



HAL
open science

Reforms and inequalities in selective fields of higher education in France: Measuring the impacts using a dual approach

Magali Jaoul-Grammare

► To cite this version:

Magali Jaoul-Grammare. Reforms and inequalities in selective fields of higher education in France: Measuring the impacts using a dual approach. *European Journal of Education*, 2022, 57 (2), pp.255-272. 10.1111/ejed.12498 . halshs-03765618

HAL Id: halshs-03765618

<https://shs.hal.science/halshs-03765618>

Submitted on 31 Aug 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Reforms and inequalities in selective fields of higher education in France: Measuring the impacts using a dual approach

Version preprint

Magali Jaoul-Grammare

BETA-CNRS, University of Strasbourg, 61 avenue de la forêt noire, Strasbourg 67085, France

Email: jaoulgrammare@beta-cnrs.unistra.fr

Abstract

One of the specificities of French higher education is that there is no single higher education system but two compartmentalised and hierarchical higher education systems comprising (1) universities and (2) *grande école* higher education institutions. Competing for a place in the latter requires that students have succeeded in *classe préparatoire* studies at the undergraduate level (an intensive foundation degree). While access to university is open to all students, access to *classe préparatoire* is very selective and remains the source of many inequalities. Thus, in 2018, only 7% of students studying in *classe préparatoire* programmes had a working-class father, compared with 50% whose father was a manager, and less than 43% were women, 30% of whom were in the science stream (RERS, 2018). Numerous reforms have been implemented over the past thirty years to mitigate inequalities associated with gender, social and cultural status, as well as geographical location. This study analysed the impact of reforms on the evolution of inequalities. With focus on social and gender inequalities, I use a dual approach to analyse questions pertaining to access and the impact of reforms; specifically, (1) a cliometric approach, based on a quantitative historical analysis of long time series, and (2) a microeconomic approach that relies on individual series. I show that despite measures aimed at opening access to students of different gender and social backgrounds, the *grandes écoles* remain a relatively compartmentalised system that perpetuates the reproduction of social and gender inequalities.

Keywords: France, Preparatory classes, gender inequalities, social inequalities, higher education

1 INTRODUCTION

French higher education evolves in a paradox: on the one hand, it fights against inequalities as recommended by the education code¹ and on the other hand, it perpetuates these inequalities through a form of French republican elitist meritocracy (Sénat, 2006 ; Baudelot and Establet, 2009 ; Dubet, 2020). This paradox is characteristic to the French higher education system that comprises a compartmentalised and hierarchical structure composed of universities on the one hand and *Grandes Écoles* on the other. Universities are public scientific, professional, and cultural institutions that are comparatively less selective. They provide education in all fields and award degrees that are *consistent with higher education degrees in Europe* (degrees structured by bachelor, master and doctoral studies). Degrees offered by universities include short technical diplomas offered by in-house institutes where admission is comparatively more selective. There are two types of *grandes écoles*: (1) engineering schools and (2) the *École Nationale Supérieure* (ENS) and the *Très Grandes Écoles*. The former are specific to a higher education institution and offer so called *classe préparatoire intégrée* degrees to students who have obtained upper secondary degrees (I use in this article the French term *baccalauréat* to refer to upper secondary degrees) (ISCED level 3; UIS, 2012). They represent about 6% of the student body. The latter are advanced higher education degree programmes that require one or two years of undergraduate studies in a *classe préparatoire* degree. Access is very selective, and only 3% of the student body are admitted entry to the advanced programmes at *grandes écoles* each year (RERS, 2020). This two-speed is the source of many inequalities. Indeed, although the massification of education (Lévy-Garboua, 1976) has brought about quantitative democratisation (Prost, 1986), academic success and access to the highest levels of the education system remain strongly correlated with social origin (Crahay, 2000), thus implying segregated democratisation (Merle, 2012). In 2019 only 7.3% of students in *classe préparatoire* programmes had a working-class father, compared with 51.4% whose father was a manager (RERS, 2020). Furthermore, apart from being reserved for a certain social elite, the preparatory classes have long remained out of reach for women, particularly in science courses: only 30% of students in *classe préparatoire* programmes in the science fields are women (RERS, 2020).²

Thus, for the past thirty years, alongside numerous reforms aimed at combating inequalities within the education system, many strategies have been developed to promote access to the *grandes écoles*. Thus, despite a French elitist tradition within many reforms of the education system³, the notion of equality of opportunity is becoming more and more prevalent. The question addressed in this article is whether the chances to access *classe préparatoire* programmes for young women and children from working-class backgrounds have increased. The originality of my approach is to adopt a double-stranded method: a cliometric approach based on a quantitative historical analysis of long macroeconomics time

series and microeconomic analysis of individual survey data. My analysis is carried out in three stages. In the first part, I describe the historical context of the *classe préparatoire* programmes which led to a social and gendered selection of students. Then, I analyse the overall impact of the reforms by examining the evolution of the number of students enrolled in preparatory classes since the 1960s through a cliometric analysis. Finally, using logistic modeling, microeconomic analysis allows me to study the evolution of opportunities to access *classe préparatoire* programmes between 1992 and 2013.

2 FROM REPUBLICAN MERITOCRACY TO SOCIAL AND GENDERED SELECTION

One of the particularities of French higher education is the importance of the *Grandes Écoles*, although they account for less than 5% of students. Created in the 18th century, the *classe préparatoire* programmes are inseparable from the competitive examinations for entry to *grandes écoles*, for which they prepare.

2.1 Between republican elitism and the reproduction of a ‘state nobility’

At the end of the 17th century, Vauban introduced a competitive recruitment system for the military institution, marking the birth of French-style republican elitism: “*No one should be admitted to the fortifications by favour or recommendation. Merit and ability alone must attract positions*” (Vauban, 1685, p. 204). In the 18th century, this system was extended to advanced studies in the fields of engineering, artillery, and navy. Candidates who were admitted then joined the corresponding schools. Despite a stated desire for meritocracy, until 1789, authorisation to sit the examinations was conditional on being related to an officer. Thus, in addition to selection by competitive examination, the selection was based on birth criteria: in 1786, all candidates had to prove hereditary connections to nobility. This social selection stemmed from the nature of the training: an expensive education, designed to accommodate the children of the nobility, who were awarded royal scholarships by the king. With the French Revolution, these privileges were abolished; public employment was open to all citizens and the only criterion was merit. The *classe préparatoire* programmes, or preparatory classes, only really came into being with the creation of the lycées in 1802 and the setting up of special mathematics classes preparing for the *École Polytechnique* competitive examination. These schools aimed to train the nation’s elite. Napoleon also saw it as a means of controlling the middle class by diverting them from revolutionary objectives. At the same time, Napoleon was uninterested in the education of girls and young women, despite the demands of the Revolution (Condorcet, 1792; Lakanal, 1793). For him, it was a matter of *raising believers, not reasoners* (Napoleon, 15 May 1807). However, education was organised for a certain category: the daughters of Napoleon’s generals—with the creation of the House of the Legion of Honor at Ecouen.

The monopoly of the lycées on preparation for the École Polytechnique lasted until 1850. The examinations remained those of the Ancien Régime era that predated the revolution: they were exclusively oral examinations, mainly on mathematics. The Falloux law of 1850 put an end to this monopoly by authorising the creation of free schools in secondary education. This competition marked a certain modernisation of the programmes preparing students to compete for entry to *grandes écoles*. Notable was the increasingly important role of written exams, and an increasing separation of students preparing for studies at *grandes écoles*, who from 1860 onwards were completely separated from other students preparing for university studies. The teaching staff at *grandes écoles* was distinguished, representing the upper-classes and a kind of teaching aristocracy (Belhoste, 2003). Under the Third Republic, the system of preparatory classes took the form that it would retain until the 1970s. The courses diversified with the creation at the end of the 19th century of the preparatory classes for higher rhetoric and the creation in 1920 of the first economic and commercial preparatory classes. These preparatory classes developed strongly from the 1970s onwards and were modernised in 1995 when the training was changed from one to two years, allowing the recognition of business school diplomas at the level of five year higher education degrees in Europe (ISCED 7).

