Do Economists Swing for the Fences after Tenure?*

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Abstract: Using a sample of all academics who pass through top 50 economics and finance departments from 1996 through 2014, we study whether the granting of tenure leads faculty to pursue riskier ideas. We use the extreme tails of ex-post citations as our measure of risk and find that both the number of publications and the portion consisting of "home runs" peak at tenure and fall steadily for a decade thereafter. Similar patterns hold for faculty at elite (top 10) institutions and for faculty who take differing time to tenure. We find the opposite pattern among poorly-cited publications: their numbers rise steadily both pre- and post-tenure.

Keywords: Tenure, Incentives, Contracting, Compensation, Publication

JEL: J24, J33, J44, M12, M52

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1. Introduction

Tenure is pervasive among American universities: every one of U.S. News and World Report's top 500 colleges in the United States has some kind of tenure-granting system. Its "philosophical birth cry" (Metzger, 1973) was the 1915 statement of the American Association of University Professors (AAUP). Formalized in the 1940 Statement of Principles on Academic Freedom and Tenure, a joint statement of the AAUP and the Association of American Colleges (AAC) proclaimed, *"Tenure is a means to certain ends; specifically: (1) freedom of teaching and research and of extramural activities, and (2) a sufficient degree of economic security to make the profession attractive to men and women of ability. Freedom and economic security, hence, tenure, are indispensable to the success of an institution in fulfilling its obligations to its students and society."* But is tenure part of an optimal contract? The incentives provided by the threat of termination are perhaps the starkest incentives faced by most employees, and tenure removes them.[1]

Since 1940, a variety of additional justifications for tenure have been proposed. It can arise from efficient risk-sharing (Ito and Kahn, 1986). It can also arise due to peculiarities in the nature of academia. One peculiarity is that professors are the members of a university best able to identify talented prospective hires, and they may fear losing their jobs if they hire too well.[2] An additional peculiarity is that universities are non-profits and lack the monitoring of upper management that shareholders typically provide. Tenure, which both protects senior faculty from dismissal and makes them residual claimants, gives senior faculty the incentive to properly monitor university leadership (Brown, 1997).

Finally, society may benefit substantially more from research which is truly groundbreaking than research which is more incremental. Trying to do something

[1] Indeed, an extensive list of articles, written over the past 25 years, has blamed the "sclerotic" performance of several European economies in the past few decades on laws that make termination difficult.
[2] This argument is due to Carmichael (1988), and has been extended by Friebel and Raith (2004) and Siow (1988).

innovative and failing looks a lot like shirking, so motivating risky innovation may require tenure (Manso, 2011).[3]

Our focus is on this last argument: do academics respond to receiving tenure by "swinging for the fences"? In order to answer this question, we hand collect a sample of all academics who pass through economics or finance departments at top 50 U.S. schools from 1996 through 2014. From this sample of over 2000 faculty, we consider two variables in the years before and after each academic receives tenure: the number of publications and the number of "home run" publications. The number of publications is a measure of the quantity of output; the number of home run publications is a measure of the quantity of *highly influential* output.

We find that both variables have values that peak at tenure and decline thereafter. The average number of annual publications falls by approximately 30% over the 2 years after tenure is granted and falls by an additional 15% over the subsequent 8 years. The average number of annual home run publications also falls by 30% over the 2 years following tenure, but falls by an additional 35% over the subsequent 8 years. Combining these facts, we find that not only do both the overall publication rate and the home run rate fall, but the likelihood of a given publication being a home run falls by approximately 25% during the 10 years following tenure.

We extend the analysis to consider papers whose eventual citations place them elsewhere in the distribution and find that the change in publication rates in the 10 years following tenure declines monotonically in the citation percentile. Papers in the bottom 10% of citations, for example, are actually published more frequently in the years following tenure than in the tenure year.

We argue that these facts suggest two things. First, the dramatic fall in publication rates over the 2 years following tenure is consistent with the fact that tenure tends to be granted when publication success is achieved; reversion to the mean is expected. The timing of tenure is at least in part endogenous: faculty can advance early if they are highly productive early in their careers, and they can switch employers if they are unlikely to get tenure. Further, the timing of publication is endogenous: faculty can

[3] Additional theories of tenure are Kahn and Huberman (1988), Waldman (1990), Demougin and Siow (1994), and McPherson and Shapiro (1999).

time their efforts on various projects to maximize the number of publications before their tenure clock expires.

Second, and more relevant for our paper, the publication behavior from years 2 through 10 post-tenure suggests that tenured faculty reduce risk-taking. This may indicate adding co-authors; advertising new papers less at conferences and seminars; working on easier topics, which can be published in good journals but not have impact; or any number of other behaviors.

We consider several alternatives to our explanation, and show that none can fully explain what we find. Results do not appear to be caused by an association between productivity (or creativity) and aging.[4] They also do not appear to be caused by increased non-research service work post-tenure or an increased tendency of tenured researchers to branch out into new subject areas. Finally, our results hold across schools and over time.

While our results are largely negative toward the granting of tenure, we note that potential benefits exist that we have not evaluated. These benefits could be traditionally economic: the carrot of tenure can (i) incentivize effort pre-tenure, (ii) allow for lower salaries, (iii) induce more selective hiring, or (iv) attract risk-averse but talented individuals to academia. These benefits could also be more philosophical: academic freedom in teaching and research is important for reasons other than the generation of highly cited papers. Therefore, this paper should not be seen as making a broad case against tenure.

2. Results

To construct our sample, we hand collected employment and publishing data. We include all faculty who were employed at any of the top 50 economics or finance departments in the U.S. in any year from 1996 through 2014. This process involved use of the Way Back Machine (waybackmachine.org) and hand-collection of *curriculum vitae* (CVs). In total, we collect 2,763 names, 2,092 of whom are eventually granted

[4] See Oster and Hammermesh (1998), Levin and Stephan (1989), and Gingras *et al* (2008) for arguments about the relationship of age and productivity. While these papers show that research productivity increases for several years at the start of a researcher's career before declining, none of these papers accounted for the granting of tenure. This hump shape, therefore, may be a result of tenure, not age.

tenure at some point prior to 2014. After collecting the set of faculty and their tenure years, we match this database to a database of publications and citations for 30 leading economics and finance journals, the collection and composition of which is described in Brogaard et al. (2014). More detail is provided in the online appendix.

a. Baseline results

We begin by evaluating a subset of faculty who are present in our data for at least 5 years prior to their tenure year and 10 years after. We require pre- and post-tenure data for all faculty. Some faculty were granted tenure less than 5 years from their first appearance in our sample. This was usually because they began their careers at government agencies in which they may not have been expected to publish to the same degree as in academia. Some faculty left academia less than 10 years post-tenure, or received tenure after 2004, and were unlikely to publish as often post-tenure. We exclude those people who would mechanically strengthen the increase in observed publication rates prior to tenure and the decrease post-tenure. The final dataset contains 980 faculty, all of whom received tenure prior to 2004.

To calculate an author's contribution to her papers, we define her contribution to a publication as 1/N, where N is the number of authors on the publication. If she is part of a three-author publication, then she is credited with 1/3 of a publication. If she is part of a two-author home run publication, then she is credited with ½ of a home run.

Figure 1 presents the author-adjusted number of papers published by this subset in event time, where the event is the receipt of tenure.

Insert Figure 1 About Here

The year marked "tenure" is the first year in which the researcher was tenured, the year marked "-1" is the year the researcher was put up for tenure, etc. The figure shows annual publications increasing monotonically prior to tenure, peaking in the neighborhood of the granting of tenure and declining steadily thereafter.

We also calculate the number of home run publications, defined as publications that, as of 2014, were among the 10% most cited of all papers published in a given year. The

plot of the number of home runs is largely similar to the plot of publications, peaking in the tenure year and falling thereafter. We can also calculate the likelihood that any given paper becomes a home run by dividing the number of home runs by the number of publications for each observation year. This series is volatile but shows some increase prior to tenure, rising from approximately 20% in the years prior to tenure to 22% in the year of tenure. The likelihood of a publication becoming a home run then falls steadily to 16% 10 years after tenure.

Together, these facts provide suggestive evidence that tenure is associated with peak academic production, in terms of the quantity of publications, the quantity of home run publications, and the likelihood that a given publication becomes a home run. Interested readers can find a similar figure, without any adjustments for the number of co-authors on a paper, in the appendix.

