

# Gender Gap in Careers of Elite School Graduates: Evidence from a French Large Firm

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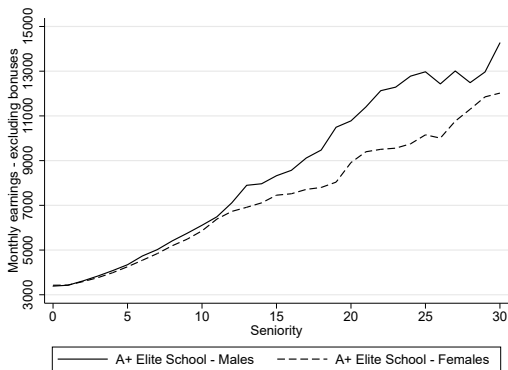
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# Introduction 1/2

Our starting point: women have a lower career path than men within a firm, even when they have the same diploma than men



# Introduction 2/2

- In this paper, we analyze career paths as a succession of detailed job positions across diploma groups
- This gender gap in career within a firm may result from gender differences in:
  - job position at the entrance
  - career path, that is transition from on job position to another
  - the speed of transition from one job to another
  - the rate of exit from the firm

# What the paper does

- We focus on executives recruited before the age of 30
- Our contribution: Disentangle the roles of entry job, job transitions, career speed in the gender career gap
- We reconstruct **theoretical career paths** using panel data
- For that we assess transition matrices from job to job within the firm, compiled by gender and detailed diploma
- We use counterfactual exercises to assess the role of entry positions, mobility and type of transitions on gender differences in careers and wages
- We make two types of counterfactuals, one assuming that the entire career takes place in the firm, the other taking into account exits during the career
- Gender differences in transition to exits reflect gender differences in external opportunities

# Main results on contrefactuals

- When not allowing exit, simulated wages trajectories give an advantage to Elite school men compared to women
- The role of job entry is negligible in these differences
- The results are similar for the other degree levels but with less marked differences
- The main differences are due to more favourable job transitions for men
- When allowing exits, the theoretical career of women is more advantageous than that of men
- The hypothesis is that the selection effect for the exit of men reduces the gender differences in career for A+ Elite School
- This effect is observed only for A+ Elite School

# Previous literature on firm case studies and career paths 1/2

Not many papers on firm case studies (micro datasets hard to get)

- Empirical literature on intra-firm promotions
  - Baker, Gibbs and Holmstrom (1994) : firm hierarchy and wage policy
  - Ariga and al. (1999) Fast track effects even after controlling for time-invariant individual effects
  - Ransom and Oaxaca (2005) model the flows of individual between different jobs within the firm as a Markov process. The intrafirm mobility generally penalizes women.

# Previous literature on firm case studies and career paths 2/2

Recent case studies on diploma and intra-firm career path using personnel datasets combined with data on diploma

- Araki, S., Kawaguchi, D., and Onozuka, Y. (2016). University prestige, performance evaluation, and promotion. Labour Economics.
- Bordon, P., and Braga, B. (2020) Employer learning, statistical discrimination and university prestige. Economics of Education Review.
- Zimmerman, S. D. (2019). Elite Colleges and Upward Mobility to Top Jobs and Top Incomes. American Economic Review

# Data and context

- A large and expanding firm:  $\approx 3,500$  executives in 2007 to 6,500 in 2018
- Executives: 54% women in 2007, 59% in 2018
- Annual payroll files over the 2007-2018 period (60,140 observations; 5.6 observations per employee on average)
- **Panel** data
- Data contains:
  - **Job** characteristics including "Occupation family": 619 items. *E.g. Research Associate, Project manager (infrastructure), Senior Lawyer (Brands), Group security Manager, Field Account Executive, Employee Experience Manager, Domain Manager (applications), Director Digital International, Business Analyst*
  - **Gross wage** (+ bonuses)
  - Precise information on degrees: level, field, institution which delivered the degree
  - **At least one degree fully characterized for 82% of all French executives.**
  - **Socio-demographic** characteristics