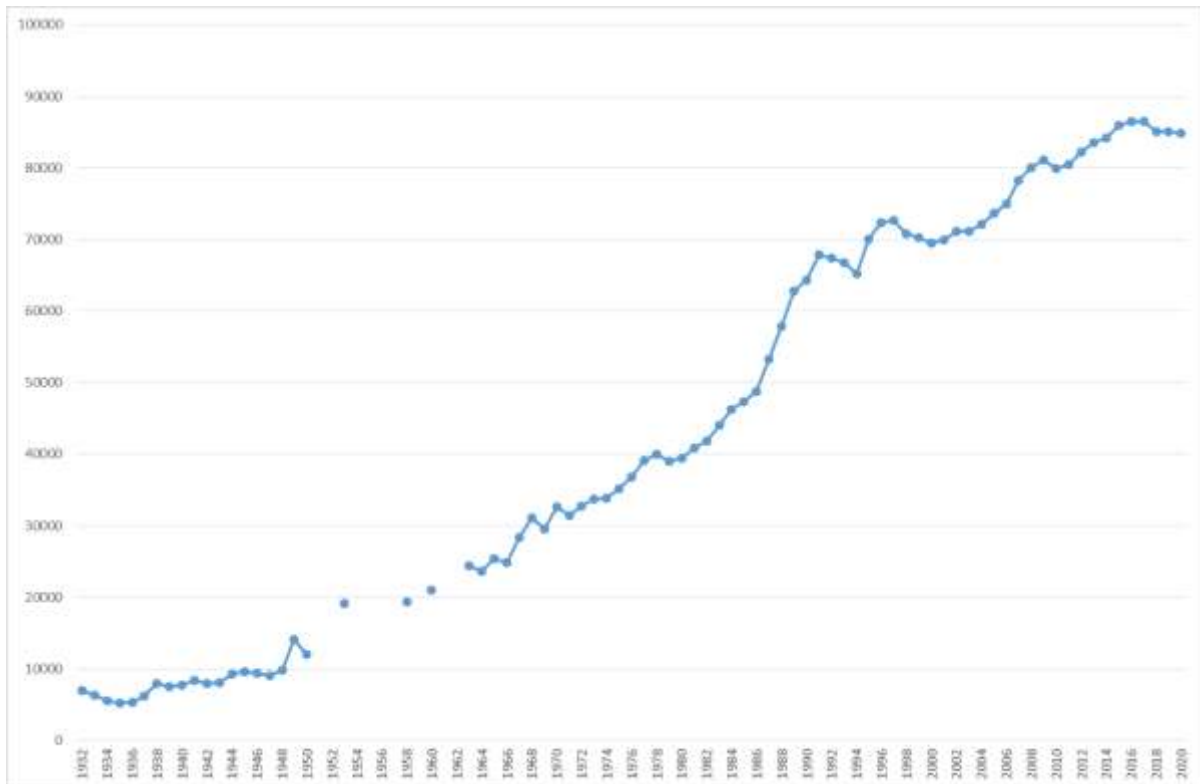
Until the end of the 1960s, the number of students changed very little, as did the social composition of the preparatory courses (Figures 1 and 2). If one cannot deny the excellence of these courses, one cannot ignore their main flaws: narrowness, Malthusianism, and elitism (Belhoste, 2003). Indeed, despite the growth in the number of preparatory classes, these programmes remain hierarchical and isolated from the rest of the higher education system and remain financially advantageous for a socially privileged population. Far from being a social lift, they appear to be a system for reproducing a *state nobility*, or *élite* (Bourdieu, 1989).

Classe préparatoire programmes are criticised for their ethnic and social compartmentalisation as well as the social narrowing of their recruitment base (Van Zanten, 2010). To respond to these criticisms, various isolated initiatives in favour of opening access to the Grandes Écoles to students from diverse social strata' emerged. As early as 1976, the preparatory classes opened to students who had completed upper secondary in technological specialisations. The *grandes écoles* programmes in Technology and Industrial Sciences (TSI) and Economic and Commercial Technological (ECT) were created for the admission of upper secondary graduates from the specialisation Sciences and Technologies of Management and Administration (STMG). This opening up continued with high school graduates from vocational specialisations obtaining access at the end of the 1980s.

With the Conventions Éducation Prioritaire (CEP) programme in 2001, Sciences Po proposed a new recruitment route reserved for students from disadvantaged high schools. ESSEC's *Pourquoi Pas Moi* scheme set up in 2002 is a tutoring system for high school students from working-class and immigrant backgrounds. However, it was not until 2005 that

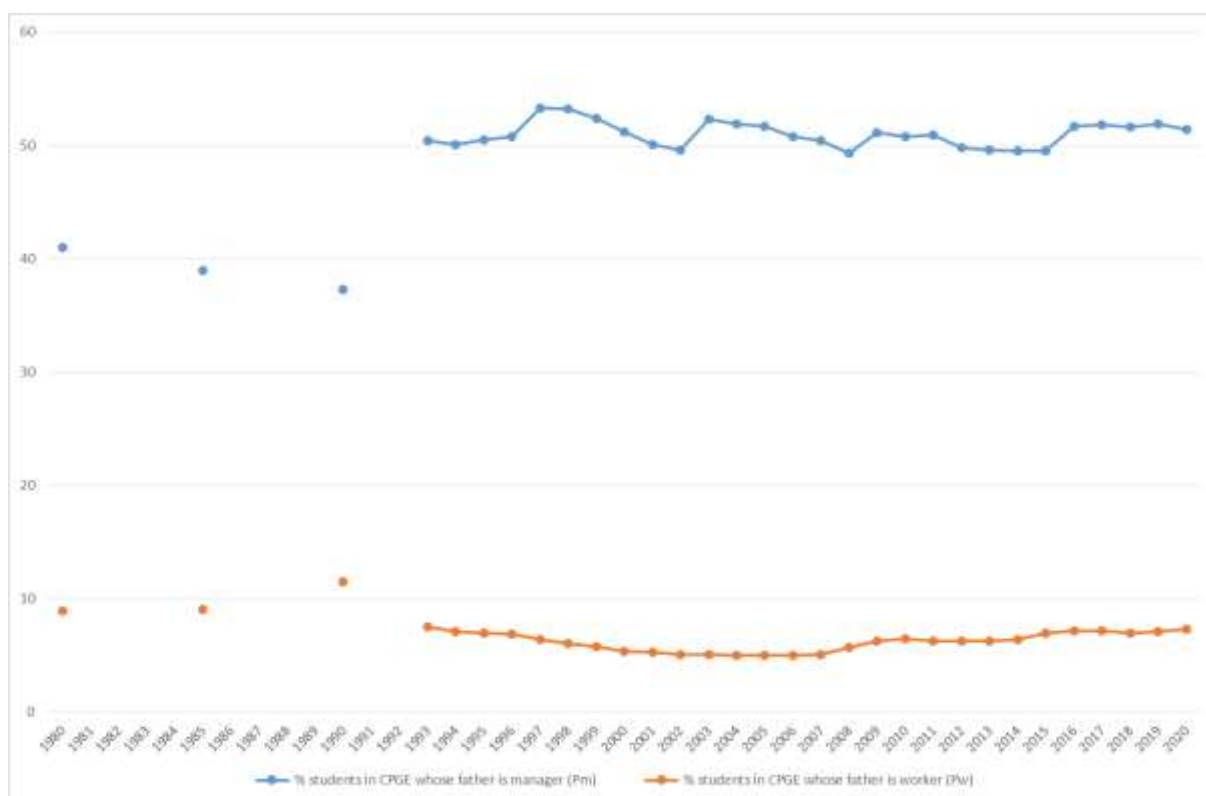
a political initiative was launched with the *Charte pour l'égalité des chances dans l'accès aux formations d'excellence*, the aim of which was to grant various advantages to young people from disadvantaged backgrounds to facilitate their access to excellence. At the end of 2008, the *Cordées de la réussite* charter was set up within the *Dynamique Espoir Banlieues* scheme to promote equal opportunities and equal success when entering higher education. To this end, it created a partnership between the *grandes écoles* and high schools in disadvantaged areas. The aim was to increase social equity by enabling students from these areas who had sufficient motivation and ability to enter *classe préparatoire* programmes. Still with a view to equal opportunities, in 2019 the ECT and TSI preparatory classes were opened to students holding a professionally oriented upper secondary school baccalauréat, for tertiary and industrial specialties with a three-year course.

