GENDER DIFFERENCES IN THE EARNINGS OF ECONOMICS GRADUATES IN FRANCE*

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Abstract

In contrast to the UK, the USA and Germany, the majority of students in economics in France are female. Using a national survey of three cohorts of French university graduates in economics we examine the gender differential in early career earnings. There is a significant raw differential in favour of males in both starting pay and earnings three years after graduation, and the latter is wider than the former. Between 1998 and 2013 both gaps have narrowed but not disappeared. Furthermore, an Oaxaca decomposition reveals that nearly all of the gap is due to a persistent unexplained component. In order to put this into perspective, the gender differential among economics graduates is compared to that in two scientific subject areas : the female-dominated life sciences and physics and chemistry (taken together) where a majority of graduates are male. The gender pay gap is smaller and the general level of earnings is lower in both science subject areas compared to economics for each cohort. The decomposition attributes the limited gap in life sciences mainly to a composition effect.

Key words: Gender pay gap, Oaxaca-Blinder decomposition, discrimination, quantile decomposition, young adults.
JEL classification: J16, J31, J71.

*We are grateful to the Centre d'Etudes et de Recherche sur les Qualifications (CEREQ)and the Reseau Quetelet for granting us access to the survey data used in this paper.

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As is the case in many countries, successive cohorts of females in France are increasingly more qualified than males. A less common feature is that there are more females than males studying economics in higher education, compared to say the United Kingdom (Crawford et al., 2018) or United States (Buckles, 2019) where less than a third of economics undergraduates are female. Using a national survey of three cohorts of university graduates over the period 1998 to 2013, we examine gender differences in labour market outcomes for economics graduates in France. The French context is an interesting case for a number of reasons. First, it has been argued that one of the reasons underlying persistent gender differentials in earnings is self-selection into certain academic disciplines: females are found in less technical subjects, which are on average less well-paid (Bertrand, 2020). A corollary of this line of reasoning is that other things being equal if females enter more technical disciplines they will also benefit from the superior return to education and cause the gender differential to narrow. A second argument is that occupational segregation enables gender pay differentials to persist in the context of the current equal pay legislation in Europe (Chamkhi and Toutlemonde, 2015). If females increasingly come to occupy similar positions to males, the gender earnings gap should decrease. These two mechanisms would reduce the so-called composition component in the Oaxaca decomposition of earnings differentials. A third reason for interest in the French case is to see whether in spite of the preponderance of female graduates in economics there remains a gender earnings differential for this group of graduates and, if so, whether this is due to the unexplained (or structure) component in the decomposition. In other words, analysing the French case can shed light on the question being considered elsewhere (Lundberg and Stearns, 2019) as to whether encouraging more females to study economics will also lead to a reduction in the earnings differential relative to their male counterparts.

Nearly all previous studies of gender earnings differences among graduates of a specific discipline use data for a particular higher education establishment: for example, Bertrand et al. (2010) study MBA graduates from the Booth School of Business at the University of Chicago, while for Reimer and Schröder (2006) it is social science students at the University of Mannheim. An early study by Gerhart (1990) used data on graduates employed in a large firm. An exception is a recent contribution by Francesconi and Parey (2018) who study the starting pay of German graduates by pooling several cohorts of students. They find that the field of study explains a large part if the gender differential in starting pay. We use three cohorts of French university graduates from a national survey to analyse gender earnings differences, but we depart from their approach in three ways. Firstly, we examine the specific case of graduates in economics (where the majority of students are female as opposed to Germany) and for comparative purposes use two scientific subject areas with different gender compositions – Physics and Chemistry (taken

together) and Life Sciences. Secondly, we analyse earnings after three years as well as starting pay which is important since initial graduate employment is often a stepping-stone to a better match. Thirdly, instead of pooling the cohorts, we examine gender differentials separately for each cohort. This turns out to be important since the raw gender differential in both starting pay and subsequent earnings have declined markedly for graduates in these disciplines between 1998 and 2013.

The cohorts are defined by the date they leave full-time education (rather than year of birth) and the three years selected are 1998, 2004 and 2010. Respondents are first interviewed three years after leaving full-time education, with follow-up interviews two and four years later. Naturally between the initial and subsequent interviews there is attrition due to different forms of mobility and so the analysis concentrates mainly on the first three years in the labour market.

Economics in France is first taught as a subject in high school and is one of the three broad divisions of the academic baccalaureat programme for the cohorts studied (the other two are scientific and literary). The actual formal economics content at this level is limited, and emphasis is on institutions and history of economic thought rather than economic principles. Students also have courses in mathematics, sociology, philosophy, history and so forth. At university economics is a 'major' subject in itself, and is also taught alongside business studies and administrative law. For the purposes of the current study, economics students are generally defined as graduates who have had an academic, formal economics training in the first two years of university. This is because students are given the option of specialising in their third and final year of undergraduate degree in subjects related to economics such as finance, accountancy, and management. However, these students will all have taken the same core courses in economic principles, mathematics, probability and statistics as an economics major in the first two years of their degree. Only 'straight economics' undergraduates are certain to have studied third year topics like econometrics and macroeconomic dynamics, but these may be part of other degree programmes as options or core courses.

Basing a definition solely on the initial years of university however will exclude certain students who come into economics having started out in a different academic discipline such as medicine or applied mathematics, or having attended another higher education institution such as the 'Classes Prparatoires' which prepare students for competitive entrance examinations into the 'Grandes Ecoles'. Students in the latter programmes tend on average to be of higher ability than direct entrants to university. Those who fail the entrance examinations usually revert to the university system since they obtain credits for the subjects already taken and usually enter the second or third year of a degree course.

