MOVING OUT OF ACADEMIC RESEARCH: WHY SCIENTISTS STOP DOING RESEARCH?

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Content

- Career path and exit from academic research career;
- Determinants of exit;
- Data: cohort based study, Japan doctoral holders 1985-89 (13,492) in hard sciences;
- Econometric strategy and results

Exit from academic research

- **Exit from academic research** occurs when academic researchers either move into positions in academe which concentrate on non research activities, such as teaching or administration, or leave an academic research career and move into industry.

Times of exit

- We identify three main periods when an academic researcher holding a PhD may decide to exit academic research:
  1. After PhD graduation: the postdoc period;
  2. At the time of tenure/permanent position;
  3. After having being promoted to associate professor (tenure/permanent position).

Determinants of exit

Determinants of exit

- Exiting an academic research career depends on the probability of receiving an offer to pursue a career in academic research compared to academic teaching, administration or an industry job.
- We identify ***individual***, ***institutional*** and ***geographical factors*** correlated to persistence in an academic research job.

Individual factors

- **Scientific productivity**: a) neg. higher productivity is associated with higher probability to get an academic research career; b) pos. high productivity => high reputations => higher probability to get offer a top administrative job (but not too frequent); c) pos. high productivity in Pasteur quadrant science => higher probability to get a job offer from industry (but not too frequent).

Individual factors 2

- **Funding inputs**: neg. in hard sciences research is lab based, the PI/head of the lab spends quite some time to raise money for the lab, stable and significant funding inputs are a precondition for building up a successful lab and carrying out research.

Individual factors 3

- **Gender**: pos. in In Japan the gender imbalance is particularly pronounced with women accounting for only 26% of all PhD graduates in 2006. In the natural sciences, only 15.7% of assistant professors are female and a mere 3.8% achieve full professor (in the US 44%, 37% and 22% A, AP, FP).

Individual factors 4

- We control for individual **academic career characteristics** such as time of tenure and academic rank and some proxy for individual **network connection/mobility**.

Institutional factors

- There is a wide literature that links **Organizational Prestige** to future employment (Gaughan and Robin, 2004), promotion (Long et al., 1993) and future productivity (Allison and Long, 1990).
- Organizational prestige is difficult to measure, however in Japan the ***top seven*** (Tokyo, Kyoto, Osaka, Tohoku, Hokkaido, Kyushu, and Nagoya) pre-imperial universities are clearly the most prestigious.
- We also control for ***financial inputs*** and ***social network*** as proxies for OP.

Institutional factors 2

- **Field specificities** affect the probability of exit, we expect that fields will differ depending on the probability of receiving an external job offer (Pasteur Quadrant Sciences have more firm job opportunities) and depending on their growth rate, **growing fields** will have lower probability of exit (neg).

Geographical factors

- We control for a few geographical factors that can influence the exit likelihood.
  - Local concentration of research-intensive universities will be neg correlated with exit
  - Local concentration of teaching-oriented universities will be pos correlated with exit.
  - We also control the size of the local industrial labour market and local supply of PhD graduates.

Data

Samples

- Cohort of 13,492 PhD graduates who were awarded a doctoral degree in hard sciences (all scientific fields except social sciences and humanities) in the period 1985-1989.
- We matched this sample to the list of recipients of the most reputable and largest source of funding for academic research in Japan the GiA programme (in 2006 only 3% of researchers had a research budget coming mostly from non GiA sources - Engineering).

Samples 2

- First we study the sample of researchers that got a PhD but never received a GiA grant –i.e. they never started an academic research career according our definition (***Pre-employment Exit***). Second, we consider the sample of PhD graduates in our cohort that received at least once a GiA grant (***Post-employment Exit***).
- We used the 2010 version of the GiA database, and regard academics whose latest record in the database occurred in 2006 or later as survivors.

Econometric strategy and results

Pre-employment Exit

- We assigned zero if the PhD graduate appears in the funding database and 1 otherwise. The researcher got at least once a GiA grant.
- We estimate the likelihood of exit by logit regressions.