Figure 1. Evolution of the total number of students enrolled in *classe préparatoire* programmes (1947–2020)



Source: Author

Figure 2. Enrolment in *classe préparatoire* programmes by social origin



Source: Author

2.2. The gendered selection to *classe préparatoire* programmes

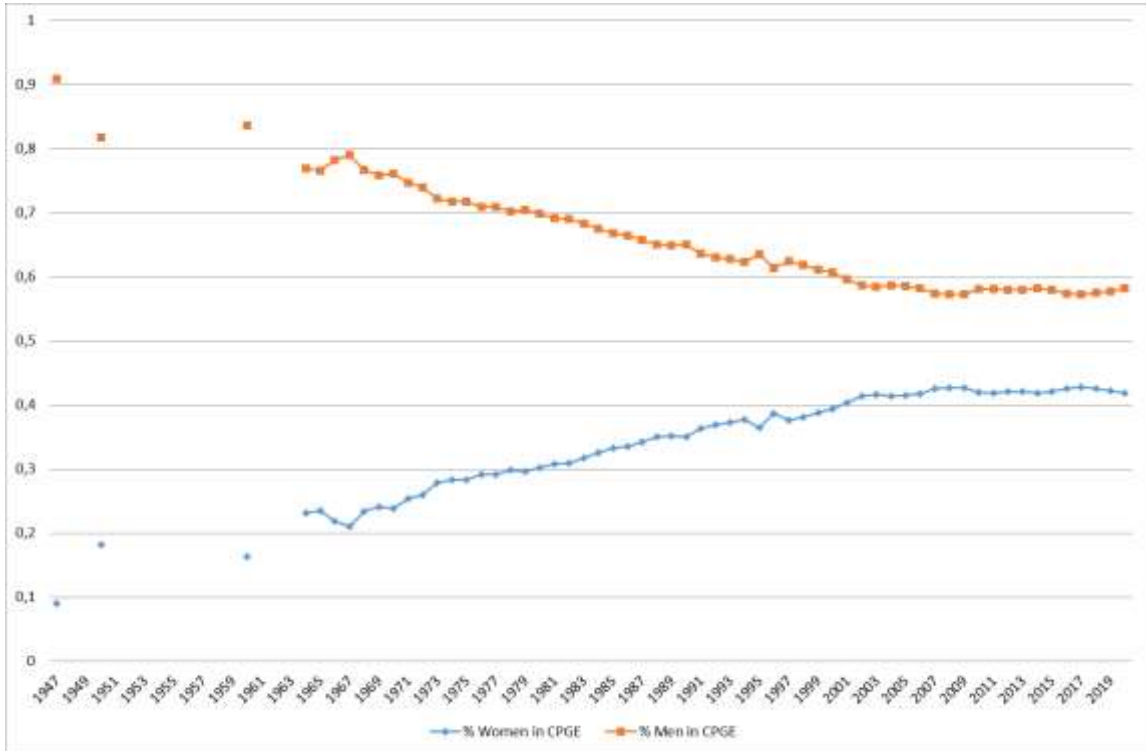
In parallel to the social imbalance within the *classe préparatoire* programmes, there is also an imbalance by gender (Figure 3.) that manifests itself in a kind of *social and gendered ghetto* (Jarraud, 2021). Indeed, because of their history, the preparatory classes have catered to military and scientific careers that traditionally were seen as unsuitable for women, whose education was not a political priority. Whilst the *Jules Ferry* laws in the 1880s ended the separation of girls and boys in primary schools, it took another century—even though higher education was less reticent about co-education—for the entire education system to become fully co-educational.

During the 20th century, various economic and societal factors contributed to opening higher education to women: the two world wars, the women's liberation movement, and the right to vote (Jaoul-Grammare, 2018). They were accompanied by major institutional reforms leading to co-education throughout the education system with the Haby law of 1975.

The movement to open higher education to women began at the end of the 19th century, stimulated by the award of the Nobel Prize for Chemistry to Marie Curie in 1911. The First World War accentuated this movement. The co-educational *École Normale Supérieure* in Cachan was created in 1912 and six years later the *École Centrale* was opened to women. In 1919, women had access to the *École Supérieure de Chimie de Paris* and the *École Supérieure d'Électricité*. In 1925, the HECJF (*Haut Enseignement Commercial pour les Jeunes Filles*) and the *École Polytechnique Feminine* were created and played an important role in the access of young women to higher education. It was not until the 1970s that women gained access to all the *Grandes Écoles* reserved for young men: the *École Polytechnique* in 1972, HEC in 1973, ENS in 1981 with the merger of two gender segregated ENS schools (Marry, 2003).

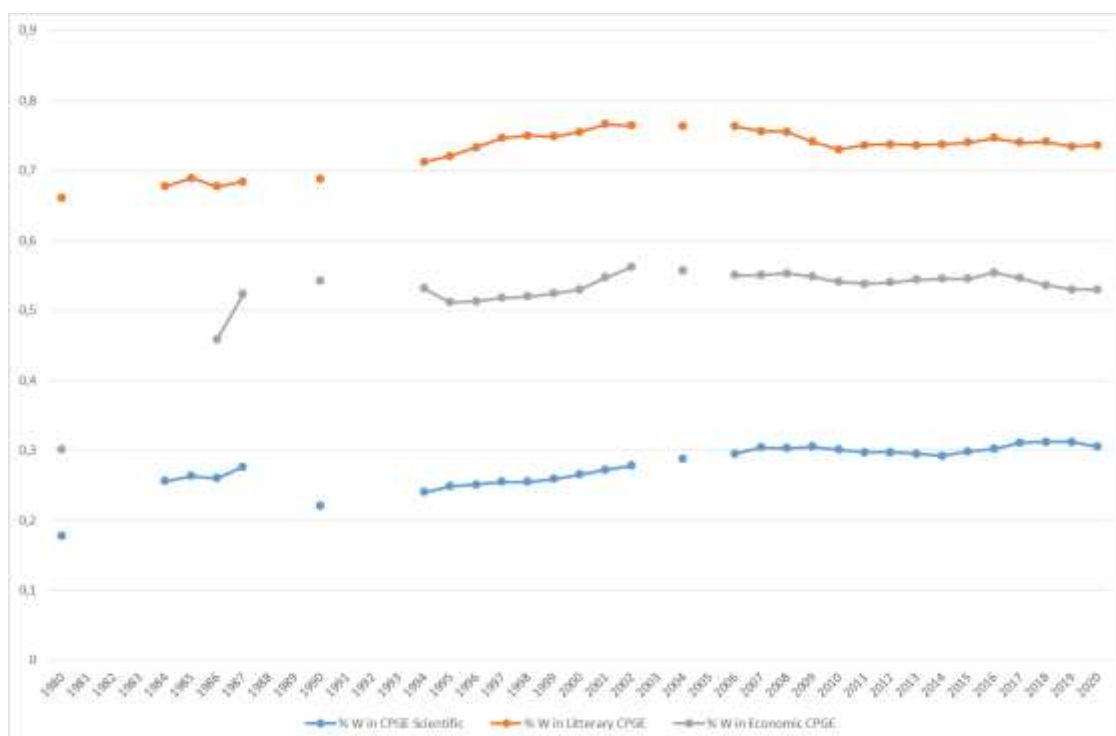
In 1995, in addition to aligning the economic and commercial preparatory classes with European standards, the scientific and literary classes were also reformed. An additional stream was created in the scientific preparatory classes; entitled *engineering sciences*, it accommodated 40% of the students in the scientific preparatory classes from the start of the 1995 academic year. At the same time, the outlets for the literary preparatory classes changed with the creation of an entrance examination for the *Grandes Écoles* of management and the creation of degree pathways with institutes of political studies and certain journalism schools. If the official objective of this reform was to modify the structure and programmes of the scientific classes, one can also perceive a desire to increase the number of women in preparatory classes. Despite this modernisation of the preparatory classes, women remain unequally distributed (Dethare, 1996): they are in the majority in the literary preparatory classes, while students of both genders were equally represented in the economic and commercial preparatory classes, and the scientific preparatory classes remain very popular with young men (Figure 4).