The notion of an economics student adopted here is therefore a university graduate who has studied and mastered formal economic principles, whatever the chosen specialisation of the highest diploma obtained. It encompasses all students who could if they so choose continue to study 'straight' economics to the degree level. The distinction between having a formal economics background and the ultimate choice of occupation is important because there are a limited number of economist positions in France, and are found mainly in high school teaching, academia, government, financial institutions and not-for-profit organisations.

The main aim of the paper is to assess whether female graduates in economics attain similar outcomes to males in this narrowly defined context. We examine gender differentials in starting pay and in earnings three years after graduation for economics students, and compare these with differentials for students in two scientific subject areas: physics and chemistry (taken together) and life sciences. The former is a male-dominated academic subject area, while in the latter the majority of students are female. These earnings comparisons are undertaken for three cohorts over the period 1998 to 2013.

In the first section, a descriptive analysis of early career paths is presented. This is followed by an examination of differences in starting wages, where it is found that there already exists an earnings gap in favour of males and this is due almost entirely to the unexplained component of the Oaxaca decomposition. However both the raw and unexplained gaps are significantly smaller for more recent cohorts. In the third section, earnings three years after graduation are analysed and it is found that the gender gap is wider than the gap in starting wages, and again is due almost entirely to the unexplained component. These gaps are also much smaller for more recent cohorts. In the penultimate section, various reasons for the size of the unexplained earnings gap are explored.

1 Characteristics of economics students

1.1 The French higher education system

The graduates studied here will have at least a university bachelor's degree in an academic discipline, having had a minimum of two years teaching in the core courses of an economics degree: microeconomic and macroeconomic principles, mathematics and statistics. The French higher education system differs in many ways from the 'Anglo-Saxon' model in that students have limited scope for choice in terms of major and minor subjects. A degree programme will contain a large component of obligatory subjects, but choice is possible among programmes. For example, a student entering the third and final year of their undergraduate degree could probably choose between economics, finance, management and accountancy. Postgraduate degrees are normally two year programmes and entry is

often selective. In the period covered (1998-2010) there have been a number of reforms but the system has essentially two exit levels: after a three year undergraduate degree or with a postgraduate Master's degree after a further two years study. Thereafter for a small number of students there is the option doing a doctorate financed by a grant from the government.

It should be noted that the public higher education system has three parallel strands: university, vocational and technical institutes and the preparatory classes for competitive examinations to enter the elite Grandes Ecoles. In each of the latter two orientations, into which entry is selective, there can be some teaching of economics and related subjects. Those students who do not pass the competitive examination, usually enter university degree programmes in economics with course credits for subjects already taken depending on the choice of Grande Ecole entry examination they have taken. In the period covered, while equivalences with the first and second years of undergraduate study have not always been systematic, generally speaking these students will enter economics and related degree programmes directly in the second or third year with a similar level of competence in formal economics as the group of undergraduates that they are joining.

Business studies and marketing are taught in the technical institutes but the level to which economics is taught is not generally compatible with undergraduate economics at university.Students at these institutes and other establishments providing post-high school vocational courses are therefore excluded from the sample used here. Alongside these public institutions, there are private sector business schools which also have some economics teaching in their programmes. These schools are very heterogeneous in terms of programme content and level, and students attending them immediately after high school are not included in the sample. However, university students in economics who subsequently obtain postgraduate diplomas from business schools are included.

1.2 The 'Generation' surveys

One important factor in a study of this kind is going to be sample size. The Generation survey contains between 32,000 and 55,000 respondents depending on the cohort, it is a national survey covering all types of school leaver. It is worth noting that while some two thirds of a cohort obtain the baccalaureat and can therefore go into higher education as a right, the subsequent drop-out rate is high. A high proportion of students who enter university do not obtain a diploma higher than the baccalaureat because they fail the exams. Others leave with an intermediate diploma after two years. Once attention is limited to economics graduates and then partitioned by gender, the resulting sample sizes are fairly small. While there are sufficient observations to undertake regression analysis – usually more than two hundred per sub-group – a detailed analysis is not always possible. A further issue is that for each cohort, the same individuals are recontacted two years

later or five years after leaving higher education. Sample attrition is not unexpectedly substantial, and so the sample size becomes even smaller.

The sample size issue aside, the survey is very rich in terms of the information collected. Not only is there detailed information on an individual's education from the age of 12 through to the final diploma obtained, there is also a retrospective employment and personal history provided month-by-month since leaving full-time education. Since the cohorts are defined by the date they leave full-time education rather than year of birth, the respondents all have roughly the same number of months of potential experience at the time the survey is undertaken. However, their actual labour market experience is known since respondents provide a month-by-month calendar of their employment status along with changes in their personal circumstances.

1.3 The earnings of economics graduates

The education variable for used corresponds to the highest diploma obtained on exit from the education system. In principle, the French equivalent of a bachelor's degree is obtained after three years of study. For the cohorts used here, the next diploma level is a two-year Master's degree, the second of which involves specialising either in a high level professional diploma or a postgraduate research degree required for entry onto a doctoral programme. It is uncommon for an individual to finish their higher education after four years after a year postgraduate study. Not undertaking the fifth year is usually the consequence of an event: receiving a job offer, deciding to become a school teacher or experiencing a change in personal circumstances. Thus, economics graduates are overwhelmingly qualified up to this fifth year of higher education. Entering a doctoral programme however tends to be rare compared to scientific disciplines since financial support is selective and career opportunities are narrow (usually academia or working as an economist for government or a not-for-profit organisation).