Insert Figure 2 About Here

Figure 2 plots the ratio of the two plots in Figure 1: home run publications divided by all publications. The series is noisy, but clearly exhibits a substantial decrease from 2 through 10 years post-tenure.[5] This decrease will be important in teasing out potential explanations for the patterns we see.

In order to better measure risk taking in publication, we plot the rate of non-home run publications. In Figure 3, we assign each paper a category based on its citations; if it was in the top 10% of citations for papers published in that year, it is called a home run. If it is in the lowest 10%, we call it a bomb. We split papers further into 10^{th} to 25^{th}, 25^{th} to 50^{th}, 50^{th} to 75^{th}, and 75^{th} to 90^{th} percentile groups. We calculate the number of papers published by authors from 5 years before to 10 years after tenure. To make the comparison clearest, we divide those numbers by the number of papers in each citation bucket in the year of tenure.

Insert Figure 3 About Here

[5] The spike in year nine is noise: returning to Figure 2, Panel B, one can see that the home run rate increases somewhat and the publication rate dips somewhat in year nine, causing the ratio to spike.

Figure 3 shows that publication rates of all paper types increase in tandem up to the year of tenure, but there is substantial divergence afterward. The number of bombs continues to increase post-tenure, while the number of papers that end up in the 10th to 50th percentiles remain relatively constant. Above-median papers are less and less common the farther the author is from her tenure date.

Table 1 shows the results of regressions designed to estimate the statistical significance of the changes in publication rates shown in Figure 1. Column numbers refer to those containing data.

Insert Table 1 About Here

We estimate variants of the following linear model:

$$Pub_{i,t} = \alpha + \beta_t + \gamma_i + \delta_{i,t}^{-5,-1} I_{i,t}^{-5,-1} + \delta_{i,t}^{+1,+5} I_{i,t}^{+1,+5} + \delta_{i,t}^{+6,+10} I_{i,t}^{+6,+10} + \varepsilon_{i,t}$$

where β_t is a year fixed effect designed to capture differential publication rates over time; γ_i is a researcher fixed effect designed to capture differential publication rates across researchers; $I_{i,t}^{m,n}$ is a dummy variable taking a value of 1 if, in year t, researcher i is between m and n years from tenure (with positive values of m and n representing post-tenure dates, and negative values representing pre-tenure dates) and zero otherwise; and $\delta_{i,t}^{m,n}$ is the coefficient on the tenure time dummy variable associated with years m to n after tenure.

The excluded year for researcher i is her tenure year, so all coefficients are average publication rates relative to a professor's tenure year. Depending on the regression, $Pub_{i,t}$ may represent the overall author-adjusted number of publications, or the author-adjusted number of home run publications for researcher i in year t.

In Table 1, Column 1, we perform a simple analysis with no year or author fixed effects. This regression ignores the facts that publication rates have increased over time, and that some authors publish more than others. We see that, on average, 0.155 fewer author-adjusted publications occur in the 5 years prior to tenure, 0.178 occur in the 5 years after, and 0.237 occur in the 5 years following that. Publications are lower before and after tenure, and even lower the longer after tenure one goes.

In Table 1, Column 2, we add year fixed effects to account for the fact that publication rates have increased over time, and in Column 3 we add year and researcher fixed effects. The inclusion of year fixed effects alone does little to affect the coefficients on years from tenure dummy variables. The inclusion of researcher fixed effects, however, has a substantial effect on both coefficients and R-squared values from the regressions. These findings are notable; by design, researcher fixed effects will absorb variation in across-researcher publication rates, as shown by the substantial increase in R-squared from Column 2 to Column 3. The effect of time post-tenure is substantially strengthened, perhaps by a reduction in measurement error leading to less attenuation bias.

In Table 1, Columns 4-6, we repeat the analyses of the first three columns and find substantial reductions in the rate at which authors produce home run papers, in periods both before and after tenure. As in Columns 1-3, the number of home runs produced decreases in the 5 years following tenure and continues to decrease in the 5 years after that.

We test whether we can statistically differentiate the coefficients on the dummy variables for the periods 1-5 years and 6-10 years post-tenure. We perform a Wald F-test for the equality of the coefficients on the dummy variables for years +1 to +5 and years +6 to +10. In all six cases, we strongly reject the null hypothesis that the coefficients are equal. Not only do the rates of publications and home runs fall in the 5 years following tenure, but they continue to fall in the 5 years after that.

In sum, we have shown that:

1. Publication and home run rates rise to tenure, peaking in the year a researcher comes up for tenure and her first year as tenured faculty.
2. Publication and home run rates fall markedly in the 2 years following tenure.
3. Publication and home run rates fall by 15% and 35% (respectively) from 2 through 10 years after tenure, while bomb rates increase by 35%.

Our interpretation of these facts is:

1. Junior faculty get better at publishing as they age, and publication lags are long, leading to an increase in the publication rate of all paper qualities as tenure approaches.

2. Tenure is typically granted when success is achieved. Because of publication lags, this leads to high publication rates in the year that the researcher is coming up for tenure as well as during the following year.
3. As tenured faculty age, they take less risk with their published papers, leading to a decade-long decline in the production of publications and home runs and an increase in the production of bombs.

It is possible that our interpretation is incorrect. Because we are interested in the response of faculty to a change in incentives, we will not further analyze the first two interpretations, instead focusing on the third claim of a change in risk taking.

b. Alternative explanations for productivity declines post-tenure

In this section we consider five alternative explanations for the patterns shown thus far that could help explain our findings. We will show that none can fully explain the patterns that we see. While they all may be at work, a reduction in risk taking seems to be relevant as well.

i. Time since PhD naturally affects productivity

It has been shown that academic productivity increases post-PhD for some time before decreasing (e.g., Oster and Hamermesh, 1998). This may be due to aspects of the profession; for example, learning by doing may cause a researcher's productivity to increase over time, while a shift in skills and interests of the profession causes productivity to decline. This may also be due to aspects of the human brain; for example, a researcher's knowledge and wisdom may increase with time, while her "processing power" decreases. In either case, there may be a natural point at which the positive and negative aspects offset one another, making productivity peak at some time. Perhaps tenure tends to be granted at that natural peak.

To investigate this possibility, we split the sample by whether a researcher was granted tenure in her fifth year, sixth year, etc. The sample in each case is substantially smaller than for the full sample, adding noise to our plots, so we make several adjustments to boost the sample. Details and plots can be found in the appendix.

For those tenured in 5 years, the year of peak production of both papers and home runs is the tenure year. For those tenured in 6 years, the publication rate is highest in the year before tenure and the tenure year; the home run publication rate peaks in the tenure year and the year after. For those tenured in 7 years, both publications and home runs peak in the year the candidate is up for tenure. As the data become noisier (fewer people are tenured each year after seven), the peaks are less clear but the general shape persists: people publish more and better papers in the run-up to tenure and fewer after.

These facts suggest that it is not simply aging that is causing the patterns observed in Figures 1 and 2. The year of tenure itself is special, not simply the number of years since graduate school.

ii. Service, teaching, and non-academic obligations increase post-tenure

It is possible – even likely – that many faculty in our sample experience increased expectations of university service after tenure, whether it be in a leadership (e.g., dean, department chair) or administrative (e.g., committee member) capacity. It is also common for senior faculty to have more difficult teaching loads, teaching more classes and fewer sections of each class. Finally, tenured faculty often have more opportunities for consulting, book writing, etc., after tenure. All of these factors would reduce publication rates, even if the researcher's aggregate career effort increased post-tenure.

To investigate this explanation for our findings, we return to Figure 2. Suppose that authors are able to distinguish between projects likely to be successful and those likely to fail. Assuming that a researcher experiences an increase in non-research obligations post-tenure, she would presumably reduce effort on low-impact projects. In this case, the number of home runs might not fall much after tenure. At a minimum, the fraction of published papers that become home runs should increase, simply because the denominator – the number of publications – would decrease. We do not see this result.

Instead, the likelihood that a given publication becomes a home run falls from 20% the tenure year to 15% 10 years later, a 25% reduction. Note that this reduction is not due to mean reversion and the endogenous timing of tenure. The decline begins in

earnest 3 years after the tenure year, which is 4 years after the researcher is up for tenure. Any papers that led the researcher to get tenure would likely have been published before then. Also note that this is an economically substantial decline in the home run rate.

