Research patterns in the Spanish accounting academia

SOLEDAD MOYA-GUTIÉRREZ
Finance Department. EADA Business School. Barcelona
smoyag@eada.edu

DIEGO PRIOR-JIMÉNEZ
Universitat Autònoma de Barcelona
diego.prior@uab.es

GONZALO RODRÍGUEZ-PÉREZ
Universitat Autònoma de Barcelona
gonzalo.rodriguez@uab.es

Research productivity, measured generally as the number and quality of papers published in academic journals, is one of the key indicators that determine success in academia. And a relevant question is to what extent the achievement of a tenured position influences academics' productivity. Building upon the life cycle theory and considering the period 1995-2009 with a sample of 300 accounting academics active in research and affiliated to Spanish academic universities we first test if untenured accounting academics are more active in research than tenured ones, controlling for the usual determinants of research productivity.

Additionally we investigate why some professors continue to be active even with low financial rewards and difficulty to achieve them. The principles of the life-cycle theory may not be now wide enough and then, we add the expectancy theory to test if there are additional determinants that may play a role in the research behaviour of accounting academics. Our results are of interests for higher education institutions and administrators looking for incentive systems that maximize research productivity.

Keywords: productivity, tenure, sustained research

INTRODUCTION

Promotion in academia is based, fundamentally, on research productivity measured generally as the number and quality of papers published in academic journals. Understanding what drives a researcher's productivity is, therefore, of interest both for researchers and for regulators, for tenure and promotions in the case of the first and for making the better informed decisions regarding the career paths of academics in the case of the latter. Institutions today deal with budget shorfalls and limited resources and therefore, decisions dealing with tenure and promotion are immensely important to the financial well being as well as the emotional well being of our institutions, of academics and last but not least, of our students (Hasselback et al, 2011)

Research productivity is then one of the key indicators that determine success in academia. And a relevant question is to what extent the achievement of a tenured position influences academics' productivity. Building upon the life cycle theory (Rauber and Ursprung, 2008, Hu, 2000, Conley et al. ,2013) and considering the period 1995-2009 with a sample of 271 accounting academics active in research and affiliated to Spanish academic universities we first test if untenured accounting academics are more active in research than tenured ones, controlling for the usual determinants of research productivity (co-authored, institution productivity and size, experience and normative issues). Results expected based on Generalizing Additive Models (GAM) are that untenured academics looking for a stable position in the academia will invest as much as possible to achieve a guaranteed financial for life reward and that, once achieved, their productivity may decrease.

Our next question focuses only on tenured academics and looks for indicators of sustained research, trying to explain why some professors continue to be active even with low financial rewards and difficulty to achieve them. The principles of the life-cycle theory may not be now wide enough to consider the diversity we expect to find in the accounting academia. In terms of the life-cycle theory, once tenured the academic will not be under an investment pressure and then, will move on to a consumption behaviour doing research just to maintain their reputational capital, because they feel motivated to do so or just for pleasure. Adding the expectancy theory (Vroom, 1964, Chen et al, 2006, Gilstrap et al, 2011) we test if beyond the life cycle expectations, there can be personal determinants (expectancy) that may play a role in the research behaviour of accounting academics.

Prior literature on research productivity for the business area can be found in studies focused, for example, in finance (Brusa, 2006 and 2009, Chan at al, 2009) or marketing (Powers, 1998, Seggie, 2009). For the particular case of accounting and starting from the study of Cargile and Bublitz (1986), we can find some interesting studies as Fogarty (2004), Chan et al. (2006), Danielson (2010), Haselback (2011), Dambrin (2011), Beattie and Goodacre (2012) or Wills et al. (2013). However, none of them is specifically dedicated to the factors contributing to the evolution of accounting research productivity overtime (sustained research)

Accounting constitutes an interesting area of study due to the fact that academics are often expected to generate both academic and practitioners' publications. It could be said that accounting is closer to professional practice that many other academic areas which makes its study of

particular interest. Additionally, Spain constitutes an ideal scenario to analyze this issue due to its particular change of direction in the academic promotion at public universities (in Spain most Universities are public up to now). In the last ten years, publishing of papers in prestigious academic journals[1] has become a critical criterion for promotion and tenure, especially since the passing of the 2001 Spanish University Act (*Ley Orgánica de Universidades,* henceforth SUA).

Our results show that tenure affects productivity positively regarding academic and indexed papers. Productivity after a full professor position also increases although results will be moderated for the change of law in Spain. As for the effect of expertise, we demonstrate how the analysis of non-linear relationships is very important to explain productivity. We find statistical significance also for other determinants as co-authorship, internationality and spill-over effects. From this new perspective, life cycle assumptions may not be enough to explain the behaviour of accounting academics in Spain and additional motivational and/or institutional considerations must be taken into account. These results are of interests for higher education institutions and administrators looking for incentive systems that maximize research productivity.

The paper is organized as follows: section 2 deals with the background and the research questions. Section 3 explains the sample and the methodology, section 4 shows the results and, finally, section 5 is dedicated to the conclusions and implications of the paper.