In what follows, we compare the characteristics and labour market outcomes of economics students with those of graduates in two scientific subject areas: physics and chemistry (taken together) and life sciences. The comparison with scientific rather than humanities disciplines is apposite in that teaching of economics in France is highly formalised and, like those in the sciences, students in economics are required to be competent in mathematics. This choice of scientific subjects is also useful for comparisons since physics and chemistry is a male-dominated subject area, while there are more female than male students in life sciences.

Figure 1 shows that more than half of economics graduates are female and the figure is stable across the three cohorts studied. This contrasts with the situation in comparable countries. The Physics and Chemistry subject area has a clear majority of male students,

while females represent an increasing proportion of graduates in Life Sciences, rising from just over half to nearly two thirds in the period covered.

Three years after graduation, male average earnings are highest in Economics, and lowest in Life Sciences. This is the case across the three cohorts (see Figure 1). For females, average pay among Economics and Physics and Chemistry graduates is similar and much higher than in Life Sciences, although female earnings in the latter have increased relatively over time. In terms of the raw gender earnings gap, the biggest gender differential in each cohort is consistently found among Economics graduates – 18% in 2001 and 11% in 2013. The gap is smallest for Life Sciences in two of the three cohorts. Finally, the raw gender gap has decreased substantially between 2001 and 2013 in all discipline, the most pronounced reduction being in Life Sciences from 9% to 2.1%.

In short, three years after graduation, pay levels for economics graduates are higher than in the two scientific disciplines, but so is the gender earnings differential. Even though the latter has decreased over the period studied, it remains above 10%.

2 Earnings regressions

Respondents provide a calendar of their different spells of employment (and non-employment). For each spell the initial earnings and final pay are recorded, along with other aspects of the job such as contract type, sector, full-time status, and so forth. In this section, we analyse the starting pay of the first employment spell that is recorded after leaving full-time education. For reasons of comparability, respondents who declare that they did not work full-time at the beginning of this first spell are excluded.

Traditionally unemployment has been high among young persons in France. However, the rate is much lower for students with higher educational qualifications (see for example, Bazen and Waziri, 2019). Nevertheless, mainly as a consequence of labour laws, the initial recruitment of a young person takes the form of a fixed-term employment contract in the majority of cases and this concerns graduates as well as those less qualified. In all regressions a dummy is included for the type of employment contract.

2.1 Starting wages of economics graduates

The logarithm of monthly starting pay net of social security contributions is regressed on a constant and a set of dummy variables which are used to represent the highest diploma obtained and whether the employment contract is a standard one. The reference category is an individual with a bachelor's degree only in a job with a fixed-term contract. The results for the three cohorts of students in economics are presented in Tables 1 and 2.

Pooling the observations and incorporating a gender dummy suggests the existence of a substantial differential in starting wages in 1998 and 2004 but which is declining across cohorts to become insignificant in 2010. In order to undertake an Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) the equations are estimated separately by gender (see Table 2). The size and significance of the coefficients are not the same for the two genders. The decomposition using female characteristics as the basis shows that the gender differential in the logarithm of starting pay is almost mainly due the unexplained component and almost entirely so for the most recent cohort (see Figure 2). In view of the fact that female students are as qualified as their male counterparts, it is not unsurprising that the component due to differences in characteristics is small (see Table 5).

It would therefore appear to be the case that while females constitute a small majority of economics graduates, their starting pay is on average lower than for male graduates. The differential is mainly due to differences in coefficients, although both the raw differential and the unexplained component have decreased substantially between 1998 and 2010, but has not disappeared.

In Physics and Chemistry and the Life Sciences, where gender differentials in log starting pay are smaller, the Oaxaca decomposition attributes a substantial part of the differential to the characteristics component (see Figure A1).

2.2 Earnings after three years

Starting wages may not be the best measure of the early career pay of economics graduates for various reasons. Earnings will be lower if the individual is undergoing training, for example, as predicted by Becker's theory of investment in post-school training. In the French context, for those entering the labour market, getting a job may be more of a priority for an individual than the level of remuneration. An initial inefficient match can be subsequently corrected by further job search. Furthermore, most first jobs are of a fixed term nature and as has been noted above, pay is higher for individuals with standard employment contracts. For these and possibly other reasons, we examine earnings differences by gender for each cohort three years after having left full-time education in order to see whether the gender gap evolves as the cohort gains experience.

For most respondents earnings are recorded at the time of interview which takes place three years after having left full-time education. For those who are not in paid employment at the time of interview, earnings at the end of the most recent spell of employment are used. Where the spell ended more than twelve months prior to interview, the case is excluded along those who have never worked. Part-time employees are also excluded from the main regression analysis. The validity of excluding the latter categories is assessed using a selectivity test. The self-employed and so-called 'family employees' are also

excluded but are not used in the selectivity test since their labour incomes are not determined in by the same mechanisms as employees. When specifying the earnings function, it is useful to note that due to the way in which a cohort is defined, all members will have roughly the same potential experience (ie three years). It is not possible therefore to identify the effect of potential experience on earnings since it would be included with other factors in the constant term. However, due to the respective calendar on employment spells, *actual* experience in terms of months occupied can be measured. Thus, the earnings equation used for starting wages is augmented by actual experience, converted into an annual measure.

Regressions using data that have been pooled by gender show that other things being equal the gender earnings differential is wider after three years compared to the gap found in starting pay. While this deterioration in the gender pay gap over the first three years of activity is less pronounced over time, it stands at close 10% in 2013. Estimating the earnings equations separately by gender and decomposing the gap reveals that the differential is almost entirely due to the unexplained component (see Figure 1). Most of the unexplained difference in the recent cohorts is due to differences in the constant term, although the annual rate of return to actual experience is higher for males for the 2004 and 2010 cohorts.

