Like Father, Like Child: Social Reproduction in the French Grandes Écoles throughout the 20TH Century *

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Abstract

Educational systems expanded over the 20th century in developed countries, and while most scholars found that it promoted social mobility, some argue that the top of the social hierarchy remains shielded over generations. In France, the most prestigious *Grandes Écoles* are elite institutions for higher education. They constitute the main pathway to top positions in the public and private sectors. The present work provides the first results on intergenerational social reproduction in these schools over more than a century. We construct an exhaustive nominative dataset of 224,264 graduate students from ten of the leading *Grandes Écoles*, spanning over five cohorts born between 1866 and 1995. We develop a new methodology within the literature using surnames to track lineages and find that families from ancient aristocratic lineage, Parisians, as well as descendants of graduates are highly over-represented in the top *Grandes Écoles*, throughout the 20th century. Across cohorts, children of *Grandes Écoles*' graduates are 72 to 154 times more likely to be admitted, and up to 450 times to the exact same school than their father. This advantage appears remarkably stable for all cohorts born since 1916 and persists across multiple generations, emphasizing the existence of a "glass floor" for the French elites.

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"One is a *Normalien*, as one is a prince by blood."[1]
Georges Pompidou, Prime Minister

1 Introduction

Education was proclaimed the "great equalizer of conditions of men, the balance wheel of the social machinery" by Horace Mann in 1848. Since that time, educational systems of developed countries experienced massive expansions and sociologists documented a decreasing influence of parental socio-economic characteristics on educational attainment over the 20$^{\text{th}}$ century (Breen and Müller, 2020). However, Erikson and Goldthorpe (1992) argued that this "neglects the degree to which those in advantaged positions can secure similar positions for their children."

We contribute to this debate by investigating, from a historical perspective, the intergenerational enrollment at the most prestigious institutions of the French higher education system: the *Grandes Écoles* (GE). We construct an original dataset of graduates, corresponding to the top 0.36% of the French population in terms of educational distribution, for cohorts born between 1866 and 1995. The results suggest a substantial advantage in admissions for sons and daughters of *Grandes Écoles*' graduates, Parisian-born individuals, as well as descendants of the former French aristocracy.

Our dataset includes an exhaustive list of 224,264 students from ten of the most prestigious *Grandes Écoles*, graduating between 1886 and 2015.[2] We develop a new methodology within the literature that exploit the informational content of surnames. Preceding studies (e.g. Clark et al., 2014) usually relied on rare surnames, which implies the choice of a somewhat arbitrary threshold, and the use of only part of the available data. Indeed, while the Anglo-Saxon *Smith*, or the French *Martin*, are not useful to identify a precise genealogical link, this is much more the case for *Zuckerberg*, *Peugeot*, or *Dassault*. Therefore, we

[1] A *Normalien* is a student from *École Normale Supérieure*, one of the oldest *Grandes Écoles*. Quoted in Peyrefitte (1964), translated by Suleiman (1978).

[2] Section 3 provides a description of the dataset, and Appendix C.1 supplements it with details on each school of our sample. Whereas there are about 500 *Grandes Écoles* in France, our study focuses on a very restricted set of 10 schools which are particularly relevant in the formation of the French elite as we explain in section 2. The list includes *École Polytechnique*, *ENA*, *ENS Ulm*, *ESCP*, *ESPCI Paris*, *ESSEC*, *Mines Paris*, *Ponts et chaussées*, *Sciences Po*, and *Télécom Paris*.

determine the probability to be linked to a given father with a specific characteristic—e.g. having studied in a GE—as a function of the distribution of such characteristic by surname and of each surname's frequency in the population. This new technique allows to exploit the completeness of our dataset, instead of a discretionary sub-sample.

Matching the lists of graduates with a national census of births per surname, we study three main dimensions: historical, geographical, and lineal advantages. Our main measure defines the chances of admission to the schools, relatively to the rest of the population. We first estimate the relative advantage of descendants from aristocratic families, who were, in the 18$^{\text{th}}$ century, the only one who were granted access to the first-founded *Grandes Écoles*. Then, we exploit the territorial anchoring of surnames and study the prospects of admissions depending on the region of birth. Lastly, we investigate admissions of sons and daughters, as well as grandchildren and great-grandchildren of the *Grandes Écoles* graduates. This last measure is very appropriate for long-term analysis because graduation from an elite school has been more stable than most alternative characteristics over the period, notably parental occupation.[3]

We find that all three dimensions strongly influence the perspectives of enrollment at the *Grandes Écoles* throughout the period. Noble families have been particularly remanent, albeit their advantage decreased gradually over the last century, from 15.1 to 8.9 times more chances than the rest of the population to enter the schools in our baseline.[4] In recent years, although the descendants of families registered as aristocratic represented only 0.2% of the population, they accounted for 2% of the students of the most prestigious *Grandes Écoles*, and up to 4% if we consider all surnames with a particle. Whereas they were highly over-represented at *Sciences Po Paris* in the early 20$^{\text{th}}$ Century, their highest admission rates are to business schools lately.

Besides, the geographical dimension of students' admissions is much representative of the very centralized nature of France. Parisian-born individuals have been 9.3 to 12.6 times over-

[3]Most previous studies used parental occupation, sometimes transformed into parental socio-economic status. Having a corporate executive father in recent cohorts is much more common than it was before the *Trentes Glorieuses*. On the contrary, only a slightly increasing share of the population had a father who graduated from a *Grande École*. In addition, education is a lifetime achievement, which does not suffer from lifecycle fluctuations like income does, or even occupation to a lesser extent. Yet, educational following in the French elite school was merely studied due to the absence of suitable data.

[4]As detailed in section 3, the baseline is constituted of all schools but *Sciences Po Paris*.

represented in the GE for cohorts born before 1965 and up to 25.2 times for the most recent period. This over-representation has a very substantial influence on the social composition of the most prestigious *Grandes Écoles*: while about 5% of the French population is born in Paris, Parisians account for 38 to 48% of GE graduates throughout the last century. Besides, as the relative advantage for Parisian-born increased in the most recent cohort, it decreased accordingly for those born in the Parisian suburbs. This is consistent with the phenomenon of gentrification of the capital city, with poorer families pushed away in the suburbs, as documented by Préteceille (2007). As for the rest of France, we emphasize a clear north-east to south-west frontier. Those born in the northern regions experienced a decreasing presence in the *Grandes Écoles* over the last century, as their elites may have been progressively attracted to Paris. By contrast, people born in the southern regions—as well as in the notable exception of *Alsace* in the North-East—experienced a rise in their admission prospects. In the recent cohorts, southerners are slightly over-represented in the French elite schools, although to a much lesser extent than Parisians are.

Finally, social reproduction is the most intense for the lineal advantage. Having a father that studied in one of the baseline schools of our sample is associated with 154 times more chances of admission in the early 20$^{\text{th}}$ century. This advantage was halved but remained remarkably stable for those born since 1916, with 72 to 83 times higher perspectives of enrollment for children of a *Grande École* graduate. These results contrast resolutely with previous studies using parental occupation as a background characteristic. Most scholars found a qualitative democratization for cohorts born in the 20$^{\text{th}}$ century, in developed societies in general (Shavit et al., 2007; Breen and Müller, 2020), and in France in particular (Vallet and Selz, 2008; Falcon and Bataille, 2018).

Our study also reveals a dynastical over-representation of families in the French elite schools: having a grandfather or a great-grandfather who graduated from a *Grande École* offers 30 to 54 times more chances to be admitted too. Besides, we explore heterogeneity between schools notably via matrices that report for each cohort all combinations of school of origin (father) – school of destination (child) intergenerational social reproduction. We show that descendants tend to mimic their ancestors with much larger admission rates to the exact same school than their ancestors, especially for *ENS Ulm*, *École Polytechnique*

or *ENA* with more than 200 times higher chances of admission in the most recent cohorts. At *Sciences Po*, intergenerational reproduction was extremely high at the beginning of the 20th century, but is now lower than in the rest of the prestigious GE. Overall, our findings show that although children of graduates constitute a narrow group, their substantial over-representation implies that, across cohorts, they account for as much as 13 to 17% of the students from the *Grandes Écoles*.

Ultimately, we characterize the late and slow admission of women, who are granted access to all *Grandes Écoles* only in the early 1970s. Whereas they constitute about 55% of the students at *Sciences Po Paris* since 2005 and 45% in the business schools, they are still significantly under-represented at *ENA* and in engineering schools in recent years. We show that the lineal advantage of a father graduating from a *Grande École* is comparable for boys and girls across cohorts. If anything, social reproduction may be slightly higher from fathers to daughters, than it is between fathers and sons. By contrast, aristocratic families favor their sons, whose relative admission rates to the schools where these families are the most over-represented are significantly higher than their sisters'.

Our study relates to several strands of the literature. The first is the one about intergenerational mobility. A vast empirical literature both in sociology and economics has investigated the intergenerational transmission of socio-economic outcomes. Quantitative sociology has measured the intergenerational link of discrete variables like social class, mainly through transition matrices, odds-ratio, and log-linear models. The economic literature has rather estimated intergenerational elasticities of continuous variables (mainly income and wealth).[5] In a paper mostly known for its model of parental investment in their children welfare, Becker and Tomes (1986) report relatively low regression coefficients (below 0.2 or insignificant) of fathers-sons' earnings in five developed countries. This was the starting point of many national studies, such as Zimmerman (1992) and Solon (1992) who both introduce permanent income and find elasticities twice larger for the US, or Lefranc et al. (2009) for France. Two influential comparative sociological studies analyzed intergenerational transmission of occupations. Erikson and Goldthorpe (1992) covered 12 countries between the 1940s and

[5]Discretization of continuous variables—popularized for example by Chetty et al. (2014)—is one of the many indicators of a narrowing difference between economics and quantitative sociology though, as discussed by Erikson and Goldthorpe (2002).

1970s and found no variation in mobility across countries and time, while Ganzeboom et al. (1989) studied 35 countries at comparable periods and argue that social fluidity globally improved. Black and Devereux (2011) and Torche (2015) offer comprehensive reviews of the numerous national and transnational studies, which demonstrate the association of parental background and children outcomes.

More precisely, our contribution relates to the role of education, the *great equalizer*, in the process of intergenerational mobility. Ganzeboom et al. (1991) have notably argued that if "the main role of education is to promote social mobility; [...] education is also the main vehicle of social reproduction." With the major structural transformations of developed societies over the 20$^{\text{th}}$ century, especially the introduction of welfare regimes and the expansion of educational systems, many scholars expected an equalization, i.e. the reduction of association between social backgrounds and educational attainment. While quantitative democratization, i.e. better access to higher levels of education, has indeed operated to a large extent (Breen and Müller, 2020), qualitative democratization, i.e. a reduction of association between social origin and educational outcome, has been more debated. The influential work of Shavit and Blossfeld (1993) found for cohorts born between 1910 and 1960 a stable link between socio-economic origin and the level of education, but most recent studies challenged this result and supported an equalization over the course of the 20$^{\text{th}}$ century, including Shavit himself (Thélot and Vallet, 2000; Shavit et al., 2007; Breen et al., 2009; Falcon and Bataille, 2018; Breen and Müller, 2020). Notably, Breen and Müller (2020) highlight a decreasing association over time, studying cohorts born between 1906 and 1979 in eight countries, including France. They conclude that "the twentieth century saw both educational expansion and educational equalization.".

A sub-filed of this literature focuses on the stratification of education. Indeed, an overall *equalization* of access to education nevertheless keeps open the potential non-linearity of social reproduction across education levels, in particular at the top of the educational distribution. Barone and Ruggera (2018) find for 26 European countries that *equalization* also operated for higher education, although a stabilization is suggested for cohorts born after 1965. For the contemporary United States, Piketty (2020) shows that the probability to pursue tertiary education rises quasi-linearly with parental income, from 25% for those with the

poorest parents to more than 90% for children of the richest. Mare (1980) as well as Shavit and Blossfeld (1993) claimed that social background was mainly influential on early years of education, with much less to actually no effect for residual transitions to advanced degrees of higher education. The former two studies rely on classifications, whose granularity at the top remains limited. Nevertheless, the limited association of educational outcomes with background characteristics for the highest levels of education was confirmed in the United States with a focus on admissions to MBA programs by Stolzenberg (1994) and Mullen et al. (2003). On the contrary, the latter study exhibits a strong link between parental education and admissions to first-professional degrees (e.g. medicine) and PhD programs, as confirmed by Torche (2018). Exploiting a different type of circumstances, Chetty et al. (2020) find that offspring with parents in the top 1% of the income distribution in the United States have 77 times more chances than those with parents in the bottom quintile to enroll at 12 institutions including the *Ivy League* colleges. Conversely, Henderson et al. (2020) show that students whose parents do not hold a university degree ("first-in-family") have lower chances to be admitted to an elite university in the United Kingdom. Linking generations with surnames, Clark and Cummins (2014) also identify that descendants of graduates from the early 19$^{\text{th}}$ century are still more likely to enroll at *Oxford* and *Cambridge*. This last set of studies revived a debate on the level of social reproduction at the top of the educational distribution.