We can also point to Figure 3, in which we show that the production of bombs actually rises by 35% in the 10 years following the granting of tenure. Service obligations should not drive an *increase* the production of low-citation papers!

Note that this discussion assumes simply that researchers abandon projects that are, in expectation, less likely to be successful. Even if it is not possible, *ex ante*, to distinguish a future home run from a future bomb, we should see the fraction of publications that become home runs stay flat after tenure. We see a decrease. This suggests that, while non-research post-tenure obligations may affect productivity, there is more to the story.

iii. Tenure causes people to branch out, which is risky and time-consuming

Tenure may not lead to an increase in home run publications, but it may lead to an increase in interdisciplinary work, which may help ideas germinate in important ways. To consider this possibility, we estimate variants of the following linear probability model, in which each observation is a single publication:

$$Y_{i,t,r,s} = \alpha + \beta_t + \gamma_r + \delta_s + T_r + X_i + \varepsilon_{i,t,r,s}$$

where $Y_{i,t,r,s}$ is a dummy variable measuring whether paper i written at time t by researcher r, who has been a professor for s years, represents branching out (defined in three ways below); β_t is a year fixed effect designed to capture differential tendencies to branch out over time; γ_r is a researcher fixed effect designed to capture differential tendencies to branch out across researchers; δ_s is an event-time fixed effect designed to measure different tendencies to branch out as a researcher ages; and T_r is a dummy variable indicating whether the researcher has tenure.

In our first regression, a paper is defined as branching out (i.e., $Y_{i,t,r,s} = 1$) if it involves a new coauthor. In this case, X_i represents a "coauthor count" fixed effect,

which accounts for the fact that researchers with more prior coauthors tend to add new coauthors more rarely.[6]

In our second regression, a paper is defined as branching out if it is published in a journal in which the researcher has never before published. For example, if a researcher has published only in finance journals and then publishes a new paper in the *Journal of Labor Economics*, then $Y_{i,t,r,s} = 1$ for this paper. In this case, X_i represents a "prior journal count" fixed effect, which accounts for the fact that it is more difficult to publish in a new journal when one has already published in many different journals previously.

In our third regression, a paper is defined as branching out if it is published in a new subject matter area. For example, the *Journal of Labor Economics* is defined as being in the area of labor economics, whereas the *Journal of Financial Economics* is defined as being in the area of finance. General interest journals are more difficult to categorize, so we define them to be in their own area.[7] In this case, X_i represents a "prior areas count" fixed effect, which accounts for the fact that it is more difficult to publish in a new area when one has already published in many areas previously.

Insert Table 2 About Here

Results are displayed in Table 2. In the first three data columns, we do not include researcher fixed effects, and in the last three we do. Regressions 1 and 4 define branching out as including a new coauthor. There do not appear to be substantial differences in the tendency to add new coauthors pre- and post-tenure. Regressions 2 and 5 define branching out as publishing in a new journal. It does not appear to be more common for researchers to publish in new journals post-tenure. If anything, regression 2 suggests a weak tendency to publish in new journals less often. Importantly, this is not because tenured faculty have been out longer; this is accounted for with event-time fixed effects. It is also not because tenured faculty have already published in more journals,

[6] A coauthor count fixed effect is actually a set of fixed effects. The first takes a value of one if the author has never had a coauthor on any of her prior papers, and zero otherwise. The second takes a value of one if the author has only ever worked with one other coauthor previously, and zero otherwise. Etc.

[7] Interested readers can find the assignment of journals to areas in Table 2a in the appendix.

making it harder to publish in a new one; this is accounted for with journal count fixed effects.

Finally, regressions 3 and 6 define branching out as publishing in a new area. As with publishing in a new journal, there is no evidence that tenured faculty branch out more. If anything, there is weak evidence of a tendency to branch out less.

iv. Risk taking may decline on average, but not for elite faculty

The preceding results are averages. Perhaps faculty at the most prestigious departments, who produce the lion's share of truly influential papers, exhibit a different pattern of publication after tenure.

In Figure 4, we perform the same analysis as in Figure 1, and plot publications and home runs for 5 years pre- to 10 years post-tenure, but restrict the sample to faculty who begin their careers at a subset of particularly prestigious schools: University of California-Berkeley, University of Chicago, Columbia University, Harvard University, Massachusetts Institute of Technology, Northwestern University, University of Pennsylvania, Princeton University, Stanford University, and Yale University.

Insert Figure 4 About Here

As in each of our subsamples thus far, publications and home runs peak in the year the researcher is up for tenure and in her first year of tenure. Both fall markedly in the first 2 years post-tenure and then consistently from 2 through 10 years post-tenure. There is more noise than for the full sample, but the pattern is striking. Faculty who begin their careers at elite schools have the same publication pattern as those who begin elsewhere. Indeed, from 2 through 10 years post-tenure, the drop in the publication rate is 15% and the drop in the home run rate is 35%, precisely the same as in the full sample. The patterns we identify are present for faculty at both higher- and lower-ranked schools.

v. It takes time for truly novel research to gain traction

Perhaps truly influential papers take time to become known and cited. Importantly for this paper, perhaps Manso (2011) is correct in suggesting that the type of innovation that tenure incentivizes is precisely the riskier type, which may take more time to catch on. To analyze whether this is the case, we restrict our sample to faculty who were tenured by 1994, and therefore papers published no later than 2004. As we evaluate the citations as of 2014, this allows at least 10 years for a paper to catch on.

Insert Figure 5 About Here

Figure 5 presents the results in this subsample. As in other subsample analyses, there is more noise, but the pattern is still present. In fact, we once again see a 15% reduction in the publication rate, and a 35% reduction in the home run rate, in years 2 through 10 post-tenure. The persistence of these ratios is surprisingly stable.

3. Conclusion

We have presented a series of figures showing that rates of publications and home run publications rise up to the year of tenure and fall for a decade thereafter. The fall is most pronounced in the 2 years immediately following tenure, suggesting that tenure is granted when a researcher is especially productive. But both rates also fall substantially from 2 through 10 years after tenure is granted, which cannot be explained by either mean reversion or the endogenous timing of tenure. We show that this is true whether faculty are tenured in 5, 6, 7, etc., years, suggesting that it is tenure, not simply the passage of time, that accounts for these results.

We find that faculty do not appear to increase their risk-taking after becoming tenured. The rate of publication of low citation papers increases substantially after tenure, but the rate of publication of home runs falls. Increased risk taking should cause both to rise. We also find no evidence that tenure causes researchers to branch out by publishing with new coauthors, in new journals, or in new areas. If anything, there is mild evidence of the opposite.

Our paper contributes to a small empirical literature on the effect of tenure on academic output. Holley (1977) evaluates the productivity, both in terms of quantity and

quality, of 97 sociologists surrounding their tenure dates. He finds decreased performance on both dimensions post-tenure. Li and Ou-Yang (2010) focus on economics and finance faculty from the top 25 schools and find no statistically significant difference in impact pre- and post-tenure. This result appears to be due to the substantial increase in statistical power that we achieve by including more faculty from more schools and a wider set of journals. Yoon (2016) analyzes the publication and citation rates for U.S. law school professors and finds that those rates rise to tenure and fall slightly thereafter. He analyzes only the first 10 years of a professor's career, little of which is post-tenure, so he cannot separate the effect of endogenous timing of tenure from the longer-run effects on productivity or effort.

We conclude by noting that our results should not be read as an indictment of the institution of tenure. There are likely benefits as well as the costs that we identify. For example, the possibility of tenure may increase effort in graduate school or early in a researcher's career, enough to offset the negative effects on effort post-tenure. It does not, however, appear that academics respond to tenure by swinging for the fences.

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Figure 1: Publications and Home Runs around Tenure

This figure plots both the number of publications and the number of those publications that were "home runs" in event time, where the event is tenure. A publication in an economics or finance journal is defined as a home run if it has more citations than 90% of all economics and finance publications appearing in the same year. The sample consists of 980 faculty whose publication activity we observe for at least 5 years before tenure and 10 years following tenure. Publications are the sum of the cohort's publications (in event time). We adjust the total publication count by dividing each publication by the number of authors (e.g., an article with four authors counts as .25 of a publication for each author).

