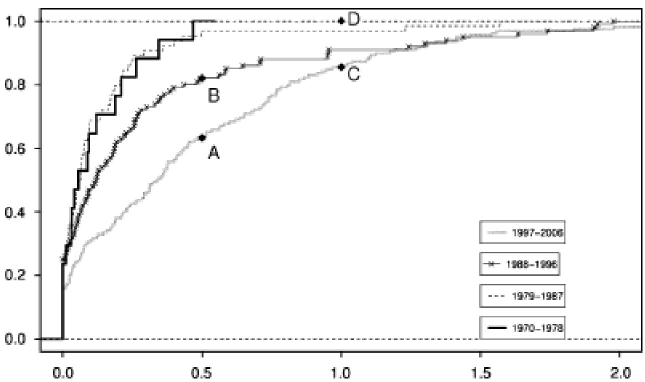

Figure 3 Output per year in terms of EER standard articles

index q into the corresponding number of standardized top-5 or EER articles (standard: 20 pages, two authors).[11] We believe these standardized indices are more accessible than q and therefore propose

$$q_i^{\text{Top5}} = q_i \Big/ \left(\frac{20}{\sqrt{2}} w^{\text{Top5}} \right)$$

$$q_i^{\text{EER}} = q_i \Big/ \left(\frac{20}{\sqrt{2}} w^{\text{EER}} \right) = \frac{3}{2} q_i^{\text{Top5}} \tag{2}$$

An author with the output index q_i has published the equivalent of q_i^{Top5} standard articles in top-5 journals or the equivalent of q_i^{EER} standard articles in the EER (or journals of similar quality). An article in a top-5 journal is *ceteris paribus* 50% more valuable than an EER article.

Let us now analyze publication patterns of the four cohorts by employing the EER standard. Figure 3 plots the average annual output in terms of the EER-standard over the first 10 years of the economists' careers. Our quality-weighted output measure confirms the findings of Figure 2: the younger cohorts are (almost) everywhere more productive than the older ones. About 40% of the youngest cohort publish more than half an EER-standard article per year (point A). The corresponding value is around 20% (point B), 5% and virtually 0% for the older cohorts. Moreover, around 20 % of the youngest cohort publish more than one EER-standard article per year (point C) while basically no one did so in the oldest cohort (point D). The average professor

Games and Economic Behavior, *International Economic Review*, *Journal of Business and Economic Statistics*, *Journal of Econometrics*, *Journal of Economic Theory*, *Journal of Finance*, *Journal of International Economics*, *Journal of Labor Economics*, *Journal of Monetary Economics*, *Journal of Money, Credit and Banking*, *Journal of Public Economics*, *Journal of the American Statistical Association*, *RAND Journal of Economics* and *Review of Economics and Statistics*.

11. In our sample the average number of pages in EER-quality journal articles is 17.4 and the average number of authors is 1.8.

of the youngest cohort published 0.47 EER-standard articles per year in the 10 years following his PhD, whereas the average professor of the oldest cohort managed to publish only 0.11 EER-standard articles per year.

Comparing Figure 3 with the left-hand panel of Figure 2 is quite revealing. First, the variation in quality-weighted output is higher than the variation in pure quantity. Taking the coefficient of variation (CoV) as a measure of inequality, there are larger output differences between professors than differences in the number of publications. The CoV for the output of the oldest cohort is 1.2 in contrast to 0.97 for the number of publications. For the youngest cohort we obtain the same pattern: the CoV for output is 1.06 and the CoV for the number of publications is 0.99. Second, the difference between cohorts increases. While the average productivity of the youngest cohort in terms of number of publications is about 180% higher than the productivity of the oldest cohort, the average output is 315% higher.

3.2.2. Publications of newly appointed professors

We now turn to our main group of interest: the newly appointed professors. The left panel of Figure 4 plots on the vertical axis the (unweighted) number of publications that each newly appointed professor has written up to the year of appointment on the vertical axis. The respective year of appointment is indicated on the abscissa.

In our sample, 206 professors (i.e. nearly 60%) had 5 or fewer publications at the time of their first appointment and almost 8% had 15 publications or more. The solid line documents the steady increase over time in the size of the oeuvres of newly appointed professors. The small insert figure shows that the CoV fell over time. Hence, in terms of the number of publications, heterogeneity falls as the average number rises.