In France in particular, higher education, including the *Grandes Écoles*, has been the focus of a considerable academic contribution, notably by the sociologist Pierre Bourdieu. The seminal *Les Héritiers* by Bourdieu and Passeron (1964) provides detailed statistics on differential access rates to higher education depending on social origin over the period 1960-1963. Bourdieu and de Saint Martin (1987) conduct surveys of *Grandes Écoles*' students over 1966-1969. They observe a "clear frontier" in terms of inherited *economic* and *cultural capital* between GE and university students, accounting for the occupations of ancestors, but also political views, choices of newspapers or consumption of cultural services. Bourdieu (1989) supplements the analysis with data on the enrollment at 84 institutions in 1984-1985, and describes a polarization between the more accessible and the more elitist schools. The multigenerational dimension is absent from most studies, one of the rare exceptions being Le Bras (1983), who categorize students at *Polytechnique* with respect to fathers

and grand-fathers being members of the "dominant class". Two additional influent studies focus precisely on intergenerational mobility in the leading *Grandes Écoles* adopting longer perspectives over four decades. Euriat and Thélot (1995) use non-exhaustive individual data for three prestigious schools of our sample, namely *Polytechnique*, *ENA*, and *ENS*. They find odds-ratio of admission of children of executives and teachers against children of popular background, declining from about 37 for cohorts born in the early 1930s, to 28 for cohorts born around 1970. They conclude that although less than in the universities, children from "popular background" improved their chances to access the top GE and that equality of access globally increased over the period. With survey data on cohorts born between 1919 and 1968, Albouy and Wanecq (2003) find higher admission chances for sons of teachers and executives to a set of 19 top *Grandes Écoles*. Odds-ratios range from 5 to 7 with respect to sons whose fathers have intermediate occupations, and from 24 to 52 compared to those whose fathers have lower occupations. Their work confirms a global *equalization* over the period, unless for a resurgence of inequalities in the very last cohort born in 1959-1968. Falcon and Bataille (2018) study cohorts born between 1918 and 1984. With a less elitist definition of the *Grandes Écoles* from the French Labour Force Surveys (5% of a cohort in the recent period), they identify a decrease of social reproduction for cohorts born in 1918-1945, a stabilization for those born in 1945-1970 and a new opening up for those born in 1970 onwards. At 2.0 and 2.5 respectively for daughters and sons, odds-ratio of admissions of upper-class versus intermediate-class origin in the most recent cohort are three to four times lower than for the oldest cohort. Bonneau et al. (2021) use administrative data and find that odds ratios for the access of "very privileged" versus underprivileged children to a set of 23 highly selective GE have decreased from 30 for the children born in 1988 to 20 for those born in 1995. They also find for the very recent period an over-representation in the GE of those registered in a Parisian high school. Overall, the existing literature applied to the *Grandes Écoles* concludes to a substantial inequality of access, however decreasing over the past decades. This set of evidence is very valuable, but has covered a limited time frame, from a few years to a few cohorts. Previous results also mostly rely on a definition of social origins based on fathers' occupations, although this characteristic shows little stability across generations.

The paper is also connected—although less directly—to the literature on the concentra-

tion of top income through two main common features: the focus on the very top of the social hierarchy and the long timeframe of historical data. Attention at the top 1% of the income distribution was initiated by Kuznets and Jenks (1953) and was revived by Piketty (2003) with an application to France, followed by Piketty and Saez (2003) for the United States, and Atkinson and Piketty (2007) for a comparative international study. It reached international public recognition with Piketty (2014)'s *Capital in the Twenty-First Century*. Exploiting fiscal data mostly for developed countries, these authors show that economic resources are highly concentrated among the very rich. They identify a decrease of the concentration of resources among top income between 1910 and the 1940s, followed by three decades of stabilization, and then a resurge of top income since 1980. Our results suggest that world wars also reshuffled social reproduction in the top of the educational distribution in France, but we find no comparable backlash over the last four decades.

Finally, this paper pertains to the literature, which takes advantage of the rich informational content of surnames. One of the main difficulties to study long-term intergenerational mobility is the scarcity of multigenerational datasets. The use of surnames in social science—as a tool to link generations with one another—opens substantial research opportunities. Researchers need successive cross-sectional nominative data and the distribution of surnames in the population to build a multigenerational dataset. Historians, demographers, or economists have a long experience with nominative sources. About 150 years ago, Watson and Galton (1875) were interested in surnames attrition, which was linked to a decline of aristocratic families. Stone (1971) explains how such data allow to understand the social links and interactions of important historical figures. Longley et al. (2007) study social integration through the evolution of the spatial repartition of surnames in Middlesbrough and Cleveland. Güell et al. (2007, 2015) worked on Catalonian data and were the first to use surnames to measure intergenerational social mobility. They were followed by Collado et al. (2012), Clark et al. (2014), or Barone and Mocetti (2020). While Clark et al. (2014) advocated that it allowed to reveal a "law" of high intergenerational social status persistence, which is claimed to be constant over time and across countries, Torche and Corvalan (2018) supported that this was rather due to a focus on the elite and that their results are group-estimates, thereby not comparable to individual ones. The present paper develops a new methodology for the use of surnames, based on the probability to be linked to a father

with a given characteristic, which allows to include in the analysis the whole population rather than only rare surnames.

The rest of the paper is organized as follows. Section 2 describes what the *Grandes Écoles* precisely are and their central importance in the French society. We complement with contextual elements on structural changes of educational systems in developed countries over the 20$^{\text{th}}$ century, especially in France. Section 3 presents the data on the graduates from the GE and provides descriptive statistics. Section 4 describes our empirical strategy, notably our measure of intergenerational social reproduction: the relative admission rates. We explain how we construct the historical, geographical, and lineal variables, and present our methodological contribution for the use of surnames. Section 5 provides an extensive set of results on the historical, geographical, and lineal advantages. We study all schools as a system and complete with heterogeneity analyses. We also provide a focus on the increasing admissions of women to the *Grandes Écoles*. Finally, section 6 discusses public policy implications.

2 Context: the *Grandes Écoles*, a flat calm in the educational transformations of the 20$^{\text{th}}$ century

Feudal times and the *Ancien Régime* were monarchic societies ruled by nepotism and the tradition of the three-estates. Social positions were defined by a birth lottery and individual merit played a marginal role. The French Revolution, in 1789, abolished the privileges of the aristocracy and overthrew this system. The 22 pre-existing universities—including *La Sorbonne*—were dismantled because of their link to the clergy and the aristocracy, and two elite higher education institutions were founded in 1794: the *École Normale Supérieure* and the *École Polytechnique*. With *École des Ponts et chaussées* (1753) and *École des Mines de Paris* (1783), they constituted the very first *Grandes Écoles*. Noble families had legal prerogatives for admission at the pre-existing schools, until the *Révolution* instituted a meritocratic tournament. Napoléon Bonaparte was highly involved in the structuration of the GE system, which he viewed as an instrument of rulership, to organize and control the training of institutors, engineers, industrialists, and soldiers. Although universities re-

emerged progressively, the dual structure of the French higher education system has remained remarkably stable for the last two centuries.[6]

The *Grandes Écoles* are relatively small top level tertiary education establishments, where the admission takes the form of highly competitive examinations called *concours*, after two years of dedicated post-secondary school preparatory program—*classes préparatoires aux Grandes Écoles*.[7] There is indeed no *legacy student*, a phenomenon that exists in the United States with rich individuals sponsoring prestigious institutions and acquiring admissions for their offspring (Meer and Rosen, 2009).

The GE had a monopoly until the very recent decades, and still conserve, a large advantage over the technical and professional training. Universities were indeed dedicated to academic knowledge—to the exception of the *Facultés* of medicine, law and pharmacology. Even the *École Normale Supérieure*—often considered the school of academic excellence—always had the utilitarian purpose of training professors. Importantly, the GE were deliberately designed for and explicitly dedicated to the education of the elite. Over the last two centuries, they have remained the royal way to decision-maker positions in the public and private sectors, training what Suleiman (1978) referred to as *state elites* as they are "trained by the State and destined for State service", be it within the administration, or for national industries.

While the lack of professional opportunities of students from the universities was partly responsible for the May 1968 outbreaks, the careers of GE graduates are to some extent guaranteed for life.[8] Seven out of the eight Presidents of the French Fifth Republic studied in the *Grandes Écoles*, and this was the case as of July 2021 of thirty-one out of the thirty-

[6] While higher education is more homogenous in Germany, Spain, Italy or the Scandinavian countries, duality of the higher education system, between elite institutions and standard universities, is a characteristic of numerous countries including Japan, the US, the UK or France (Brezis and Hellier, 2018). Yet, the American model of business schools emerged in the early 20^{th} century within the universities, while the French elite schools have always operated separately from the *Facultés*

[7] Belhoste (2002) presents the evolution over the 19^{th} and 20^{th} century of the admission examination of the *École Polytechnique*, which inspired the examinations of most of the schools. It was designed in 1794 and immediately decentralized in 22 cities across the country. Initially, there were only oral examinations. Written tests were progressively introduced during the 19^{th} century as an initial stage for applicants to be eligible to attend oral examinations. The process evolved very marginally over the course of the 20^{th} century. It was rapidly generalized in most schools, although slightly later for business schools at the end of the 19^{th} century, starting with *HEC* in 1892.

[8] Suleiman (1978, p. 4) states that "one needs to demonstrate considerable competence [...] but once that competence has been demonstrated at an early age, it is never again called into question."

five French CEOs of firms in the CAC40—the forty largest companies on the French stock market—, including 10 from *École Polytechnique* alone. The *Grandes Écoles* also shape careers slightly less at the top of the occupational distribution, as documented for the private sector by Delefortrie-Soubeyroux (1961), Barsoux and Lawrence (1991) or Vion et al. (2014). There is no historical dataset on wages and income distributions of graduates from the top *Grandes Écoles* but numerous sources document substantial returns to education in these institutions.[9]

Geographically, the most prestigious schools are principally centralized in the Parisian area. The transfer of the *École Nationale d'Administration* (*ENA*) from Paris to Strasbourg in 1991 constitutes one of the rare exceptions. *ENA*'s status is also peculiar as it is attended by slightly older students, mostly after graduation from another *Grande École*. Even if its control was ultimately transferred to the Chamber of Commerce of Versailles in 1980, the foundation of *ESSEC* by Jesuits in 1907 is also a specificity, as most schools are secular. All schools are to some degree supervised by the State, but private and public institutions coexist, and some have alternated between the two status. Many of the most prestigious schools were directly founded at the initiative of the State, except for business schools. Public annual resources devoted to tertiary education were historically very heterogeneous and in favor of the GE. Recent data reports average annual spending per student of around 10,000€ in the universities, 15,000€ in the preparatory classes to the *Grandes Écoles* and over 100,000€ at *École Polytechnique* or *École des Mines de Paris*, or even above 150,000€ for the *École Nationale d'Administration*.[10] While public subsidies have historically supported to some extent all *Grandes Écoles*, students' fees mostly concerned business schools until

[9]The newspaper *L'Expansion* had a notorious tradition of referencing wages for graduates, a mission also produced by the *Conférence des grandes écoles* (the professional organization of the schools), or more recently by the *Financial Times*. A broad conclusion we may raise from these sources is that the median first job wage offered to graduates from the prestigious schools in our sample seems to roughly correspond to two to three times the level of the median wage in France over the past decades. Although partly informative, these sources usually rely on graduates' surveys with partial response rates, they mostly cover the last 30 to 50 years and they rarely account for exceptionally high wages.

[10]Sources: Ministry of Tertiary Education, Research, and Innovation (DEEP), schools' activity reports, reports by the *Cour des Comptes*. Piketty (2020) reports the distribution of total public spending per student across the whole schooling—from nursery school to higher education—in 2018 in France. The first percentile benefits from 60,000€ while the last receives 300,000€ per student, for a median at 120,000€. These inequalities are not peculiar to France, as Piketty (2014) also shows a high concentration of resources in the United States: out of thousands of universities, the 60 with the highest capital endowments receive more than half of total endowments.

recently. Students at *ENA*, *ENS* or *Polytechnique* even have a status of civil-servant trainees, which comes with a financial payment during their education. Piketty (2020) shows that in 2014-2016 the share of private spending in total cost of tertiary education averages at 30% in France, Italy, or Spain, against 65% in the United States, but less than 10% in Scandinavian countries.

Contrary to universities, the *Grandes Écoles* are not centrally supervised by the Ministry of higher education, but are attached to different ministries. For example, the Ministry of Defense supervises the *École Polytechnique*, whose status is military, although it trains all kind of executives. This system favored the progressive gain in autonomy of all schools, private or public, and their capacity to resist attempts of reforms (Suleiman, 1978; Pasquali, 2021). Therefore, over the last century, the environment of the *Grandes Écoles* has remained remarkably stable, whereas the transformation of higher education was otherwise substantial, in all developed societies including France.