THEORETICAL FRAMEWORK, PRIOR LITERATURE, AND HYPOTHESIS DEVELOPMENT

Studies on research productivity for the particular area of business are not abundant although there has been an increase in recent times due to the important transformation that is taking place in continental Europe in the requirements for tenure and promotion in public and also private universities. However scant literature is found dedicated to the productivity in accounting - Cargile and Bublitz (1998), Fogarty (2004), Chan et al. (2006), Danielson (2010) and Hasselback (2010).

Studies like Chan et al, (2006) and Hasselback (2010) or Danielson (2010) describe or sometimes rank accounting programmes, accounting doctoral graduates or scholars based on their productivity. With respect to studies looking for determinants of productivity, Cargile and Bublitz (1998) mailed a questionnaire to 840 accounting academics asking them for the perceptions on research facilitators. Results showed how access to computers, time-related items (reducing teaching loads and committee assignments) and people related items were important factors to determine research productivity.More recently, the study by Fogarty (2004) explores the research of the older cohort of accounting academics in the US. Their results indicate that the continuation of research by accounting faculty is explained by both institutional and personal factors. They find that the continuing influence of the current affiliation appears to be the more obvious influence on sustained productivity.

[1] According to the new Spanish regulation, the quality of journals is determined by their presence in several internationally recognized indexes. While this view is an interesting and debatable issue in itself, it is far beyond our scope of discussion and therefore not addressed here.

Expanding the field of analysis to other scientific disciplines, several studies found different factors that explain productivity. Coauthored papers and collaborating with foreign authors is showed in several studies as a factor that increases the number of published papers (Kasperskaya et al. (2012), Haslam et al. (2009)). More authors facilitate more research, and to have a foreign author make easy to publish in English or North-American journals, that are better classified in recognized indexes, especially when they are English speaking academics. Also Hilmer and Hilmer (2007) and Smith et al. (2008) point out the importance of the collaboration in their research, nothing that the importance of the thesis director explains productivity in the first's years. Chen et al. (2009) found that the best strategy is to publish with peer coauthors'.

Other authors consider the importance of the team or the department where the researcher is integrated - as point Rey-Rocha et al. (2002) considering consolidated teams – or the institution. Chan et al. (2009) and Fogarty (2004) found that elite institutions are related with more productivity, Seggie and Giffith (2009) point out that the productivity depends on the institution and also Cruz-Castro and Sanz-Menéndez (2010) and Smith et al. (2008), that consider that institutions with more prestige achieve more funds and this is reflected in more productivity. Bigger and better universities generally have more resources and expertise and therefore easier access to public research, funding and therefore more probabilities of productivity, although Betsey (2007) does not have relationship between the classification of the university and productivity. Linked to available funds, Vasileiadou and Vliegenthart (2009) also found that the presence in meetings is important to explain productivity, but for Betsey (2007) this factor is not important.

Another characteristic considered in the literature that explains productivity is the seasonality, signalling learning and experience. For Brusa et al. (2006) productivity depends on the life cycle, and also for Betsey (2007), in which productivity is related with age but only for women, and for Chan et al. (2009), that considers that there is a quadratic effect in productivity when they consider the life cycle of publication for the researchers. Also for Cruz-Castro and Sanz-Menéndez (2010) time is important, in the sense that early publication explains productivity, and Fogarty (2004) shows how senior academics maintain high levels of papers production, especially those affiliated to high prestige institutions.

Our study builds, as a first step, on the life-cycle theory which states that the interaction between two major factors determines the behaviour of academics regarding research productivity, the Investment motivated research and the consumption motivated research, modulated by the process of natural aging: (Diamond, 1986, Levin and Stephan, 1991). The investment hypothesis states that an individual engages in research because of the perceived significant future financial reward for the research activity. Pre-tenure academics looking for a stable position in the academia will invest as much as possible to achieve a guaranteed financial for life reward (in Spain still today most public universities offer tenure to academics who obtain an external governmental accreditation). Based then on the life-cycle theory and the accounting academic environment in Spain together with prior literature, we pose our first hypothesis:

H1: Pre-tenure accounting academics will be more active in research than post tenure ones because they are looking for a stable position and a financial long term reward guarantee.

Our next step turns into post tenure academics, the senior cohort. And our research looks now for indicators of research vitality or sustained research. For this group of academics the principles of the life-cycle theory may not be wide enough to consider the diversity we expect to find in the accounting academia. That is, in terms of the life-cycle theory, once tenured the academic will not be under an investment pressure and then, will move on to a consumption behaviour doing research just to maintain their reputational capital, because they feel motivated to do so or just for pleasure. However, this theory does not consider a factor that may be very relevant in our particular environment for the determination of sustained research and that is the probability of getting next rewards. And then it is necessary here to look for a conceptual framework that considers, beyond life cycle behaviours, factors that can explain why some academics continue active in research beyond tenure while some others do not. The Expectancy theory provides us with a richer framework that includes as part of the motivation of academics and additionally to the reward expected, the probability to achieve it, the expected effort needed (the expectancy in terms of Vroom, 1964). In our scenario of accounting academics in Spain, this effort is quite high while the financial reward is quite low. Our expectation is then that post tenure accounting academics will not continue to be vital researchers. The inclusion of expected effort together with the reward expected leads us to our second hypothesis