# Higher education in France

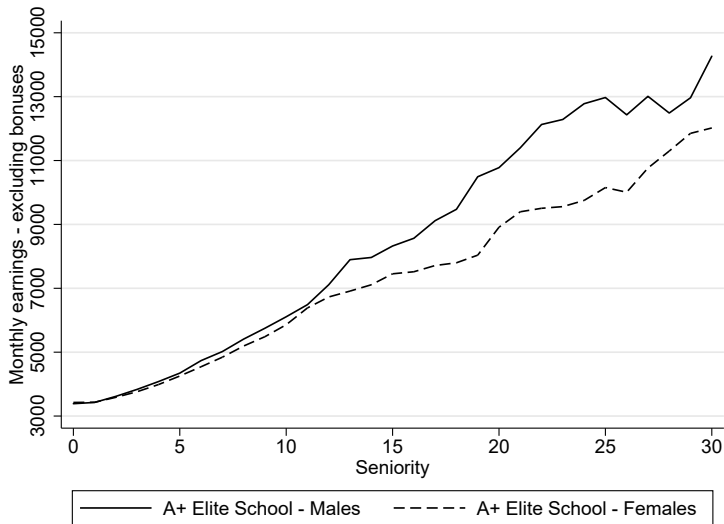
- Several types of institution can deliver higher education degrees:
- **University**
- Elite Schools (*Grandes Ecoles*): mainly business schools and engineering schools
  - distinction between **A+ Elite Schools** ( $\approx$  Ivy League) and Other Elite Schools
- Other institutions short vocational degree

# Distribution of employees across degree

Degree	All		Males		Females	
	%	N	%	N	%	N
<b>A+ Elite school</b>	20.1	1527	20.2	642	20.1	885
Other Elite school	36.2	2743	36.6	1165	35.9	1578
<b>University</b>	13.6	1029	11.9	378	14.8	651
Other degree	18.8	1423	20.5	654	17.5	769
Unobserved degree	11.4	864	10.9	346	11.8	518

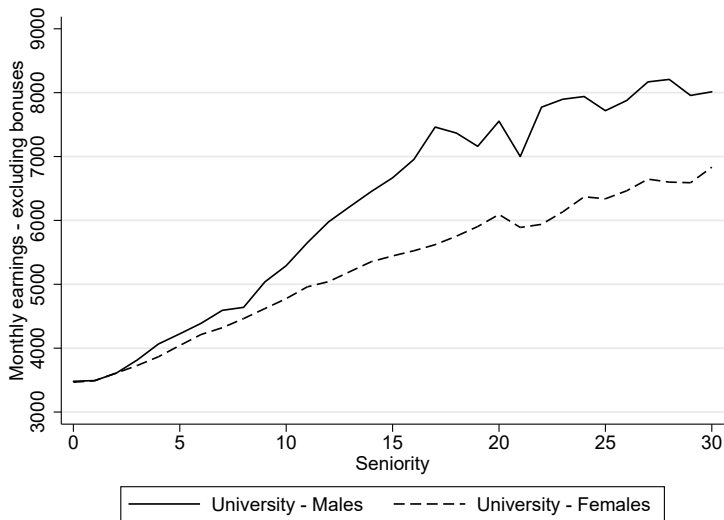
# Average monthly wage, for employees less than 30 years-old when hired

Pooled data, 2007-2018



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Pooled data, 2007-2018



# Overall strategy

We are interested in differences in career prospects of entrants across diploma groups

For that purpose:

- 1 We compute a job transition matrix
- 2 We estimate a wage equation with job fixed effects
- 3 From these quantities, we simulate job trajectory and wages for an entrant after any given duration
- 4 We compute wage statistics on the sample of entrants for any given duration

# Transition process

Consider that individual  $i$  enters the firm in year 1 and occupies one of the  $J$  available jobs

Denote  $P_{i,t}^j$  the probability that job  $j$  is occupied by individual  $i$  at time  $t$ , and  $P_{i,t}^{J+1}$  the probability of exiting

Denote  $P_{i,t}$  the  $(J+1) \times 1$  vector piling up these probabilities

$P_{i,1}$  is filled with 0 except for entry job  $j(i)$  for which there is 1

We consider that the job transition process is first-order Markov with transition matrix  $M$  (such that exit is an absorbing state)

The job occupied by the individual after  $t$  periods verifies:

$$P_{i,t} = M^{t-1} P_{i,1}$$

# Job mobility and exits

Denote by  $M_{j,k}$  the term  $(j, k)$  of matrix  $M$

The probability of moving jobs between years  $t$  and  $t + 1$  is:

$$m_{t,t+1} = \sum_{j=1}^J (1 - M_{j,j}) P_{i,t}^j$$

The expected number of job moves until year  $t$  is  $\sum_{\tau=1}^{t-1} m_{\tau,\tau+1}$