Figure 3. Enrolment in preparatory classes by gender



Source: Author's calculations from various databases (see section 2.1 for details)

Figure 4. Distribution of women by stream of preparatory classes



Source: Author's calculations from various databases (see section 2.1 for details)

In 2019, young women represented only one-third of the students in scientific preparatory classes and 28.7% in engineering schools (RERS, 2020). This slow phenomenon of opening scientific training to women is described as a *respectful revolution* (Marry, 2004) in the sense that the terms *engineer* and *woman*, long considered antinomic in French, have gradually been introduced into a society with conformist values in which the world of engineering previously was only conjugated in the masculine.⁴ The phenomenon is also described as unfinished in the sense that women are still in the minority in engineering schools.

However, since the 1980s, a movement to integrate women into scientific research has been underway. A women engineer's association was created in 1982 to promote the engineering profession among young women on the one hand and women engineers and scientists in the world of work on the other. To fight against the disaffection of girls for scientific studies, associations promoting women in the fields of mathematics and science were created in 1987 and 2000 respectively (*Femmes et mathématiques* and *Femmes et Sciences*). At the same time, since 1998, the L'Oréal-UNESCO Foundation for Women in Science has been awarding annual prizes for the excellence and talent of women scientists. In 2000, one of the objectives of the Lisbon Strategy was to increase the flow of female students into scientific and technical studies by at least 15% and to reduce the gender imbalance in these fields. Thus, in 2001, the Ministry of Research in France created the Irène Joliot-Curie Prize to promote the place of women in research and technology. Ten years later, European and international partnerships were set up by the CNRS to encourage professional equality between women and men within research institutions (the INTEGER project;⁵ the ERA-NET GENDER-NET project.⁶ In 2013, the Conference of University Presidents (CPU), the Conference of Directors of French Engineering Schools (CDEFI), and the Conference of Grandes Écoles (CGE) signed a charter, one of the objectives of which is to encourage young women to study at Grandes Écoles, especially in the fields of science and technology (CGE, 2015). The empirical analysis presented in this article attempts to chart the status of a movement for greater access for women and socially disadvantaged youth to *classe préparatoire* type preparatory classes at Grandes Écoles higher education institutions in France.

3 A CLIOMETRIC APPROACH OF LONG STATISTICAL MACROECONOMIC SERIES ON PREPARATORY CLASSES

Quantitative Economic History or cliometrics is a “research approach to quantitative history based on economic theory and informed by the production of new data and the use of modern quantitative tools to understand the past” (*French Cliometric Association*). Based on economic theory and quantitative methods, it has developed in the interest of history (not of economics) intending to understand the past, sometimes debunking myths (Diebolt, Jaoul, San-Martino, 2005).

Using longitudinal statistical series, the aim here is to identify which events have affected the evolution of enrolment in preparatory classes in France since the 1960s. For this purpose, I use the outlier methodology developed in France by Darné and Diebolt (2004) to detect the existence of possible breaks in the statistical series.

3.1. Data and methods

The series used in this work represent European regions of France and come from several sources. Enrolment in preparatory classes by gender and specialty are taken from the Ministry of Education’s series and more specifically from the archives of the Direction de l’évaluation, de la prospective et de la performance (DEPP). The data are available for all enrolments in an ad hoc manner between 1947 and 1963 and then in full for the period 1964–2020; for enrolments by specialty, the data are available since 1980. Enrolments in preparatory classes by social origin come from the DEPP archives and more particularly from the Repères et références statistiques (RERS). These data are available on an ad hoc basis for the period 1980–1993 and for the entire period of 1993–2020.

My cliometric analysis relies on the study of two main statistical indicators. The first indicator is the ratio of young women to young men (P_g/P_b) enrolled in preparatory classes and broken down by specialty. The second indicator comes from the work of Euriat and Thélot (1995). They proposed a logistic ratio calculated as:

$$r = \frac{P_m(1-P_w)}{P_w(1-P_m)}, \text{ with,}$$

P_w = share of working-class children enrolled in preparatory classes

P_m = share of managers’ children enrolled in preparatory classes

This ratio relates two percentages of likelihood:

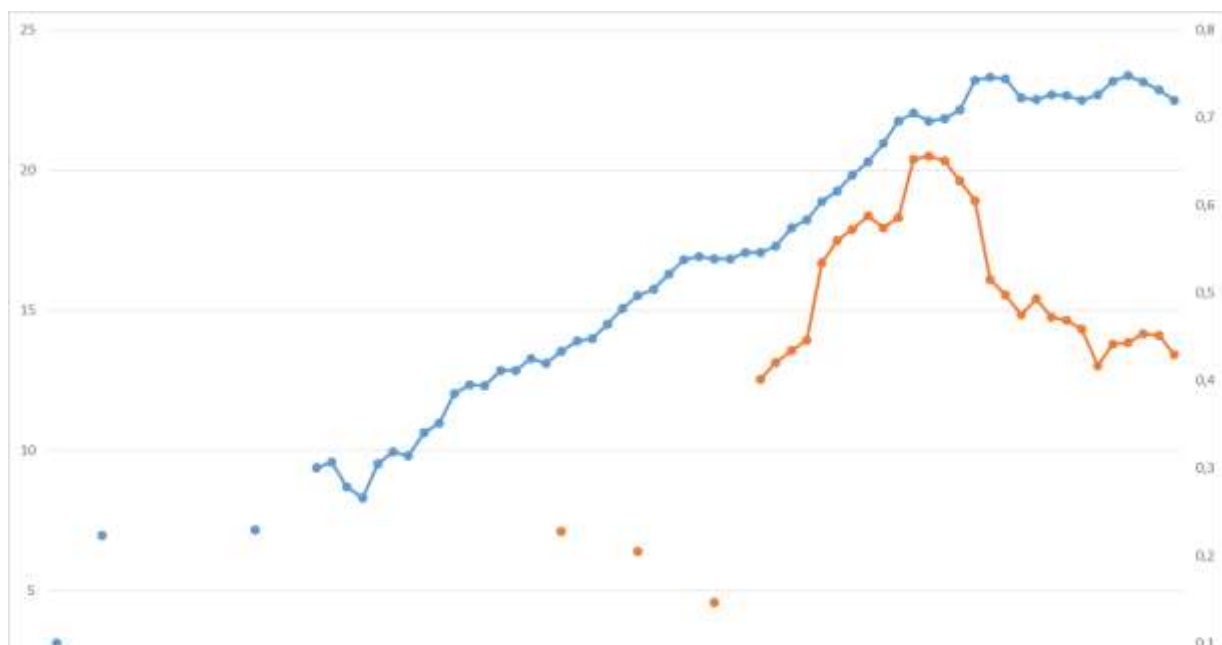
- The case in which, taking at random a child of a manager and a child of a worker, we are in the situation where the first enters a preparatory class and the second does not. It is written $P_m(1 - P_w)$;

- Or in the opposite case, i.e. the situation where the child of a manager does not enter a preparatory class and the child of a worker does. It is written: $P_w(1 - P_m)$.