H2: Post tenure academics' research productivity is positively influenced by the expectancy

However, and beyond individual choices to continue to be active in research, there can be other factors that also play a role in the academics' behaviour regarding publications. We have seen in prior literature how institutional factors or collaboration can also influence the patterns of research. Additionally, legal incentives that often are local can also be determinant. For the particular case of Spain, the Spanish University Act (SUA) was adopted in 2001, changing the pattern of publications. After SUA publications in professional journals are not considered for tenure and promotion, and we could expect more academic papers and/or with more quality (published in indexed journals). Related with that, researchers could have changed their pattern of publications, specializing in academic journals. Thus, we can test if more dedication to academic journals can be associated with more productivity. Other studies shows that more dedication to research is associated with more productivity – for Betsey (2007) more dedication to classes is associated with less productivity, and for Cargile and Bublitz (1986) productivity is associated with teaching loads and committee assignments -, and we could suppose that more dedication to academic papers be associated with more academic productivity.

Based on the prior debate we pose our third hypothesis.

H3: Research patterns can be influenced by other factors different from motivational / expectancy ones

RESEARCH DESIGN

Sample

The data has been manually collected. Starting from the list of accounting academics obtained both from official sources (in the case of civil servants) as well as from other sources like institutions' webpages, conferences attendance lists and the members list of the Spanish Accounting Academics Association, we have collected all the papers published for the period 1995-2009 (subsequent expansions of the database demonstrated that the results were temporally consistent, both before and after these years). This time period covers the situation before the SUA to control for research-related measures taken during the previous years (research assessment, increasing of grants, and financed projects) and the immediate years after the new regulation. Our basic unit of analysis is the Spanish accounting academic (academic affiliated to a Spanish institution) who, between 1996 and 2009, has published at least one article in a journal included in the ABS o JCR index or in a Spanish academic database called IN-RECS, a well-known Spanish source for ranking journals in the social sciences2. International papers were collected using Business Source Elite and ABI- Inform databases, and papers published in local journals were collected using DIALNET, a database that collect research output of Spanish academics in Spanish journals.

A total of 635 academics satisfied the abovementioned requirement. After eliminating observations without data in some of the explanatory variables, our database consists in 2,776 academic-year observations (271 academics with a total of 4.695 papers)3.Articles were classified as academic (ACA) or professional (PRO) according to the orientation of the journal in which they were published. Journal orientation was determined from the "aims and scope" of the journal and, if that proved inconclusive double peer review was used as an option, i.e., peer-reviewed journals were classified as academic. Journals aimed at helping accountants or business professionals (or public administration professionals) with their work were treated as professional. These journals usually assume a normative stance in addition to having an informative or educational mission. Articles in professional journals typically adopt a positive or descriptive approach, but the analysis is rarely complex. On the other hand, academic journals mainly target the research community and seek to explain reality using a consistent theoretical framework, sometimes with the help of complex analytical or empirical methods or concepts. In the category of academics we have considered quality papers as those published in ABS or JCR journals, and also the two more important Spanish accounting journals: "Revista Española de Financiación y Contabilidad" and "Revista de Contabilidad". These journals were not indexed in the former indexes in the years of the study, but for years they have constituted one of the main ways to spread the academic accounting research in Spain.

[2] This database is freely accessible at the following Internet address: http://ec3.ugr.es/in-recs/. To our knowledge there were no Spanish accounting scholars that published only in English during this period.

[3] We have repeated all the analysis extracting possible influential observations, obtained with several methods that compare residuals with independent variables. The basic findings are the same that the presented in the study

Variables

Dependent Variables

As there is no, to our knowledge, prior literature on the subject in accounting, we have worked with papers on productivity from other scientific areas to determine which variables could be more suitable for our study (Rauber and Ursprung, 2008 for economics, Brusa et al. 2009 and 2010 for finance, Vasileiadoua and Vliegenthartb 2009 for technology or Seggie and Griffith, 2009, for Marketing). Starting from this prior literature and adding some measures that we believe that can be useful; we have considered the following productivity measures in our paper: Total papers by year; professional papers by year; academic papers by year; indexed papers (ABS or JCR)

Independent Variables

Our two main independent variables are named TENURE and FULL. These are the variables we employ to test the pattern of publications for accounting academics in Spain. TENURE variable takes zero value if in the analyzed year the academic has not a tenured position (whatever the contractual figure it is employed), otherwise one. We want to contrast whether before a tenured position researchers publish more that afterwards. FULL variable takes zero value if in the analyzed year the academic has not a position of full professor. We would also suppose than before achieving a full professor position researchers publish more, and after they diminish their effort because of the lack of incentives.