The probability of exiting the firm between years  $t$  and  $t + 1$  is:

$$e_{t,t+1} = \sum_{j=1}^J P_{i,t}^j M_{j,J+1}$$

The probability of exiting before year  $t$  is  $P_{i,t}^{J+1} = P_{i,t-1}^{J+1} + e_{t-1,t}$

# Individual wage equation

Wage equation at the individual level:

$$\log w_{i,t} = X_{i,t}\beta + \delta_{j(i,t)} + \epsilon_{i,t}$$

where:

- $w_{i,t}$  is the monthly wage
- $j(i, t)$  is the job occupied by individual  $i$  at time  $t$
- $X_{i,t}$  are (time-varying) individual variables
- $\delta_j$  is a job fixed effect
- $\epsilon_{i,t}$  is a residual



# Individual explanatory variables

List of individual explanatory variables:

- Female (dummy)
- Couple statuses (dummies)
- Initial number of children and births (dummies)
- Full-time status (dummy) and part-time proportion
- Age and firm tenure (and their squares)
- Education level, including diploma groups (dummies)
- Years (dummies)

# Simulated wage trajectories: Setting

We compute and compare counterfactual wage statistics for individuals entering the firm when authorizing or not exits

We capture the effects of differential selection into exit across jobs

Wage equation can be rewritten as:

$$\log w_{i,t} = X_{i,t}\beta + Z'_{i,t}\delta + \epsilon_{i,t}$$

where  $Z_{i,t} = (1_{\{j(i,t)=1\}}, \dots, 1_{\{j(i,t)=J\}})'$ ,  $\delta = (\delta_1, \dots, \delta_J)'$

# Simulated wage trajectories: exit not allowed

When not authorizing exits, the law of  $Z_{i,t}$  is given by:

$$P_{i,t} = \tilde{M}' P_{i,t-1}$$

$\tilde{M}$  the transition matrix  $M$  rescaled such that exit is not allowed

Job trajectories are simulated recursively drawing in probability laws from  $t \geq 2$  onwards ( $P_{i,1}$  being known)

Simulated wages are obtained from these trajectories (ie. from realized  $Z_{i,t}$ ), updated  $X_{i,t}$  and residuals drawn in normal laws

We can then compute wage statistics (such as the average) on all individuals remaining in the firm at each date after entry

# Simulated wage trajectories: exit allowed

When authorizing exits, one needs to rather consider for the law of  $Z_{i,t}$ :

$$P_{i,t} = M' P_{i,t-1}$$

Exit is an absorbing state for which no wage is simulated

We can then compute wage statistics (such as the average) on the subsample of individuals remaining in the firm at each date after entry

# Quantities in practice

We compute average quantities for all individuals aged  $\leq 30$  entering the firm during our period of study

The job transition matrix  $M'$  is obtained from all the yearly job transitions occurring within the firm and real exits (temporary suspensions from the firm are ignored)

# Career wage profiles across diploma groups and gender

Goal: Disentangle the roles of entry jobs and job transitions

Comparison of wage profiles across gender groups, by diploma

Job transition matrix of a given group is alternatively that of:

- the group itself (men or women)
- the pooled sample
- the group itself with mobility rates of pooled sample

Considering the pooled sample imposes similar job transitions across gender

Remaining differences in wage profile are attributable to differences in entry jobs

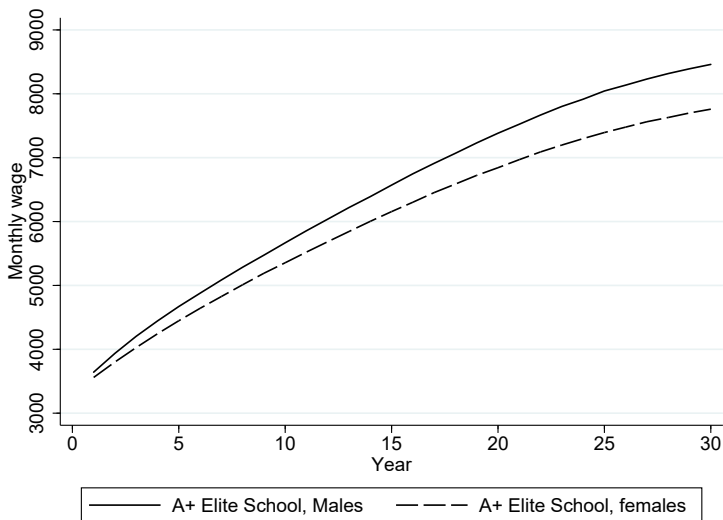
Using mobility rates of pooled sample imposes same career speed across gender