The ratio of these two percentages therefore provides the increased likelihood of being in the first case rather than the second. Euriat and Thélot (1995) showed that this measure of social inequality is better than the additive ($P_m - P_w$) or multiplicative (P_m/P_w) measure. Indeed, these measures have the disadvantage of considering that this difference has the same *value*, whatever the starting point. Moreover, the multiplicative measure may lead to an opposite conclusion if one considers the 100% complement of the shares, i.e. the share of students not admitted to a preparatory class. These indicators make it possible to evaluate respectively the access of women, and children of modest social origin, to preparatory classes. In other words, they can be seen as a measure of gender and social inequalities in the preparatory classes. If the share of young women relative to young men increases, a decrease in gender inequality can be deduced; similarly, a decrease in the ratio r is synonymous with a reduction in social inequality.

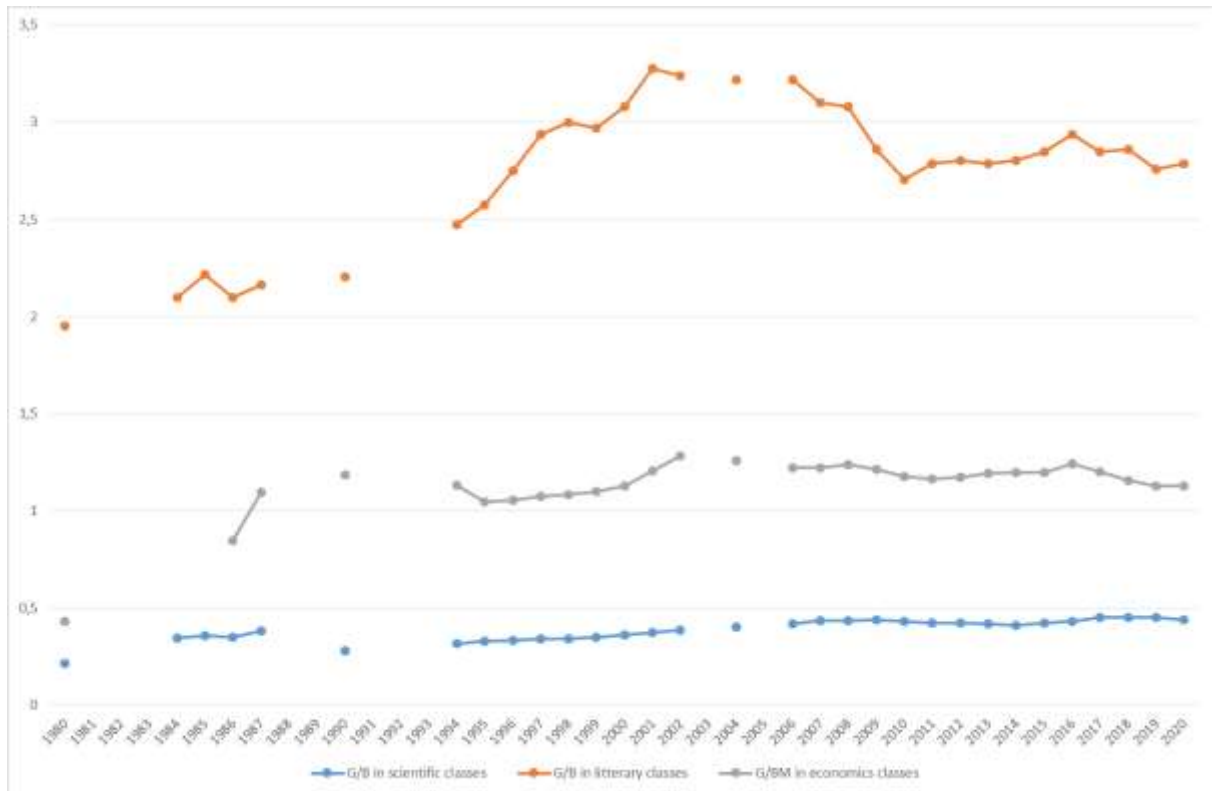
After a significant drop in the 1990s, the share of children of working-class parents in preparatory classes has increased slightly since the mid-2000s and has stabilised at around 7%; the share of young women in preparatory classes has evolved steadily, rising from 20% in the 1960s to around 40% in the 2020s (Figures 2. and 3.). Concerning the relative share of young women compared to young men, although it has increased over the whole period, the number of young women is still lower than that of young men and the ratio seems stable at around 75%, highlighting a gap in the access to preparatory classes for young women (Figure 5). This gender gap is essentially present in the scientific preparatory classes, while on the contrary, the literary preparatory classes show a shortage of young men with twice as many young women enrolled. The economic preparatory classes, on the other hand, remain in relative parity (Figure 6).

Figure 5. Evolution of gender (right-scale) and social inequality (left-scale) indicators



Source: Author

Figure 6. Relative evolution of the share of young women according to the course of study



Source: Author

The indicators do not follow a regular pattern. There are several breaks, or changes, of varying degrees of importance. The objective of the outlier method is to detect changes in patterns that have had a significant real impact on the evolution of time series and to identify the institutional, historical, or economic events responsible for these changes. This method is relatively well suited to historical analysis insofar as it is based on the analysis of real, non-simulated shocks. In statistical theory, an observation is considered exceptional when it deviates (positively or negatively) significantly from its mean value or trend and does so with very low frequency. From a purely statistical point of view, an extreme event is defined as a value two to three times the standard deviation of the series, while an atypical value is defined as a value well above three times the standard deviation of the series. I am only interested here in atypical, outlier, or exceptional values. The analysis of atypical points thus makes it possible to associate atypical observations with educational, economic, political, or financial events. The challenge is to identify these points, their possible causes, and their effect on the series. The effects on the time series are varied and depend on the type of outlier detected. The literature lists four types of outliers: *Innovative Outliers* (IO), which represent temporary shocks that can be assimilated to ‘noise’, *Additive Outliers* (AO), which are associated with one-off exogenous changes, *Temporary Changes* (TC), and *Level Shifts* (LS), which represent

ephemeral and permanent structural changes respectively. An AO is generally considered to affect only one observation in the series but not its future values. A TC causes a rapid change in the level of the series which quickly returns to its evolutionary path. Finally, an LS affects the level of the series from a certain point onwards in a definitive manner.

The cliometric analysis carried out here will consist of detecting possible changes in the pattern by which social and gender inequalities in access to preparatory classes have evolved and identifying the events responsible for these changes. It will also be necessary to see what impact—positive or negative—these events have had on the evolution of the series.

3.2. Results

The results were obtained using the program TRAMO (Time Series Regression with ARIMA Noise, Missing Observations, and Outliers) developed by Gómez and Maravall in 1997. Three outliers were detected (Table 1): the year 1987 marked a decrease in gender inequalities; for 1997 an increase in the ratio of social inequalities were recorded, whereas 2008 shows a decrease in the ratio of social inequalities.

The year 1987 saw the conjunction of two phenomena increasing the number of students in preparatory classes, particularly in science and economics: (1) constant growth in the total number of *baccalauréat* holders and (2) the arrival of the first class of post-reform vocational *baccalauréat* holders, who essentially had access to the scientific preparatory classes (STI) and the economic preparatory classes (ECT). However, as young men are in the majority in the vocational streams, it seems unlikely that this would have increased the participation of women in the scientific and economic preparatory classes. On the other hand, the same year saw a decentralisation in the organisation of preparatory classes—now organised in a number of medium-sized towns in a bid to achieve social and geographical democratisation (Duterq et al., 2019). Although these preparatory classes are for the most part (60%) scientific classes, they likely contributed to promoting access for young women to preparatory classes. However, this effect is only temporary and from an overall point of view, there are no events that contribute specifically to the opening up of the preparatory classes to young women.