But we also consider that there are two other variables that can influence the two formers. On the one hand, in 2001 the Spanish University Act (SUA) changed the main incentives to promote positions in the academia. In short, it established the pre-eminence of papers published in indexed journals in front other kind of papers, as professional ones. Thus, we have built the variables TENSUA and FULLSUA, which controls if the researcher has achieved a tenured or a full professor position, respectively, before or after the SUA. With the new requirements, we could expect that after the SUA, to achieve a tenured or a full professor position, researchers could have reduced the number of professional papers in front of an increase of academic or indexed ones. We have interacted the TENURE variable with TENSUA (TENURE*TENSUA) and FULL with FULLSUA (FULL*FULLSUA), to control whether the tenured or full professor position has been achieved before or after SUA.

On the other hand, the percentage of tenured accounting teachers in the department (TENDEP) and the percentage of full professors in the department (FULLDEP) can influence publication in the sense that in departments with more tenured positions it would be more difficult to achieve one, and thus discourage research productivity. Moreover, a high percentage of tenured or full professors in the department can discourage the publication of papers for the difficulty to achieve these positions in the department.

The other issue to test is about the temporal pattern of publishing, which can be controversial. On the one hand before the tenured position researchers can publish more that afterwards. But perhaps they have after more incentives to publish, to achieve a full professor position. And even more, after achieving this position we can have two possible options: to continue

publishing or not. Hopwood (2007) shows that a high percentage of accounting scholars, more than scholars from other disciplines, cease research activity once they secure a stable job. Once stabilized, they tend to pursue alternative activities that include teaching more post-graduate courses or offering consultancy services, thus reducing academic research to a means of career progression rather than the end itself.

The above reasons made us consider and important variable to explain the productivity of the Spanish accounting academics: the number of years since the first publication (indicating experience), that we name ANPUB, the antiquity of publication. Along this variable we can explain the research productivity, considering also the effect of some control variables based on prior literature and also on our own beliefs about what should be correlated with the productivity of accounting academics.

Control variables

We expose briefly other independent control variables. Since collaborative strategies must influence positively the number of papers, we expect a positive relationship with the number of authors by paper (AUART) and with the number of foreign authors by paper (AUX), that facilitate the access to foreign journals in many manners, specially solving language problems. Some studies, as Cruz-Castro and Sanz-Menendez (2010) indicated that the sex of the researcher (value 1 for variable MALE if it is a man, zero if a woman) is important explaining productivity. Seggie and Griffith (2009) found that women have less research productivity. On the other hand, the Spanish Univesity Act (variable SUA, with value 1 if the paper has been published after SUA, in 2001, zero otherwise) modified the incentives to publish, demanding more research to achieve a stable position. This, we can expect a positive relationship between SUA variable and research productivity.

We can also consider the number of active accounting researchers in the University Department (REDEP) and the number of papers published by the active accounting researchers in the University Department divided by the number of active accounting researchers in the University Department and excluding the papers of the analyzed researcher (ARDEP). We can expect a positive relationship with number of published papers, since research productivity if influenced by belonging to a consolidated team - Rey-Rocha et al. (2002). Researchers tend to imitate their colleagues to gain recognition and legitimacy (Cheung 2008; Luukonen, 1992). Thus, in the following table we present a resume of our independent variables:

TENURE	Value 1 if in the considered year the research has a tenured position
TENSUA	Value 1 if the researched has achieved a tenured position after SUA
TENDEP	% of accounting tenured teachers in the department
FULL	Value 1 if in the considered year the research has a full professor position
FULLSUA	Value 1 if the researched has achieved a full professor position after SUA
FULLDEP	% of accounting full professors in the department
MALE	value 1 if the researcher is a man, zero if a woman
AUX	Number of foreign authors by paper
AUART	Number of authors by paper
REDEP	Number of active accounting researchers in the University Department
ARDEP	Number of papers published by the active accounting researchers in the University Department
SUA	Value 1 if the paper has been published after Spanish University Act (2001)
ANPUB	Antiquity in publication

Methodology

We consider that time plays a significant role in explaining research productivity, because tenure and full position are achieved in a line time. We have discussed that we could not have a linear relationship between time and research productivity, considering that before and after tenured and full position the pattern of publications could change. For this reasons we employ Generalized Additive Models (GAMs) to model the relationship between dependent (number of papers) and independent, in particular the years of publication.

GAMs are a nonparametric extension of Generalized Linear Models (GLMs) when the researcher has not a reason to choose a particular response function (linear, quadratic, etc.), and we want a flexible response adapted to the data. Contrary to the GLMs, GAMs do not require a priori estimation of response curve shape or a specific parametric response function. GAM uses a smooth function and calculates a smooth curve that goes through data as well as possible, while being parsimonious. In our cause the smoothed variable is ANPUB, the years of publication. For each predictor variable it separates into sections (delimited by 'knots') and then fit a polynomial function to each section separately. The condition is that the second derivative of the function between knots must be the same for the sections sharing a knot. This eliminates kinks in the curve and builds a continuous curve in all points. In short, we are using smooth functions of our predictor variables, which can take on a great many forms. We consider a Poisson distribution with a log link function because our dependent variable (number of papers) is a vector of count data.