Primary schooling was rapidly generalized in the United States in the 19$^{\text{th}}$ century, while its universalization was only initiated around the 1880s in countries like the United Kingdom, Germany, or France (Piketty, 2020). In France, the Ferry laws made primary schooling free and compulsory in 1882. Until the 20$^{\text{th}}$ century, secondary schooling was merely accessible to the *bourgeoisie* and tertiary education to less than 1% of the population (Prost, 1968). As detailed by Breen and Müller (2020), countries like Germany or the Netherlands already had a substantial share of the population with secondary education in the beginning of the 20$^{\text{th}}$ century. By contrast, in countries dominated by agricultural activities, such as France, Spain or Italy, populations reached lower levels of education. Although the phenomenon was slower in France and Spain, an increasing share of the population progressively completes secondary education: it concerns a majority of the population for cohorts born in the second half of the century.[11] The share of the population with tertiary education also increased significantly, especially since cohorts born after World War 2, from a small minority, to 30 to 50% in most developed countries, and up to 70% in Japan or Korea. Consequently, the share of national income devoted to education rose from about 1% in 1890 to 6% in the early 21$^{\text{st}}$ century in the most populated European countries (Piketty, 2020). In France, the surge in

[11] Yet, secondary schooling in France remained socially stratified until the 1970s when it became unified by the Berthoin reform.

tertiary education emerged slightly later than most comparable countries. Indeed, Appendix Figure A.1 shows that while less than 5% of the population obtained the *baccalauréat* (high school diploma) until 1950, this share increased progressively until a breaking point in 1968, after which it exploded, accompanied by more registrations to the universities. French universities were selective until 1960 and then remained unselective until 2018, with the only requirement being the *baccalauréat*. In the 1970s, universities also opened their first professional curriculum, intended to compete with the GE. Alongside the increase of the number of students in the universities, many new *Grandes Écoles*—although less prestigious—were founded since the 1960s and nowadays, there are about 500 GE in the French educational system. Nevertheless, none of the more recent schools compete in any way possible—selectivity, access of its graduates to elite positions, reputation—with the centenarian schools our study focuses on (Vion et al., 2014). By contrast, the period was remarkably stable for these long-established *Grandes Écoles*, whose number of graduates scarcely increased in comparison, as we show in section 3.

3 Data: schools registers and nominative births census

Our study combines two main types of data: lists of *Grandes Écoles* graduates and nominative censuses for the distribution of surnames in France. To our knowledge, we are the first to gather a dataset of elite students in France, over more than a century. Our dataset exhaustively covers 10 *Grandes Écoles* over the period 1886-2015 and includes 303,514 curricula and 285,286 distinctive students. We collected the data from the schools' Alumni associations, libraries, or archive departments, as well as from other archive institutions. The 10 schools are, historically and still today, among the most prestigious ones, offering the best careers' opportunities to their graduates.[12] To enhance intertemporal comparability, we restrict to the most standard curricula by discarding PhD diplomas, MBAs, executive or specialized masters, as these degrees emerged in recent decades. We also exclude the international cycles at *ENA* dedicated to foreign students since 1964. Table 1 provides summary statistics

[12] One could expect our study to include *HEC Paris* and *École Centrale Paris*, but we could not collect the data. Other candidates included *École nationale supérieure d'arts et métiers*, *École Nationale Supérieure des Beaux-Arts de Paris*, or military schools, such as *École spéciale militaire de Saint-Cyr*, but these schools are less typical of the French elite (Suleiman, 1978).

for each school such as the period covered by the data, the year of admission of the first women, the average number of students per promotion, and the share of students who bear a "native" surname, which are surnames which are present in France over the whole period of study, as defined below.

The following overview of the schools in our sample is completed by further contextual details in Appendix C.1. *Sciences Po Paris* is a school of political science or administration. The *École Nationale d'Administration* (*ENA*), founded in 1946, trains senior civil servants. The *École Normale Supérieure* (*ENS Ulm*) is a top-level research-training institution in humanities and science. We include five public engineering schools: *ESPCI Paris*, *École Polytechnique*, *École des Ponts et Chaussées*, *Télécom Paris* and *Mines Paris*. Our sample also contains two business schools, for which our data coverage starts in the beginning of the 20$^{\text{th}}$ century: *ESSEC* and *ESCP*. These 10 schools are not a perfectly homogeneous group, but they may be studied as a whole. Indeed, Bourdieu (1989) distinguishes between the "intellectual" tradition (e.g. *ENS Ulm*) and the "power" tradition (e.g. *HEC*, *ENA*) but advocates anyway for the study of the GE as a comprehensive system.

Appendix Figure A.2 reports the evolution in each school over time of the raw number of graduates (A.2a) and of the share of the French population admitted (A.2b). We observe collapses followed by peaks of students' enrollments during the first and the second world wars. These limited annual fluctuations followed by resumptions have limited effect on our estimates, as we analyze cohorts of 25 years and not short-term variations, as detailed thereafter. The share of the population enrolling the prestigious *Grandes Écoles* increased over the last 130 years but in no instance in comparable proportions to the massive increase in the universities. After World War 1, which constitutes an important turning point, the share of the French population admitted to the schools increases, but mostly due to the addition of data for business schools, as well as the important increase of alumni at *Sciences Po Paris*. The latter school trained overall about half of the graduates from our sample. Therefore, we study *Sciences Po Paris* separately and consider the 9 other *Grandes Écoles* as our baseline, for one single school not to account for about half of our sample. We also note that the lists of graduates are complete and exhaustive until 2010, but that we lose part of the sample afterwards. In particular, we cover business schools until 2012, and lose part

Table 1: Description of the dataset per *Grande École*.

Category	*Grande École*	Data coverage period	Entry of women	Total # of graduates	Average # of annual graduates	Share of native graduates
Admin. and research	Sciences Po Paris	1886-2015	1919	152,578	1,183	74%
	ENA	1946-2015	1946	7,714	112	92%
	ENS Ulm	1886-2015	1886	16,826	130	91%
Engineering	ESPCI Paris	1886-2015	1919	5,978	46	91%
	École Polytechnique	1886-2013	1972	37,823	293	89%
	Ponts et Chaussées	1886-2014	1962	13,567	105	77%
	Télécom Paris	1889-2012	1963	11,829	94	74%
	Mines Paris	1921-2012	1969	8,476	90	85%
Business	ESSEC	1905-2010	1969	20,327	185	84%
	ESCP	1906-2011	1972	28,396	261	78%

Notes: *Data coverage period* reports the earlier and latest year of admission in the data. *Entry of women* reports the date at which women are admitted to the schools on a regular basis, although very sporadic appearance of one or very few women may occur earlier, for example during World War 1. The *Average # (number) of annual graduates* is simply the *Total # (number) of graduates* during the whole period divided by the timespan in the data. The *share of native graduates* corresponds to the share of individuals bearing a "native" surname—as defined in the text of the paper—, irrespectively of their nationality or migration history, which we do not observe.

of the engineering schools from 2013 on. We discuss in footnote 16 the limited implications of this data coverage issue.

Observations systematically include the surname and the first name of each student. We also observe at least one middle name for 34% of the students. We know the maiden name of almost all women in the sample, but only for 15% do we observe both a maiden and a married name. Gender is also provided for 30% of the observations but we completed this information. We construct for each first name a gender propensity score, thanks to a births' census by gender by first name in France between 1900 and 2016, from the French National Institute of Statistics (INSEE). Some first names are gender-neutral but we were able to categorize 93% of the first names appearing in the schools. The remaining uncategorized students, whose curriculum dates before a school was accessible to women, are identified as men. In the end, we know the gender of 99.7% of the students.

To ensure consistency between the different sources and increase the number of matches, we use token and bigram fuzzy matching on surnames between *the Grandes Écoles* data and the census of surnames. It allows to detect mis-spelled or shortened surnames in some

school registers.[13] With a multicriteria screening, which we detail in Appendix C.2, we also identify individuals who studied in multiple schools in order not to count them several times when studying groups of schools. After exclusion of the non-standard curricula, we identify that among the 303,514 curricula of our sample, 267,943 individuals attended one school only, 16,465 attended two schools, while 871 studied in three different schools, and 7 persons attended no less than four schools.[14]

Finally, we approximate the birth year of each student. As we discarded admissions at the master, MBA, or PhD level, and due to the required two-year post-secondary school preparation before the admission examination, the standard age of first admission to a *Grande École* is around 20 years old. This is consistent with data reported by several schools. It implies that students admitted in 1886 are assumed to be born in 1866, while those admitted in 2010 are assumed to be born in 1990. The birth year of students who pursued multiple curricula is based on the admission year in the first school they were admitted to. A specificity concerns admissions to *ENA*, who occur at an older age. As 56% of enrollees went previously to at least one other school of our sample, we identify their average age of admission to *ENA*—27 years old—using the years difference with the admission to the first school. We assume that students that did not study previously in another *Grande École* of our sample are also admitted to *ENA* at 27 years old.[15]

To exploit the nominative list of graduates, we need information on the frequency of surnames in the population. The French National Statistics Institute produces for the period 1891-1990 a detailed births' census at the surname–municipality level, which allows to compute the number of births per surname, by region, and at the national level. The census is structured with four cohorts of 25 years: 1891-1915, 1916-1940, 1941-1965 and 1966-1990. The 25 years divide corresponds to generations, as Mazuy et al. (2015) show that in 1946, 1966 and 1986 the large majority of births occur when parents are between 20

[13] For example, as *de Villepin* does not exist officially in France, a student appearing as such in a school register is officially a *Galouzeau de Villepin*. This was identified via token fuzzy matching, which identifies similarities based on sequences of characters separated by spaces. Another example is *Boufandeau* officially in the census as *Bouffandeau*. The latter association arose from bigram fuzzy matching, which focuses on similarities between each pair of successive characters.

[14] The most common are *École Polytechnique* – *École des Ponts* (4,128 individuals), and *Sciences Po Paris* – *ENA* (3,559 individuals), which are expected sequences, as discussed in Appendix C.1.

[15] This is an approximation due to the admission of some students at an older age, while they are already civil servant (*concours interne*), but this remains a marginal concern as discussed below.

and 30 years old. Therefore, we consider those born in 1891-1915 as the parents of those born in 1916-1940, the grandparents of those born in 1941-1965 and the great-grandparents of those born in 1966-1990. For students born until 1995, we create an extra pseudo-cohort (1971-1995), for which we assume similar births per surname as in 1966-1990.[16] Obviously, not everyone born in the $[Year; Year + 25[$ interval will have their children precisely born in the $[Year + 25; Year + 50[$ interval. For individuals at the edge of a generation, parents and children may on some occasions appear in the same generation—when there is less than 25 years between their births—or sometimes two generations apart. This constitutes a mismeasurement of our intergenerational link, which biases our estimation of social reproduction, as it adds noise to our explanatory variables.[17]

As we observe the pool of potential applicants to the *Grandes Écoles* through the number of births in France by surname, we must restrict the analysis to those for which we most likely observe the number of births. This motivates a restriction to "native" surnames, as being those for which immigration occurred at last in the late 19$^{\text{th}}$ century. This necessary choice was shared by many scholars working with surnames in the long run, as for instance Dupâcquer and Kessler (1992). Indeed, the distribution of "native" surnames born in France is a good measure of potential "native" applicants to the *Grandes Écoles*.[18] Restricting to "native surnames" also limits the issue of self-selection in migration: the fact that migrants have different unobserved characteristics than natives (Borjas, 1987). Indeed, Meurs et al. (2006) show that immigrants, but also children of immigrants, experienced in 1999 more unemployment, as well as lower access to higher-status occupations in France. Similarly, a report by the OECD (2016) shows, for the recent period, that access to tertiary education in

[16] The total number of births between 1971 and 1995 was simply 3% lower than between 1966 and 1990 (INSEE). This necessary assumption on surnames distribution, and the fact that the list of graduates is less exhaustive after 2010, imply that results for the pseudo-cohort 1971-1995 should be read with slightly less confidence. They still add to our historical perspective a glimpse of the evolution of social reproduction within the last decade, when compared to the cohort 1966-1990.

[17] The magnitude of the bias is difficult to precisely gauge. Its direction is a downward bias, as long as the parent–child association is the strongest within the family.

[18] We thereby dismiss individuals born abroad, who immigrate in France before the age 20, for which data on the number of births is partial at best. To the contrary, we include those born in France, who emigrate to study or work abroad. First, the latter choice was historically relatively limited and even remained marginal more recently. Indeed, the *Grandes Écoles* provide high-quality education, usually at lower fees than alternatives, in Anglo-Saxon universities for instance. Docquier and Marfouk (2006) show that only 3.4% of tertiary educated individuals emigrate outside France. More importantly, emigrating to study is a decision, which does not discard studies at a *Grande École* from the opportunity set.

France is much lower for individuals with both parents being foreign-born and low educated (26.8%), than it is for those with both parents being low educated as well but French-born (42.3%). Restricting our analysis to native surnames in both the census and the graduates' data prevents composition effects with respect to immigrants and descendants of immigrants to vary over time. Appendix C.3 details how we identify "foreign" surnames. We classify as bearing a foreign surname 17% of the births in France for the last birth cohort (1966-1990), which is consistent with the share represented by immigrants and descendants of immigrants at that time (Bouvier, 2012).

Our study covers individuals born between 1891 and 1995, who studied in the *Grandes Écoles* between 1911 and 2015. We also include the graduates born in 1866-1890 as ancestors of the first cohort. Our baseline sample is constituted of the graduates from the 9 *Grandes Écoles*, excluding *Sciences Po Paris*. Table 2 displays descriptive statistics in three parts. First, the census of births per surname, then the graduates from the baseline schools, and finally *Sciences Po Paris* students. 33% of the surnames in the census are associated with an immigration history over the 20$^{\text{th}}$ century. Those immigrant surnames account for about 8% of all births. Over the whole period, there are 118,337 graduates from the 9 baseline GE and 113,085 graduates from *Sciences Po Paris* with native surnames, each accounting for 0.18% of the native French population

As we outline in Appendix Figure A.2b, the share of the population admitted to the GE progressively increases and approximately doubles from the first to the last cohort, both at *Sciences Po Paris* and in the 9 baseline schools—to the exclusion of the pseudo-cohort 1971-1995 with partly missing data. Studying in a *Grande École* nowadays is not perfectly equivalent to doing so at the end of the 19$^{\text{th}}$ century. Still, the expansion remains very limited compared to the one of baccalaureate holders and of tertiary education as a whole. Appendix Table B.1 emphasizes that the composition of our baseline has slightly varied across time, with the business schools training an increasing share of the graduates. Heterogeneity results by school and by school category therefore proves very useful. The slow increase of the share of admitted women is subject to a detailed investigation in section 5.4.

