Effects of Entry Economic Conditions on the Career of Economics Ph.D.

Yeabin Moon

Department of Economics
University of Houston

January, 2022

Introduction

There is no unemployment among Ph.D.s in economics – John Siegfried

- Strong demand for economics PhD over the decade (BLS 2021)
  - growing demand both in academia and in practice
  - industries appreciate causal inferences more and more (Athey, Luca 2019)
- Pandemic left scars on the current economics profession worldwide (INOMICS)
  - 2020's Jobs for economists have 14% fewer job postings than 2019
- A depressed labor market may bear lasting scars: *lost generation*
- Less work has been done on whether the careers of economists is affected by the business cycles
- I build a theoretical model to examine the potential mechanisms and test the predictions empirically

Features of the Market for Ph.D.s in Economics

- The market for economists is ideal for studying the initial condition
  1. well-defined job market
     - most jobs are posted on JOE Listings
     - recruiting process mostly occurs around ASSA conference every year
  2. entry-year unemployment rate is very low
     - placement outcomes vary every year
  3. different workplace environment
     - academics: work under up-or-out policies
     - private sectors: high skilled industries
     - more than half candidates are internationals
     - male dominated
  4. productivity is measurable through publishing activity
- Detailed employment histories and a range of ranking measures are available

Motivation and Research Question

- Workers graduating into a recession would likely match to a lower level starting jobs than their luckier counterparts (Devereux 2002)
  - first job placement is important in explaining the long-term losses (Kwon et al 2010, Oreopoulos et al. 2012)
  - how long the effects remain depends on the ease of switching jobs (Van den Berge 2018, Cockx and Ghirelli 2016)
- Develop the theoretical model to explain what drives the persistent outcomes for economics PhD
  - academic publications are valued both in academia and practice (Swindler and Goldreyer 1998)
- Test the model's predictions using detailed information on career paths and productivity measures available on the web
  - short run: initial placements
  - long run: occupational choices and publications

Preview on Research Findings

1. Demand for economists is pro-cyclical
   - fluctuations are primarily driven by the academic tenure-track positions in US
2. Entering a recession is bad for placements
   - increase in unemployment rate has adverse effects on
     - initial academic employment
     - quality of placements conditional on taking an academic job
     - this effect declines over time
   - indicate an initial mismatch
3. It is bad for productivity
   - recessionary cohorts publish fewer top 50 journal articles
   - also happened to those who started their careers at top research university
4. These effects are primarily mediated through mobility
   - economists rarely switch occupations in response to economic conditions
   - determinant of these switching costs is development of task-specific human capital

Road Map

1. Literature Review
2. Data
3. Theoretical Model
4. Empirical Results
5. Conclusion

Contribution I : Persistent Effects of Entry Condition

- Many papers analyze the effect of entry conditions on the labor market outcomes over time (Kahn 2010, Oreopoulos et al. 2012, Schwandt and von Wachter 2019, Yu et al. 2014, Maclean, 2015, Ball 2021)
  - expand into health, marriage, divorce, fertility, crimes
  - effects vary by education, major, race, institutional settings (Altonji et al. 2014, Beiler 2017, Choi et al. 2020, Liu et al.)
- Most relevant to mine is Oyer (2006), but my research is different from:
  1. 32 Ph.D. granting programs in U.S. having more general cohort characteristics
  2. nearly complete employment histories: possible to trace non-academic careers
     - examine occupational switching
  3. the private and international demand for economists grew exponentially
     - 73 % increase in private sector postings from 2004 – 2012
  4. examine the potential mechanisms underlying persistent career effects