In GAMs, the response for each model is divided in two parts, the parametric part and the smooth part. The coefficients of the parametric part have the same interpretation that in GLMs. But the coefficients of the smooth part only indicate if a non-linear relationship exists between the independent and the dependent variable. When the smooth is significant it indicates that there is not a horizontal relationship. The complexity of the curve is indicated by the edf (effective degrees of freedom) coefficient, which would have a value around one if it was a linear relationship. It has no sense to search for the explanation of the smoothing coefficients. The best way to understand the non lineal effect is to graphically represent the estimated splines.

RESULTS

Descriptives

In Table 1we have the descriptive of the variables of the study. In Panel A, we can observe that the mean of total published papers after tenure is higher than before, but without significant difference. The other differences by type of paper are significant ($p<0.01$ henceforth), showing that after tenure accounting academic have replaced professional papers by academic ones, especially indexed. As we will see afterwards, analyzing the pattern of publications over time, the relationship is more complex that merely considering a lineal relationship. But with these data we can say that after tenure the effort in publication is higher than before considering academic and indexed papers, without controlling for any other variables.

Considering only means, our findings shows that production has a significant increase after achieving a full professor position, except in professional papers. The above results will be nuanced in the next section, because the analysis of non-linear relationships is very important to explain productivity.

The mean difference in the number of total papers before and after SUA is not significant, but the mean differences for kind of papers are significant, showing that after SUA academics have substituted professional papers by academic ones, especially indexed.

In Panel B of Table 1 we present the descriptive for continuous variables. Numbers are self-explained, but we can comment some general aspects. We can observe the scarce number of foreign authors by paper (AUX) collaborating with Spanish accounting researchers (percentile 75 is still zero) and that more than a half of the papers have more than two authors (AUART). In relation to the environment in which the academics develop their research, the mean of active researchers in accounting of the department is 17.0, but it presents a high variability, showing the different size of the departments in Spain. Considering the personal structure of the department, 14% of active accounting researchers have a tenured position and 4% a full professor position. Findings may seem low, but we need to note that the percentage is calculated taking into account the total of the department, and in most of cases this includes not only accounting teachers but also other areas as finance, organization or marketing ones. In any case, variability is higher for tenure than for full professor positions. Finally, we can note that our sample is constituted by a 33% of observations before SUA and 67% afterwards, and that the years of publication is significantly higher after SUA. On the other hand, the number of years to achieve a tenured position is significant higher after SUA (7 years before first publication, vs. 4 years), and also for a full professor position (15 years before 11years).

In Table 3 we present Pearson correlations among independent and total papers. Findings are similar for all types of papers and in order to maintain the paper in an acceptable length we do not present the other tables. Correlations are calculated supposing a lineal relationship among variables, and although the relational form that we have found is more flexible we can observe some general aspects. The main point to consider is that all variables present a relationship with research productivity except SUA and the percentage of full professors in the department (FULLDEP). On the other hand, the antiquity of publication presents, obviously, a high relationship with tenure and full professor position. Also there is a high correlation between the percentage of tenured and full professors (42%).

Multivariate Analysis

In Table 3 we can observe the four regressions performed by GAMs, in which dependent variables are number total of papers, professional papers, academic papers and indexed papers. The first five variables shows the relationship between the number of papers and different variables related with tenure. There is no a significant relationship between tenured position and the number of papers, except in the case of professional ones, lower for tenured teachers. Moreover, for tenured achieved after SUA we can observe as the number of total and academic papers is significant lower for the whole sample. But when we interact the two above variables we can see as, for tenured positions after SUA (TENURED*TENSUA), after tenure the number of papers has increased showing a different behaviour pattern after SUA for tenured teachers respect before. Another issue to consider is that higher is the percentage of tenured academics in the department (TENDEP), indicating more competitiveness, higher is the production of papers that can allows promotion (academic papers). But this change when we interact with the tenure position (TENURED*TENDEP): after tenure, the higher is the % of tenured teachers in the department (more competence for achieving a full professor position) the lower is the number of papers. The structure of human resources in the department, indicating possibility of promotion, also affects productivity.

Findings are, in some aspects, similar if we consider the variable indicating full professor position with these differences. On the one hand, after a full professor position the number of academic papers has a significant increase. On the other hand, the percentage of full professors in the department affects in a negative and significant manner to the number of indexed papers.