Table 2: Descriptive statistics per cohort: national census and *Grandes Écoles* students.

		Full period		Cohorts					
		Number of surnames	Total # of births		Births 1891-1915	Births 1916-1940	Births 1941-1965	Births 1966-1990	
Census	Census	807,229	65,423,121		10,686,923	14,149,274	20,099,847	20,487,077	
	Census of "native"	541,426	59,938,195		10,574,454	13,700,315	18,655,322	17,008,104	
	Share of "native"	67%	92%		99%	97%	93%	83%	
		Number of surnames	Total # of Students 1866-1995	Students' cohort 1866-1890	Students' cohort 1891-1915	Students' cohort 1916-1940	Students' cohort 1941-1965	Students' cohort 1966-1990	Students' cohort 1991-1995
9 *Grandes Écoles*	Students	63,155	141,761	8,398	13,962	20,331	36,287	57,437	5,346
	"Native" students	48,073	118,337	7,997	13,291	19,202	31,920	42,438	3,489
	Share of "native"	76%	83%	95%	95%	94%	88%	74%	65%
	Top educ %		0.18%	-	0.13%	0.14%	0.17%	0.25%	0.10%
	Women %		19%	7%	6%	6%	18%	32%	28%
Sciences Po Paris	Students	77,496	152,552	7,035	14,364	26,273	52,752	45,025	7,103
	"Native" students	49,956	113,085	5,467	11,088	21,508	39,993	30,837	4,192
	Share for "native"	64%	74%	78%	77%	82%	76%	68%	59%
	Top educ %		0.18%	-	0.10%	0.16%	0.21%	0.18%	0.12%
	Women %		33%	0%	6%	20%	36%	51%	56%

Notes: The table is structured in three parts. The upper part concerns the births census, then descriptive statistics are provided for the graduates from the baseline 9 *Grandes Écoles*, and finally for the students of *Sciences Po Paris* alone. We provide statistics for bearers of all surnames (first lines of each section of the table) and for native surnames only (second lines), as well as the share of those native surnames in each statistic (third lines). For both sections on students, restricting to native surnames, we also provide information on the share of the French population admitted (*Top educ %*), and on the share of women among students (*Women %*). Two columns regard the full period, whereas the 6 columns on the right refer to specific cohorts. We provide information on the number of distinctive surnames in each category, as well as the number of births (for census data) or the number of students (for data on graduates). The sum of the total number of students at *Sciences Po Paris* and at the 9 baseline schools is logically higher than the total number of students we reported overall (285,286), and for native students only (224,264). Indeed, some students studied at *Sciences Po Paris* but also in other schools.

4 Empirical strategy

In the present section, we first discuss the use of surnames and define the specific advantages we study: historical (H), geographical (G) and lineal (L). Depending on the surname an individual from a given cohort bears, we determine a noble bloodline, and the probabilities to be born in any French region, as well as of the father to have graduated from a *Grande École*. In a second part, we describe our measure of social reproduction: the relative admission rate (RAR), which relates the admission rate of those with a given advantage to the admission rate of the rest of the population.

4.1 Surnames to convey history, geography, and lineage

Surnames have limited to no direct effect on socio-economic outcomes, especially once we exclude foreign surnames, that may be discriminated. Yet, they work as family trackers. We take advantage of the informational content of surnames in three ways. First, they intrinsically carry historical content: *de Boissieu*, for example, is a surname of aristocratic origin. Second, this historical component implies that they also convey a geographical dimension. Whereas *Masseglia* is *Provençal*, i.e. from the south-east part of France, all *Le Pouezard* in the censuses 1891-1990 are born in *Bretagne*, in the north-west of the country. Third, all bearers of a surname in generation $t+1$ are descendants of a father sharing the same surname in generation t. In France, surnames have been hereditarily transmitted through the patriarchal line since the 12^{th} century, although surnames selection and mutations were very common in the middle age. From 1474, surnames could not be modified without the King's approval. In 1539, the order of Villers-Cotterêts generalizes the registration of family names, whose orthography is stabilized. Since 1870, the spelling of surnames has been definitively fixed by the implementation of the *Livret de famille* (family register). Two recent laws of 2003 and 2008 state that the father's name, the mother's name, or a combination of both may be chosen. Our study focuses on individuals born between 1866 and 1995, which make patronyms a reliable intergenerational link between fathers and sons, as well as fathers and daughters through their maiden names.

Aristocracy comes from the Greek *aristos*, meaning excellence, and *kratos*, meaning power, and signifies the power of the more able. But the power of the aristocracy during the *Ancien Régime* was rather inherited than earned. The French Revolution abolished their privileges in 1789. As noble families had prerogatives to study at the *Grandes Écoles* 250 years ago, we investigate whether this historical advantage has vanished after the *Révolution* or if it has rather persisted over generations.[19]

We identify individuals of aristocratic lineage in two ways. The first simply considers all bearers of surnames with a particle.[20] Although most families from aristocratic ascendance do bear a particle, some noble families do not bear a surname with a particle, and a surname with what seems to be a particle does not systematically imply noble ascendance.[21] Using surnames with particles constitutes a convenient and appropriate proxy of nobility, but it remains an approximation. We therefore use a second definition of nobility: the *table of families* issued by the Association for Mutual Help of the French Nobility—*Association d'Entraide de la Noblesse Française* (ANF)—, which registers 2,650 surnames of noble families.[22] The eleven most common ANF registered surnames account for 50% of the births. To avoid that most of the sample is constituted by a tiny minority of surnames, we use surnames within 2 standard deviations of the mean number of births per cohort within the list of ANF registered surnames. This condition restricts the list to surnames with at most 125 births per generation, and each surname contributes therefore to no more than 0.1% of the population of registered nobles. We construct two dummy variables for the historical advantage, Hp_S and Hr_S, with value 1 if the surname S includes a particle (Hp_S) or if it is registered by the ANF (Hr_S), and 0 otherwise. Obviously, we thereby identify nobility as being transmitted by fathers. This appears not to be too much of a concern, as de Saint-

[19] Ennoblement is nowadays demanded on a very marginal basis but was a structural dimension of nobility in the old Regime. The aristocratic status of most families therefore dates back at least from the 18$^{\text{th}}$ century (Wood, 1977).

[20] These are surnames including any of the following strings: " *d'*", " *de* ", " *du* ", " *des* " or starting by "*d'*", "*de* ", "*du* " or "*des* ", at the exception of those of the Dutch form containing "*van de* ", which are generally identified as foreign surnames anyway.

[21] Refer to Coulmont (2019) for a complementary discussion on that matter.

[22] 2,283 surnames match with the national census of patronyms, which is consistent with the fact that the association explicitly states the extinction of several families, which they nevertheless preserve in the list. A family must apply to get registered by the association and there is therefore a degree of selection, but the official mission of the association is to establish the list of families of "authentic nobility" (de Saint-Martin, 1993), and the association claims that 2,300 out of 3,200 subsisting families are registered.

Martin (1993) shows that 64% of men registered at the ANF married a woman of noble ascendance, underlining a very high degree of homogamy among noble families, permanency of a traditional matrimonial alliances scheme (Elias, 1985).

The second characteristic we investigate is the place of birth. Geographical centralization is very pregnant in France, in comparison to many other countries, due to historical roots originating in the Kingdom of France. The emergence of the *Grandes Écoles* was a national and centralized plan, and most of the major *Grandes Écoles* are located in or around Paris. Economic activities are concentrated in the Parisian area (*Île-de-France*), accounting for about one third of the French GDP, and one fourth of employment in the recent period. Parisians have a higher level of education, higher income, and have access to better schools.

With this context in mind, we study the geographical dimension of admissions to the *Grandes Écoles* thanks to the regional distribution of births per surname. Surnames do indeed embody a strong regional identity. At the surname level, the main region of origin accounts on average for 53 to 72% of all births depending on the cohort, and between 42 and 52% if we weight by the population size of surnames. Therefore, bearing a given surname is roughly associated with one chance over two to be born in one given region out of 22 Metropolitan regions, with many surnames being very highly geographically concentrated. We construct regional–cohort variables $G_{R,c,S}$, which indicate the probability of being born in a given region R in cohort c for each surname S.[23] Within the Parisian region, we also provide a finer level of analysis by constructing the probability to be born in the capital city itself, as well as in the Parisian region (*Île-de-France*) to the exception of inner Paris.

While surnames allow to characterize nobility ascendence with certitude, they simply inform on a probability of geographical origin. Yet, surnames are substantially informative on births' geo-locations. In addition, we directly identify the place of birth of bearers of each surname by cohort, and therefore do not need to rely on the paternal rather than maternal transmission for that dimension.

[23] We focus on Metropolitan regions and use the geographic breakdown officially operative from 1970 to 2015, which was not too distinct from the original Clémentel's regions of 1919. Births in the Germany annexed *Alsace-Lorraine* (1871-1918) are also included. With 70 births out of 71 in *Provence-Alpes-Côte d'Azur* (PACA) between 1941 and 1965, the value of $G_{PACA,1941-1965}$ for the surname *Masseglia* is 0.99, indicating that a bearer of the surname *Masseglia* has a 0.99 probability of being born in that region.

Finally, we study the lineal presence in the French elite schools. Linking generations via surnames is effective but it is not a perfect tool either. Most surnames share a common descent—*souche* (stump) in French—but subdivide in distinct family branches. It is particularly true for highly occurring surnames, such as *Smith* in the United States or *Martin* in France. Indeed, rarely occurring surnames are more relevant to precisely track family ties. Fortunately, the distribution of surnames is highly skewed with an abundance of rare surnames in France, as it appears on Appendix Figure A.3. Some studies relying on surnames' links restrict their samples to rare surnames (Clark et al., 2014; Güell et al., 2015). We prefer to exploit the completeness of our sample and avoid choosing an arbitrary threshold for surnames to be considered rare. We rather define as an explanatory variable the probability that the father of someone bearing a given surname has studied in an elite school. The rarer the surname, the more likely the bearers in the older and the younger cohorts are father and daughter or son. Let $AR_{GE,c,S}$ be the admission rate (AR) of the bearers of surname S to a given GE for cohort c:

$$AR_{GE,c,S} = \frac{St_{GE,c,S}}{N_{c,S}}$$

with $St_{GE,c,S}$ the number of students with the surname S born in cohort c graduating from the GE and $N_{c,S}$ the number of births of bearers of the surname S in the French population in cohort c. GE will alternatively be the whole set of schools, the 9 schools in the baseline, a single school, or specific categories, like engineering or business schools. Denoting masculine students as St^M and with the simplifying and acceptable assumption that for each surname in each cohort, there are as many men as women, we may compute a masculine AR:

$$AR^M_{GE,c,S} = \frac{St^M_{GE,c,S}}{N_{c,S}/2}$$

We then define the lineal advantage (L) as the probability for someone born in cohort c that his or her father[24] studied in a GE as the admission rate of masculine bearers of the same

[24]Subsequently, we define the probability that one's grandfather studied in a *Grande École*, as the probability to be linked to a given father among those bearing the same surname ($\frac{1}{N_{c-1,S}/2}$), multiplied by the probability that a given student in the GE in the grand-paternal cohort is the father of this identified father ($\frac{St^M_{GE,c-2,S}}{N_{c-2,S}/2}$): $L^{M,Gen-2}_{GE,c,S} = \frac{1}{N_{c-1,S}/2} \times \frac{St^M_{GE,c-2,S}}{N_{c-2,S}/2} = 4 \times \frac{St^M_{GE,c-2,S}}{N_{c-1,S} \times N_{c-2,S}}$. The probabilities that a great-grandfather and great-great-grandfather studied in a given Grande École are respectively defined as follow: $L^{M,Gen-3}_{GE,c,S} = \frac{8 \times St^M_{GE,c-3,S}}{N_{c-1,S} \times N_{c-2,S} \times N_{c-3,S}}$ and $L^{M,Gen-4}_{GE,c,S} = \frac{16 \times St^M_{GE,c-3,S}}{N_{c-1,S} \times N_{c-2,S} \times N_{c-3,S} \times N_{c-4,S}}$. While $N_{1866-1890}$ is the only missing information in our dataset, we assume the number of births per surname in 1866-1890 to be similar to the one in 1891-1915.

surname in the previous cohort:

$$L_{GE,c,S}^{M,Gen-1} = \frac{St_{GE,c-1,S}^{M}}{N_{c-1,S}/2} = AR_{GE,c-1,S}^{M}$$

With this new approach, we observe a probability distribution for this independent variable, like for the geographical origin of individuals. As the data does not provide a definite father–child link, our independent variable takes the value 0 for those whose surnames does not appear in the GE in the previous generation, and the probability of a value 1 that the father graduated for the others. The latter probability is cohort and surname dependent. It is a function of the number of masculine births and of masculine graduates bearing the same surname in the previous cohort.