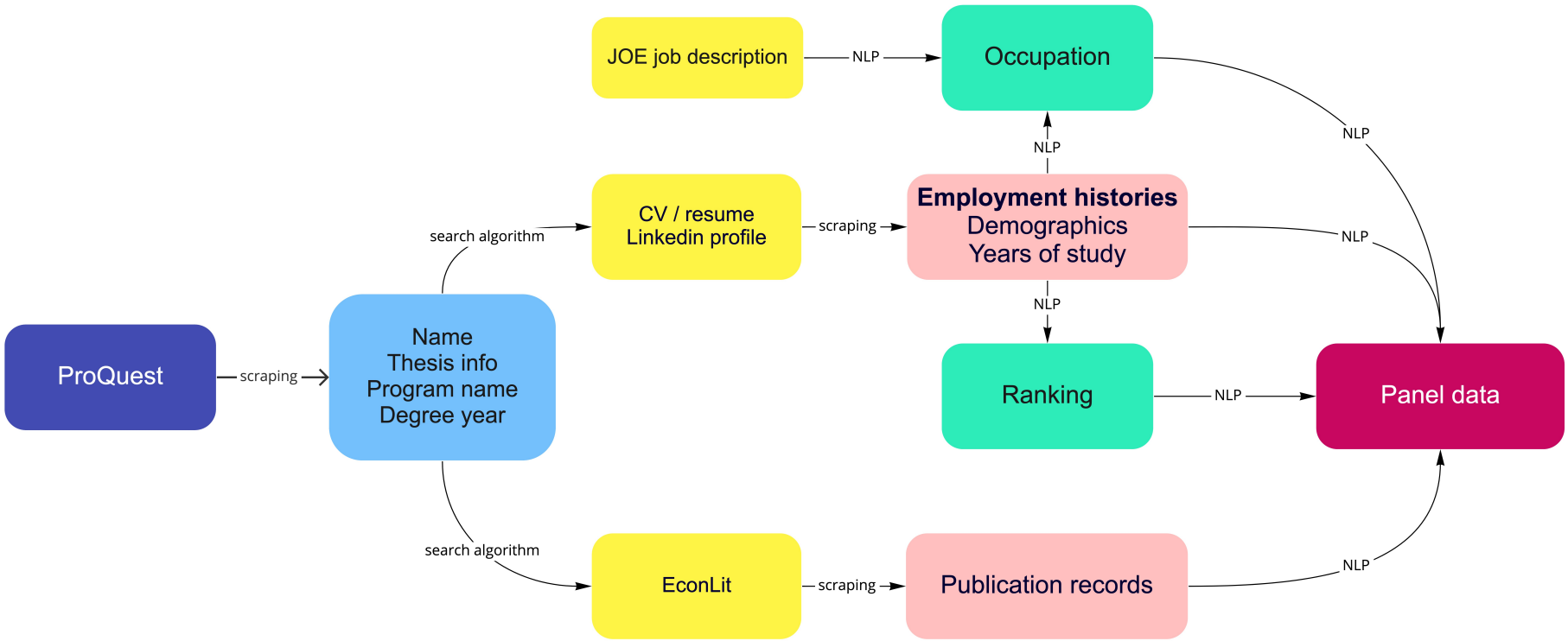
Contribution II : Occupation Choice

- The study of exogenous shocks can help shed additional light on the determinants of career developments
- Job mobility plays a crucial role in recovering from the early damages (Van den Berge 2018, Cockx and Ghirelli 2016)
- Human capital formation *VS* Signaling
  - initial investment in skills specific to occupation keeps a person on a certain career trajectory (Gibbons and Waldman 2004, 2006)
  - bad signaling from starting in a less favorable job hinders unlucky graduates to from switching occupation when recovers (Nunley et al. 2017)
- This paper provides more supporting evidence for the model of task-specific human capital
  - persistent effects are driven by the very first exposure to unemployment rates

Data

- ProQuest Dissertations & Theses Global
  - collect the doctoral dissertations by institutions, year of publications, economics (related) classification, subject codes
  - $\sim$ 4,600 graduates from top 32 programs in U.S. between 2004–2012
- Scrape CVs on the web or Linkedin experience profile
  - collect employment history until 2020
  - demographic information
  - could not find about 600 individual careers
- Publication information from EconLit
- List of job postings from JOE
  - hiring institution, position, JEL classifications, job descriptions
- Construct the matching algorithm to compile all data