In the two natural sciences, the gender gaps are smaller than in economics. The nature of the gap is also quite different (see Figure A1). Firstly, the differential in earnings after three years is not always greater that the gap in starting pay. In 2013 for graduates in both subject areas the gap in starting pay is bigger than that in subsequent earnings, and the differential in life sciences is mainly due to the composition effect. In Physics and Chemistry the gap is entirely due to the unexplained component.

The conclusion that emerges is one where an initial gender gap in the pay of economics graduates is exacerbated over the subsequent two to three years after graduation. While the size of the gap is smaller for the most recent cohort, it remains significant. In the two scientific subject areas, the picture is quite different. In the female-dominated Life Sciences, the gap is small, narrowing over time, and decreases between starting and subsequent pay at least for 2010. In Physics and Chemistry where the majority of graduates are male, there is smaller gender gap than among economics graduates. As in economics, the gap is due almost entirely to the unexplained component in the Oaxaca decomposition.

2.3 Robustness checks

The results presented thus far are based on a series of regressions, and in this section we undertake a number of tests in order to see whether the estimates are robust. It is

important to stress from the outset that while we are using micro data, examining the earnings of narrowly defined groups of graduate means that the sample sizes used in the regressions are not very large compared to those usually employed for studies of earnings differences. Furthermore, the survey used does not always have the sampling rate. For example for the 1998 cohort, a total of 55,000 individuals, whereas for 2010 it was 38,000. In the regressions underlying population weights are used.

The dependent variable used is monthly earnings for full-time employees. This means that inactive and unemployed necessarily excluded along with those working part-time. In order to examine the reliability of the estimates we first undertake a selectivity test (see Melino, 1982). In the first stage probit, along with the education variable we include additional variables such as age at the moment leaving full-time education, whether the individual lives with their parents or lives with a partner, if the individual was behind in school and if the individual attended a 'classe préparatoire' prior to entering university. These additional variables have varying statistical significance across cohorts and subject areas, but one or more play a role in determining presence in the sample used for the earnings regressions. The p values of the test are presented in Tables 2 and 4 and indicate that excluding the part-time and non-employed individuals does not play a role in the regressions for economics graduates.

A second robustness check is the inclusion of those part-time employees working three days or four days a week. The monthly earnings is converted into a full-time equivalent and separate dummy variables number of days worked. Again the overall conclusions are not altered by the incorporation of these part-time employees. There is no apparent penalty in economics for working less than full-time.

The definition of an economics graduate includes individuals who finish by specialising in a related subject such as finance or accountancy. A dummy variable for a graduate in 'straight economics' is found to be statistically insignificant at conventional levels except in one case – males in the 2010 cohort who apparently are paid less compared to other specialisations chosen by students who have been trained in economics.

The decompositions of the gender gap in earnings indicate that the unexplained component is the main contributor to the difference between the means of log earnings by gender (or equivalently the log of the geometric mean of earnings). Using the method proposed by Firpo et al. (2009) it is possible to undertake the decomposition at different quantiles rather than at the mean. We did not use this method as our main approach because of the limitations of sample size. However, this decomposition suggests that the gender differential is in the middle and upper half of the earnings distribution and as in the Oaxaca decomposition, overwhelmingly attributable to the unexplained component.

3 Why is the unexplained component so persistent?

While the raw gender differential has narrowed over time, the remaining gap is due almost entirely to the difference between the coefficients of the earnings equations for the two sexes. This component is often attributed to discrimination in the labour market since females and males are not obtaining the same returns to a given set of characteristics. In order to evaluate this possibility, we undertake some preliminary explorations using self-reported experience of discrimination (see Neumark and McLennan, 1995 for a full discussion of the issues involved).

In the 2010 cohort, 13.6% of female economics graduates report that they have experienced discrimination of any kind. However, while the figure for males is lower, the difference is not statistically significant. Specifically on the issue of gender discrimination, 3% of females say they have been a 'victim' (the term used in the questionnaire) and less than 1% of males and the difference is significant. These figures are lower than for discrimination due to their name which is 6% for females and 7.5% for males (see Table 6).

Another reason for the significant unexplained component of the gender differential could be related to the strategy adopted in job search and differences in the weight attributed to various aspects of a job (pay may not be as important as other components – see for example Clark, 1997). While three quarters of female economics graduates feel they are well-paid, there is no real difference compared to their male counterparts. More than 80% of both genders state that they are fully satisfied with their professional life, while 4.4% for females and 2.1% for males feel that they are over-qualified for their current job.

One significant difference between male and female economics graduates is in terms of job mobility. More than half of females change jobs at least once in the first three years after graduation compared to less than 45% of males. This is related to the observation that 56% of males are on a regular contract in their first job (46% for females). Combined with a higher return to experience for males, it would may be the case that job-changing may not involve increases in remuneration.

4 Concluding remarks

The fact that a majority of economics graduates are female in France provides an interest case study of the issues raised by the aims of encouraging more women into the economics profession. In spite of equality in terms of economics qualifications and a narrowing of the raw gender pay gap over time, there remains a persistent differential which is overwhelmingly due to the unexplained component of the Oaxaca decomposition. This finding appears to be robust since it is there from the first job and grows over the first few

years in the labour market. This sets economics apart from other technical disciplines such as the female-dominated life sciences and to a certain extent male dominated subject areas such as physics and chemistry. While there is some evidence of self-reported discrimination, it appears that female economics graduates are more likely to change jobs in the early part of their career and this mobility does not lead to significantly higher earnings.