The first year with a significant impact on social inequalities was 1997; a year that reflects an increase in social inequalities. In 1995, the reform of preparatory classes began with two objectives: a better adaptation to the needs of the economy and a diversification of courses. The economic and commercial classes were compiled in line with European standards and curricula. New specialisations were created in scientific classes and for literature classes, degree paths connecting to political studies institutes and some schools of journalism were created. This resulted in an increase in the number of students in preparatory

classes, after four years of steady decline (Dethare, 1996). But depending on their social origin, students have not benefited equally from this opening. It appears that this set of reforms mainly benefited students from higher social backgrounds (Duterq & Masy, 2016) and thereby increased social inequalities since 1997.

The second year which had a significant impact on social inequalities was 2008; a year when social inequalities decreased. In the first decade of the 21st century, an increased desire to open preparatory classes to students from lower social backgrounds manifested. Thus, many education institutions (Sciences Po⁷, ESSEC⁸, Lycée Henri IV in Paris⁹) set up various programmes to enable students from modest backgrounds to access preparatory classes. At the same time, at the political level, several initiatives were launched with the same objective (Charter for Equal Opportunities in Access to Excellence in Education, 2005). In 2008, with the ‘Cordées de la réussite’ Charter set up within the ‘Dynamique Espoir Banlieues’ scheme, the main aim was to promote equal opportunities in access to highly selective courses of higher education. This measure allowed a degree of democratisation and had a positive effect on widening access to the preparatory classes to students from diverse social backgrounds. Moreover, at the same time, there was an increase in the rate of students in the preparatory classes who were grant recipients (Duterq & Masy, 2016), which may also explain this decrease in social inequalities. However, the widening access to the preparatory classes is specific to each field of study (Duterq & Masy, 2016). If the data were available, it would be interesting to conduct a similar analysis by training specialty.

Table 1. Detection of outliers

Indicator	Year	Type	Value (units of standard deviation)	Sign and duration of the effect	Event
Ratio W/M in preparatory classes	-	-	-	-	-
Ratio W/M in scientific P.C	1987	TC	3.9		Reform of the professional baccalauréat;
Ratio W/M in economic P.C	1987	TC	4.7	Positive temporary structural change	Creation of scientific PC in medium-sized towns
Ratio W/M in literary PC	-	-	-	-	-
Ratio of social inequalities	1997	LS	3.9	Positive permanent structural change	Results of the reforms of the PC in 1995-1996

	2008	LS	-3.5	Negative permanent structural change	'Cordées de la réussite' Charter set up within the 'Dynamique Espoir Banlieues' scheme
--	------	----	------	--------------------------------------	--

Note: PC= preparatory classes, i.e. *classe préparatoire* programmes

Source: Author

Thus, despite a desire for social and gender diversity, few events have had an impact on the evolution of inequalities in access to the preparatory classes. The next section discusses the extent to which opportunities to access *classe préparatoire* programmes have changed over the last thirty years from an individual point of view.

4 MICROECONOMIC ANALYSIS

The cliometric analysis highlights an effect of the various reforms and political measures for increasing access for women and socio-economically disadvantaged students to *classe préparatoire* programmes. The objective of this part is to deepen the macroeconomic approach by a microeconomic analysis to study the evolution of the chances of access to these preparatory classes over the last thirty years.

4.1. Data and method

Data was analysed from two surveys, the Céreq's 1992 and 2013 Generation surveys. Céreq¹⁰ is a French public establishment under the joint authority of the French Ministry of National Education, the Ministry of Economy, Industry and Employment, and the Ministry of Labor, Social Relations, Family, Solidarity and Urban Affairs. It provides advice on education policies and is specialised in the production of statistical data at the regional and national levels, as well as in quantitative research on education, labour market entry, and employment. The Generation surveys are longitudinal surveys carried out every six years addressing the first years of the active life of young people who left the education system, in this case in 1992 and 2013 respectively. They provide information on education pathways and professional integration. For 1992, 27,000 individuals were interviewed and 20,000 for 2013. Among them, we selected individuals with a level of education equal to or higher than one year after the baccalauréat, i.e., respective samples of 9,388 and 10,475 individuals.

I have analysed the evolution of access to preparatory classes between 1992 and 2013. More specifically, by comparing the chances of going to preparatory classes rather than to

university, according to the academic (type of baccalauréat, grade repetition prior to secondary school) and personal characteristics of individuals (gender, social origin, cultural origin). Social origin is measured in two different ways; namely, by parental occupation and by parental level of education (Table 2).

Table 2. Variables and descriptive statistics

Variable	Modalities	1992	2013
Orientation after the baccalauréat	BTS ¹¹	28.6	29.3
	Preparatory Classes	11.8	11.8
	Health and social training (HST)	0.2	2.1
	IUT ¹²	11.4	11.2
	University	46.9	37.3
	Medical studies	-	6.2
	Business school recruiting at the baccalauréat level	1.1	2.1
Gender	Men	49.7	44.9
	Women	50.3	55.1
Parental occupation	At least one parent is a manager	34.0	39.5
	Both are non-executive	66.0	60.5
Parental level of studies	Both have less than the baccalauréat	59.8	33.1
	At least 1 of the 2 has the baccalauréat or a higher diploma	40.2	66.9
Parental nationality	At least one parent was not born in France	15.2	25.8
	Both were born France	84.8	74.2
Baccalauréat	Professional (Pro)	1.5	12.6
	Economics (ES)	17.7	18.9
	Literary (L)	15.9	11.0
	Scientific (S)	34.4	32.6
	Technological (Techno)	30.5	24.9
Having repeated a year before entering secondary school	No	94.6	95
	Yes	5.4	5

Source: Author

The problem of inequalities is all the more difficult to assess because, depending on the estimation methods and the populations on which the measurements are made, the results sometimes lead to different conclusions (Selz & Vallet, 2006). When the odds ratios are calculated on the whole population, inequalities in access to diplomas according to social origin seem to have diminished; if the sample is reduced to a particular level of diploma, the inequalities remain stable (Blossfeld & Shavit, 1993).

To measure the impact of individual characteristics on access to preparatory classes, for each year, 1992 and 2013, a multinomial logistic regression was estimated. This is a generalisation of the binary regression to a variable Y that can take k values. The objective is

to study the effects of various variables X on the choice of Y. The estimation of the model depends on a reference situation for Y, Y=0.

More precisely, the aim is to estimate the effects of various personal variables on the probability of entering a preparatory class rather than university, chosen as the reference situation. The effects are measured in terms of *odds ratio*. The estimated coefficients can then be interpreted as follows: *for year Z, the probability that young men enter a preparatory class rather than university was x times greater (or smaller) than for young women*. Thus, the comparison of the odds ratios for the two years will make it possible to articulate the evolution of the impact of gender and social inequalities on access to preparatory classes.

The model is written as: $Ln\left(\frac{P(Y=i/X)}{P(Y=0/X)}\right) = \alpha_i + b_i(X) = \alpha_i + \beta_{ij}X_j$

This amounts to choosing Y=0 as a reference and estimating k-1 binary regressions.

As $\sum_i P(Y = i) = 1$, the model becomes:

$$P(Y = 0/X) = \frac{1}{1 + \exp[\alpha_1 + b_1(X)] + \dots + \exp[\alpha_{k-1} + b_{k-1}(X)]} = \frac{1}{1 + \sum_{i=1}^{k-1} \exp[\alpha_i + b_i(X)]}$$

$$P(Y = j/X) = \frac{\exp[\alpha_j + b_j(X)]}{1 + \sum_{i=1}^{k-1} \exp[\alpha_i + b_i(X)]}, \quad j=1, \dots, k-1$$

$$\text{Finally: } (Y = j/X) = \frac{\exp[\alpha_j + b_j(X)]}{\sum_{i=0}^{k-1} \exp[\alpha_i + b_i(X)]}, \quad j=0, \dots, k-1 \text{ and } \alpha_0 = \beta_{0l} = 0$$

Here, we estimate the effects of personal variables X_j (gender, social origin, cultural origin, grade repetition prior to secondary school, type of baccalauréat) on the probability of access to the various orientations after the baccalauréat relative to a reference orientation, the university. The coefficients are interpreted as deviations from the reference points (here: Woman, Non-executive Parents, Parental level of education < baccalauréat, Foreigner, Technological baccalauréat, Repeat years).