# Outcomes

Outcomes considered for this presentation:

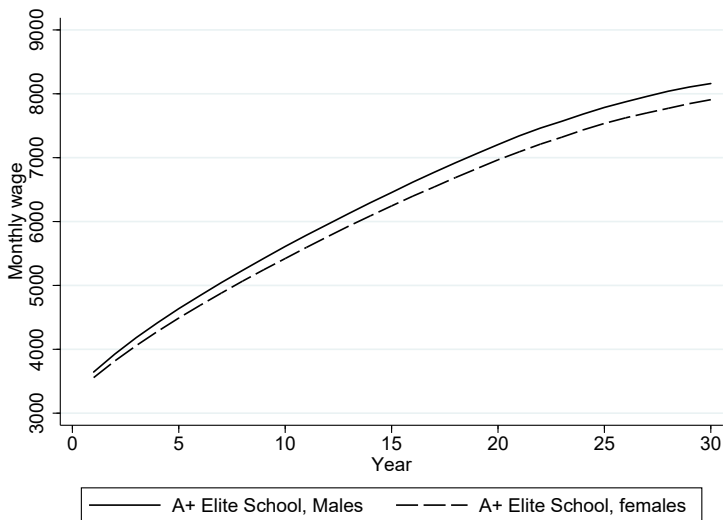
- Two group of executives: A+Diploma and University
- Monthly wages
- First part: assuming the entire career within the firm
  - Simulated career wage profiles
  - Simulated career wage profiles, pooled transition
  - Simulated career wage profiles, pooled speed
- Second part: taking into account exit from the firm
  - Simulated career wage profiles
  - Simulated career wage profiles, pooled transition

# Gender careers for **A+ Elite Schools**, gender transitions

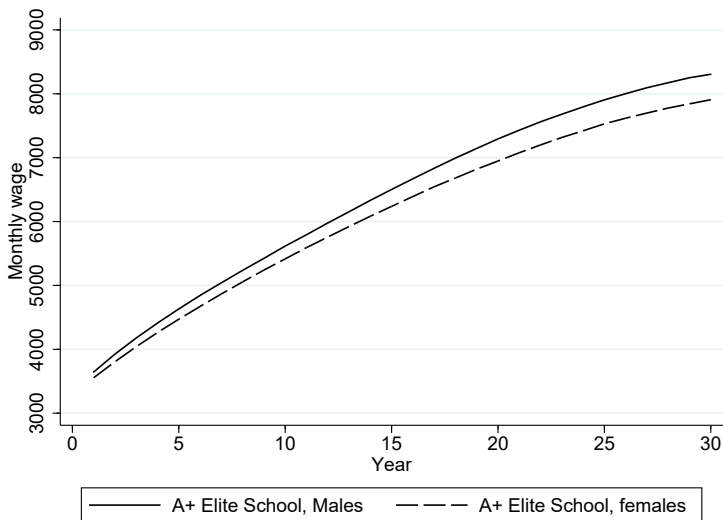




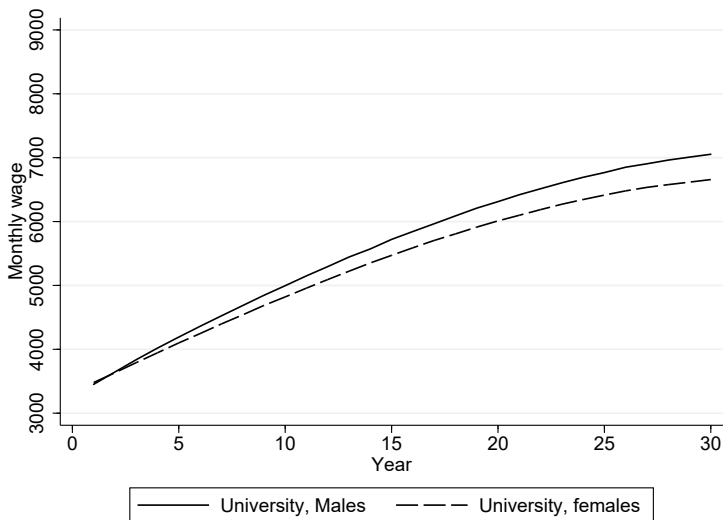
# Gender careers for **A+ Elite Schools**, pooled transitions