Like for the historical advantage, we focus on transmission from fathers to both sons and daughters. Married names of women would have proven useful to investigate the transmission from mothers, as the share of births outside marriage exceeds 10% only from 1979 onward, but was negligible during most of our period of study. However, this information in the graduates' lists is school-dependent and too scarce to consider a systematic study. Whereas a report by the OECD (2016) stated that upward mobility is about the same when only one of the two parents holds the higher qualification, regardless of who holds it, be it the mother or the father, Beller (2009) argues that excluding mothers—as most studies do—from the assessment of intergenerational mobility is not trivial for the estimations. In any case, women constitute only 7%, 6%, 6% and 18% of the graduates in the four ancestors' cohorts. In addition, the high level of homogamy among the French elite implies that fathers and mothers have very similar characteristics. In particular, the levels of education are highly correlated, as it was shown by Goux and Maurin (2003) for cohorts born between 1934 and 1978, and Bouchet-Valat (2014) for a more recent analysis between 1969 and 2011. The latter study shows that endogamy among *Grandes Écoles* graduates even increased over the period. Higher education institutions even serve as marriage markets, as demonstrated by Nielsen and Svarer (2009) in the Danish case. Moreover, correlations of attributes are not restricted to education but include economic characteristics such as labor earnings (for the French case, see Frémeaux and Lefranc, 2020).

Besides, an important dimension of intergenerational mobility is fertility, especially since birthrates have been found to depend on socio-economic background, both across countries

and within countries.[25] Yet, our estimates do not isolate the effect of fertility. As we observe education, fertility and advantages at the surname level, an underlying assumption for the probability to be linked to a father with advantage A to be accurate is that, within bearers of a similar surname, there is no major differences in fertility levels between those with or without advantage A. We cannot test it with available data as the historical, geographical, and lineal advantages are observed at the surname level. Nevertheless, demographical studies in France provide evidence of a relatively standardized fertility. Indeed, variance in the number of children has progressively reduced in developed countries. In France, the desired number of children sets at 2 or 3 children for most women since decades (Sobotka and Beaujouan, 2014). A vast majority of French families had 2 or 3 children across the last century. Toulemon (2001) reports that less than 20% of French women born in the beginning of the 20$^{\text{th}}$ century, and only 10% of women born in the second half of the century had 4 children or more. Besides, socio-economic differences in fertility have also been found to be lower in France than in other European countries (Toulemon et al., 2008). There was more volatility in the number of children per family at the end of the 19$^{\text{th}}$ century (Dupâquier, 1988). More importantly, Dürr (1992) documents the differential extinction or proliferation of family lines in France between 1800 and the 1970. If he finds that over more than one and a half century, only about 35% of family descents remain active, while the rest disappeared, extinction rates were much higher in the first generations of the 19$^{\text{th}}$ century than they were over the 20$^{\text{th}}$ century. Moreover, only extremely rare surnames are threatened of vanishing (Dupâquier, 1992). If differences in fertility partly shape intergenerational transmission, they are less influent in the French context and over the 20$^{\text{th}}$ century, than they are in other countries, or were earlier in time. Our data does not allow for a proper decomposition.

In Appendix Table B.2, we report descriptive statistics on the explanatory variables identifying the three advantages we study. We include the population size concerned by each background characteristic and the number of surnames with at least one birth with the given characteristic.

[25] The negative socio-economic and educational gradients of fertility were theoretically conceptualized around differences in opportunity costs with the idea of a quantity–quality trade-off for children (Becker and Lewis, 1973; Becker and Tomes, 1976). Yet, the lower number of children for the better educated has been questioned more recently. Notably, Kravdal and Rindfuss (2008) identify with Norwegian data on cohorts born between 1940 and 1964 that better educated women give births a few years older but do not have less children. Better educated men are even less likely to remain childless.

4.2 Relative admission rates

Our measure of social reproduction is both simple to understand and to interpret. We know $AR_{GE,c,S}$ the admission rate (AR) to a given GE (or group of GE) of the bearers of surname S born in cohort c. As defined in subsection 4.1, bearing a surname S is associated with characteristic A either with certitude—historical advantage—or with a certain probability—geographical or lineal advantages. We may define for cohort c the frequency of appearance of individuals with the advantage A (as indicated by their surnames S) in a sample of school GE to their frequency in the French population as defined by:

$$AR_{GE,c,A(S)} = \frac{St_{GE,c,A(S)}}{N_{c,A(S)}}$$

Observations are at the individual level, but observables are surname-dependent (S). To put it simply, $AR_{GE,c,A(S)}$ is the share of the population born in cohort c with advantage A educated in the GE. We define a tool close to odds-ratios, albeit more straightforward to interpret: the relative admission rate (RAR) of those with advantage A. It relates the admission rate to the GE of those with advantage A to the admission rate of the rest of the population, i.e. the admission rate of the group A', not benefiting from advantage A:

$$RAR_{GE,c,A(S)} = \frac{AR_{GE,c,A(S)}}{AR_{GE,c,A'(S)}}$$

The relative admission rate of individuals with advantage A in the *Grandes Écoles* is therefore the factor by which they are more or less represented in the GE compared to the rest of the population.[26] If $RAR_{GE,c,A(S)}$ equals 1, those with advantage A are evenly represented in the GE. When $RAR_{GE,c,A(S)}$ is below 1, they are under-represented in the GE, while they are over-represented when it is above 1. We directly estimate the coefficients of the relative admission rates (RAR) and their corresponding confidence intervals with a log-binomial specification, developed by epidemiologists (Wacholder, 1986). More precisely, for the successive cohorts, we estimate the probability of a binary outcome: having studied in a *Grande École* ($GE = 1$) or not ($GE = 0$). Our univariate explanatory variable $X_{S,c}$ is surname dependent and is alternatively Hp_S, Hr_S, $G_{R,c,S}$ and $L_{GE,c,S}^{M,Gen-t}$ for the historical,

[26] When those with advantage A are a small group, the complementary set includes almost everyone and $AR_{GE,c,A'(S)}$ is close to the overall representation $AR_{GE,c}$. $RAR_{GE,c,A(S)}$ is in that case close to being related to the average admission rate in the society.

geographical, and lineal advantages. For the whole French population, we know the admission history in the *Grandes Écoles* and have information on advantages by surname. The estimated equation of the log-binomial model is:

$$\log[P(GE = 1|A(S), c)] = \alpha_c + \beta_{A(S),c} X_{S,c}$$

The $RAR_{GE,c,A(S)}$ is simply the exponential of $\beta_{A(S),c}$.[27]

5 Results

In this section, we show that, over the last century, noble families (section 5.1)—especially in the business schools—, Parisians (section 5.2)—even more so in the very recent period—, and descendants of graduates (section 5.3)—over multiple generations, particularly in the same school than their fathers—all benefited from greater admission prospects to the *Grandes Écoles* than the rest of the population. Section (5.4) characterizes the slow admission of women. The analysis, as most studies on mobility, is descriptive and we therefore perform bivariate analyses. As praised by Torche (2015), this constitutes a more appropriate choice outside a causal framework.[28]

5.1 Historical advantage: *Grandes Écoles*, the ball of aristocracy

In *The State Nobility: Elite Schools in the Field of Power*, Pierre Bourdieu (1989) argues that the GE serve as a legitimization process, suggesting an analogy between the modern elite and the *Ancien Régime* nobility. While some families kept notable real estate properties, aristocratic descendants have, for most part, lost their economic supremacy as exposed by de Saint-Martin (1993), although they were still about 5 times over-represented in the highest Parisian inheritances in the early 20$^{\text{th}}$ century (Piketty, 2020). de Saint-Martin (1993) also showed that noble families have been pursuing educational strategies, by selecting specific

[27] $\log[RAR_{GE,c,A(S)}] = \log[\frac{P_c(GE=1|A(S),c)}{P_c(GE=1|A'(S),c)}] = \log[P_c(GE = 1|X = 1)] - \log[P_c(GE = 1|X = 0)]$
$= \alpha_c + \beta_{A(S),c} X_{S,c}[= 1] - (\alpha_c + \beta_{A(S),c} X_{S,c}[= 0]) = \alpha_c - \alpha_c + \beta_{A(S),c}[1 - 0] = \beta_{A(S),c}$
$\Leftrightarrow RAR_{GE,c,A(S)} = exp(\beta_{A(S),c})$

[28] Yet, Appendix Table B.3 reports estimates from multivariate regressions. This is rather indicative and preferably rely on the bivariate analyses presented in the present section with respect to the historical, geographical, and lineal advantages.

schools, such as *Notre-Dame des Oiseaux* in Paris, a high school where 19% of students had particle surnames between 1976 and 1985. An over-representation of noble descendants was also identified in France in the private sector (Birnbaum et al., 1978) and in "elite" occupations and positions (Coulmont, 2019), as it was also shown by Dronkers (2003) for the Dutch case.

Table 3: Noble families in any of the 9 *Grandes Écoles*.

		Surnames with a particle 14,363 surnames - 4,184 students				French Nobility Association register 2,486 surnames - 1,943 students			
(1) Cohort	(2) Global admiss. rate	(3) Popula -tion share	(4) Share among students	(5) Group admiss. rate	(6) Relative admiss. rate*	(7) Popula -tion share	(8) Share among students	(9) Group admiss. rate	(10) Relative admiss. rate*
1891-1915	0.13%	0.36%	4.0%	1.4%	**11.6** [10.4-12.9]	0.12%	1.7%	1.9%	**15.1** [12.8-17.9]
1916-1940	0.14%	0.44%	4.3%	1.4%	**10.0** [9.1-11.0]	0.14%	1.9%	1.9%	**13.9** [12.0-16.0]
1941-1965	0.17%	0.48%	3.7%	1.3%	**7.9** [7.3-8.6]	0.15%	1.8%	2.0%	**12.0** [10.6-13.6]
1966-1990	0.25%	0.59%	3.6%	1.5%	**6.4** [5.9-6.9]	0.20%	1.7%	2.1%	**8.5** [7.6-9.7]
1971-1995	0.22%	0.59%	3.8%	1.4%	**6.6** [6.0-7.1]	0.20%	1.8%	2.0%	**8.9** [7.8-10.1]

Notes: *admiss.* stands for admission. This table reports our main measure of social reproduction—the relative admission rates—by cohort for the baseline 9 *Grandes Écoles* both for individuals bearing a surname with a particle, and for members of families registered at the French Nobility association. We also report the *population share* of these groups within the French "native" population, as defined in the text of the paper. The *share among students* consists of the share of individuals with noble ascendance among graduates from the 9 schools. The *Group admiss. rate* is the fraction of individuals with noble ascendance who enroll at one of the 9 schools. We recall that the *relative admission rate* is defined as compared to the rest of the population, i.e. all non-noble individuals. The *global admission rate* of the French population to the 9 schools is also reported. The number of *surnames* and *students* are reported across cohort for the whole period. *95% confidence intervals are reported between brackets.

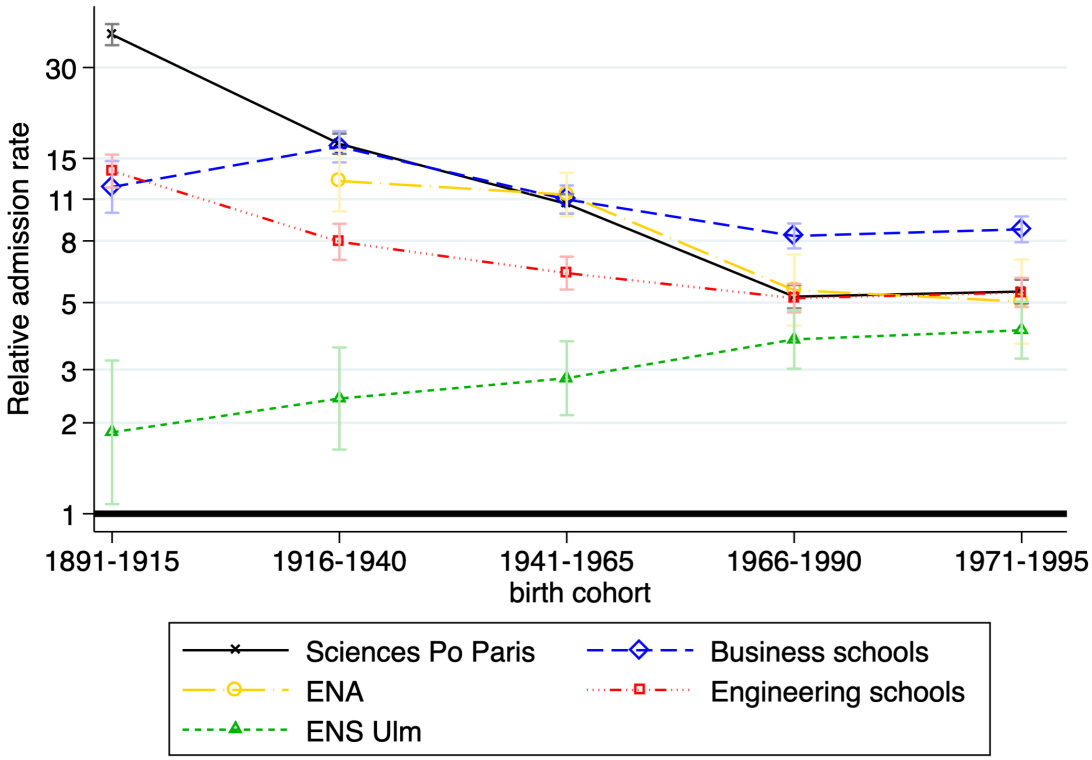
In this sub-section, we analyze whether this ancestral nobility enrolls at the GE significantly more than the rest of the population. Table 3 reports by cohort the relative admission rates to the baseline 9 *Grandes Écoles*—without *Sciences Po Paris*—of both the surnames with a particle and the families registered at the French Nobility Association. The second column recalls by cohort the global admission rate of the French population to the schools, between 0.13 and 0.25%. Columns 3 and 7 present by cohort the population share of each nobility group. Registered nobles are about three times less numerous than bearers of surnames with particles. Birthrates were relatively dynamic: one French native out of 278 bore a surname with a particle one century ago, against one out of 170 for the cohort 1966-1990.[29]

[29]This increase in population size is not due to the restriction to native surnames, although the magnitude would be slightly lower considering the full population.