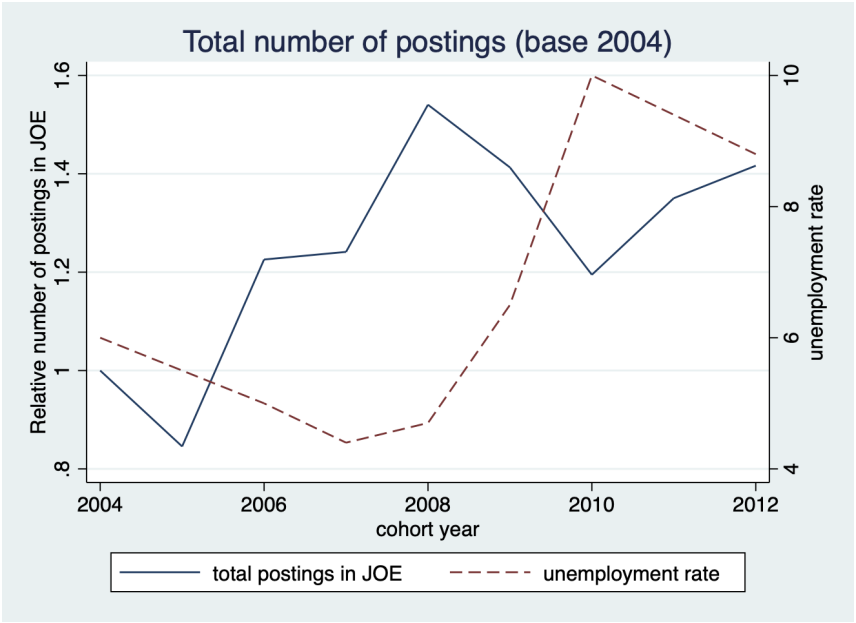
Data Preparation Workflow

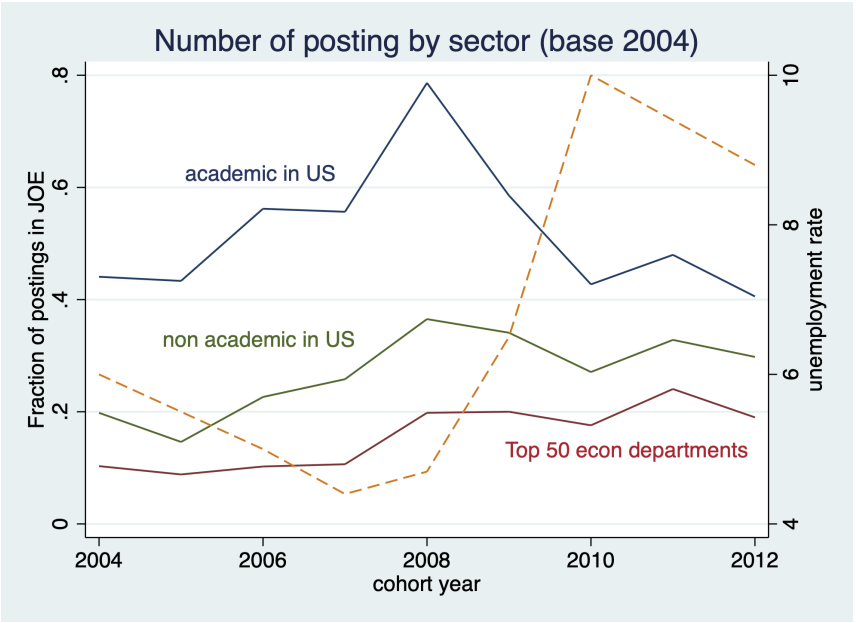


Descriptive Statistics

	Overall (1)	tier 1 (2)	tier 2 (3)	tier 3 (4)
Main independent variables				
female	0.287	0.251	0.324	0.309
	(0.452)	(0.433)	(0.468)	(0.462)
US bachelor	0.426	0.471	0.398	0.376
	(0.494)	(0.499)	(0.489)	(0.484)
Main outcome variables				
number of publications by 3 years	0.327	0.445	0.247	0.210
	(0.742)	(0.873)	(0.627)	(0.557)
number of publications by 6 years	0.873	1.208	0.641	0.546
	(1.516)	(1.778)	(1.298)	(1.048)
number of publications by 9 years	1.414	1.970	1.020	0.880
	(2.325)	(2.748)	(1.948)	(1.562)
Initial placements				
tenure-track in R1 university	0.232	0.301	0.184	0.165
	(0.422)	(0.459)	(0.388)	(0.371)
private sector	0.240	0.226	0.261	0.241
	(0.427)	(0.418)	(0.439)	(0.427)
number of schools	32	10	10	12
number of individuals	3,979	1,795	1,197	987

Cyclical Demand for Economics PhD





- Total postings decreased by 22 percent between 2008–2010
  - largest drop: the full-time tenure track academic positions in U.S. ($\sim$ 45 %)

Theoretical Framework: task-specific human capital

- How do economists accumulate human capital?
- Theory of human capital accumulation provides the foundation of career development
  - human capital accumulation is largely determined during the first decade of one's career in high-skill occupations (Rosen 1990, O'Flaherty and Siow 1995)
  - Gibbons and Waldman (2006) suggests task-specific human capital approach to explain persistent wage effects of initial conditions
- The idea is based on that a worker develops skills according to the tasks
  - e.g. acquire teaching skills more if one placed at liberal arts college
  - it is different to
    - general-purpose human capital: education
    - firm (or occupation) specific human capital
- Job mobility would raise questions on the transferability of skills
  - more costly for whose skills are not transferable across jobs
  - critical at research universities in which early switching tends to be discouraged

Division of Tasks by Occupation

- Literature use occupational and industry codes from the census
  - change in occupation means the skills required for new occupations would be substantially different from those used in the old
  - need to build another index because of the small range of occupations economists would work at
- Define occupations by analyzing job descriptions and other sources
  - R1 university defined by Carnegie Classifications
  - All other universities in US
  - Research organization or governmental agencies in US (e.g. World Bank)
  - Foreign institute
  - Private institute

appendix

Model Preview

- Based on the model from Gibbons and Waldman (2004 and 2006)
  - simplify the accumulation speed and the effect of schooling
  - follow the definition of occupation
    - define occupation o as the collection of firms having the same task
    - add the explicit task weights on each occupation o
  - add the dynamics of task-specific human capital jointly determined by innately ability and labor market experience
  - the output is determined by match qualities of human capital, ability, and firm with a worker
  - incorporate entry economic conditions into the model
    - predict the worker's mobility

Model

- Worker i at firm f in o at t produces cumulative task j specific output Y^j_{ifot}:

$$\log Y^j_{ifot} = \gamma_o \overbrace{\left[\sum_j \beta^j_o \left(\underbrace{H^j_{it}}_{\beta^j_{o'}, \text{Exp}_{io't}} \right)\right]}^{\text{Task}_{iot}} + \overbrace{\sum_j \beta^j_o \alpha^j_i}^{\text{m}_{io}} + \mu_{if} \quad (1)$$

$$\text{where} \sum_j \beta^j_o = 1 \text{ for all } o = 1, ..., O$$

- γ_o is the occupation-specific return to human capital
- β^j_o is the share of time a worker spends on average in the task j in o
- H^j_{it} is the human capital accumulated in task j until time period t
  - $\text{Exp}_{io't}$ denotes the previous tenure in occupation o' to simplify exposition
- α^j_i: initial endowment for the task j
- μ_{if} denotes the idiosyncratic match quality between i and f

Model - continue

$$\log Y^j_{ifot} = \gamma_o \text{Task}_{iot} + \overbrace{\sum_j \beta^j_o \alpha^j_i}^{m_{io}} + \mu_{if} \quad \text{where} \sum_j \beta^j_o = 1 \quad \text{for all } o = 1, ..., O \quad (2)$$

- Hence, the output is determined by the match qualities
  1. between the tasks and the accumulated human capital
     - task tenure
  2. between the tasks and the innate ability
  3. between the firm f and individual i

Characteristics of task tenure

- To make an exposition simpler, examine two-task model $J = \{R, T\}$

$$\text{Task}_{iot} = \gamma_o \left\{ \beta_o^R H_{it}^R + \left(1 - \beta_o^R\right) H_{it}^T \right\}$$

- o' and o denote source and target occupation, respectively

Proposition

For $\beta_{o'}^R > 0.5$, task-tenure is valued more if moves to $\beta_o^R > \beta_{o'}^R$
For $\beta_{o'}^R < 0.5$, task-tenure is valued more if moves to $\beta_o^R < \beta_{o'}^R$
For $\beta_{o'}^R = 0.5$, task-tenure does not change regardless of moving

- If o is more specialized than o', the one's task tenure would be valued more
  - e.g. if one worked at teaching college, her task-tenure would be valued less when moving to research-heavy university
- if o' is very general, switching does not have any merit for task tenure

Occupational switching

- Improvement on match-up qualities and returns to task tenure would make a shift more likely, but there is a loss from the task tenure according to the proposition when move

$$(m_{io} - m_{io'}) + (\mu_{if} - \mu_{if'}) + (\gamma_o - \gamma_{o'})\,\text{Task}_{io't} \tag{3}$$
$$> \gamma_o \underbrace{\left[\left(\beta^R_{o'} - \beta^R_o\right)\left(H^R_{it} - H^T_{it}\right)\right]}_{\text{potential loss}} + \underbrace{x_{o't}}_{\text{switching cost}}$$