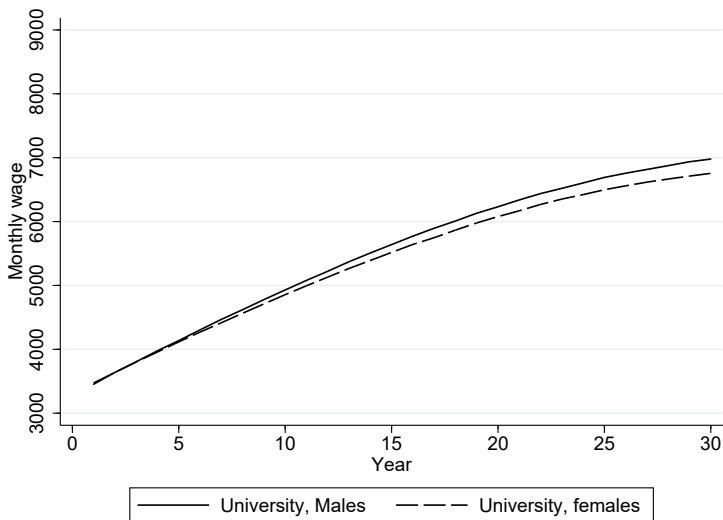
# Gender careers for **A+ Elite Schools**, pooled mobility



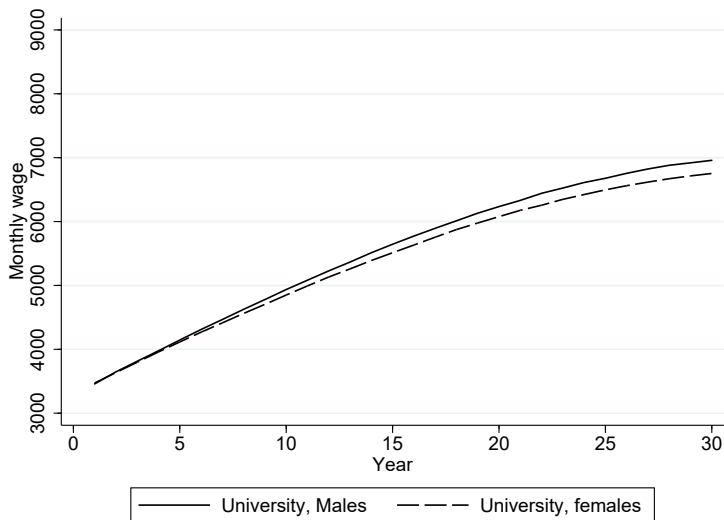
# Gender careers for **University**, gender transitions



# Gender careers for **University**, pooled transitions



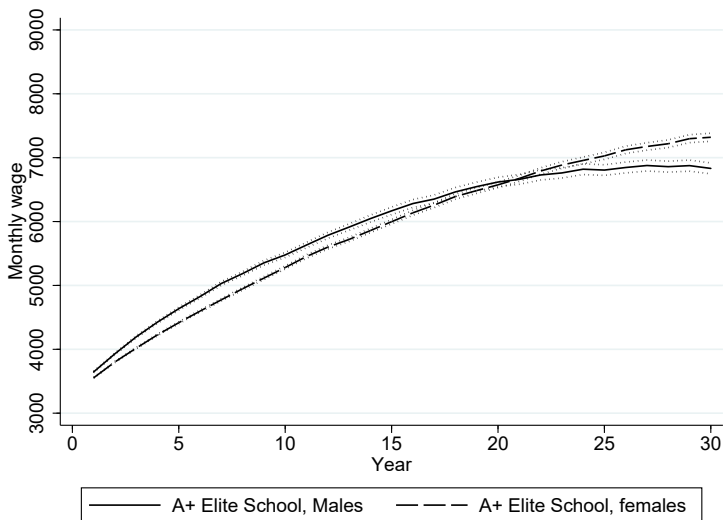
# Gender careers for **University**, pooled mobility