We now turn to measuring the oeuvres of newly appointed professors with the help of the output index. Each dot in the right panel of Figure 4 represents the value of the output index q_i^{EER} of professor i who got his or her

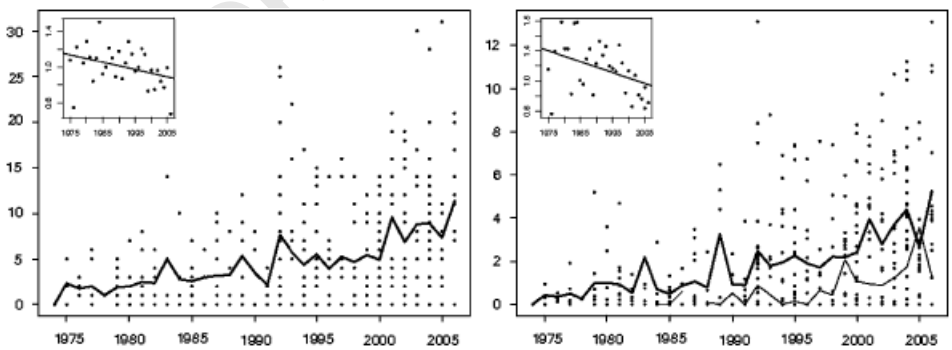

Figure 4 Total number of publications (left) and total output in terms of EER standard articles (right) in the year of appointment

first professorship in the year indicated on the abscissa. The scatter diagram shows that also average (quality-weighted) output has increased over time. While before the 1990s the typical newly appointed professor had around 0.98 EER articles, after this period the average number of standardized EER articles is 2.8. The bold line indicates the average number of standardized EER articles of newly appointed professors in the year of their appointment. This is contrasted by the thin line showing the average number of standardized EER papers of economists in their eighties career year who have yet to obtain a professorship. On average, successful applicants thus have a larger oeuvre than their less successful peers.

Given the relatively large within-cohort heterogeneity in research productivity, the career strategies employed by 'the stars' are of special interest. The following example suggests: among the three top appointees in 2004 (all over 10 standardized EER articles) one person had 28 articles of average quality and thus obtained an output equivalent to 10 EER articles mainly through quantity. The other two candidates had only 16 and 14 articles, but these articles included one or more in top-5 journals.

The increase in average (quality-weighted) output is again accompanied by a decrease in heterogeneity among the newly appointed professors (although not among all professors as shown in Figure 3): the insert figure shows that the CoV fell over time. The rise in average output is therefore not the result of one or two individuals who are outstanding in each year but rather the result of an upward shift of the entire distribution.

4. THE FUTURE

So far we have focused on how publication habits have changed in the past. More important for post-docs today is, however, what the world will look like in 2–5 years.

4.1. The estimation approach

The easiest way to predict future research productivities of newly appointed professors is to consider a linear regression equation $q_i = \boldsymbol{x}'_i\beta + \varepsilon_i$ that specifies the output index as a function of the year of appointment and of other individual characteristics. Our measure q_i of research output permits both zero and non-zero values – and the zero count is substantial (about 20% of the entire sample). This feature suggests a hurdle model.[12] In a hurdle model, zeros can be viewed as a strategic decision of a post-doc not to pursue publication in EconLit journals. An observation of $q_i = 0$ means that the respective post-doc either concentrates on alternative publication outlets or

12. The model was originally introduced by Cragg (1971) and since then has been applied widely in many other fields.

that he or she invests more time on other career-promoting activities such as enhancing teaching quality.[13]

To specify the likelihood function for this model, let us define the indicator function d_i, which assumes the value '1' if the index q_i is positive and the value '0' otherwise. If the decision to pursue EconLit publications and the distribution of positive outcomes of the index q_i are governed by two independent processes, the following individual contribution to the likelihood function applies:

$$\ell_i = [F(q_i = 0|\boldsymbol{x}_i, \theta_1)]^{1-d_i}[[1 - F(q_i = 0|\boldsymbol{x}_i, \theta_1)]g(q_i|q_i > 0, \boldsymbol{x}_i, \theta_2)]^{d_i} \quad (3)$$

$F(q_i = 0)$ denotes the probability of not publishing in EconLit journals and $g(q_i|q_i > 0)$ denotes the probability density of positive outcomes of the index. Without loss of generality, the publication decision can be described by a simple Probit. $g(\cdot)$ can be a probability density of any positive-valued random variable. In the present application, we experiment with lognormal and γ distributions for the positive part of the output index. To decide which of these distributions fits the data best, we apply the Andrews (1988) χ^2 goodness of fit test.

The dependent variable in our analysis is the EER standardized output index q_i^{EER}. The set of explanatory variables comprises the year of appointment, the age of a newly appointed professor, his or her career age and gender, and dummy variables for the country in which the postgraduate degree was attained (Germany and Austria/Switzerland). Finally, the set of explanatory variables includes dummy variables that indicate the area of specialization.