- Potential loss is governed by two factors
  - how similar the tasks between occupation o and o', $|\beta^R_o - \beta^R_{o'}|$
    - if the source occupation is very general, there would be no loss
  - how much human capital accumulated from the previous occupations

Discussion: Overview of the model's contributions

- If economists' human capital is not task-specific, the markets would be similar to the high skilled industry
  - the workers would mitigate the initial mismatch by switching, and hence the effects would not be permanent

- If workers' human capital is task specific, there are two more cases
  - the economist's tasks are specialized (distances are significant)
    - they would less likely switch because they might risk losing the human capital
    - the initial effects would remain
  - the economist's tasks are general (distances are small)
    - economists would more easily switch the occupation, and hence the initial placement effects are less likely to be permanent

Empirical Strategy I

- The regression model is not typically directly derived from the model
- Estimate the short- and long-term effects of initial labor market conditions
  - for individual i, cohort c, department d, fields of study f

$$y_{icdf} = \beta \text{ec}_c + \gamma X_i + \lambda_d + \theta_f + \epsilon_{icdf} \tag{4}$$

  where ec_c indicates the economic conditions at graduation for c
  - λ_d, θ_f are fixed effects for department and fields of study, respectively
  - X_i includes US bachelor and gender indicators

- Investigate y_{icdf}:
  1. Placement outcomes
     - whether one would be landed at R1 university as a full-time professor
     - ranking of the placements
  2. Job mobility
     - whether an individual has ever switched from the initial placements

Table 2: Effect of entry condition on the initial placements in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	-0.0214***	-0.0286**	-0.0172**	-0.0317***
	(0.00483)	(0.0106)	(0.00654)	(0.00612)
female	0.00616	0.00570	0.00586	0.00618
	(0.0160)	(0.0149)	(0.0149)	(0.0161)
US bachelor degree	0.0589***	0.0657***	0.0588***	0.0587***
	(0.0109)	(0.0118)	(0.0109)	(0.00877)
tier 2 (rank 11–23)		-0.114***		
		(0.0145)		
tier 3 (rank 24–45)		-0.128***		
		(0.0193)		
unemployment× tier 2 (β_1)		0.0168		
		(0.0151)		
unemployment× tier 3 (β_2)		0.00897		
		(0.0180)		
unemployment× female (β_1)			-0.0144	
			(0.0148)	
unemployment× US bachelor degree (β_1)				0.0234***
				(0.00664)
$\beta_u + \beta_1$		-0.0118	-0.0316	-0.0082
P-val from F-test $\beta_u + \beta_1 = 0$		0.3335	0.0259	0.1803
$\beta_u + \beta_2$		-0.0196		
P-val from F-test $\beta_u + \beta_2 = 0$		0.0980		
mean(dependent variable)	0.2339	0.2339	0.2339	0.2339
Observations	3916	3916	3916	3916
R^2	0.063	0.040	0.063	0.064

Standard errors in parentheses and are clustered by cohort level.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 2: Effect of entry condition on the initial placements in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	-0.0214***	-0.0286**	-0.0172**	-0.0317***
	(0.00483)	(0.0106)	(0.00654)	(0.00612)
female	0.00616	0.00570	0.00586	0.00618
	(0.0160)	(0.0149)	(0.0149)	(0.0161)
US bachelor degree	0.0589***	0.0657***	0.0588***	0.0587***
	(0.0109)	(0.0118)	(0.0109)	(0.00877)
tier 2 (rank 11–23)		-0.114***		
		(0.0145)		
tier 3 (rank 24–45)		-0.128***		
		(0.0193)		
unemployment× tier 2 (β_1)		0.0168		
		(0.0151)		
unemployment× tier 3 (β_2)		0.00897		
		(0.0180)		
unemployment× female (β_1)			-0.0144	
			(0.0148)	
unemployment× US bachelor degree (β_1)				0.0234***
				(0.00664)
$\beta_u + \beta_1$		-0.0118	-0.0316	-0.0082
P-val from F-test $\beta_u + \beta_1 = 0$		0.3335	0.0259	0.1803
$\beta_u + \beta_2$		-0.0196		
P-val from F-test $\beta_u + \beta_2 = 0$		0.0980		
mean(dependent variable)	0.2339	0.2339	0.2339	0.2339
Observations	3916	3916	3916	3916
R^2	0.063	0.040	0.063	0.064

Standard errors in parentheses and are clustered by cohort level.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 2: Effect of entry condition on the initial placements in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	-0.0214***	-0.0286**	-0.0172**	-0.0317***
	(0.00483)	(0.0106)	(0.00654)	(0.00612)
female	0.00616	0.00570	0.00586	0.00618
	(0.0160)	(0.0149)	(0.0149)	(0.0161)
US bachelor degree	0.0589***	0.0657***	0.0588***	0.0587***
	(0.0109)	(0.0118)	(0.0109)	(0.00877)
tier 2 (rank 11–23)		-0.114***		
		(0.0145)		
tier 3 (rank 24–45)		-0.128***		
		(0.0193)		
unemployment× tier 2 (β_1)		0.0168		
		(0.0151)		
unemployment× tier 3 (β_2)		0.00897		
		(0.0180)		
unemployment× female (β_1)			-0.0144	
			(0.0148)	
unemployment× US bachelor degree (β_1)				0.0234***
				(0.00664)
$\beta_u + \beta_1$		-0.0118	-0.0316	-0.0082
P-val from F-test $\beta_u + \beta_1 = 0$		0.3335	0.0259	0.1803
$\beta_u + \beta_2$		-0.0196		
P-val from F-test $\beta_u + \beta_2 = 0$		0.0980		
mean(dependent variable)	0.2339	0.2339	0.2339	0.2339
Observations	3916	3916	3916	3916
R^2	0.063	0.040	0.063	0.064