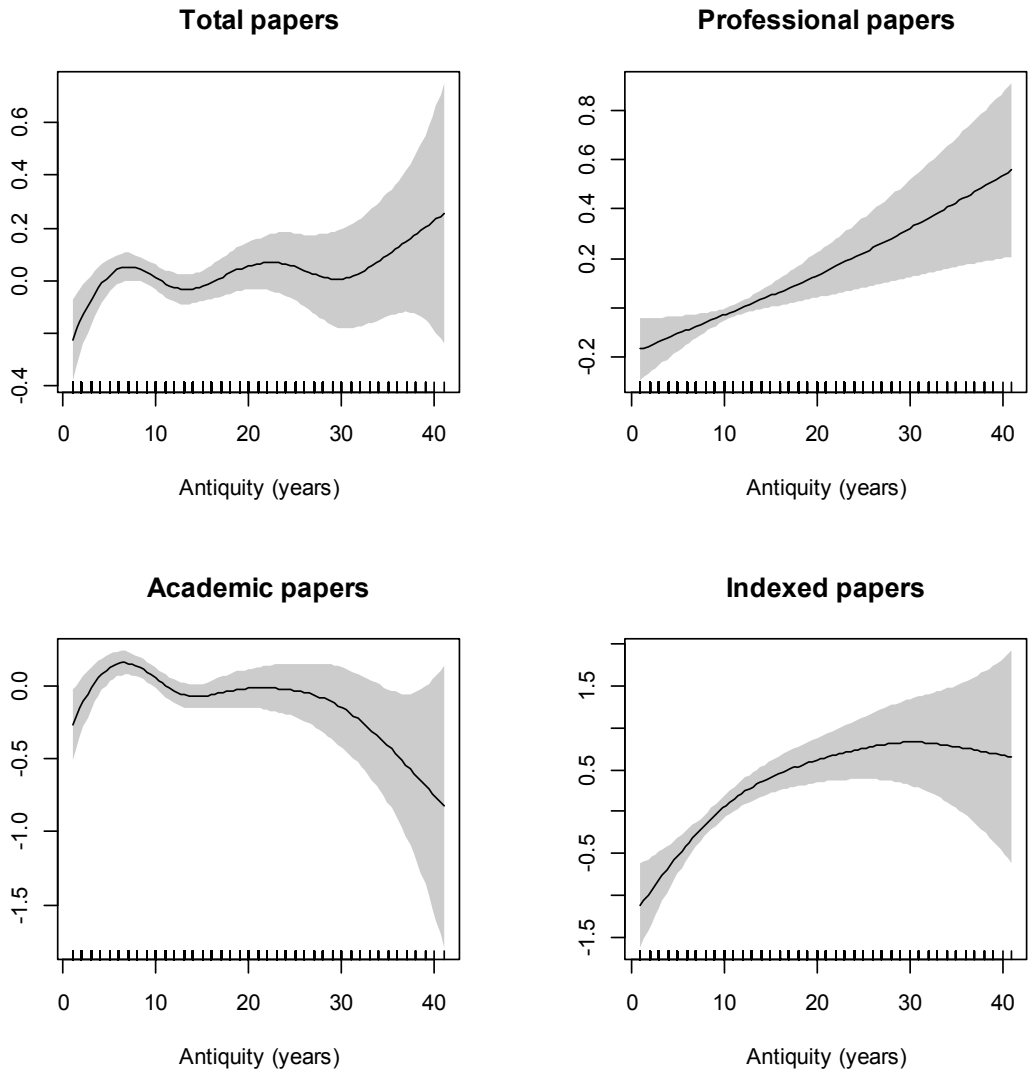
For the control variables, we can comment some relationships. After SUA the only significant, and positive, relationship is with indexed papers.

As we expected, collaborative strategies favour the number of papers: publishing with more authors (AUART) increase the productivity of any kind of papers, and also publishing with foreign academics (AUX) (considering that $p<0.1$ for professional papers). Also the environment affects the number of published papers. Belong to a productive department; with high rate of published papers by active researchers (ARDEP), increase any kind of published papers except professional ones, and also being surrounded by a high number of active researchers in the department (REDEP), indicating this variable that the size of the department is important explaining productivity. Larger departments favour productivity. On the other hand, being a male increase the production of any kind of papers.

We can ask if between tenured and full professor position the number of papers has a continuous decrease or we can find other behaviour. Is in this case were GAM's demonstrate all this potential. In Table 3, the coefficient of ANPUB variable (antiquity of publication) is significant. This is the smooth variable we use in the analysis, and the coefficient does not have a parametric interpretation. Being significant only indicates that this variable has a non-lineal influence in the number of papers. The coefficient has a value of one if there is a lineal relationship, and the higher it is the more flexible is the relationship.

To see the functional form of the relationship between years of publication and number of papers we can observe the Figure 1. We have four graphs, one for each dependent variable. The x-axis shows the number of years publishing, and the y-axis is our dependent variable in each regression: the different kind of published papers. The solid line in the graph is the response variable in the standardized scale of the lineal predictor (antiquity of publication). We have to note that the y-axis has not a direct interpretation because values are centred in zero. The discontinued lines indicate a 95% confidence interval around the estimated values and we need to note that after twenty years of publication this interval has a higher range, because the number of academics publishing after these years is reducing.

Figure 1. Pattern of publication. X-axis: antiquity in publication. Y-axis: type of paper.