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Table 1: Starting pay

Cohort	**1998**	**2004**	**2010**
Constant	6.94	7.036	7.205
Master 1 year	0.117	0.173	0.068ns
2 years	0.222	0.203	0.218
Ph.D.	0.341	0.338	0.394
Regular contract	0.205	0.152	0.131
Male	0.097	0.091	0.048ns
R^2	0.24	0.15	0.15
Observations	736	408	397

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net starting monthly pay. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Table 2: Starting pay: separately by gender

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
Constant	6.90	7.06	7.13	7.01	7.18	7.28
Master 1 year	0.170	0.071ns	0.110ns	0.229*	-0.06ns	0.119ns
2 years	0.259	0.199	0.125*	0.300	0.268	0.164**
Ph.D.	0.381	0.315	0.324	0.330	0.451	0.337
Regular contract	0.200	0.212	0.065	0.252	0.094*	0.163
R^2	0.21	0.19	0.07	0.22	0.17	0.13
Observations	383	353	229	179	203	194

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net starting monthly pay. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Table 3: Earnings of economics graduates three years after graduating

Cohort	1998	2004	2010
Constant	6.86	6.822	6.874
Master 1 year	0.102**	0.192	0.125
2 years	0.244	0.230	0.220
Ph.D.	0.246	0.354	0.316
Regular contract	0.236	0.131	0.181
Actual experience	0.071	0.147	0.155
Male	0.102	0.114	0.091
R^2	0.28	0.22	0.30
Observations	796	481	404

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net starting monthly pay. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Table 4: Earnings three years after graduating: separately by gender

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
Constant	6.731	7.151	7.018	6.751	6.861	6.960
Master 1 year	0.147	0.071ns	0.183**	0.169**	0.113ns	0.115ns
2 years	0.335	0.152**	0.186	0.254	0.287	0.152ns
Ph.D.	0.340	0.168**	0.331	0.355	0.381	0.255
Regular contract	0.223	0.234	0.062ns	0.234	0.196	0.176
Actual experience	0.100	0.046ns	0.100	0.184	0.130	0.181
R^2	0.29	0.11	0.11	0.30	0.30	0.28
Observations	437	359	269	212	208	196

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net monthly pay after three years. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Table 5: Sample characteristics by gender, economics

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
(a) log starting wage						
Age	24.3	24.8	24.2	24.7	24.3	25.2
Highest diploma						
Bachelor	0.056	0.089	0.126	0.094	0.087	0.079
Master 1 year	0.301	0.260	0.186	0.205	0.034	0.077
Master 2 years	0.626	0.618	0.643	0.653	0.847	0.805
Ph.D.	0.016	0.031	0.044	0.046	0.030	0.037
Regular contract	0.442	0.620	0.386	0.444	0.467	0.559
Observations	383	353	229	179	203	194
(b) log wage after three years						
Age	27.3	27.9	27.2	27.9	27.5	28.1
Highest diploma						
Bachelor	0.058	0.083	0.120	0.123	0.071	0.090
Master 1 year	0.326	0.264	0.216	0.216	0.034	0.068
Master 2 years	0.590	0.610	0.611	0.584	0.863	0.805
Ph.D.	0.024	0.041	0.052	0.075	0.030	0.036
Regular contract	0.806	0.927	0.805	0.824	0.830	0.811
Actual experience	2.40	2.24	2.38	2.36	2.43	2.50
Observations	437	359	269	212	208	196

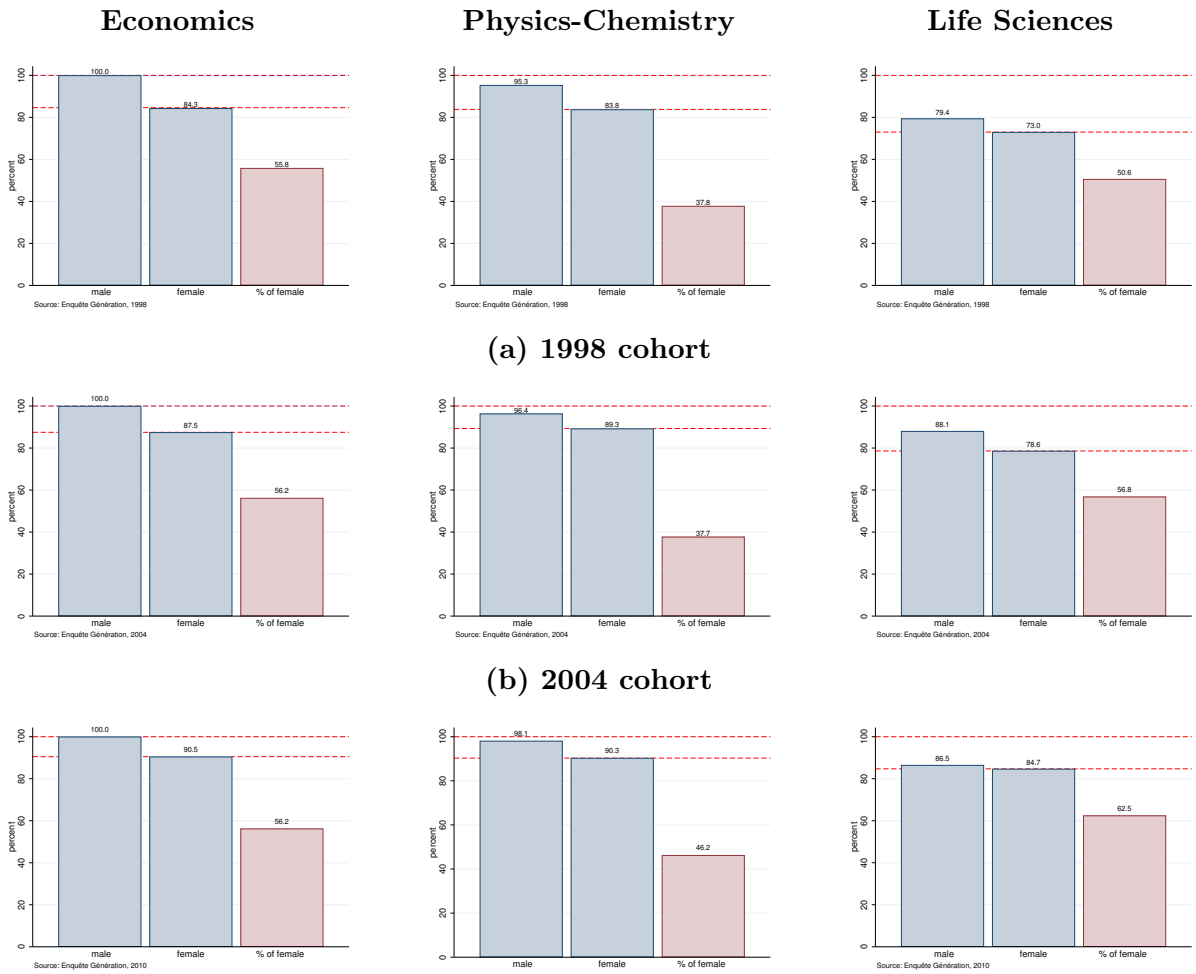
Note: The table reports summary statistics for our analysis sample. Means are reported for continuous variables. *Source*: Enquête Génération.