Columns 4 and 8 show that noble families represent a quite stable share among admitted students over the whole period. Surnames with particles account for about 4% of the students, while students from registered families represent slightly less than 2% of the graduates for all cohorts. The stability is partly due to their increasing demographic weight, as young individuals from noble families experience stable admission rates (columns 5 and 9), while the admissions for the whole population increased (column 2). Indeed, about 1.5% of those with a particle in their surname and about 2% of the children of registered noble ascendance are admitted to one of the 9 prestigious *Grandes Écoles* of our baseline sample across the period. As a consequence of their stable admission rate and of the increasing admission rate in the rest of the population, the relative admission rates of noble families decline over the period. One century after the French revolution, the bearers of a surname with a particle born between 1891 and 1915 had 11.6 times the chances to be admitted to the French elite schools, and up to 15.1 times for those registered at the Nobility association. This historical advantage has progressively declined for each successive cohort. Yet, more than two centuries after the *Révolution*, descendants of nobles are still over-represented in the *Grandes Écoles*: 6.5 times for those with particle surnames and even 8.9 times for families registered at the French Nobility Association. While the magnitude of estimates for descendants of families registered at the French Nobility Association might be more accurate, as it defines nobility more precisely, both identifications conclude to a statistically significant remanence of the advantage of descendants of the French aristocracy in the enrollment at the most prestigious *Grandes Écoles* during the 20^{th} century.

Figure 1 presents a decomposition in school categories of the relative admission rate of noble families with a particle in their surname. We show that nobles used to be intensely over-represented a century ago at *Sciences Po Paris*—which was excluded from the results for the baseline presented just above—with as many as 38 times more chances to enroll for those born between 1891 and 1915. While nobles represented 0.36% of all births of this cohort, they constituted as much as 12% of the students at *Sciences Po Paris*. However, we also observe for *Sciences Po Paris* a steady decline of the RAR of nobles over the 20^{th} century. It becomes comparable to most of the other schools in the last cohorts, with slightly more than 5 times more chances to be admitted. We thereby extend previous findings by Coulmont (2019)—who exhibits the decreasing share of students bearing a particle surname at *Sciences*

Figure 1: Noble families in the *Grandes Écoles*, by school or school category.



Notes: This figure reports by birth cohort at different schools and schools' categories our main measure of social reproduction—the relative admission rates—for individuals with a particle in their surname. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate.

Po Paris since 1920—by relating the frequency of these surnames to their frequency in the French population. We observe that admissions to the *École Nationale d'Administration* (*ENA*) were also very favorable to nobles in the first decades after its foundation in 1945, with about 13 times more chances to enroll, but that the situation improved with a RAR of 5.0 for the cohort 1971-1995. Noble families are hardly significantly over-represented at the *École Normale Supérieure* at the beginning of the 20$^{\text{th}}$ century. However, this specificity progressively fades, and the over-representation of families of aristocratic ascendence at *ENS* becomes comparable to what it is for other schools. Finally, except for the first cohort, business schools constitute the category for which relative admission rates of individuals from noble families are the highest.

In an analysis of education reported in the *Who's Who in France* for individuals mostly born in the 1940s, de Saint-Martin (1993) finds that bearers of surnames with a particle

frequently studied at *ENA*, *Sciences Po Paris*, military schools and at law faculties. Her work also underlines that they favor business schools over scientific ones. By using more complete data over a longer timeframe, as well as relating it to the frequency of surnames in the population, our analysis strengthens the results for the cohorts born before 1966. It also shows that business schools are nowadays a stand-alone, while the over-representation of the descendants of the aristocracy at *Sciences Po Paris* and *ENA* converged to the same level than at engineering schools. Detailed results per school are presented in Appendix Table B.4, where we also provide the results for surnames registered at the Nobility association. It notably stresses out that *ESCP* and the catholic founded *ESSEC* are not homogenous in this dimension, as the RAR of registered nobles was 40.5 and 36.9 at *ESSEC* for the two first cohorts respectively, against 5.5 and 16.1 at *ESCP*. The advantage of noble families in the admissions to both schools has however converged since the cohort 1941-1965. As for engineering schools, we also find that *Polytechnique* and *Mines Paris* enrolled more nobles born in the first two cohorts than other schools.

5.2 Geographical advantage: Paris and its impassable gateways

Table 4 presents our findings for Parisian families. We first observe in columns 3 and 4 that the number of births in Paris is declining over the period, dropping from 6.67% of all births in 1891-1915 to 4.12% in 1966-1990. By contrast, Parisians are constantly over-represented in the schools. While their relative admission rates (column 8) were already of 9.3, 10.4 and even 12.6 in the three first cohorts, it doubled for those born after 1966, who had about 25 times more chances to be admitted to the prestigious *Grandes Écoles* than the rest of the French population. This over-representation has a very substantial influence on the social composition of the *Grandes Écoles*, as Parisians constitute more than one third to almost half of the students of the 9 baseline schools throughout all cohorts (column 6).

This phenomenon is to be linked to the structural evolution of the capital region over the 20th century, as the demographical weight of the capital city within the capital region has shrunk from 80% in 1880, to about 50% around 1950, and less than 20% nowadays, as we show on Figure A.4, accompanied by contextual comments. The historical migrations from and towards Paris underline the interest of our measure of geographical origin, which

Table 4: Parisian-born individuals in any of the 9 *Grandes Écoles*.

(1) Cohort	(2) Number of surnames	(3) Number of births	(4) Popula -tion share	(5) Number of students*	(6) Share among students*	(7) Group admiss. rate*	(8) Relative admiss. rate**	
1891-1915	128,453	705,190	6.67%	4,989	37.54%	0.7%	**9.3**	[8.3-10.4]
1916-1940	166,487	930,258	6.79%	7,899	41.14%	0.8%	**10.4**	[9.5-11.3]
1941-1965	159,330	1,098,642	5.89%	13,301	41.67%	1.2%	**12.6**	[11.5-13.7]
1966-1990	133,616	700,783	4.12%	20,185	47.56%	2.9%	**25.1**	[23.1-27.2]
1971-1995	133,616	700,783	4.12%	18,215	47.63%	2.6%	**25.2**	[23.2-27.4]

Notes: *admiss.* stands for admission. This table reports by cohort the *relative admission rates* of Parisian-born individuals at the baseline 9 schools. We also report by cohort the *number of surnames* with at least one birth in Paris, the *number of births* in Paris and the corresponding *population share*. *The number of Parisian versus non-Parisian students—and therefore *share among students* from the *Grandes Écoles* and *group admission rate*—are adjusted per surname with respect to the share of Parisian versus non-Parisian births and the estimated relative admission rate between Parisians and the rest of the population. Refer to Appendix C.4 for technical details on the computation. ** 95% confidence intervals are reported between brackets.

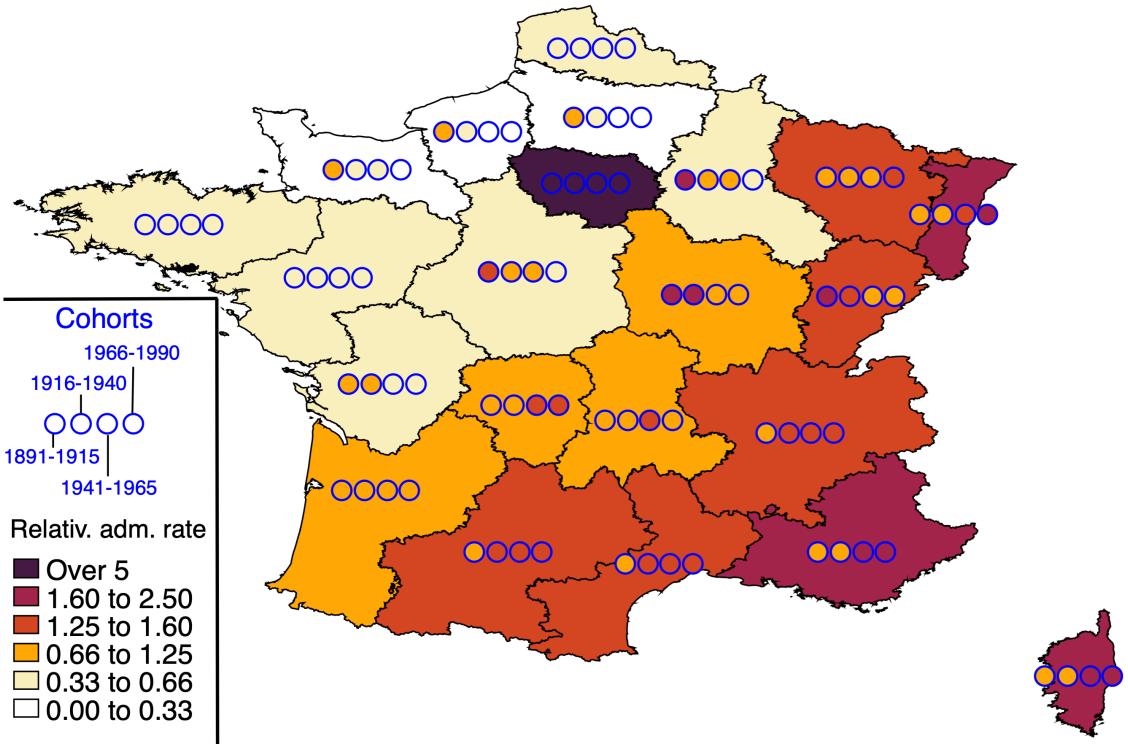
tracks the place of birth of individuals as being the important background characteristic. The sudden rise of the RAR of Parisians in the most recent cohort should at least partly be linked to the progressive gentrification of the city of Paris, implying that fewer families can afford to stay and have their children born there. Fostered by a sudden increase in house prices (Friggit, 2008), as well as the reduction in the number of persons per household (Rochas, 1994), the population of inner Paris indeed decreases rapidly from 2.8 million in 1960 to 2.2 million inhabitants in 1980, a level which has remained relatively stable since. We also show in Appendix Table B.5 that families born in Paris in the most recent periods had higher prospects of enrollment earlier in the century. This underlines that families who remained settled in Paris have had a higher socio-economic status since several generations.

Appendix Figure A.5 reports the relative admission rates of Parisians from Table 4 and contrasts it with the RAR of families born in Île-de-France (Parisian area) to the exclusion of inner Paris, as well as in the region as a whole. While the over-representation of those born in the Parisian region only scarcely increases (RAR estimates from 6.2 to 7.3 over the whole century), the large increase of the RAR for Parisians born since 1966 is concomitant with an important decrease for the suburban population (from 5.4 to 3.6), underlining the rising polarization between the capital city and the suburbs among people bearing native surnames. While Bonneau et al. (2021) exhibited, for the academic year 2016-2017 only, that about half of the students of *École Polytechnique*, *ENS Ulm* or *Sciences Po Paris* were

previously registered in a Parisian high school, our results show that this is not a recent phenomenon, and that it considerably increased at the end of the 20th century.

This clear Parisian hegemony has a corollary: the constant under-representation, over the last century, of those born in the rest of France, namely outside of the Paris area, which is generically called *Province*. Indeed, we observe a strong polarization of the French system, with Paris on the one hand, and the rest of the territory on the other.

Figure 2: Relative admission rates to any of the 9 *Grandes Écoles* by region of birth in metropolitan France: 1971-1995 cohort in font color and previous cohorts with traffic lights.



Notes: *relativ. adm. rate* in the legend stands for relative admission rate (RAR). The font color refers to the relative admission rate of the 1971-1995 cohort. The four successive "traffic-lights" refer to the RAR of the cohorts 1891-1915, 1916-1940, 1941-1965, and 1966-1990 respectively. With the positions of the traffic lights in each region as a reference, we find from North to South: *Nord-Pas-de-Calais*, *Picardie*, *Haute-Normandie*, *Basse-Normandie*, *Lorraine*, *Champagne-Ardenne*, *Île-de-France*, *Alsace*, *Bretagne*, *Centre*, *Pays de la Loire*, *Bourgogne*, *Franche-Comté*, *Poitou-Charentes*, *Limousin*, *Auvergne*, *Rhône-Alpes*, *Aquitaine*, *Midi-Pyrénées*, *Provence-Alpes-Côte d'Azur*, *Languedoc-Roussillon*, and finally the island of *Corse*.