The graphs show clearly the existence of non-lineal effects between the antiquity and the variable response number of papers (total, academic and indexed). And also the different behaviour respect academic, indexed and professional papers. And thus the global effect in the total

papers. Let us start with professional papers, the simplest interpretation. We can observe a continuous increase over time for professional papers, almost a linear relationship4 (the coefficient for ANPUB in table 3 is scarcely higher than one for professional papers).

The functional form for academic papers is more complex, and basically determinates the shape for the total papers until thirty years. Around seven years after publication there is a maximum in the number of published papers. After that, when tenure is achieved, we have another six-year period where number of academic papers decrease. But afterwards the number of papers by year is increasing to achieve a maximum twenty-two years, when academic papers start to diminish with the difference that after thirty years the number of total papers stats to increase another time. The pattern for indexed papers is very different: we can see a continuous increase.

The above effects influences the functional form showed in the graph for total papers. Until around thirty years the functional form is very similar to the one of academic papers. After this year, total production starts to slightly decrease until 30 years, increasing after surely by the effect of professional papers. In the graph for indexed papers we can see a continuous increase along time, more pronounced at the beginning and that starts to decrease around thirty years. Additionally, two adjustment measures are showed and the end of Table 1, indicating that the regression with less adjustment is for professional papers, followed by indexed one.

CONCLUSIONS AND IMPLICATIONS

We have analyzed how different incentives may play a role in the productivity of accounting academics. From stability incentives like tenure to motivational incentives like a full professor position or other factors like collaboration, internationality, legal incentives or institutional characteristics, we have looked for an explanation of their pattern of publication, based on the life-cycle theory as the starting point and adding motivational theories later.

Our results performed by GAMs show that there is no a significant relationship between tenured position and the number of papers, except for professional ones that decrease. However, when we interact tenure with SUA then we can see that, for tenured positions after SUA the number of papers has increased. That is, accounting academics do not decrease their publication activity but focus on academic and indexed papers that may lead them to more prestigious positions. Another issue to consider is that the higher is the percentage of tenured academics in the department, indicating more competitiveness, the higher is the number of academic papers. But this changes when we interact with the tenure position, and, after tenure, the more competence for achieving a full professor position, the lower the number of papers.

As for the effect of the full professor variable, we have seen how full professors also increase their productivity even though there is no later incentive. Again the effect moderates with SUA. This shows us that other factors different from a stable and prestigious position motivate

[4] In all four regressions, AIC (Akaike Information Criteria) and Chi^2 obtained in an anova test shows that the election of GAM's adjust better than corresponding GLM's.

accounting academics to continue. We have seen how the years of publication is always a significant determinant of productivity meaning that the experience and learning process is now more satisfactory than ever and that leads professors to continue. Regarding additional frequent predictors considered, we observe that collaboration and internationalisation together with department size favour productivity.

Finally, and as for the particular relationship between the years of publication and productivity, results show clearly the non-lineal effects between them. The years of publication have moderate effects on productivity, being the most interesting that of academic and indexed papers. While academic papers follow somehow a variable pattern over time, indexed papers increase steadily along with years and experience.

Overall the results show that accounting academics follow a research pattern that goes beyond life-cycle predictions and, even after tenured positions, continue to be active although trying to focus on those publications that may allow them to achieve the incentives. The key role of years of publication shows that the learning experience and the seasonality in quality research expands their research vitality over a long period of time.

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TABLES

Table 1. Descriptives.

Panel A. Number of papers by year, before and after several characteristics.

		Total	Professional	Academic	Indexed
Total	mean	1.69	0.86	0.83	0.14
	sd	1.84	1.31	1.23	0.43
Before tenure (25%)	mean	1.67	0.97	0.70	0.09
	sd	1.79	1.46	1.08	0.32
After tenure (75%)	mean	1.70	0.82	0.88	0.16
	sd	1.86	1.25	1.28	0.46
Before full profesor (81%)	mean	1.57	0.85	0.73	0.11
	sd	1.79	1.33	1.13	0.38
After full profesor (19%)	mean	2.18	0.90	1.28	0.25
	sd	1.99	1.18	1.51	0.59
Before SUA (33%)	mean	1.71	0.91	0.80	0.06
	sd	1.82	1.27	1.28	0.25
After SUA (67%)	mean	1.68	0.84	0.85	0.18
	sd	1.85	1.32	1.21	0.49

Panel B. Descriptives for continuous variables

	MEAN	SD	P25	P50	P75
TENDEP	0.144	0.107	0.051	0.154	0.212
FULLDEP	0.044	0.033	0.021	0.032	0.055
AUART	1.556	1.215	0.000	2.000	2.375
AUX	0.060	0.364	0.000	0.000	0.000
REDEP	16.963	11.383	8.000	13.000	26.000
ARDEP	1.438	0.697	1.000	1.400	1.781
ANPUB	11.637	7.485	6.000	10.000	16.000
Before SUA	8.591	6.436	4.000	7.000	12.000
After SUA	13.134	7.512	8.000	12.000	18.000
Years for tenure	4.867	2.713	3.000	4.000	6.000
Before SUA	3.854	1.628	2.000	4.000	5.000
After SUA	7.122	3.238	5.000	7.000	9.000
Years for full professor	11.402	3.309	9.000	11.000	13.000
Before SUA	10.823	2.932	9.000	11.000	13.000
After SUA	15.353	3.036	13.000	15.000	18.000

Table 2. Pearson correlations.