3.2. Results

According to our samples, the structure of French higher education changed little between 1992 and 2013 (Table 2). One-third of students have a secondary school diploma from a science track and majority of them go on to university studies.

However, the social composition of higher education has changed. Social inequalities have increased: the proportion of children of managers studying at university level has risen from 34% to 40%. The proportion of students whose two parents have obtained a secondary school diploma or a higher degree has increased by 26 points.¹³ However, a certain cultural

openness can be observed: the proportion of students whose parents were not born in France rose from 15% to 23%. Finally, the comparison of the two samples also highlights the feminisation of higher education, which has gone from a parity situation in 1993 to a majority of young women (55%) in higher education in 2013.

To analyse the evolution of the chances to access *classe préparatoire* programmes, we estimate three logistic models for each of the two years, 1992 and 2013. In model A, the social origin is measured by the parents' occupation. In model B, the social origin is measured by the parent's level of education. Finally, the last model (C) combines both indicators. We are particularly interested in the odds ratios and their evolution between the two dates (Table 3.). The closer the odds ratio is to the value 1, the more equal the situation. Thus, if the odds ratios have changed between the two dates, we can conclude that inequality has increased or decreased.

The estimation of the whole multinomial logistic model indicates the probability of access to the various orientations after students have finished upper secondary school relative to a reference orientation—the university. I am particularly interested here to compare entry to university and preparatory classes in *classe préparatoire* programmes (Table 3).

Gender inequalities in access to these preparatory classes have decreased between 1992 and 2013. In 1992, young men were 60% more likely than young women to enter the preparatory classes; in 2013, they were only 20% more likely. However, access rates continue to favour young men. However, as the data do not allow us to know the specialties of the preparatory classes, it is impossible to know either how this reduction in gender inequalities has manifested itself, or whether the increased access for young women extends to the field of scientific training.

As for social inequalities, they have changed little: children from privileged social backgrounds are still twice as likely to enter the preparatory classes. Inequalities have even increased if we look at the overall model, where the advantage of children from privileged social backgrounds has risen from 35% to 80%. We can observe the same trend in business school and short technical studies (BTS, IUT): young men and students whose father is a manager are disproportionately represented.

In terms of prior schooling, the students who completed upper secondary education in scientific tracks still have an advantage, but the gap has narrowed considerably.¹⁴ On the other hand, certain democratisation of access to the preparatory classes can be noted between 1992 and 2013. The access rates in 1992, for students who completed upper secondary education in a technological specialisation were 60% lower compared to students from economic specialisations and 30% lower compared to students who had specialised in literature. In contrast, by 2013 the likelihood of students from technological specialisations to access preparatory classes had almost doubled. At the same time, we note that students who

completed upper secondary education in vocational tracks are five times more likely than students from technological specialisations to enter the preparatory classes.

Table 3. Odds-Ratios

	1992			2013		
	Model A	Model B	Model C	Model A	Model B	Model C
Gender: <i>Men vs Women</i>	1.7	1.6	1.65	1.2	1.2	1.2
Parents' occupation: <i>Manager vs Non-executive</i>	2*	-	1.35	2.1	-	1.8
Parents' level of studies: = or >bac vs < bac	-	2.5	2.1	-	2.2	1.6
Parents' nationality: <i>French vs Foreigners</i>	NS	NS	NS	1.1	1.1	1.1
Baccalauréat :						
<i>S vs Technological</i>	8**	7.5	7.3	2.9	2.8	2.6
<i>ES vs Techno</i>	1.7	1.6	1.5	0.5	0.4	0.4
<i>L vs Techno</i>	1.4	1.3	1.3	0.6	0.6	0.6
<i>Pro vs Techno</i>	NS	NS	NS	0.2	0.2	0.2
Grade repetition prior to secondary school: <i>No vs Yes</i>	2.5	2.4	2.3	1.4	1.2	1.2

Note:

NS=non-significant;

*: in 1992, an individual with at least one parent in management was twice as likely to go to preparatory classes rather than university;

** : in 1992, an individual with a scientific baccalauréat was eight times more likely than an individual with a technical baccalauréat to enter a preparatory class rather than a university

Source: Author

Conclusion

The objective of the study on which this article reports was to analyse, using both a macroeconomic and microeconomic approach, the evolution of access to *classe préparatoire* programmes, here referred to as preparatory classes, associated with prestigious *grandes écoles* higher education institutions in France

The macroeconomic analysis based on a cliometric approach sought to shed light on the influence of institutional, economic, and social changes in the evolution of the share of young women, and a ratio of social inequalities, in *classe préparatoire* programmes. The outlier methodology shows that few events have had an impact on the evolution of overall inequalities. Only three events seem to have initiated a beginning of democratisation. The creation of local preparatory classes in medium-sized towns in the mid-1980s seems to have facilitated the participation of young women. However, the influence of this event was only temporary and the share of young women remains comparatively lower at around 40% (Dethare, 1996), underlining the difficulty of reforming this training system.

At the social level, two points in time stand out as having had an impact on social inequalities. The year 1997 is associated with a reform or modernisation of the preparatory classes that led to an increase in social inequalities. The year 2008, when a Charter and Social scheme policy was adopted, contributed to decreasing social inequalities.

In the microeconomic analysis, I compared the evolution of the chances of access to preparatory classes between 1992 and 2013, according to the school characteristics of individuals and different inequality vectors. The results show that access to preparatory classes is still very much affected by inequalities, particularly gender and social inequalities.

Even if gender inequalities decreased between 1992 and 2013, the likelihood to access preparatory programmes favours young men. On the other hand, despite a social opening via technological and professional upper secondary *baccalauréat* degrees, social inequalities have not changed, remaining very favourable to students whose parents are managers or have higher education.

The results, both macroeconomic and microeconomic, underline a continued resistance to the access of women and socio-economically less favoured students to the preparatory classes. This shared characteristic of the *Grandes écoles* that continues to perpetuate social privilege (Bourdieu 1989) has also been recognised in a report by the French Senate (Sénat, 2006). According to Duru-Bellat, Kieffer, and Reimer (2010), it is the very structure of French higher education, which is hierarchical and differentiated, that emphasises the role of social inequalities; this has been further accentuated by the introduction of the three-cycle degree structure in higher education following the Bologna process (bachelor, master, doctorate; Jaoul-Grammare, 2013).

Thus, despite a quantitative democratisation of education (Prost, 1986); democratisation can be described as *segregated* (Merle, 2012), with the French education system remaining very unequal. This contributes to France being one of the OECD countries where social origin has the greatest influence on academic success (PISA, 2012).

Acknowledgements

I am very grateful to anonymous referees for their comments, which were of great help in the final version of this paper.

DATA AVAILABILITY STATEMENT

Research data are not shared.

REFERENCES

- Baudelot, C., Dethare, B., Hérault, D., Lemaire, S., Rosenwald, F. (2003). Les classes préparatoires aux grandes écoles. Évolutions sur vingt-cinq ans. *Les Dossiers de la DEPP*, n°146.
- Baudelot, C., Establet, R. (2009). *L'Élitisme républicain. L'école française à l'épreuve des comparaisons internationales*. Seuil.