We begin by estimating the conditional model for both lognormal and γ distributions of the positive part of q_i^{EER}. Model selection results are shown in Table 2.[14] The γ distribution appears to provide a more accurate fit than the lognormal distribution which is rejected by the test. The gamma distribution is therefore our preferred specification. The fact that the model with the γ distributed positive part of q_i^{EER} passes the Andrews test underlines furthermore its high explanatory power.

Given the above model selection results it is easy to show that the conditional mean of our hurdle model will be expressed by

$$E(q_i^{\mathrm{EER}}|\boldsymbol{x}_i) = \alpha e^{\boldsymbol{x}'_i\beta_2}\Phi(\boldsymbol{x}'_i\beta_1) \quad (4)$$

13. The next logical step in extending the model would be to account for selectivity, which occurs if post-docs stop aspiring to a professorship. Since we have no information on the career intentions of non-tenured post-docs we are, however, forced to assume that the selectivity bias is negligible.
14. To perform the test we partition the data according to 0.2, 0.5 and 0.8 cutoff points of the distribution of the output index and 1/3 and 2/3 cutoff points of the distribution of the elapsed time between graduation and appointment. The relevant test statistic is given in the Equation 3.18 in Andrews (1988), p. 1435.

Table 2 Model selection

Specification	χ^2 test statistics	DF	p-Value
Lognormal	25.810	9	0.0022
Gamma	12.089	9	0.2084

Table 3 Estimation results (endogenous variable: q_i^{EER})

	β_1	p-Value	β_2	p-Value
Year of appointment[a]	0.049	0.000	0.052	0.000
Age at appointment	0.040	0.201	0.007	0.747
Career age at appointment	– 0.070	0.067	– 0.058	0.016
PhD in Germany	– 0.040	0.874	– 0.641	0.000
PhD in AUT or SUI	0.301	0.408	– 0.190	0.326
Gender	– 0.555	0.102	– 0.228	0.245
Microeconomics	1.286	0.001	1.537	0.000
Macroeconomics	1.390	0.000	1.376	0.000
International/monetary economics	1.486	0.001	1.306	0.000
Economic policy	0.898	0.010	1.215	0.000
Public economics	1.140	0.003	1.474	0.000
Statistics/econometrics	0.632	0.102	1.392	0.000
Economic history	0.319	0.498	0.586	0.136
Finance	– 1.137	0.002	1.092	0.009
Intercept	– 1.913	0.054	– 1.244	0.108

Notes: The estimate for α is 1.492 with p-value 0.000.
[a] Year of appointment is the actual year of appointment minus 1970.

where α is a shape parameter and $\exp\{\boldsymbol{x}'_i\beta_2\}$ is a conditional scale parameter of the γ distribution. Given the estimated values of β_1, β_2 and α, we can use equation (4) to track the evolution of the expected value of the output index in the near future.

4.2. Results

The estimation results are presented in Table 3. They are perfectly in line with our expectations. First of all, the estimates of β_1 and β_2 for the year of appointment are both positive and significant at the 5% level. A positive estimate of β_2 means that the expected value of the output index increases with time, implying that prospective professors need to be prepared to generate stronger research records in the future. In addition, more and more post-docs will in the future pursue publication in EconLit journals (this is the effect of β_1). The career age effect is more complex. The estimated value of β_2 is negative and significant at the 5% level, but the estimated value of β_1 is not

significantly different from zero. Insignificance of β_1 implies that career age has no impact on the decision of pursuing the EconLit publication strategy. This result is logical because in the framework of the model, individuals do not revise their decisions. At the same time, considering the expected value of the q_i^{EER} index as given in equation (4), insignificance of β_1 does not imply that the marginal effect of career age is zero. Because β_2 is negative, it follows that among any two otherwise identical newly appointed professors the one who received the PhD earlier can be expected to have a smaller oeuvre.

Turning now to the country in which the PhD degree was attained, one can see that both coefficients are insignificant for Austria and Switzerland, whereas the coefficient of β_2 is negative and significant for Germany. The attendant effect compares Germany with the remaining foreign countries (11% of the sample), whereby three-fourth of the observations refer to the United States, the United Kingdom and Canada. Finally, neither gender nor the age of the applicant appears to have a significant effect on the size of the oeuvre at the time of the first appointment.