Standard errors in parentheses and are clustered by cohort level.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 2: Effect of entry condition on the initial placements in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	-0.0214***	-0.0286**	-0.0172**	-0.0317***
	(0.00483)	(0.0106)	(0.00654)	(0.00612)
female	0.00616	0.00570	0.00586	0.00618
	(0.0160)	(0.0149)	(0.0149)	(0.0161)
US bachelor degree	0.0589***	0.0657***	0.0588***	0.0587***
	(0.0109)	(0.0118)	(0.0109)	(0.00877)
tier 2 (rank 11–23)		-0.114***		
		(0.0145)		
tier 3 (rank 24–45)		-0.128***		
		(0.0193)		
unemployment× tier 2 (β_1)		0.0168		
		(0.0151)		
unemployment× tier 3 (β_2)		0.00897		
		(0.0180)		
unemployment× female (β_1)			-0.0144	
			(0.0148)	
unemployment× US bachelor degree (β_1)				0.0234***
				(0.00664)
$\beta_u + \beta_1$		-0.0118	-0.0316	-0.0082
P-val from F-test $\beta_u + \beta_1 = 0$		0.3335	0.0259	0.1803
$\beta_u + \beta_2$		-0.0196		
P-val from F-test $\beta_u + \beta_2 = 0$		0.0980		
mean(dependent variable)	0.2339	0.2339	0.2339	0.2339
Observations	3916	3916	3916	3916
R^2	0.063	0.040	0.063	0.064

Standard errors in parentheses and are clustered by cohort level.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 3: Effect of entry condition on initial-placement ranking for those who placed in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	12.30**	12.63*	12.45*	24.51**
	(4.590)	(5.725)	(5.463)	(8.556)
female	0.458	0.273	0.418	1.622
	(11.54)	(9.472)	(11.47)	(11.26)
US bachelor degree	14.77	15.27	14.79	13.95
	(10.79)	(11.84)	(10.71)	(8.691)
tier 2 (rank 11–23)		42.13***		
		(7.503)		
tier 3 (rank 24–45)		68.10***		
		(11.02)		
unemployment× tier 2 (β_1)		-4.003		
		(6.936)		
unemployment× tier 3 (β_2)		-3.320		
		(11.26)		
unemployment× female (β_1)			-0.531	
			(8.717)	
unemployment× US bachelor degree (β_1)				-22.36**
				(9.337)
$\beta_u + \beta_1$		8.6290	11.9195	2.1511
P-val from F-test $\beta_u + \beta_1 = 0$		0.1906	0.1418	0.5991
$\beta_u + \beta_2$		9.3116		
P-val from F-test $\beta_u + \beta_2 = 0$		0.4121		
mean(dependent variable)	137.80	137.80	137.80	137.80
Observations	1183	1183	1183	1183
R^2	0.125	0.081	0.125	0.129

Standard errors in parentheses and are clustered by cohort level.

The department ranks are quoted from *econphd.net rankings 2004*.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 3: Effect of entry condition on initial-placement ranking for those who placed in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	12.30**	12.63*	12.45*	24.51**
	(4.590)	(5.725)	(5.463)	(8.556)
female	0.458	0.273	0.418	1.622
	(11.54)	(9.472)	(11.47)	(11.26)
US bachelor degree	14.77	15.27	14.79	13.95
	(10.79)	(11.84)	(10.71)	(8.691)
tier 2 (rank 11–23)		42.13***		
		(7.503)		
tier 3 (rank 24–45)		68.10***		
		(11.02)		
unemployment× tier 2 (β_1)		-4.003		
		(6.936)		
unemployment× tier 3 (β_2)		-3.320		
		(11.26)		
unemployment× female (β_1)			-0.531	
			(8.717)	
unemployment× US bachelor degree (β_1)				-22.36**
				(9.337)
$\beta_u + \beta_1$		8.6290	11.9195	2.1511
P-val from F-test $\beta_u + \beta_1 = 0$		0.1906	0.1418	0.5991
$\beta_u + \beta_2$		9.3116		
P-val from F-test $\beta_u + \beta_2 = 0$		0.4121		
mean(dependent variable)	137.80	137.80	137.80	137.80
Observations	1183	1183	1183	1183
R^2	0.125	0.081	0.125	0.129

Standard errors in parentheses and are clustered by cohort level.

The department ranks are quoted from *econphd.net rankings 2004*.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 3: Effect of entry condition on initial-placement ranking for those who placed in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	12.30**	12.63*	12.45*	24.51**
	(4.590)	(5.725)	(5.463)	(8.556)
female	0.458	0.273	0.418	1.622
	(11.54)	(9.472)	(11.47)	(11.26)
US bachelor degree	14.77	15.27	14.79	13.95
	(10.79)	(11.84)	(10.71)	(8.691)
tier 2 (rank 11–23)		42.13***		
		(7.503)		
tier 3 (rank 24–45)		68.10***		
		(11.02)		
unemployment× tier 2 (β_1)		-4.003		
		(6.936)		
unemployment× tier 3 (β_2)		-3.320		
		(11.26)		
unemployment× female (β_1)			-0.531	
			(8.717)	
unemployment× US bachelor degree (β_1)				-22.36**
				(9.337)
$\beta_u + \beta_1$		8.6290	11.9195	2.1511
P-val from F-test $\beta_u + \beta_1 = 0$		0.1906	0.1418	0.5991
$\beta_u + \beta_2$		9.3116		
P-val from F-test $\beta_u + \beta_2 = 0$		0.4121		
mean(dependent variable)	137.80	137.80	137.80	137.80
Observations	1183	1183	1183	1183
R^2	0.125	0.081	0.125	0.129

Standard errors in parentheses and are clustered by cohort level.