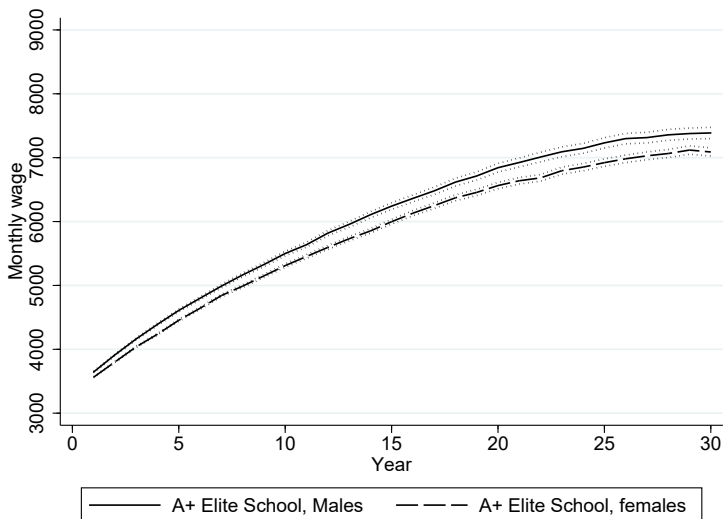
# Results on wage, no exit

- Gender wage disparities building over time  
Disparities larger for Elite Schools A+ than for university
- Disparities nearly disappear when using pooled-sample transition matrix of the diploma group  
⇒ The a role of job transitions is the main factor to explain this gender gap  
⇒ The a role of the entry job is negligible in the gender career gap
- Differences in the speed of career progression explain more of the gender career gap for university degrees than for A+ degrees

# Gender careers for **A+**, gender transitions, exit included

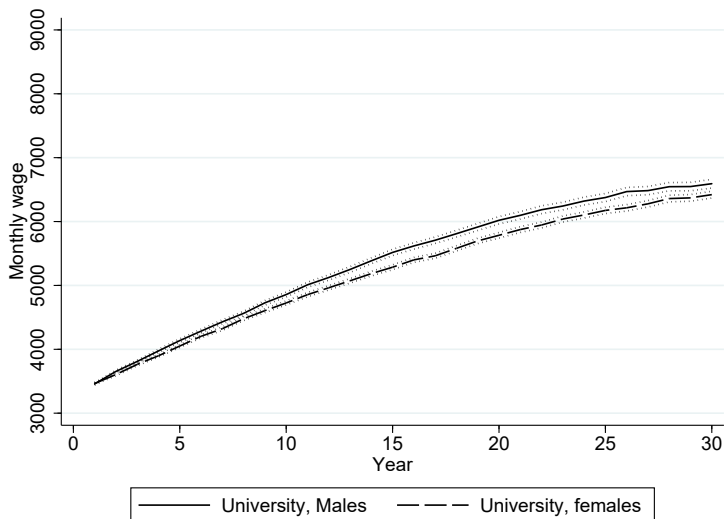


# Gender careers for **A+**, pooled transitions, exit included

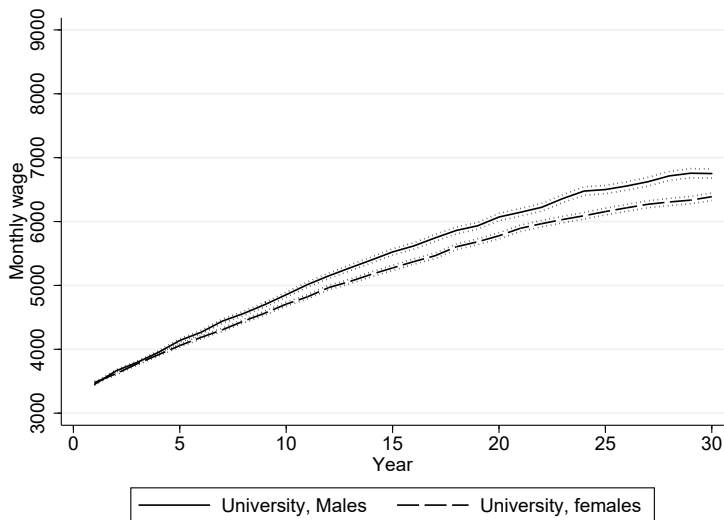




# Gender careers for **University**, gender transitions, exit incl.



# Gender careers for **University**, pooled transitions, exit incl.



# Conclusion and perspectives

- We use panel data set over 13 years within a large French company.
- We build transition matrices between job positions defined at the finest level of the company's nomenclature
- Our main results
  - When the counterfactuals are done assuming that the entire career takes place in the firm, the career gap between men and women is almost entirely due to differences in job transitions
  - When the counterfactuals take into account exits during the career, the simulated careers of "A+" women are more advantageous than those of men, after 20 years of seniority
  - This effect disappears when we use pooled transitions matrices.
  - It suggests that men's departures provide more opportunities for women in late-career positions
- Work in progress : *Next steps*
  - The impact of maternity on the job transitions within the firm, according to the level of diplomas
  - The role of spells spent in foreign branch on career in France