The "*Province*", however, does not constitute a homogeneous set. Figure 2 shows a heatmap of admissions to the baseline 9 schools for the 22 metropolitan regions. The font color relates to the relative admission rates for the cohort 1971-1995, while the four "traffic lights" symbols refer to the successive cohorts between 1891 and 1990. This cartography high-

lights a clear north-east to south-west axis. The dynamics and the trend across cohorts highlighted by the "traffic lights" show that all regions to the northwest of a Strasbourg-Toulouse (north-east to south-west) axis experienced a decreasing representation in the *Grandes Écoles* over the period, e.g. from 0.97 for the cohort 1891-1915 to 0.18 for 1966-1990 in *Picardie*. This seems to indicate that the elites from the northern regions, geographically closer to Paris, were progressively drawn in the capital city. By contrast, the southern regions and the notable exception of *Alsace* in the North-East have been over-represented in the schools and have experienced a rise in their admission prospects for the more recent cohorts.[30]

As it appears in Appendix Table B.6, which provides detailed results by region and cohort, the over-representations for the cohort 1966-1990 of *Alsace* (2.1), *Corse* (2.0), *Provence-Alpes-Côte d'Azur* (1.9), *Languedoc-Roussillon*, (1.6) or *Rhône-Alpes* (1.5) remain however incomparable to the RAR of Parisians (25.1). For the most recent periods, our results are in line with Bonneau et al. (2021) on admissions to the most selective GE for the academic year 2016-2017, except for Corsica, which appears under-represented in their work.[31]

5.3 Lineal advantage: like (great-grand)father, like child in the *Grandes Écoles*?

A spontaneous way to think of social mobility and social reproduction is to link an achievement in a generation with the same achievement in the previous generation. We evaluate for the first time how descendants of *Grandes Écoles* graduates do perform at the same admission examinations, over generations. Table 5 summarizes the main results of access to any of the 9 prestigious *Grandes Écoles* from our baseline for children of graduates from any of these 9 schools. For the cohort 1891-1915, 14,619 sons and daughters (column 4) had a

[30] While all further cohorts were not concerned, those born in the first decade of the first cohort (1891-1915) in the German-annexed North-East territories of *Alsace-Lorraine* were probably not all potential applicants to the *Grandes Écoles*.

[31] Admissions of Corsican students may have reduced in recent years. But the gap between the two studies might more probably be explained by the different geographical trackers used. Possibly Corsicans enrolling at the *Grandes Écoles* transit through continental high schools. Or, bearing a Corsican surname could be associated with a lower probability to be born in Corsica among the GE graduates. Yet, our methodology producing original results on the long-run is comforted by the fact that most geographical results for our last cohort echo Bonneau et al. (2021)'s findings for admissions in 2016-2017. To further convince on the accuracy of surnames to identify geographical origin, Appendix Figure A.6 shows how well it identified the historical over-representation of individuals born around Lyon in the local business school (*EM Lyon*).

father born between 1866 and 1890 who bore one of the 5,502 identified surnames (column 3) and graduated from one of the 9 baseline schools.[32] 1,766 of those children were admitted to one of the GE (column 6). While the overall admission rate to the *Grandes Écoles* was of 0.13%, the success rate of graduates' children was 12.1% (column 2 and 8). This implies a substantial relative admission rate of children of graduates during the *Belle époque* (i.e. from the end of the 19$^{\text{th}}$ century to 1914): with 154 times more chances to be admitted to these prestigious schools (column 9). Although children of graduates constitute a narrow group, representing only 0.14% of the population for the first cohort (column 5), their presence in the schools is noteworthy: they account for as much as 13.3% of the students (column 7).

Table 5: Admissions to any of the 9 *Grandes Écoles* of children of graduates from any of the 9 *Grandes Écoles*.

(1) Cohort	(2) Global admiss. rate	(3) Number of surnames	(4) Number of births*	(5) Popula -tion share*	(6) Number of students*	(7) Share among students*	(8) Group admiss. rate*	(9) Relative admiss. rate**
1891-1915	0.13%	5,502	14,619	0.14%	1,766	13.3%	12.1%	**154** [127-187]
1916-1940	0.14%	8,602	31,205	0.23%	2,500	13.0%	8.0%	**81** [69-96]
1941-1965	0.17%	12,072	49,234	0.26%	4,483	14.0%	9.1%	**72** [63-83]
1966-1990	0.25%	16,651	49,542	0.29%	6,777	16.0%	13.7%	**75** [66-86]
1971-1995	0.22%	16,972	50,223	0.30%	6,503	17.0%	12.9%	**83** [73-96]

Notes: *admiss.* stands for admission. This table reports by cohort our main measure of social reproduction—the *relative admission rates*—to the baseline 9 schools for children of graduates from these 9 schools. The precise reading of each column is detailed in the notes of Tables 3 and 4. * As discussed in the notes of Table 4, technical details on the computations are presented in Appendix C.4. ** 95% confidence intervals are reported between brackets.

Those born between 1916 and 1940, whose fathers held a GE diploma were also highly over-represented in the 9 GE but their RAR was halved, with 81 times more chances to be admitted—between 69 and 96 at the 95% confidence level—, which is significantly lower than in the previous cohort. The following cohorts born in 1941-1965, 1966-1990, as well as the pseudo-cohort 1971-1995, also experience large over-representations in the schools with point estimates of their RAR at 72, 75 and 83 respectively, not statistically different from one another. The consequences on the composition of the *Grandes Écoles*' cohorts are

[32] With 7,996 fathers in the paternal generation bearing these 5,502 surnames, it corresponds to 1.83 children per graduate on average.

substantial. Across cohorts, children of graduates have represented between 13 and 17% of all admitted students, one individual every 6 to 8 students.

Social reproduction in the French *Grandes Écoles* is therefore characterized by a very high level for all cohorts of the past century, especially for those born during the *Belle Époque*. The magnitude of social reproduction substantially reduced for those born after World War 1, but it remained impressively stable for all subsequent cohorts. Depending on the birth cohort, a young individual born in France between 1916 and 1995 has between 72 to 83 times more chances to enroll at one of the 9 *Grandes Écoles* of our sample if his or her father did too.

The stability of intergenerational reproduction since 1916 in the very prestigious *Grandes Écoles* responds to Euriat and Thélot (1995)—for cohorts born in 1930-1970—and Falcon and Bataille (2018)—for births over 1918-1984—, who both identified a decreasing social reproduction using parental occupation as a background characteristic. Falcon and Bataille (2018) study a much wider, heterogeneous, and unstable set of GE, as acknowledged by the authors. While they conclude to a "clear equalization trend in access to the highest educational levels in France", we show that this has not operated at the extreme top of the educational distribution (top 0.18 to 0.36% including or not *Sciences Po Paris*). A complementary reason for our different findings is that our measure of paternal education in a *Grande École* is a sign of cultural capital, while parental occupation would rather relate to socio-economic inequality. Social origin may actually be less influential than cultural origin with respect to educational attainment, a result which was suggested by Thélot and Vallet (2000), who identify a stronger influence of parental diploma than of father occupation on education.

As a sensitivity analysis, Appendix Table B.7 provides comparable findings for the 10 schools including *Sciences Po Paris*, with only slightly lower point estimates. We also report in Appendix Table B.8 a series of robustness tests for our main estimates of relative admission rates to the 9 baseline schools. We show that both the trend and the order of magnitudes of our estimates are robust to a restriction to rarer surnames, for which we more precisely track lineages. Results are also robust to the inclusion of "immigrant" surnames, although the evolution is obviously more contrasted for the more recent cohorts when the schools

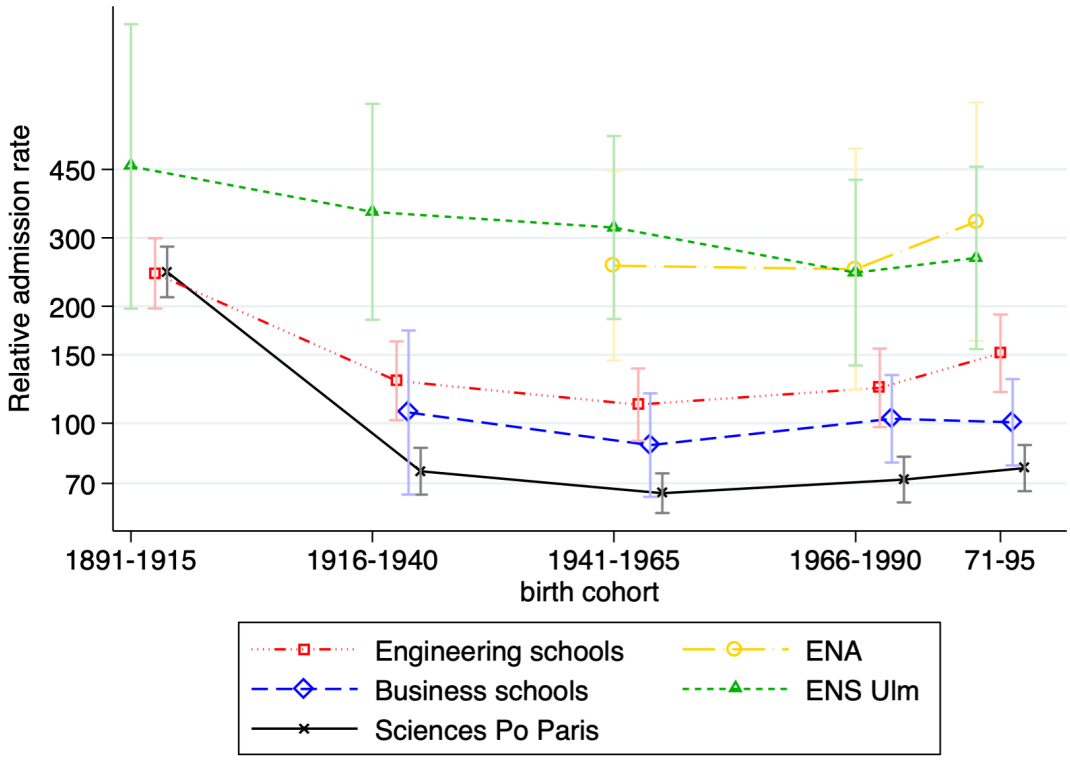
started to open much more widely to international students.

As we read on Appendix Table B.1, the weight of each school category has evolved over the last century, particularly for the business schools, which were absent from the first ancestors' generation. To verify that it does not explain the sharp drop in the RAR between the two first cohorts, we estimate separately the relative admission rates to one of the 9 *Grandes Écoles* when the father did study at an engineering school, at *École Normale Supérieure*, or at a business school. As a result, Appendix Table B.9 shows that graduates from all school categories provide very high admissions prospects to their offspring. However, the advantage is significantly lower for children of business schools' graduates born until 1966. The increasing share of business schools' students in our sample, and more generally as an important component of the French elite education, is responsible for part of the decrease in social reproduction between the two first cohorts. Still, this result is not imputable to composition effects, as a sharp decline of social reproduction between the two first cohorts is also observed for the children of graduates of engineering schools, who constitute the majority of the ancestors' sample in the very first cohorts. Regarding the *ENS*, however, the number of graduates is smaller and larger confidence intervals make the pattern less clear to analyze.

As the *École Normale Supérieure* is perceived as the very core of the French intellectual elite, it may appear surprising that children from *Normaliens* do not exhibit higher prospects of enrollment at the GE. The prestigious *Grandes Écoles* constitute a comprehensive elite system. Yet, we should consider that a large part of social reproduction could happen with descendants being admitted to the very same school in which their fathers studied.[33] Figure 3 reports RAR to the same school category where the fathers studied. The first striking result is that the relative admission rates are higher: there is a much larger social reproduction within each school or schools' category, than overall in the *Grandes Écoles*. While the RAR to the 9 GE of children of *ENS* graduates born between 1891 and 1915 is 93, the point estimate suggests that they had 458 times more chances than the rest of the population to enroll at *ENS Ulm* too.

[33]It may also partly explain the increasing RAR of descendants of business schools' graduates, for the admission to all 9 GE, as these schools represent an increasing share of the baseline, from 21% of the students for the cohort 1891-1915 to 42% for the cohort 1966-1990.

Figure 3: Lineal advantage for children in the same school category than their fathers.



Notes: This figure reports, by birth cohort, to different schools and schools' categories, the relative admission rates for children with a father who graduated from the same school or school category. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate.

Indeed, higher RAR are observed for all schools' categories, in all cohorts. We already stated that the over-representation at *Sciences Po Paris* of children from noble families born between 1891 and 1915 was extremely large. We also find that at that time, children of *Sciences Po*'s graduates were 245 times more likely to be admitted to the school. Having a father that studied at *Sciences Po* remains a considerable advantage across all cohorts. However, the advantage has decreased importantly, and is lower than what we observe for engineering schools, *ENS* or *ENA* since the 1916-1940 cohort. With respectively only 112 and 130 students per year in average, the confidence intervals for children of graduates from *ENA* or *ENS Ulm* are large and partly intersect with those of other schools. It remains notable that social reproduction is particularly high in these two schools. While Euriat and Thélot (1995) found that the admission to *ENS Ulm* is as unequal for cohorts born in the 1930s than for cohorts born around 1970 with respect to parental occupation, we find that point estimates of the RAR of children of *ENS Ulm* graduates rather decreased.