The department ranks are quoted from *econphd.net rankings 2004*.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 3: Effect of entry condition on initial-placement ranking for those who placed in R1

	(1)	(2)	(3)	(4)
unemployment (β_u)	12.30**	12.63*	12.45*	24.51**
	(4.590)	(5.725)	(5.463)	(8.556)
female	0.458	0.273	0.418	1.622
	(11.54)	(9.472)	(11.47)	(11.26)
US bachelor degree	14.77	15.27	14.79	13.95
	(10.79)	(11.84)	(10.71)	(8.691)
tier 2 (rank 11–23)		42.13***		
		(7.503)		
tier 3 (rank 24–45)		68.10***		
		(11.02)		
unemployment× tier 2 (β_1)		-4.003		
		(6.936)		
unemployment× tier 3 (β_2)		-3.320		
		(11.26)		
unemployment× female (β_1)			-0.531	
			(8.717)	
unemployment× US bachelor degree (β_1)				-22.36**
				(9.337)
$\beta_u + \beta_1$		8.6290	11.9195	2.1511
P-val from F-test $\beta_u + \beta_1 = 0$		0.1906	0.1418	0.5991
$\beta_u + \beta_2$		9.3116		
P-val from F-test $\beta_u + \beta_2 = 0$		0.4121		
mean(dependent variable)	137.80	137.80	137.80	137.80
Observations	1183	1183	1183	1183
R^2	0.125	0.081	0.125	0.129

Standard errors in parentheses and are clustered by cohort level.

The department ranks are quoted from *econphd.net rankings 2004*.

Department and fields of study fixed effects are included in the estimation except column (2)

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Discussion

- Table 2 presents that the entry conditions would negatively affect the placement outcomes at R1
- Assuming that most graduates are research-oriented, the bad entry conditions would result in an occupational mismatch
- Table 3 further presents that the quality of the placement even within the R1 is also lowered by the bad economic conditions
- Note that faculties in more prestigious institutions tend to spend less time teaching, the terrible entry conditions would result in the task mismatch even within R1 compared to good entry conditions

Table 4: Effect of entry conditions on the placement in R1 over time

	(1) initial	(2) 5 years	(3) 9 years	(4) initial	(5) 5 years	(6) 9 years
unemployment (β_u)	-0.0214***	-0.0121*	-0.00821*	-0.0286**	-0.0110	-0.00583
	(0.00483)	(0.00595)	(0.00434)	(0.0106)	(0.00659)	(0.00773)
female	0.00616	-0.00878	-0.0182*	0.00570	-0.00828	-0.0151
	(0.0160)	(0.0161)	(0.00930)	(0.0149)	(0.0153)	(0.00846)
US bachelor degree	0.0589***	0.103***	0.106***	0.0657***	0.115***	0.123***
	(0.0109)	(0.00947)	(0.0148)	(0.0118)	(0.00963)	(0.0133)
tier 2 (rank 11–23)				-0.114***	-0.136***	-0.118***
				(0.0145)	(0.0171)	(0.0204)
tier 3 (rank 24–45)				-0.128***	-0.138***	-0.115***
				(0.0193)	(0.0187)	(0.0180)
unemployment× tier 2 (β_1)				0.0168	0.00537	0.00415
				(0.0151)	(0.0175)	(0.0206)
unemployment× tier 3 (β_2)				0.00897	-0.00890	-0.0123
				(0.0180)	(0.0161)	(0.0163)
$\beta_u + \beta_1$				-0.0118	-0.0056	-0.0016
P-val from F-test $\beta_u + \beta_1 = 0$				0.3335	0.7185	0.9127
$\beta_u + \beta_2$				-0.0196	-0.0199	-0.0181
P-val from F-test $\beta_u + \beta_2 = 0$				0.0980	0.1077	0.1453
mean(dependent variable)	0.2339	0.3069	0.2788	0.2339	0.3069	0.2788
Observations	3916	3916	3916	3916	3916	3916
R^2	0.063	0.064	0.065	0.040	0.046	0.045

The dependent variable is whether one works at R1 university after given years

Columns (1)–(3) further includes department fixed effects

Fields of study fixed effects are included in all the estimation

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 4: Effect of entry conditions on the placement in R1 over time

	(1) initial	(2) 5 years	(3) 9 years	(4) initial	(5) 5 years	(6) 9 years
unemployment (β_u)	-0.0214***	-0.0121*	-0.00821*	-0.0286**	-0.0110	-0.00583
	(0.00483)	(0.00595)	(0.00434)	(0.0106)	(0.00659)	(0.00773)
female	0.00616	-0.00878	-0.0182*	0.00570	-0.00828	-0.0151
	(0.0160)	(0.0161)	(0.00930)	(0.0149)	(0.0153)	(0.00846)
US bachelor degree	0.0589***	0.103***	0.106***	0.0657***	0.115***	0.123***
	(0.0109)	(0.00947)	(0.0148)	(0.0118)	(0.00963)	(0.0133)
tier 2 (rank 11–23)				-0.114***	-0.136***	-0.118***
				(0.0145)	(0.0171)	(0.0204)
tier 3 (rank 24–45)				-0.128***	-0.138***	-0.115***
				(0.0193)	(0.0187)	(0.0180)
unemployment× tier 2 (β_1)				0.0168	0.00537	0.00415
				(0.0151)	(0.0175)	(0.0206)
unemployment× tier 3 (β_2)				0.00897	-0.00890	-0.0123
				(0.0180)	(0.0161)	(0.0163)
$\beta_u + \beta_1$				-0.0118	-0.0056	-0.0016
P-val from F-test $\beta_u + \beta_1 = 0$				0.3335	0.7185	0.9127
$\beta_u + \beta_2$				-0.0196	-0.0199	-0.0181
P-val from F-test $\beta_u + \beta_2 = 0$				0.0980	0.1077	0.1453
mean(dependent variable)	0.2339	0.3069	0.2788	0.2339	0.3069	0.2788
Observations	3916	3916	3916	3916	3916	3916
R^2	0.063	0.064	0.065	0.040	0.046	0.045