	ART	TENURE	TENSUA	FULL	FULLSUA	TENDEP	FULLDEP	MALE	AUART	AUX	REDEP	ARDEP	SUA
TENURE	0.0079												
TENSUA	-0.0377**	-0.5465***											
FULL	0.1298***	0.2787***	-0.3205***										
FULLSUA	-0.1174***	-0.2648***	0.3127***	-0.8815***									
TENDEP	0.0420**	0.0486**	-0.1384***	-0.1163***	0.1144***								
FULLDEP	0.0297	0.0482**	-0.1025***	0.1298***	-0.1130***	0.4224***							
MALE	0.1069***	0.1547***	-0.2093***	0.2092***	-0.2112***	-0.0448**	0.0266						
AUART	0.4812***	-0.0168	0.0408**	0.0543***	-0.0301	-0.0056	-0.0484**	0.0051					
AUX	0.1451***	0.0343*	0.0032	0.0357*	-0.0732***	-0.0753***	-0.0666***	0.0333*	0.1632**				
REDEP	0.0854***	0.0601***	-0.0974***	-0.0466**	0.0803***	0.5823***	0.3607***	-0.0569***	0.0278	-0.0309			
ARDEP	0.1653***	-0.0875***	0.0423**	-0.0592***	0.0651***	0.0876***	0.0711***	-0.0541***	0.1472***	-0.0221	0.1994***		
SUA	-0.0064	0.2155***	0.1769***	0.0357*	0.0510***	-0.0366*	-0.0278	-0.0629***	0.0598***	-0.0132	0.1010***	-0.0329*	
ANPUB	0.0732***	0.5565***	-0.4507***	0.6966***	-0.6570***	-0.0143**	0.2179***	0.1891***	0.0142	0.0188	0.0430**	-0.0622***	0.2854***

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Variables that explain research productivity. Estimated coefficients. Standard error in parentheses. Dependent variable # of papers

	Total	Professional	Academic	Indexed
TENURE	-0.057	-0.228*	0.105	0.0004
	(0.102)	(0.130)	(0.154)	(0.611)
TENSUA	-0.125*	-0.027	-0.271**	0.836
	(0.072)	(0.095)	(0.110)	(0.541)
TENURE*TENSUA	0.208**	0.093	0.367***	-0.265
	(0.085)	(0.116)	(0.127)	(0.558)
TENDEP	1.112***	0.982**	1.318**	-2.006
	(0.345)	(0.460)	(0.526)	(-1.598)
TENURE*TENDEP	-1.160***	-0.637	-1.768***	0.238
	(0.360)	(0.486)	(0.540)	(-1.573)
FULL	0.084	-0.360*	0.339*	0.451
	(0.133)	(0.190)	(0.186)	(0.561)
FULLSUA	-0.258**	-0.180	-0.356**	-0.088
	(0.124)	(0.175)	(0.175)	(0.547)
FULL*FULLSUA	0.245*	0.237	0.284	0.642
	(0.148)	(0.218)	(0.203)	(0.575)
FULLDEP	0.705	3.889***	-4.338***	(-1.953)
	(0.599)	(0.743)	(-1.028)	(-2.447)
FULL*FULLDEP	-1.458	0.186	-1.416	-9.710**
	(-1.002)	(-1.290)	(-1.576)	(-3.918)
MALE	0.228***	0.280***	0.162***	0.210*
	(0.033)	(0.046)	(0.047)	(0.117)
AUART	0.405***	0.339***	0.476***	0.498***
	(0.012)	(0.017)	(0.018)	(0.046)
AUX	0.095***	0.079*	0.103***	0.347***
	(0.028)	(0.044)	(0.036)	(0.063)
REDEP	0.005***	0.002	0.011***	0.017**
	(0.002)	(0.002)	(0.002)	(0.007)
ARDEP	0.149***	0.079***	0.209***	0.204***
	(0.020)	(0.030)	(0.026)	(0.065)
SUA	-0.066	-0.116**	-0.008	0.629***
	(0.040)	(0.055)	(0.059)	(0.176)
Constant	-0.476***	-0.908***	-1.383***	-4.239***
	(0.157)	(0.216)	(0.228)	(0.799)
Approximate significance of smooth terms. Effective degrees of freedom. Ref. degrees of freedom in parentheses				
ANPUB	5.172** (5.968)	1.400*** (1.706)	5.274 *** (6.041)	2.959*** (3.649)
Adjusted R^2	14.2%	5.3%	12.8%	7.2%
Deviance explained	29.4%	13.1%	27.1%	22.9%

*** p<0.01, ** p<0.05, * p<0.1