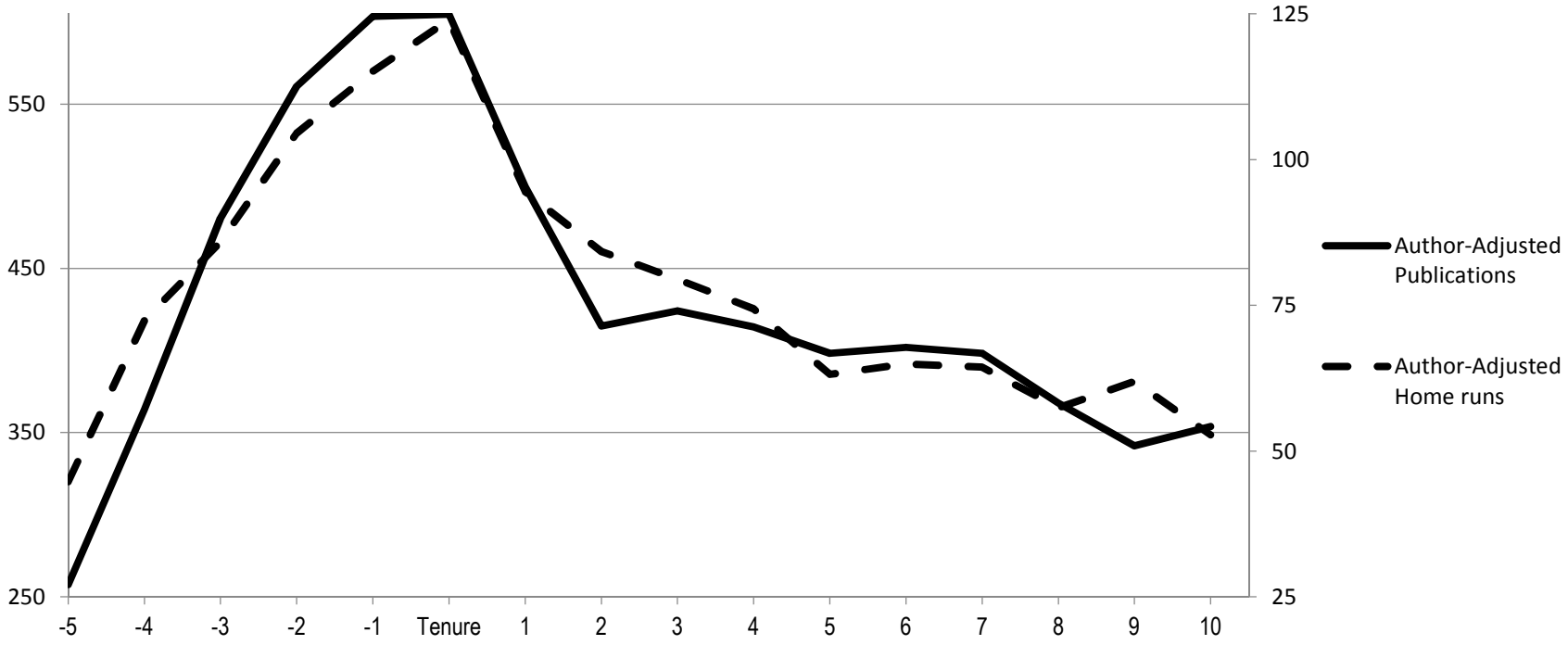


Figure 2 Ratio of Home Runs to Publications around Tenure

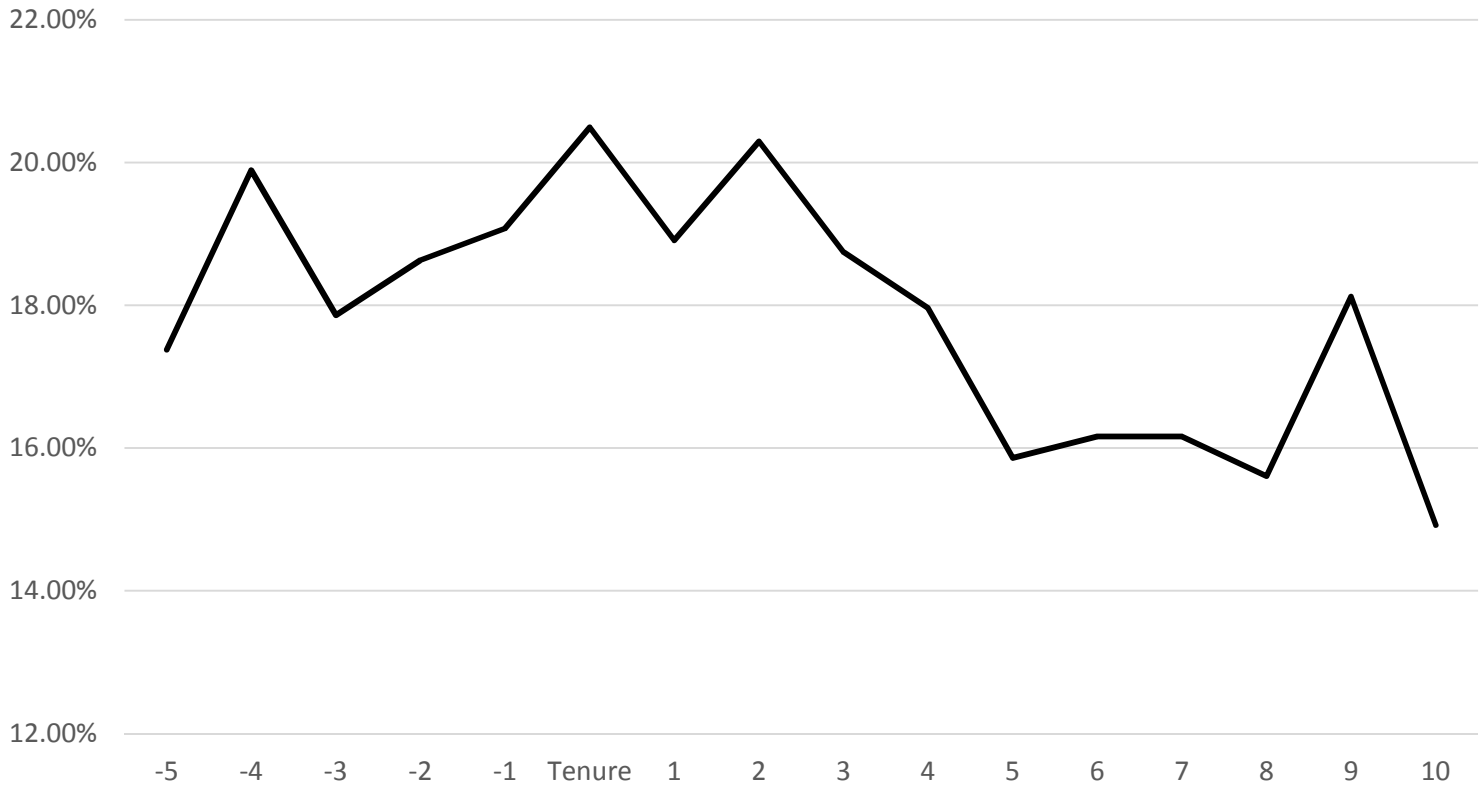


Figure 3: Publications around Tenure by Citation Percentile

This figure plots the relative frequency of publications by citation percentile around tenure. Home runs (Bombs) are those above the 90th (below the 10th) percentile of all economics and finance papers in the same year. Pubs: 75th-90th, Pubs: 50th-75th, 25th-50th, and Pubs: 10th-25th are similarly defined. For each percentile group, a plotted observation is the ratio of publications appearing in that event year relative to the year of tenure (so that by construction the ratio = 1 for each group in the year of tenure).