The dependent variable is whether one works at R1 university after given years

Columns (1)–(3) further includes department fixed effects

Fields of study fixed effects are included in all the estimation

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 4: Effect of entry conditions on the placement in R1 over time

	(1) initial	(2) 5 years	(3) 9 years	(4) initial	(5) 5 years	(6) 9 years
unemployment (β_u)	-0.0214***	-0.0121*	-0.00821*	-0.0286**	-0.0110	-0.00583
	(0.00483)	(0.00595)	(0.00434)	(0.0106)	(0.00659)	(0.00773)
female	0.00616	-0.00878	-0.0182*	0.00570	-0.00828	-0.0151
	(0.0160)	(0.0161)	(0.00930)	(0.0149)	(0.0153)	(0.00846)
US bachelor degree	0.0589***	0.103***	0.106***	0.0657***	0.115***	0.123***
	(0.0109)	(0.00947)	(0.0148)	(0.0118)	(0.00963)	(0.0133)
tier 2 (rank 11–23)				-0.114***	-0.136***	-0.118***
				(0.0145)	(0.0171)	(0.0204)
tier 3 (rank 24–45)				-0.128***	-0.138***	-0.115***
				(0.0193)	(0.0187)	(0.0180)
unemployment× tier 2 (β_1)				0.0168	0.00537	0.00415
				(0.0151)	(0.0175)	(0.0206)
unemployment× tier 3 (β_2)				0.00897	-0.00890	-0.0123
				(0.0180)	(0.0161)	(0.0163)
$\beta_u + \beta_1$				-0.0118	-0.0056	-0.0016
P-val from F-test $\beta_u + \beta_1 = 0$				0.3335	0.7185	0.9127
$\beta_u + \beta_2$				-0.0196	-0.0199	-0.0181
P-val from F-test $\beta_u + \beta_2 = 0$				0.0980	0.1077	0.1453
mean(dependent variable)	0.2339	0.3069	0.2788	0.2339	0.3069	0.2788
Observations	3916	3916	3916	3916	3916	3916
R^2	0.063	0.064	0.065	0.040	0.046	0.045

The dependent variable is whether one works at R1 university after given years

Columns (1)–(3) further includes department fixed effects

Fields of study fixed effects are included in all the estimation

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Empirical Strategy II

- Analyze the effect of entry conditions on the economists' productivity
- Approximate the productivity using the cumulative number of publications
  - for individual i, cohort c, department d, fields of study f, at year t

$$y_{icdft} = \beta \text{ec}_c + \gamma X_i + \lambda_d + \theta_f + \tau_{exp} + \epsilon_{icdft} \tag{5}$$

    where ec_c indicates the economic conditions at graduation for c
  - λ_d, θ_f are fixed effects for department and fields of study, respectively
  - τ_{exp} capture the labor-market experience fixed effects
  - X_i includes US bachelor and gender indicators
- Investigate y_{icdft}:
  - Cumulative number of articles
    - top 50, top 20 and top 5

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 5: Effect of entry condition on number of publications in Top 50 economics journals

	Full sample				Restricted to initial placement in R1			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
unemployment (β_u)	-0.0213***	-0.0807***	-0.0452***	-0.0136	-0.0628**	-0.0886***	-0.110***	-0.0273
	(0.00795)	(0.0244)	(0.0119)	(0.00915)	(0.0252)	(0.0306)	(0.0307)	(0.0291)
female	-0.288***	-0.278***	-0.286***	-0.288***	-0.576***	-0.558***	-0.555***	-0.571***
	(0.0240)	(0.0239)	(0.0226)	(0.0240)	(0.0563)	(0.0526)	(0.0583)	(0.0572)
US bachelor degree	0.00424	0.0594***	0.00448	0.00435	-0.00749	0.0821	-0.0165	-0.0127
	(0.0119)	(0.0123)	(0.0120)	(0.0116)	(0.0638)	(0.0506)	(0.0640)	(0.0619)
tier 2 (rank 11–23)		-0.609***				-0.902***		
		(0.0485)				(0.0838)		
tier 3 (rank 24–45)		-0.685***				-0.860***		
		(0.0537)				(0.0774)		
unemployment× tier 2 (β_1)		0.104***				0.149**		
		(0.0363)				(0.0671)		
unemployment× tier 3 (β_2)		0.104**				-0.0215		
		(0.0435)				(0.0646)		
unemployment× female (β_1)			0.0817***				0.167**	
			(0.0216)				(0.0706)	
unemployment× US bachelor degree (β_1)				-0.0175				-0.0645
				(0.0111)				(0.0431)
$\beta_u + \beta_1$		0.0234	0.0365	-0.0311		0.0608	0.0570	-0.0918
P-val from F-test $\beta_u + \beta_1 = 0$		0.1456	0.0108	0.0031		0.2241	0.3325	0.0124
$\beta_u + \beta_2$		0.0229				-0.1100		
P-val from F-test $\beta_u + \beta_2 = 0$		0.2951				0.0254		
mean(dependent variable)	0.9225	0.9225	0.9225	0.9225	1.9321	1.9321	1.9321	1.9321
Observations	50311	50311	50311	50311	11963	11963	11963	11963
R^2	0.169	0.149	0.169	0.169	0.324	0.298	0.325	0.324

The dependent variable is the cumulative number publications in the top 50 economics journals.