Table 6: Gender gap in discrimination and job satisfaction, earnings after three years, 2010

	Females	**Males**	**Difference**
Discrimination in hiring:	0.136	0.127	-0.009ns
name	0.066	0.075	0.009ns
maternity	0.001	0	-0.001ns
gender	0.029	0.008	-0.021*
age	0.023	0.008	-0.014ns
experience	0.004	0	-0.004ns
origin	0.015	0.042	0.027ns
Opinion about the job:			
well paid	0.768	0.781	0.013ns
job performance above	0.044	0.021	-0.023ns
good prof. achievement	0.800	0.850	0.050ns
Attachment (job mobility):			
1	0.446	0.562	0.115*
2	0.371	0.265	-0.106ns
3	0.116	0.144	0.027ns
4	0.044	0.013	-0.031*
5+	0.021	0.015	-0.006ns

Notes: The table shows answers to questions about discrimination and job satisfaction. The first two columns show proportions. The last column contains results of a test of equality of means between males and females. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Figure 1: Earnings and proportion of female graduates by subject areas (Male average earnings in Economics = 100)



(a) 1998 cohort

(b) 2004 cohort

(c) 2010 cohort

Notes: The figure plot gender gaps in wages (blue) and proportion of female graduates (red) by subject areas. All the gaps are based on the male wages in economics. *Source*: Enquête Génération.

Figure 2: An Oaxaca decomposition of the gender differential in starting pay and subsequent earnings among economics graduates

Source: Enquête Génération, 1998

(a) 1998 cohort

Source: Enquête Génération, 2004

(b) 2004 cohort

Source: Enquête Génération, 2010

(c) 2010 cohort

Notes: The figures plot raw (blue) gender gaps in wages, decomposed into a part explained (red) and an unexplained part (green). Following Blau and Kahn (2017), the decomposition uses as the counterfactual the earnings of an average woman at the male returns ($\overline{x}_f\widehat{\beta}_m$), which assumes the latter represent competitive prices. We also explore the sensitivity of the findings to weighting the difference in characteristics by the female returns and returns estimated using a pooled model with a gender dummy variable following Fortin (2008). Change in reference coefficients give similar estimates. *Source*: Enquête Génération.

Appendices

Table A1: Sample characteristics by gender, Physics and Chemistry

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
(a) log starting wage						
Age	25.6	26.2	25.5	26.6	25.4	26.8
Highest diploma						
Bachelor	0.154	0.168	0.280	0.199	0.030	0.050
Master 1 year	0.153	0.123	0.040	0.075	0.010	0.111
Master 2 years	0.239	0.278	0.290	0.199	0.525	0.199
Ph.D.	0.453	0.429	0.388	0.525	0.433	0.638
Regular contract	0.379	0.508	0.367	0.477	0.362	0.345
Observations	189	347	124	259	157	277
(b) log wage after three years						
Age	28.3	29.2	28.1	29.3	28.3	30.0
Highest diploma						
Bachelor	0.199	0.152	0.368	0.231	0.033	0.102
Master 1 year	0.206	0.157	0.062	0.082	0.071	0.098
Master 2 years	0.221	0.267	0.249	0.216	0.480	0.182
Ph.D.	0.372	0.422	0.319	0.469	0.414	0.615
Regular contract	0.789	0.822	0.743	0.758	0.727	0.613
Actual experience	2.23	2.28	2.48	2.43	2.50	2.55
Observations	213	361	137	275	159	281

Note: The table reports summary statistics for our analysis sample. Means are reported for continuous variables. *Source*: Enquête Génération.