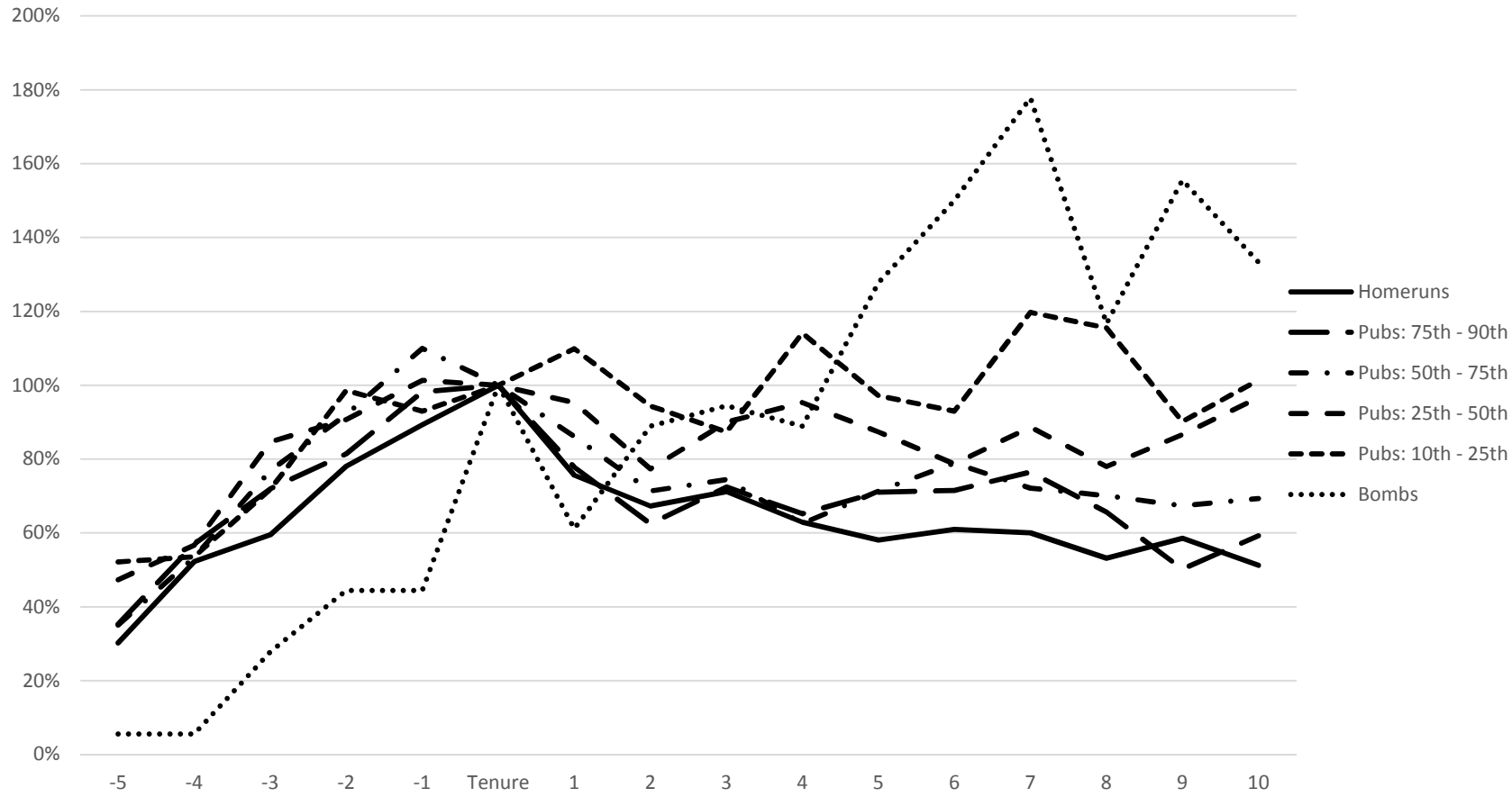


Figure 4: Publications and Home Runs around Tenure in Elite Schools

This figure reproduces Figure 2, Panel B, for faculty who initially placed in a top school: University of California-Berkeley, University of Chicago, Columbia University, Harvard University, Massachusetts Institute of Technology, Northwestern University, University of Pennsylvania, Princeton University, Stanford University, and Yale University.

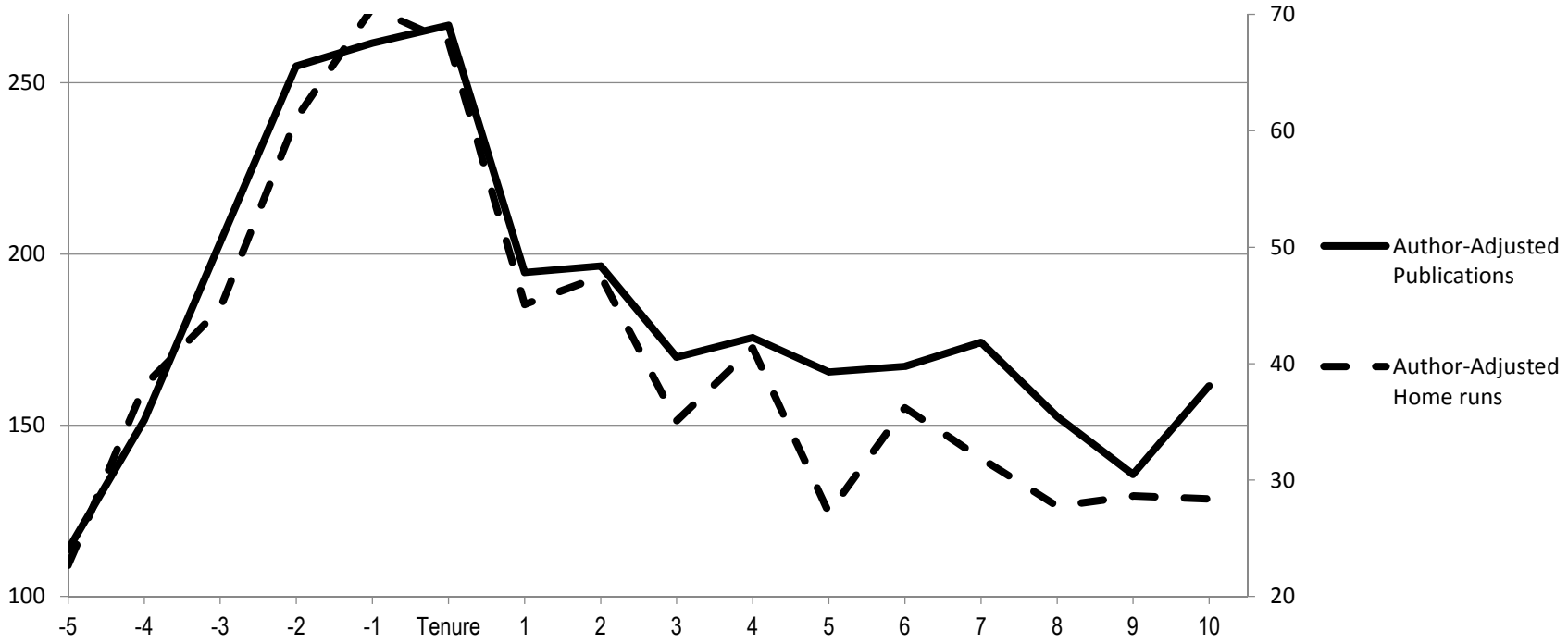


Figure 5: Publications and Home Runs for those Tenured by 1994

This figure reproduces Figure 2, Panel B, for faculty who were tenured by 1994.