When interpreting the estimates of the dummy variables capturing specialization, one needs to consider both β_1 and β_2 simultaneously. The estimate of β_2 for 'Finance' is, for example, quite high, which does not imply, however, that specialists in finance publish much more than, for example, economic historians. The negative and significant value of β_1 for 'Finance' rather shows that quality publications are not particularly important in this field. As a matter of fact, for the year 2006 the expected value of q_i^{EER} appears to be smaller in finance than in economic history (1.55 vs. 2.16, to be precise).[15]

4.3. Looking ahead

In this section we use the results reported in Table 3 to predict the size of the oeuvre of newly-appointed professors in terms of our q_i^{EER} output measure. Figure 5 shows the results for a five year forecast horizon (i.e. up to 2011). The Figure indicates that the standard for obtaining a professorship are likely to further increase in the near future and can be expected to continue to differ across fields. By the year 2011 a newly appointed professor is expected to have published on average nearly 6 EER standard articles. In the most competitive areas (microeconomics and public economics) this number can even exceed 7.

With increasing forecast horizon the model becomes, of course, less accurate. This is because positive significant coefficients for the year of appointment imply an increasingly convex relationship between time and the expected output. A re-estimation of the model in five or seven years may

15. The estimated effects of the fields of specialization should, however, be taken with a grain of salt. We used the denomination of the professorships as indicators for the field of specialization. In a previous version of this paper, we used an alternative classification with somewhat different results.

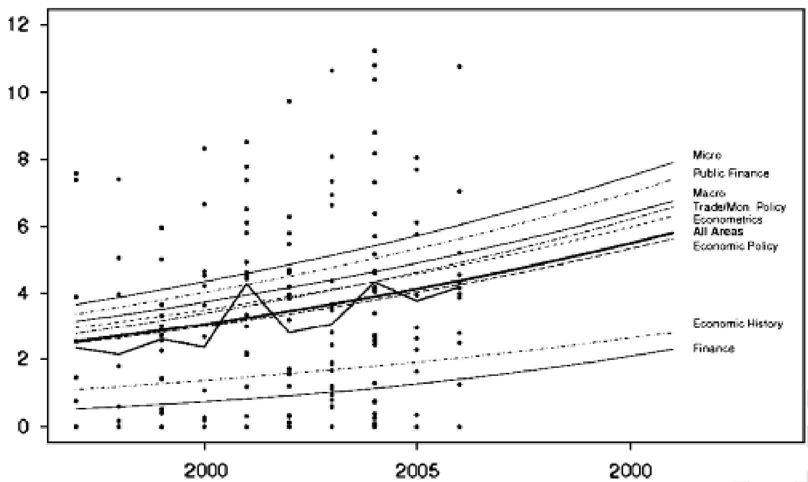

Figure 5 Future output averages in terms of EER-standard articles

reveal a reversal of the trend and show at which value the output index will eventuelly level off. Nevertheless, the benchmark of 6 EER standard articles for the near future, which corresponds to 4.2 single-authored EER articles or 2.8 single-authored top-5 articles, is unlikely to be reversed.

Post-docs who would like to check whether their output meets, exceeds, or falls short of the average, are invited to make use of our website www.HowToGetTenured.de. This website calculates the individual output index q_i^{EER} on the basis of any entered list of publications. This information allows each post-doc to position him or herself in Figure 5.

5. CONCLUSION

The objective of this article is to quantify the research output of newly-appointed economics professors in Austria, Germany and the German-speaking part of Switzerland. We find that a publication record of around 6 EER standard articles is a reasonable benchmark for an ambitious post-doc. It is advisable to start applying for professorships at the age of 35–36 (or 5–6 years after having completed the PhD) with a output index of 1 or 2 points below the respective field average. This discounting is called for because our investigation is based on published articles. Taking into account the existence of substantial appointment lags, the numbers reported here are therefore higher than the numbers that indicate when a post-doc is ready to apply for professorships. Papers that are accepted for publication should of course be counted as publications. Needless to say, however, that the reported figures can only provide a rough indication. Ultimately, the view of the appointment committee is what counts.

Future work may overcome some of the limitations of this study. In order to contain a potential selection bias, extending the database to include 'unsuccessful' candidates would certainly be a worthwhile endeavor. There is, however, no easy way to classify a post-doc as unsuccessful because his or her objectives are not observable. We also acknowledge that including more potentially important determinants of job market success (such as book publications and fund-raising) may be a promising route for future work. Finally, and maybe most importantly, our analysis might overestimate the importance of journal publications due to missing values. If CVs are made available on the internet chiefly by economists who publish in EconLit journals, then our estimates are likely to be too high. However, if we impute the EconLit publications in the year of the first appointment of all professors who have not published their CVs on the internet, the output measure is reduced only by about 15%.[16] This simple check provides us with a good estimate of the potential sample selection bias: we do not overestimate the forecasted output average by more than 0.75 EER articles.

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16. See http://www.HowToGetTenured.de for a precise description of our robustness check.

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