Table A2: Sample characteristics by gender, Life Sciences

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
(a) log starting wage						
Age	25.1	25.6	25.3	25.4	26.1	26.2
Highest diploma						
Bachelor	0.258	0.142	0.361	0.133	0.102	0.110
Master 1 year	0.234	0.222	0.074	0.104	0.055	0.028
Master 2 years	0.303	0.444	0.321	0.453	0.448	0.443
Ph.D.	0.203	0.189	0.242	0.308	0.393	0.417
Regular contract	0.291	0.337	0.361	0.359	0.182	0.265
Observations	252	211	227	173	322	226
(b) log wage after three years						
Age	28.1	28.3	28.2	28.4	28.9	29.1
Highest diploma						
Bachelor	0.221	0.174	0.420	0.141	0.113	0.108
Master 1 year	0.305	0.287	0.070	0.125	0.037	0.023
Master 2 years	0.297	0.380	0.286	0.465	0.482	0.473
Ph.D.	0.175	0.157	0.222	0.268	0.367	0.394
Regular contract	0.597	0.650	0.652	0.642	0.464	0.513
Actual experience	2.16	2.02	2.36	2.19	2.41	2.39
Observations	272	251	238	204	327	240

Note: The table reports summary statistics for our analysis sample. Means are reported for continuous variables. *Source*: Enquête Génération.

Table A3: Starting pay: separately by gender, Physics-Chemistry and Life Sciences

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
(a) Physics-Chemistry						
Constant	6.92	6.96	6.98	7.18	7.263	7.179
Master 1 year	-0.066ns	0.095ns	0.528	0.231**	0.057ns	0.057ns
Master 2 years	0.232	0.304	0.359	0.259	0.026ns	0.275*
Ph.D.	0.420	0.428	0.514	0.322	0.307	0.412
Regular contract	0.125	0.172	0.152**	0.055ns	0.175	0.160
R^2	0.441	0.411	0.392	0.21	0.396	0.276
Observations	189	347	124	259	157	277
(b) Life Sciences						
Constant	6.88	7.10	7.06	6.93	7.142	7.113
Master 1 year	-0.003ns	-0.149*	0.049ns	0.141**	0.075ns	0.088ns
Master 2 years	0.173	0.053ns	0.156	0.324	0.230	0.198
Ph.D.	0.374	0.262	0.362	0.490	0.384	0.421
Regular contract	0.203	0.135	0.136	0.207	0.079ns	0.247
R^2	0.341	0.268	0.304	0.19	0.186	0.355
Observations	252	211	227	173	322	226

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net starting monthly pay. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

Table A4: Earnings three years after graduating: separately by gender, Physics-Chemistry and Life Sciences

Cohort	1998		2004		2010	
	Females	**Males**	**Females**	**Males**	**Females**	**Males**
(a) Physics-Chemistry						
Constant	6.90	6.99	7.03	7.17	6.911	7.059
Master 1 year	-0.132*	0.169	0.123ns	0.271	0.325	-0.124ns
Master 2 years	0.145	0.292	0.147**	0.194	0.336	0.336ns
Ph.D.	0.245	0.369	0.229	0.237	0.553	0.251ns
Regular contract	0.214	0.237	0.167**	0.106	0.084**	0.159**
Actual experience	0.092	0.036	0.090*	0.059**	0.092	0.123**
R^2	0.452	0.378	0.226	0.20	0.419	0.293
Observations	213	361	137	275	159	281
(b) Life Sciences						
Constant	6.81	6.86	6.84	6.96	7.024	7.042
Master 1 year	0.099ns	-0.000ns	0.079ns	0.114ns	-0.038ns	0.306
Master 2 years	0.191	0.152	0.133	0.286	0.063ns	0.205
Ph.D.	0.344	0.248	0.355	0.430	0.249	0.393
Regular contract	0.186	0.317	0.141	0.204	0.089ns	0.203
Actual experience	0.066	0.069	0.135	0.056	0.145	0.065**
R^2	0.254	0.457	0.450	0.334	0.313	0.371
Observations	272	251	238	204	327	240

Notes: OLS estimates with robust standard errors. The dependent variable is the logarithm of the net starting monthly pay. ns indicates not significant, * and ** indicate statistical significance at 10%, 5% level, respectively. *Source*: Enquête Génération.

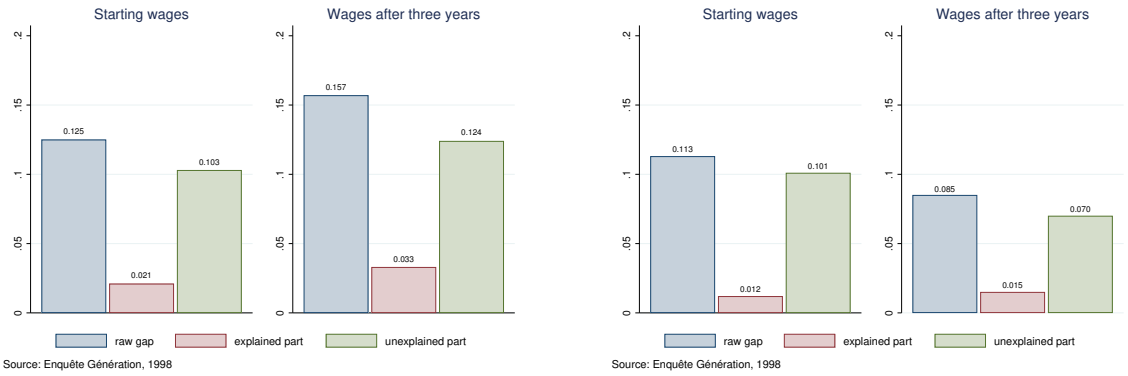
Table A5: RIF decomposition of the gender gap in wages, by cohort