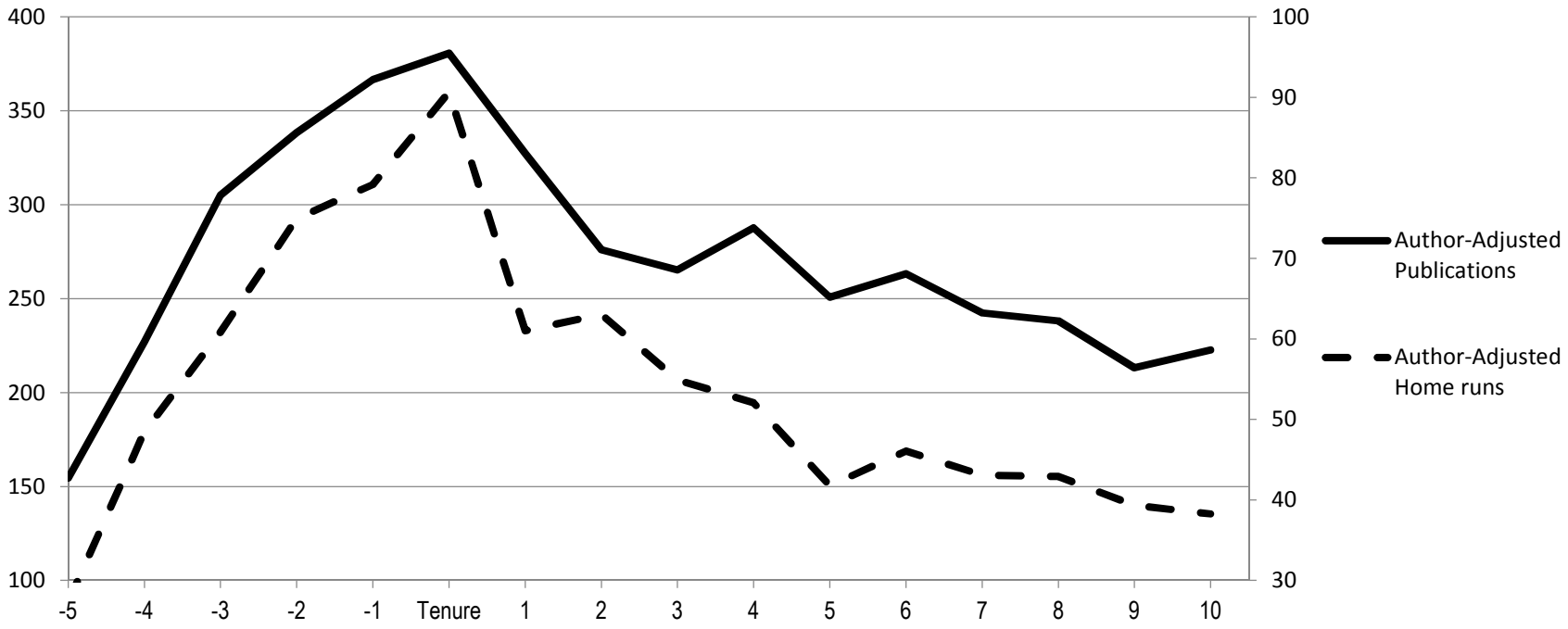


Table 1: Publications and Home Runs around Tenure

The dependent variable in the first (last) three data columns is author-adjusted publications (home runs). Years -5 to -1, Years +1 to +5, and Years +6 to +10 are the 5 years before tenure, the first 5 years after tenure, and the next 5 years after tenure, respectively. The final row reports the *p*-value from a linear restriction test, which tests the equality of coefficients on Years +1 to +5 and Years +6 to +10. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively. XXX standard errors clustered? XXX

Dependent Variable	Publications	Publications	Publications	Home runs	Home runs	Home runs
Years -5 to -1 (Pre-tenure)	-0.155***	-0.168***	-0.092***	-0.040***	-0.046***	-0.032***
	(0.028)	(0.028)	(0.027)	(0.112)	(0.011)	(0.011)
Years +1 to +5 (Post-tenure)	-0.178***	-0.153***	-0.226***	-0.046***	-0.038***	-0.052***
	(0.028)	(0.028)	(0.027)	(0.011)	(0.011)	(0.011)
Years +6 to +10 (Post-tenure)	-0.237***	-0.186***	-0.373***	-0.065***	-0.049***	-0.085***
	(0.028)	(0.028)	(0.037)	(0.011)	(0.011)	(0.015)
Observations	15680	15680	15680	15680	15680	15680
Year Fixed Effects	NO	YES	YES	NO	YES	YES
Person Fixed Effects	NO	NO	YES	NO	NO	YES
R-Squared	0.0072	0.0233	0.2780	0.0037	0.0161	0.2164
P-value for Test: Years +1 to +5 = Years +6 to +10	0.0000	0.0167	0.0000	0.0000	0.0260	0.0000

Table 2: Other Forms of Risk-taking

The dependent variable in the first and fourth data columns is a dummy variable equal to one if a professor published a paper with a new coauthor and zero otherwise. In the second and fifth data columns it is a dummy variable equal to one if a professor published a paper in a new journal, and in the third and sixth data columns it is a dummy variable equal to one if a professor published a paper in a new subject area. Subject areas are grouped into accounting, econometrics, finance, general interest, industrial organization, international economics, labor economics, law and economics, macroeconomics, microeconomics, monetary economics, and public economics. *, **, and *** indicate statistical significance at the 10%, 5%, and 1%, respectively. XXX standard errors clustered? XXX

Dependent Variable	New Coauthor	New Journal	New Area	New Coauthor	New Journal	New Area
Tenure	-0.006	-0.053***	-0.041***	0.005	0.012	0.009
	(0.011)	(0.011)	(0.008)	(0.014)	(0.014)	(0.010)
Observations	16280	16280	16280	16280	16280	16280
Year Fixed Effects	YES	YES	YES	YES	YES	YES
Event Year Fixed Effects	YES	YES	YES	YES	YES	YES
Coauthor Count Fixed Effects	YES	NO	NO	YES	NO	NO
Journal Count Fixed Effects	NO	YES	NO	NO	YES	NO
Area Count Fixed Effects	NO	NO	YES	NO	NO	YES
Person Fixed Effects	NO	NO	NO	YES	YES	YES
R-Squared	0.060	0.131	0.098	0.235	0.272	0.307

Online Appendix – Text:

Data and Methodology:

To determine the top 50 departments, we rely on the rankings of Conroy et al. (1995). Table 1a reports the schools, listed in alphabetical order.

Insert Table 1a About Here

We use a department ranking created before the sample period so as to minimize any bias due to a department growing or falling in prestige during the period of study.

To determine the current faculty at the departments in the sample, we visit each school's website and collect all tenure-track names listed on the website. For each faculty member, we download his or her most recent *curriculum vitae* (CV) as a record of current and past academic positions, and level of the position (Assistant, Associate, Full, Visiting, Emeritus). Next, we look at department websites from past years. We can see previous versions of department websites using waybackmachine.org, a website dedicated to archiving all content on the internet. Waybackmachine.org collects data periodically back to 1996. Most schools in the sample have websites going back to 1996, although several start in later years. This allows us to construct a sample of nearly all faculty employed at these schools in any year from 1996 through 2014. For each faculty member, we use an internet search to find her most recent CV, so that we have data for appointments even if she left the top 50 prior to 2014. In total, we collect 2,763 names, 2,092 of whom are eventually granted tenure at some point prior to 2014. In our work below, we require a researcher to be in academia for at least 5 years prior to tenure, and 5 or 10 years after tenure. This reduces our sample to 1,331 researchers who are in academia for at least 5 years after being granted tenure, and 980 who are in the sample for at least 10 years post-tenure.

Typically, schools grant tenure at the same time that a faculty member is promoted to Associate Professor, though there are exceptions at each school. Some regularly grant tenure only a few years after promotion to Associate and some grant

tenure only upon promotion to Full Professor. To determine when a faculty member was granted tenure, we employ a multi-step process.

First, we determine the prevailing policy for when tenure is granted at each school. This requires finding faculty who disclosed the year that they were granted tenure on their CVs. If all disclosing faculty from a single school received tenure at the same position (for example, immediately upon appointment to Associate professor), then we determine that this is the standard for the school. This accounts for the vast majority of schools in the sample. Next, we contact department representatives, most often faculty, to inquire about the standard at each school. The standards resulting from this process match the standards determined from CVs.

Second, for schools with ambiguous standards (most notably Carnegie Mellon, which changed its tenure timing midway through the sample period), determining tenure dates requires contacting department faculty who would know the tenure status of the faculty member in question. For schools that grant tenure several years after an appointment to Associate Professor, we contact department faculty who are aware of the professor's date of tenure.

Third, for a random sample of faculty, we contact either them or their colleagues to confirm the assigned tenure year. This process is surprisingly consistent, with few examples where our tenure time assignment is incorrect. Data error typically occurs when (i) a faculty member moves to a new school and is simultaneously promoted from Assistant to Associate Professor, (ii) the new school tenures internal candidates at the Associate level, and (iii) the new faculty member receives tenure after only 1 or 2 years at the new school. It is not possible to fully correct for this potential error in the data, but the number of observations subject to this potential problem is well under 1/10 of the sample, and the fraction of those observations that are likely to be in error is small. Furthermore, this error can only serve to weaken our results.