- Belhoste, B. (2001). La préparation aux grandes écoles scientifiques au XIXème: établissements publics et institutions privées. *Histoire de l'éducation*, 90, 101-130, *open edition*, <https://journals.openedition.org/histoire-education/834>
- Belhoste, B. (2003). Les classes préparatoires aux grandes écoles. Présentation historique. *Démocratie, classes préparatoires et grandes écoles* Colloquium. Paris, École Normale Supérieure, 16 and 17 May 2003.
- Blanquer Law (2018). *La loi pour une école de la confiance*. <https://www.education.gouv.fr/la-loi-pour-une-ecole-de-la-confiance-5474#:~:text=Abaissement%20de%20l'instruction%20obligatoire,une%20%C3%89cole%20de%20la%20confiance.>
- Blossfeld, H. P., Shavit, Y. (1993). *Persistent Inequality. Changing Educational Attainment in Thirteen Countries*. Westview Press.
- Bourdieu, P. (1989). *La noblesse d'État. Grandes écoles et esprit de corps*. Paris: Les éditions de Minuit.
- Canel, A. Oldenziel, R., Zachman, K. (2000). *Crossing boundaries, building bridges*. Routledge.
- Céreq. (1997). *Génération 1992*. Marseille: Centre d'études et de recherches sur les qualifications.
- Céreq. (2016). *Génération 2013*. Marseille: Centre d'études et de recherches sur les qualifications.
- Conférence des Grandes Écoles (CGE) (2015). *La CGE multiplie ses actions en faveur de l'égalité femmes-hommes*, Communiqué de Presse du 9 mars 2015.
- Condorcet N. (1792). *Rapport et projet de décret sur l'organisation générale de l'instruction publique*.
- Crahay, M. (2000). *L'école peut-elle être juste et efficace?* Bruxelles: De Boeck.
- Darné O., Diebolt C. (2004). Unit Roots and Infrequent Large Shocks: New International Evidence on Output. *Journal of Monetary Economics*, 51(7), 1449–1465.
- Dethare, B. (1996). Les classes préparatoires aux grandes écoles. Année 1995–1996. Notes d'information de la DEP, n°96:14.
- Diebolt, C. Jaoul, M. & San Martino, G. (2005). Le mythe de Ferry: une analyse cliométrique. *Revue d'Economie Politique*, 115(4), 471–497.
- Dubet, F. (2020). Peut-on produire des inégalités justes dans un monde de promotion de l'égalité ? *Éducation et socialisation*, 58, *open edition*, <http://journals.openedition.org/edso/12892>
- Duru-Bellat, M., Kieffer, A., Reimer, D. (2010). Les inégalités d'accès à l'enseignement supérieur: le rôle des filières et des spécialités. Une comparaison entre l'Allemagne de l'Ouest et la France. *Économie et statistique*, 433–434, 3-22.
- Dutercq, Y., Lanéelle, X., Michaut, C., David, P. (2019). Les classes préparatoires de proximité, entre démocratisation et loi du marché. *Education et Formations*, 100, 169–186.
- Dutercq, Y., Masy, J. (2016). Origine sociale des étudiants de CPGE : quelles évolutions ?. *CNESCO*, 36p.
- Education Code (2013). <https://www.legifrance.gouv.fr/codes/id/LEGITEXT000006071191/>, France.
- Euriat, M., Thélot, C. (1995). Le recrutement social de l'élite scolaire en France. Evolution des inégalités de 1950 à 1990. *Revue française de sociologie*, 36(3), 403–438.
- Gómez V., Maravall A. (1997). "Programs TRAMO and SEATS: Instructions for the User (Beta version: June 1997)", *Working Paper, 97001*, Ministerio de Economía y Hacienda, Dirección General de Análisis y Programación
- Haby Law (1975). *Loi relative à l'éducation*. <https://www.education.gouv.fr/loi-ndeg75-620-du-11-juillet-1975-relative-l-education-3716>

- Jaoul-Grammare, M. (2018). L'évolution des inégalités de genre dans l'enseignement supérieur entre 1998 et 2010. Une analyse de l'(in)efficacité des réformes politiques. *Education et Formations*, 96, mars, 113–131.
- Jarraud, F. (2021). Grandes écoles: Aucun progrès dans l'ouverture sociale. *Le café pédagogique*, janvier 2021.
- Lakanal, J. (1793). *Projet d'éducation du peuple français*, présenté à la Convention National au nom du Comité d'Instruction Publique.
- Leroy M., Biaggi C., Debuchy V., Duchêne F., Gaubert-Macon C., Jellab A., Loeffel L., Rémy-Granger D. (2013). *L'égalité entre filles et garçons dans les écoles et les établissements scolaires*, Rapport MEN-IGEN 2013-041.
- Lévy-Garboua, L. (1976). Les demandes de l'étudiant ou les contradictions de l'université de masse. *Revue Française de Sociologie*, 17(1), 53–80.
- Marry C. (2003). Les paradoxes de la mixité filles-garçons à l'école: Perspectives internationales. Rapport pour le PIREF et conférence au MEN, Paris.
- Marry C. (2004). *Les Femmes ingénieurs, une révolution respectueuse*, Belin, Paris.
- Merle, P. (2012). *La ségrégation scolaire*, Paris, La Découverte, coll. Repères.
- Ministère de l'Éducation Nationale. (2015). *La lutte contre les inégalités scolaires. Refonder l'école*. Ministère de l'Éducation Nationale, France.
- PISA (2012). *Programme International pour le Suivi des Acquis des élèves*. Paris: OECD.
- Prost, A. (1986). L'enseignement s'est-il démocratisé?, Les élèves des lycées et collèges de l'agglomération d'Orléans de 1945 à 1980, Paris, PUF, 206p.
- RERS - Repères et Références Statistiques, 1990–2020, Ministère de l'éducation Nationale, DEPP.
- Sénat (2006). *Rapport d'information au nom de la commission des Affaires culturelles (1) par la mission d'information (2) portant sur la diversité sociale et l'égalité des chances dans la composition des classes préparatoires aux grandes écoles*. Sénat, France.
- Selz, M., Vallet, L.A. (2006). La démocratisation de l'enseignement et son paradoxe apparent. *Données sociales-La société française*, 101–107.
- Thomas, F. (2014). *Le système éducatif: grandes réformes et réajustements*. MAIF.
- Vauban, S. le Prestre. (1685). Le Directeur général des fortifications, Mémoires. In Goulon, M.: *Mémoires pour l'attaque et la défense d'une place*, Jean et Herman Verbeek, Leide.
- Van Zanten, A. (2010). L'ouverture sociale des grandes écoles: diversification des élites ou renouveau des politiques publiques d'éducation? *Sociétés Contemporaines*, 79(3), 69–95.

ENDNOTES

¹ *The public service of higher education contributes to the success of all students; to the fight against discrimination, to the reduction of social or cultural inequalities and to the achievement of equality between men and women by ensuring access to the highest forms of culture and research for all those who have the will and the ability to do so. [...] To this end, it shall ensure the inclusion of individuals, regardless of origin, social background and health condition.* (Education Code, 2013. Amended articles from 2000 and 2006).

² Another type of inequality that is very present at grandes écoles but not studied here is territorial inequality. Indeed, the largest number of *classe préparatoire* degrees are offered in Paris and the Paris region. However, this inequality is decreasing (Sénat, 2006): Paris accounted for 40% of *classe préparatoire* degrees in 1970; this proportion was 30% in the mid-2000s.

³ One of the latest reforms of the education system aims to bring all students *to the highest level of talent and merit* (Blanquer Law, 2018).

⁴ This slow transformation is described by Canel, Oldenziel & Zachman (2000) in their book *Crossing boundaries, building bridges*.

⁵ The Institutional Transformation for Effecting Gender Equality in Research (INTEGER) project aims at sustainable structural change in research and higher education institutions to improve professional equality between researchers of both genders.

⁶ This project is dedicated to the promotion of professional equality between women and men within research institutions and to the integration of the gender dimension in research content.

⁷ *Conventions Éducation Prioritaire* (CEP) a programme in 2001

⁸ *Pourquoi Pas Moi* tutoring scheme in 2002

⁹ Tutoring system for preparatory classes in higher education created in 2003

¹⁰ Centre d'études et de recherches sur les qualifications (<https://www.cereq.fr/>).

¹¹ Diploma awarded after two years of technical studies, depending on secondary school.

¹² Diploma awarded after two years of technical studies, depending on university.

¹³ This increase is in part due to the increase in the general level of education of the population as a result of the increase in the average length of studies.

¹⁴ There was also a decrease in the impact of grade repetition between 1992 and 2013.