	10%	20%	50%	80%	90%
1998 cohort					
(a) log starting wage					
Total gender gap	0.142	0.168	0.158	0.094	0.120
Explained part	0.065ns	0.036ns	0.015ns	0.026ns	0.032ns
Unexplained part	0.076	0.131	0.142	0.067	0.088
Observations	736	736	736	736	736
(b) log wage after three years					
Total gender gap	0.240	0.204	0.163	0.155	0.158
Explained part	0.010ns	0.033ns	0.003ns	0.033ns	0.006ns
Unexplained part	0.229	0.170	0.159	0.121	0.152
Observations	796	796	796	796	796
2004 cohort					
(a) log starting wage					
Total gender gap	0.060ns	0.037ns	0.145	0.103	0.157
Explained part	0.016ns	0.023ns	-0.004ns	0.024ns	0.016ns
Unexplained part	0.043ns	0.013ns	0.150	0.078	0.140
Observations	408	408	408	408	408
(b) log wage after three years					
Total gender gap	-0.018ns	0.084	0.180	0.185	0.179
Explained part	0.008ns	0.005ns	0.002ns	0.000ns	-0.010ns
Unexplained part	-0.027ns	0.079	0.177	0.184	0.189
Observations	481	481	481	481	481
2010 cohort					
(a) log starting wage					
Total gender gap	0.026ns	0.037ns	0.060ns	0.046ns	0.118
Explained part	0.032ns	0.018ns	0.029ns	0.002ns	0.035ns
Unexplained part	-0.006ns	0.018ns	0.031ns	0.044ns	0.082
Observations	397	397	397	397	397
(b) log wage after three years					
Total gender gap	0.024ns	0.081	0.107	0.138	0.074ns
Explained part	0.004ns	-0.001ns	0.027ns	-0.005ns	0.007ns
Unexplained part	0.020ns	0.083	0.080ns	0.143	0.066ns
Observations	404	404	404	404	404

Notes: The table presents RIF decomposition results based on the procedure developed by Firpo and al. (2009). The dependent variable is the log net starting monthly pay (panel a), the log net pay after three years (panel b). Men are chosen as the reference group. We control for highest diploma obtained (reference group: bachelor's degree), employment contract (reference group: a fixed-term contract), and actual experience for the estimation of log wage after three years. ns indicates not significant. *Source*: Enquête Génération.

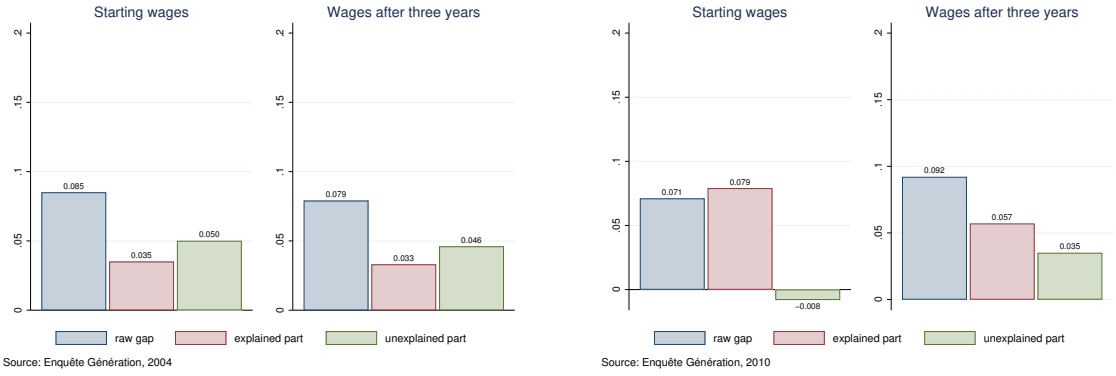
Figure A1: An Oaxaca decomposition of the gender differential in starting pay and subsequent earnings among physics and chemistry and life sciences graduates

Physics-Chemistry **Life Sciences**



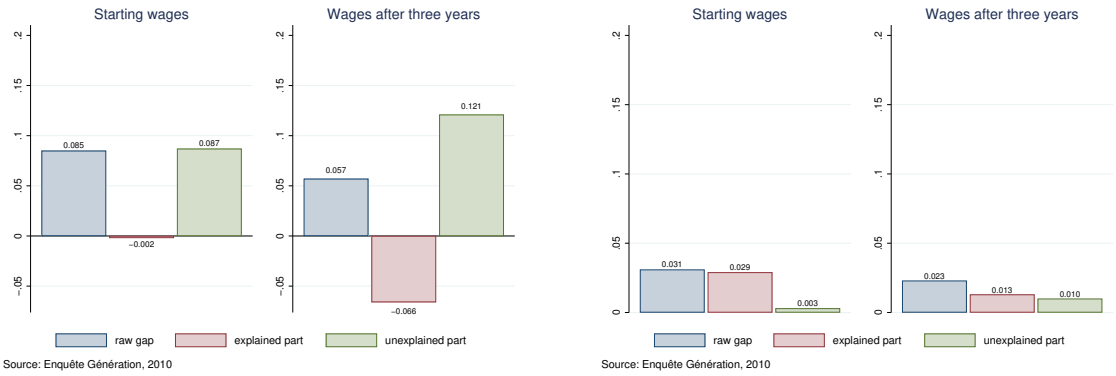
Source: Enquête Génération, 1998 Source: Enquête Génération, 1998

(a) 1998 cohort



Source: Enquête Génération, 2004 Source: Enquête Génération, 2010

(b) 2004 cohort



Source: Enquête Génération, 2010 Source: Enquête Génération, 2010

(c) 2010 cohort

Notes: The figures plot raw (blue) gender gaps in wages, decomposed into a part explained (red) and an unexplained part (green). Following Blau and Kahn (2017), the decomposition uses as the counterfactual the earnings of an average woman at the male returns ($\overline{x_f}\widehat{\beta}_m$), which assumes the latter represent competitive prices. We also explore the sensitivity of the findings to weighting the difference in characteristics by the female returns and returns estimated using a pooled model with a gender dummy variable following Fortin (2008). Change in reference coefficients give similar estimates. *Source*: Enquête Génération.