After collecting the set of faculty and their tenure years, we match this database to a database of publications and citations for 30 leading economics and finance journals. The collection and composition of this database is described in Brogaard et al. (2014). Merging the datasets requires standardizing school and faculty names. The former is straightforward but, because we cannot systematically distinguish publications among faculty members with common names (e.g., Beth Allen, Belinda Allen, Brandon

Allen, Bryant Allen and Bryon Allen all share the Web of Science name Allen, B), we remove those faculty with identical name listings. Readers or researchers who access the data underlying our work online should note that missing faculty likely share Web of Science names with other important faculty, leading to their exclusion. Also note that there is some discretion here: William J Adams of University of Michigan shares a Web of Science name with Walter Adams, but William has many publications and Walter has one, in 1951. In cases like this, the error from assigning the name to William is less than the loss to data from excluding him from the sample, so we keep his observations.

The data collection process introduces some errors, but that number is likely to be small, and any errors in the tenure date are likely to be one year or two at most. These errors, when present, will weaken our results, not strengthen them.

Separating faculty by years-to-tenure:

As referenced in the text of section 2.b.i, we plot split our sample of Figure 1 into several sub-samples based on how long it took a researcher to get tenure. Specifically, we split the sample by whether a researcher was granted tenure in her fifth year, sixth year, etc. The sample in each case is substantially smaller than for the full sample, adding noise to our plots, so we make two adjustments to improve the sample. First, we adjust our sample to include faculty who are in the sample for at least 5 years after tenure, as opposed to 10. This increases the sample size by nearly 40%, to 1,331 members, relative to requiring that faculty must be in the sample for 10 years post-tenure. Second, the number of faculty receiving tenure more than a decade after a PhD is too low to meaningfully display in a plot, so we group together all faculty who receive tenure after 10-15 years. Note that the number of faculty differs by tenure year, so the fact that faculty tenured in 6 years publish more papers than those tenured in 5 should not suggest that they are more productive on a per-researcher basis. Figure 2a displays the results.

Insert Figure 2a About Here

For those tenured in 5 years (Panel A), the year of peak production of both papers and home runs is the tenure year. For those tenured in 6 years, the publication rate is highest in the year before tenure and the tenure year; the home run publication rate peaks in the tenure year and the year after. For those tenured in 7 years, both publications and home runs peak in the year the candidate is up for tenure. As the data become noisier (fewer people are tenured each year after seven), the peaks are less clear but the general shape persists: people publish more and better papers in the run-up to tenure and fewer after.

These facts suggest that it is not simply aging that is causing the patterns observed in Figures 1 to 3. The year of tenure itself is special, not simply the number of years since graduate school.

Online Appendix – Tables and Figures:

Figure 1a: Publications and Home Runs around Tenure

This figure plots both the number of publications and the number of those publications that were "home runs" in event time, where the event is tenure. A publication in an economics or finance journal is defined as a home run if it has more citations than 90% of all economics and finance publications appearing in the same year. The sample consists of 980 faculty whose publication activity we observe for at least 5 years before tenure and 10 years following tenure. Publications are the sum of the cohort's publications (in event time).

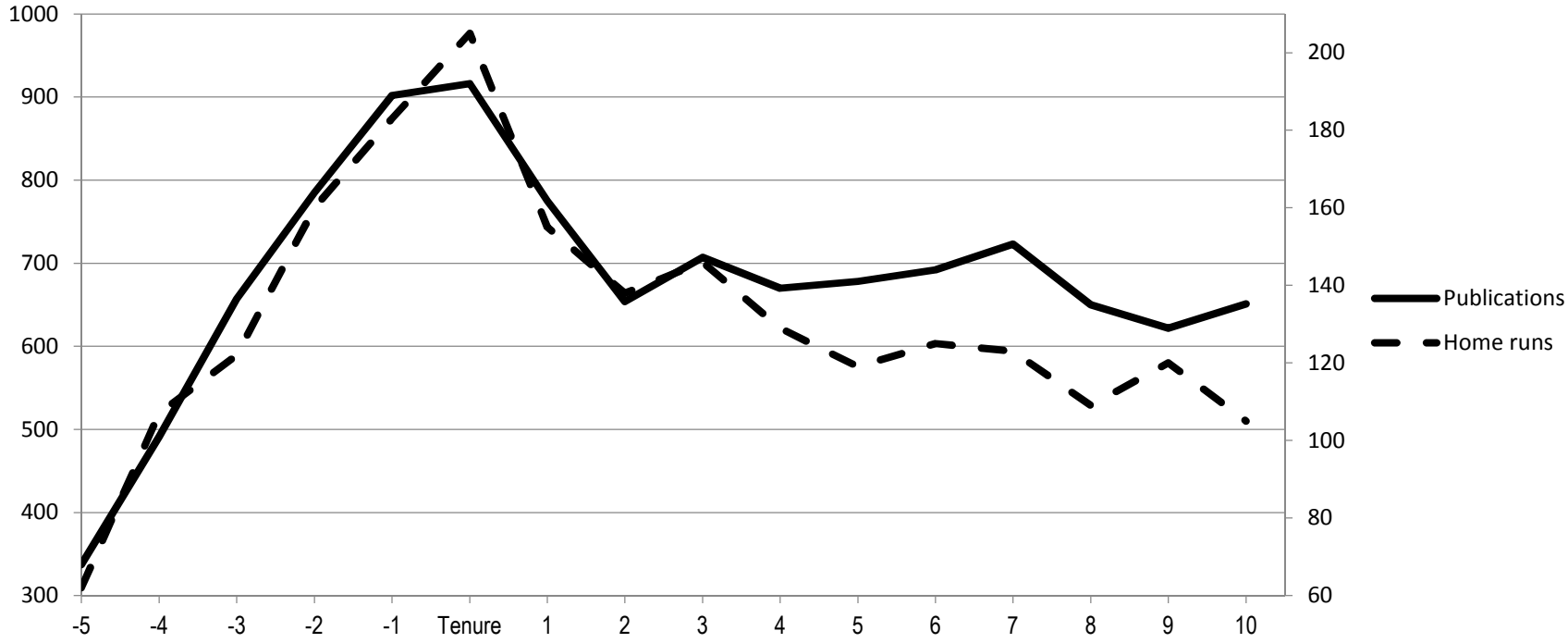
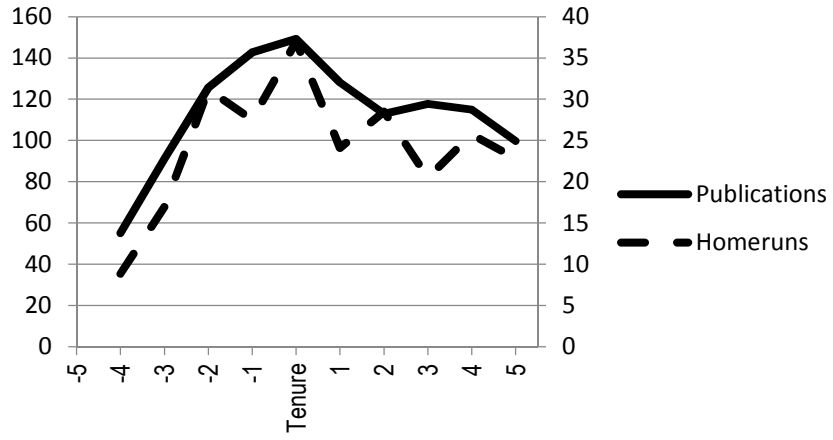


Figure 2a: Publications and Home Runs by Year of Tenure
Each figure plots both the number of author-adjusted publications and home runs in event time, where the event is tenure. A publication in an economics or finance journal is defined as a home run if it has more citations than 90% of all economics and finance publications appearing in the same year. Each panel considers a different time to tenure: 5, 6, 7, 8, and 9 years. The final panel considers all faculty tenured in 10-15 years. The sample includes 1,331 faculty who were tenured before 2009. XXX For the keys in all the panels, change "Homeruns" to "Home runs". XXX