Department and fields of study fixed effects are included in the estimation except column (2) and (6).

Standard errors in parentheses and are clustered by cohort level and current year t.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Table 6: Transition Probability between Occupations

	occupation 9 years after graduation				
Initial occupation	R1 university	all other US university	research org in US	foreign institute	private institute
panel a. all samples					
R1 university	74.08	5.08	6.37	8.21	6.26
all other US university	10	73.04	4.13	4.57	8.26
research org in US	11.67	3.24	67.91	4.86	12.32
foreign institute	6.31	2.87	3.78	77.87	9.17
private institute	6.17	2.54	6.89	7.01	77.39
panel b. cohorts from 07 and 08 (good cohorts)					
R1 university	74.78	3.04	6.96	9.57	5.65
all other US university	8.73	77.78	1.59	3.97	7.94
research org in US	10.34	2.59	69.83	5.17	12.07
foreign institute	7.36	1.84	0.61	77.91	12.27
private institute	5.94	1.83	9.13	7.31	75.8
panel c. cohorts from 10 and 11 (bad cohorts)					
R1 university	74.21	4.74	6.32	5.79	8.95
all other US university	8.89	76.67	5.57	1.11	7.78
research org in US	11.8	2.25	64.04	6.18	15.73
foreign institute	8.48	3.57	3.57	76.34	8.04
private institute	4.68	2.92	10.53	5.85	76.02

Each row calculates the transition probabilities from the initial occupation to the occupation working at 9 years after graduation.

Robustness Check

- In the analysis above, assume that the macroeconomic conditions at graduation represent an exogenous labor demand shock
  - the average quality of graduates who enters the market is not systematically associated with the economic conditions
- 5 years of study is arguably the norm of the economics Ph.D. programs
  - start year of PhD is partially observable
- Examine the effect of the entry economic conditions on one's decision to delay graduation
  - individuals tier 1 programs would have an option to delay
  - revisit the previous findings using individuals from other than tier 1 programs

Table 7: Effect of entry condition on delaying graduation

	(1)	(2)	(3)	(4)
unemployment (β_u)	0.0247	0.0485*	0.0243	0.0213
	(0.0136)	(0.0240)	(0.0167)	(0.0159)
female	0.0202	0.00958	0.0202	0.0202
	(0.0149)	(0.0155)	(0.0151)	(0.0148)
US bachelor degree	-0.0218	-0.0255	-0.0218	-0.0220
	(0.0356)	(0.0357)	(0.0355)	(0.0355)
tier 2 (rank 11–23)		0.0102		
		(0.0282)		
tier 3 (rank 24–45)		-0.0172		
		(0.0397)		
unemployment× tier 2 (β_1)		-0.0276		
		(0.0166)		
unemployment× tier 3 (β_2)		-0.0592		
		(0.0447)		
unemployment× female (β_1)			0.00143	
			(0.0165)	
unemployment× US bachelor degree (β_1)				0.00804
				(0.0295)
$\beta_u + \beta_1$		0.0209	0.0257	0.0292
P-val from F-test $\beta_u + \beta_1 = 0$		0.2423	0.0741	0.2612
$\beta_u + \beta_2$		-0.0106		
P-val from F-test $\beta_u + \beta_2 = 0$		0.7128		
mean(dependent variable)	0.4909	0.4048	0.4909	0.4909
Observations	2371	2371	2371	2371
R^2	0.069	0.027	0.069	0.069

The dependent variable is whether one studied longer than 5 years.

Department and fields of study fixed effects are included in the estimation except column (2).

Standard errors in parentheses and are clustered by cohort level.

* $p < 0.10$, ** $p < .05$, *** $p < .01$

Conclusion

- The analysis cannot be complete
  - it is based on the C.V. or resume, entirely subjective
  - measurement errors
  - attrition problem

- Assuming that those missing individuals are less likely successful, I believe my findings would provide the minimum effects of the entry conditions on the economics Ph.D.'s career and productivity

- To conclude, the transition from education to the labor market in a recession would threaten the economists' careers

- Their occupational outlook would not be more promising than surrounding cohorts, and the productivity loss is expected on average

Thank You

Fuzzy matching

- One challenge of the task is scrape text data from the source document and convert them into suitable format
  - web scraping and document scraping
    - search tools in Python or range of APIs
    - might involve legal issues $\rightarrow$ commercial APIs
- Bigger challenge is that there are same institution but were taken as different forms
  - CV, dissertations, rank data, Journal entry
  - matching economists' names are even more complicated
- Employ learning methods from data science literature
  - data matching or fuzzy matching (probabilistic data matching)

General Steps

- N-grams: a set of co-occurring words within a given sentence (Wang et al. 2006)
  - collect the words in the sentence having more meaning
- TF-IDF: count the word occurs in each document
  - evaluate how important a word is and (learning)
    - very important since the names have only a few words
  - long computing time ...
- Cosine similarity: how close the two sentences is
- Matching rates vary
  - JOE in US institutions: 89%
  - All institutions: 70%

back

Job description: Natural Language Processing

- Analyze the text in the job descriptions from JOE and CSWEP letters
- Most Frequently Appeared Words in job postings
  - Tenured track positions: **research, economics, teaching**, curriculum
  - Research org: **research, economics**, teaching
  - Private: **research**, economics, communication, work, policy, experience, analysis, skills, quantitative, management
- Word **research** and **teaching** dominates in Academic positions
- Diverse range of words are captured in private sector positions
  - communication related words are rarely captured in academic positions
- Possibly, different skills are required for the private sectors back