Post-employment Exit

- We analyze the sample of researcher that got at least one grant and study their exit from the database.
- We estimated the likelihood of exit by survival analysis, drawing on a duration model.
- We draw on a discrete approach based on the complementary log-log (*cloglog*) model (similar results for continuous model).
- A set of time dummy variables is included in order to capture the unobserved time-varying effect on the likelihood of drop out.

Post-employment Exit by career stage

- We split the sample in two pre and post tenure (becoming associate professor), to check for differences depending on the career stage.

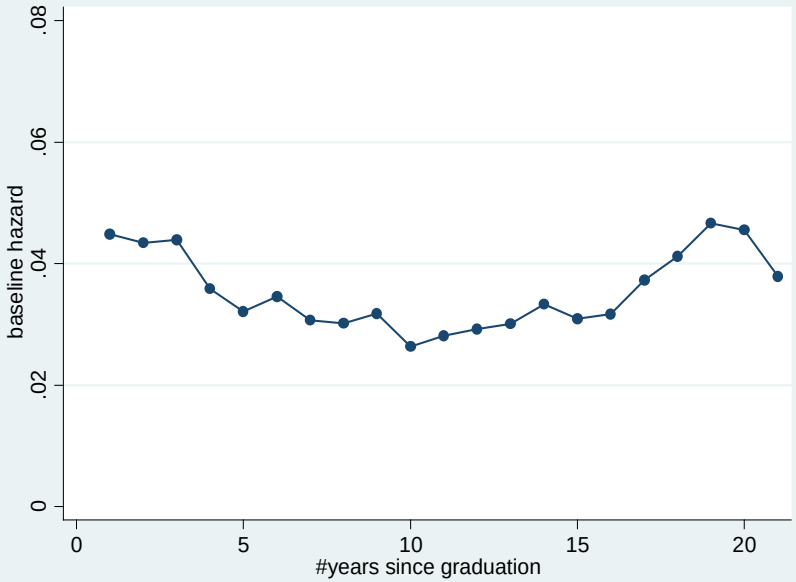
Exit

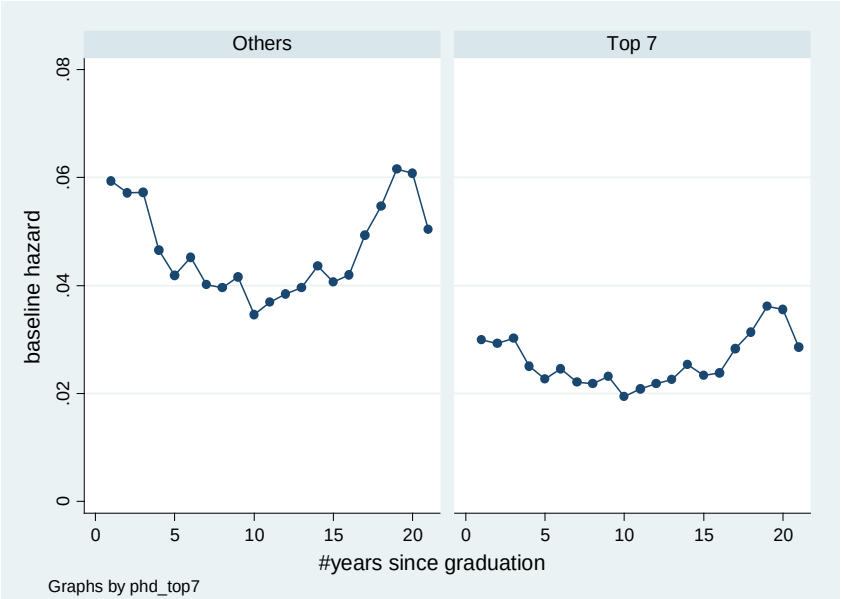
	Model 1		Model 2		Model 3	
Individual factors						
graduation year	.007	(.012)	.023	(.020)	.012	(.020)
female	.587 ***	(.070)	.567 ***	(.072)	.566 ***	(.072)
Institutional factors						
top7			-.237 ***	(.061)	-.242 ***	(.061)
univ fund			.003	(.008)	-.005	(.008)
ln(#colleague)			-.310 ***	(.043)	-.278 ***	(.044)
field growth			.141	(.144)	.135	(.145)
field dummies			YES		YES	
Geographical factors						
ln(*#national univ employment*)					-.246 ***	(.075)
ln(*#private univ employment*)					.064 **	(.021)
ln(*#industrial employment*)					-.021	(.047)
ln(*#PhD graduate*)					.113 †	(.062)
χ^2 test	74.459 ***		796.663 ***		832.348 ***	
Log likelihood	-9158.37		-8797.26		-8779.42	
N	13492		13492		13492	