PANEL A: Tenured in 5 Years



PANEL B: Tenured in 6 Years

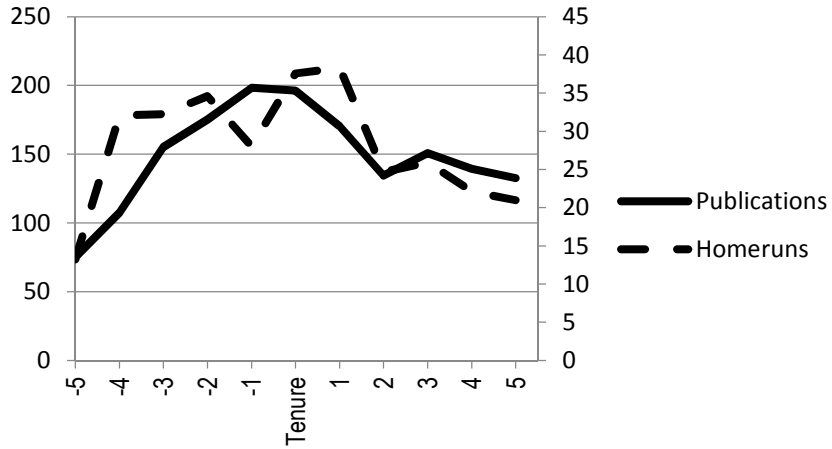
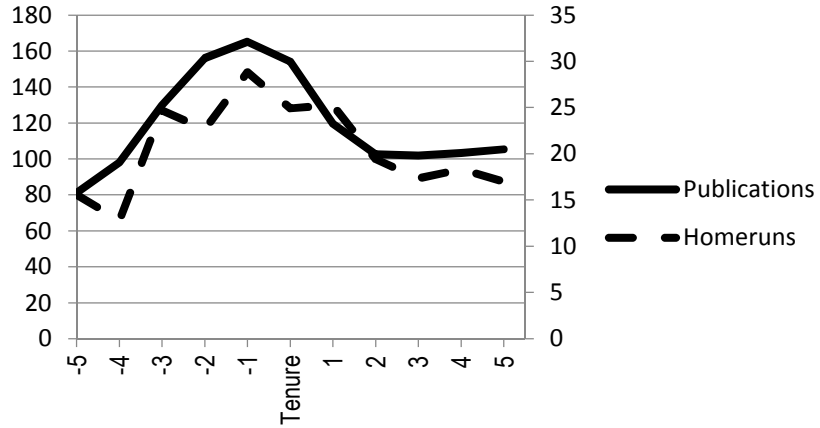
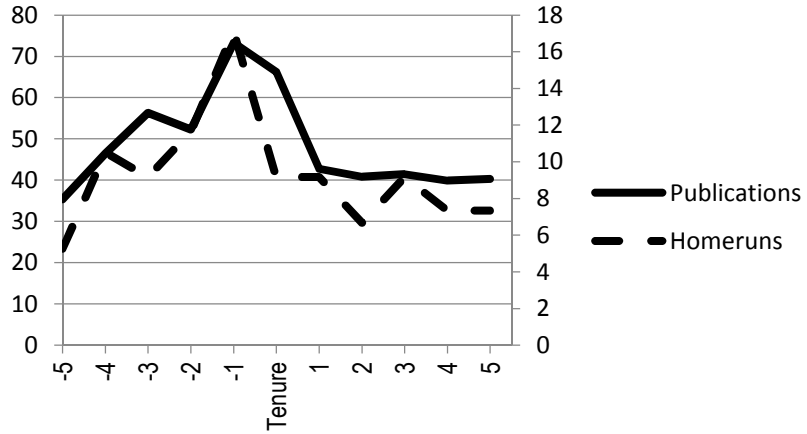


Figure 4 Continued

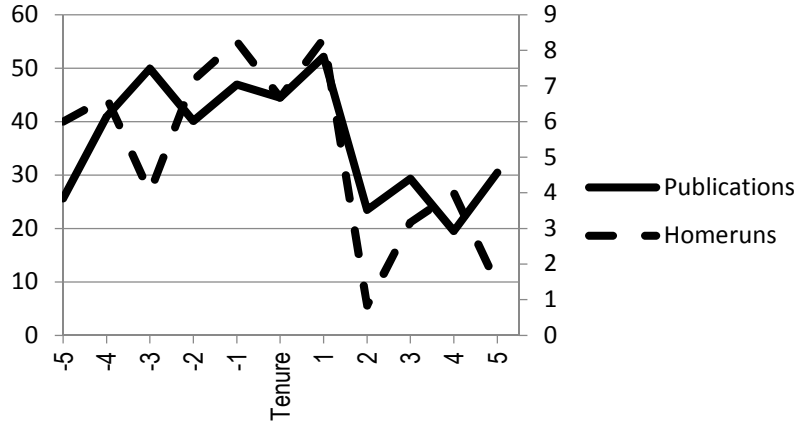
PANEL C: Tenured in 7 Years



PANEL D: Tenured in 8 Years



PANEL E: Tenured in 9 Years



PANEL F: Tenured in 10-15 Years

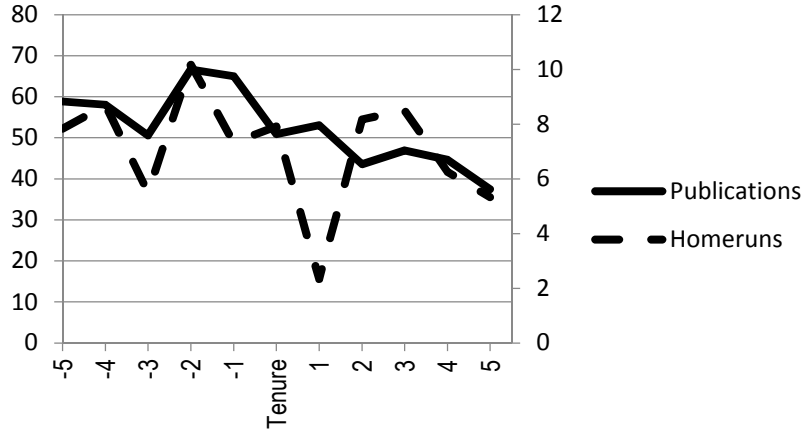


Table 1a: Schools

Table 1 lists the schools used in this research. To determine the top 50 departments, we rely on the rankings of Conroy et al. (1995). The schools are listed in in alphabetical order.

Boston College	SUNY-Stony Brook
Boston U.	Texas A&M
Brown U.	U. of Arizona
Cal Tech	U. of California-Berkeley
Carnegie Mellon	U. of California-Davis
Columbia U.	U. of California-Los Angeles
Cornell U.	U. of California-San Diego
Duke U.	U. of California-Santa Barbara
Harvard U.	U. of Chicago
Houston U.	U. of Colorado-Boulder
Iowa State U.	U. of Florida
Johns Hopkins U.	U. of Illinois-Urbana
Michigan State U.	U. of Indiana-Bloomington
MIT	U. of Iowa
New York U.	U. of Maryland
North Carolina State U.	U. of Michigan
Northwestern U.	U. of Minnesota
Ohio State U.	U. of North Carolina-Chapel Hill
Penn State U.	U. of Pennsylvania
Pittsburgh U.	U. of Rochester
Princeton U.	U. of Texas, Austin
Rice U.	U. of Virginia
Rutgers U.	U. of Washington
Southern Methodist U.	U. of Wisconsin-Madison
Stanford U.	Yale U.

Table 2a: Categories of Journals

A list of journal categories, the number of journals in each category, and the journals in each area

Journal Category	Number in Category	Web of Science Journal Abbreviations
Accounting	3	ACCOUNT REV J ACCOUNT ECON J ACCOUNTING RES
Econometrics	3	J APPL ECONOMET J ECONOMETRICS J FINANC ECONOMET
Finance	13	FINANC ANAL J FINANC MANAGE J BANK FINANC J CORP FINANC J FINANC J FINANC ECON J FINANC INTERMED J FINANC MARK J FINANC QUANT ANAL J FINANC RES MATH FINANC REV FINANC REV FINANC STUD
General Interest	16	AM ECON J-APPL ECON AM ECON J-ECON POLIC AM ECON REV ECON J ECONOMETRICA INT ECON REV J APPL ECONOM J BUS J BUS ECON STAT J ECON LIT J ECON PERSPECT J POLIT ECON MANAGE SCI Q J ECON REV ECON STAT REV ECON STUD
Industrial Organization	2	J IND ECON RAND J ECON
International	1	J INT ECON
Labor	2	J HUM RESOUR J LABOR ECON
Law and Economics	1	J LAW ECON
Macroeconomics	3	AM ECON J-MACROECON J ECON GROWTH REV ECON DYNAM
Micro Theory	4	AM ECON J-MICROECON ECON THEORY GAME ECON BEHAV J ECON THEORY
Monetary	2	J MONETARY ECON J MONEY CREDIT BANK
Public Economics	1	J PUBLIC ECON