Exit

	Model 1		Model 2		Model 3	
Individual factors						
pub stock	-.030 ***	(.006)	-.026 ***	(.006)	-.032 ***	(.006)
fund stock	-.021 ***	(.005)	.001	(.005)	-.008	(.005)
female	-.255 **	(.079)	.027	(.080)	.172 *	(.081)
job tenure	-.157 ***	(.005)	-.025 ***	(.005)	.008 †	(.005)
rank	-.363 ***	(.043)	-.432 ***	(.044)	-.399 ***	(.044)
mobility	-1.352 ***	(.023)	-.383 ***	(.032)	.106 **	(.036)
Institutional factors						
top7			-.198 **	(.066)	-.297 ***	(.068)
univ fund			.035 ***	(.009)	.017 †	(.010)
ln(#colleague)			-.438 ***	(.020)	-.102 ***	(.028)
field growth			-1.666 ***	(.180)	-.273	(.228)
field dummies			YES		YES	
Geographical factors						
ln(*#national univ employment*)					-.593 ***	(.044)
ln(*#private univ employment*)					.083 ***	(.023)
ln(*#industrial employment*)					-.333 ***	(.038)
ln(*#PhD graduate*)					.404 ***	(.042)
χ^2 test	27636.06 ***		28315.80 ***		28349.89 ***	
Log likelihood	-13811.18		-11995.59		-11349.76	
N	81331		81331		81331	

Whole sample





Prediction of Post-employment Exit by Career-Stage

	Model 1		Model 2	
Individual factors				
pub stock	-.021 **	(.007)	-.041 ***	(.009)
fund stock	.011 †	(.006)	-.037 ***	(.010)
female	.185 *	(.088)	-.028	(.213)
job tenure	.009	(.006)	.020 *	(.008)
rank			-.206 *	(.092)
mobility	.178 ***	(.048)	.011	(.059)
Institutional factors				
top7	-.348 ***	(.074)	-.121	(.186)
univ fund	.006	(.011)	-.006	(.029)
ln(#colleague)	.049	(.037)	-.309 ***	(.044)
field growth	-.309	(.259)	-.092	(.488)
field dummies	YES		YES	
Geographical factors				
ln(*#national univ employment*)	-.715 ***	(.051)	-.368 ***	(.081)
ln(*#private univ employment*)	.077 **	(.026)	.071	(.054)
ln(*#industrial employment*)	-.307 ***	(.043)	-.387 ***	(.077)
ln(*#PhD graduate*)	.462 ***	(.049)	.356 ***	(.077)
χ^2 test	19714.42 ***		8068.85 ***	
Log likelihood	-8314.19		-2934.59	
N	52584		28747	

Conclusions

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- Scientific productivity and individual funding (not in all samples) are correlated negatively to exit.

- # of research active colleagues in the university are negatively correlated with academics leaving a research career. Especially at the entry level and for associate and full professors. Within field and university positive externalities?

Conclusions: Inequality

- Female academics tend to exit research more easily. This effect is especially strong immediately after graduation, less so during the junior stage, and disappears during the senior career (however only 4.4% of profs are females)

- Researchers in less-prestigious universities tend to exit more easily especially in early phases of their career.

The postdoc period

- In Japan since 2005, doctoral graduates are appointed as assistant professors after five or six years of postdoc employment on average, with only 15% of PhDs achieving this position immediately after graduation.
- Postdoc getting longer in all countries (Stephan, 2012);
- Academic career becoming less attractive.

The time of tenure/permanent position