Although confidence intervals are too large to decisively conclude, relative admission rates progressively fell from 458, to 350, 319, and 244 chronologically for the four complete cohorts. On the contrary, Euriat and Thélot (1995) found a decreasing inequality in the admissions to *ENA*. Our point estimates of RAR to *ENA* of *ENA* graduates' children are relatively stable for the cohort 1941-1965 (254) and 1966-1990 (249), while the last pseudo-cohort, for which we observe students until 2015, would rather indicate an increasing intergenerational reproduction in the recent decade at *École Nationale d'Administration* (330).

We also confirm the clear drop of the RAR between the cohorts 1891-1915 and 1916-1940 for all schools that had ancestors at that time, albeit the difference is not significant for *ENS*. Although we cannot precisely disentangle the effects within the complexity of the channels of transmission, our results suggest that financial constraints may be less determining than cultural capital. Indeed, not only studying at *ENS* is nearly free, but students are paid by the State during the program. Yet, social reproduction is stronger than for the more expensive business schools. Economic capital may however play a non-neglectable role at different stages of the educational process, as for example regarding family location decisions and the quality of the closest schools.[34]

The descriptive statistics provided in Table 2 show that the number of graduates progressively increased, from 0.13% to 0.25% of the population. Did it influence the trend of mobility, in particular the sharp drop in social reproduction in the early 20$^{\text{th}}$ century? To answer the questions, we investigate social reproduction in a subset of schools with stable class sizes across all cohorts: the *École Polytechnique*, the *École Normale Supérieure* and the *École supérieure de physique et de chimie industrielles de la ville de Paris* (*ESPCI*). These three schools welcomed in average 0.07% of the population across the last century, ranging from 0.07% to 0.08% depending on the cohort. As they are among the most elitist schools—in terms of the number of enrolled students notably—, the RAR of descendants of their graduates, reported in Appendix Table B.10, are higher. More importantly, the decreasing pattern of the relative admission rates between the cohorts 1891-1915 and 1916-1940 is confirmed, plummeting from 210 to 121 (both being statistically different from one

[34] Poupeau and François (2008) show that familial strategies of avoidance of geo-affected public schools in specific districts make schooling segregation even stronger than residential segregation, suggesting that both economic resources and parental strategies interact in this intergenerational transmission.

another). Although the statistical power is limited for these small schools, the trend in the following cohorts appears however rather upward, with point estimates of the RAR being 137 (1941-1965), 158 (1966-1990) and even 181 (1971-1995).[35] Schools with stable number of annual admissions rather exhibit a U-shape pattern of intergenerational social reproduction over the last century, with higher advantages for cohorts born before the first World War and since the end of the *Trente Glorieuses* (1945-1973). Bearing in mind that those three schools may differ in some other dimension than the sole evolution of class sizes, the stability of intergenerational social reproduction in the *Grandes Écoles*, which we document throughout most of the 20$^{\text{th}}$ century, could have been favored by the increase of the class sizes. While this increase was very limited compared to the universities, opening new seats in the GE appears as one way to improve *qualitative democratization*.

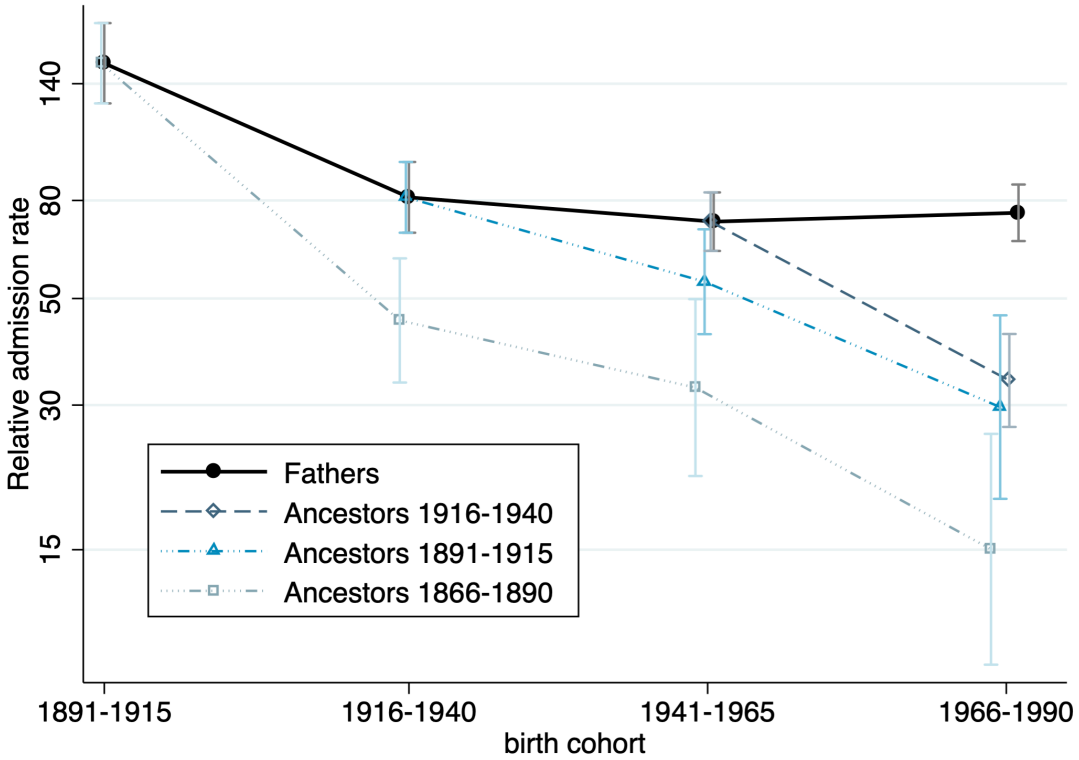
We may still wonder if there was something specific to the status of the fathers (born 1866-1890) of the first cohort (born 1891-1915), that may explain this specifically high RAR in the early 20$^{\text{th}}$ century. Do these fathers also offer very high prospects to their descendants two, three or even four generations later? Figure 4 presents a multi-generational perspective with the influence of fathers, grandfathers, great-grandfathers, and great-great-grandfathers on the admission to the 9 baseline *Grandes Écoles*. By construction, the first point of each multi-generational curve is common to the dark solid-curve representing fathers–children associations, which recalls uni-generational results reported in Table 5.[36] The lighter curve displays the RAR of descendants of the masculine ancestors born between 1866 and 1890. We already showed that their children had 154 times more chances to be admitted to one of the 9 schools. We now exhibit that their grandchildren remain advantaged, yet 3.4 times less, with 45 more chances to enroll. The RAR of their great-grandchildren born between 1941 and 1965 is still 33, while their great-great-grandchildren, born a century after them, still had 15 times more chances than the rest of the population to enroll at a *Grande École*.

In each cohort, the multi-generational transmission is lower than the fathers-children transmission. Yet, the decrease from uni-generational to multi-generational transmission

[35] Whereas the 1891-1915 to 1916-1940 decline is significant at the 2% level, the increase between 1916-1940 and 1971-1995 is only significant at the 11% level.

[36] Our dynastical setting does not abstract from the mediating role of intermediate generations. We measure the relative chances of those with a grand-paternal graduate, without removing the effect of parental education in the GE, such that we offer a direct measure of persistence in the long-run.

Figure 4: Dynastical lineal advantage for the admission to any of the 9 *Grandes Écoles*, for those with ancestors in any of the 9 *Grandes Écoles*.



Notes: This figure reports by birth cohort the relative admission rates to the baseline 9 *Grandes Écoles* for children with ancestors who graduated in different cohorts from these schools. Depending on the ancestor's birth cohort, they may be their fathers, grand-fathers, great-grand-fathers, or even great-great-grandfathers. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate. We do not report the 1971-1995 cohort because this pseudo-cohort is less suited for multi-generational analysis.

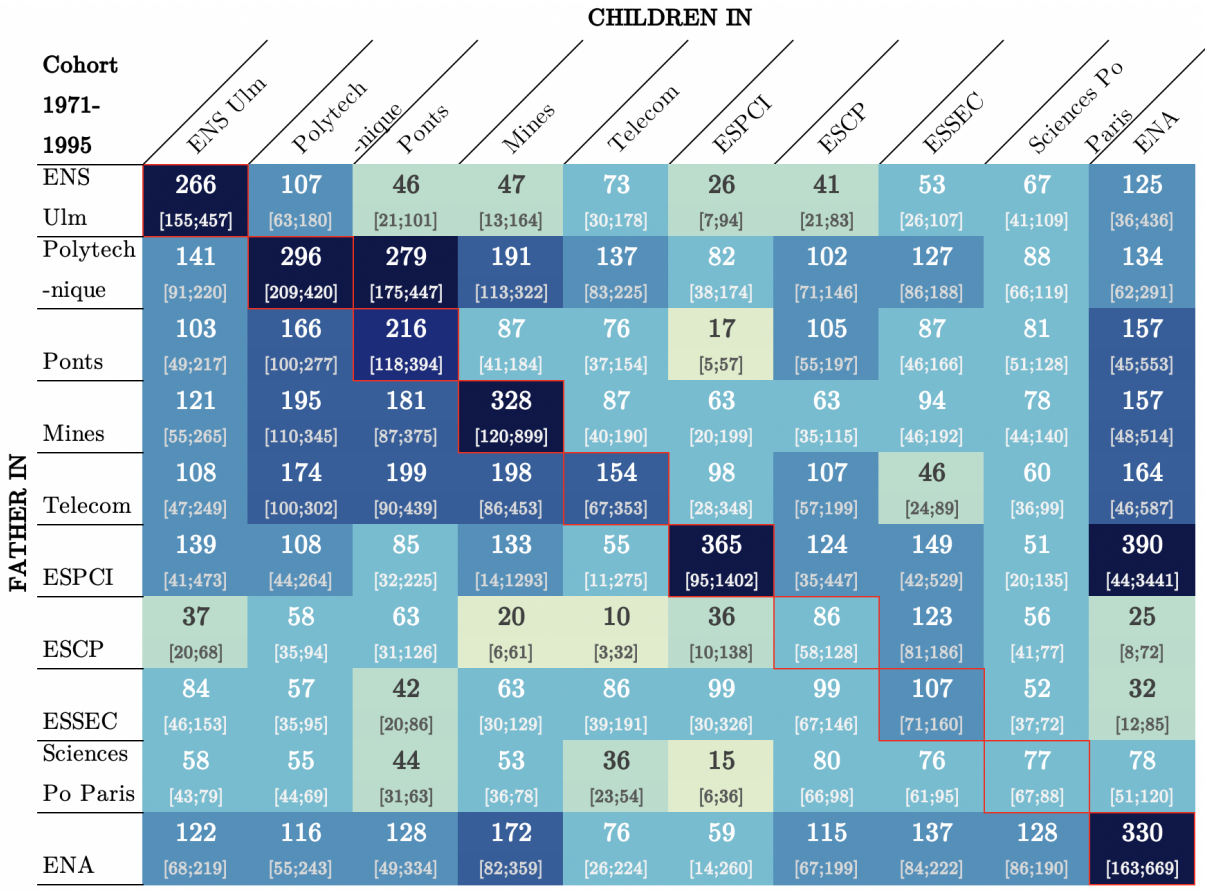
is more moderate for the more recent cohorts of ancestors. The graduate ancestors born in 1891-1915 offered RAR of 81, 54 and 30 to their children, grandchildren, and great-grandchildren respectively—namely simply 1.5 times lower for grandchildren compared to children. The children and grandchildren of graduates born in 1916-1940 had respectively 72 and 34 times more chances to enroll a *Grande École*. Overall, across cohorts, two to three generations after its ancestor, a descendant of a graduate from the *Grandes Écoles* still had 30 to 54 times more chances than the rest of the population to study in a *Grande École*. First, this shows that the very high fathers–children transmission of the first cohort is indeed very peculiar, and not transmitted in comparable magnitudes to later descendants. Secondly and more importantly, it constitutes evidence of a very persistent multigenerational over-representation of families in the French elite schools, who constitute educational dynasties.

Finally, we deepen the characterization of intergenerational mobility between schools over the period. Table 6 is a heat matrix, which reports for the cohort born in 1971-1995, all relative admission rates to the school of origin (father) – school of destination (child) level. In lines, we read the RAR to each of the 10 schools, given that the father has studied in one particular school. In columns, we read the RAR in a given school depending on where the father studied. As we analyze admissions to a given school conditionally on fathers' graduation in a particular school, sample sizes are logically smaller. This is particularly true for the first cohort with less students, or for smaller schools such as *ESPCI*. With those limitations in mind, results in Table 6, combined with similar matrices for all cohorts in Appendix Tables B.11a, b, c, d are very informative regarding the structure of intergenerational transmission across schools.

We first confirm that descendants tend to mimic their ancestors: the diagonals are among the darkest areas across all cohorts, especially at *ENS Ulm*, *École Polytechnique* and *ENA*. As scientific schools are grouped on the upper-left part (*ENS Ulm* and engineering schools), and schools with a tradition of presentation skills (business schools, *Sciences Po Paris*, and *ENA*) on the bottom-right, we underline a wider dark area around the diagonal. We also observe the relatively specific status of *ESPCI*, which has lower intergenerational association with the other engineering schools. Indeed, *Ponts*, *Mines* and *Télécom* are much more linked to *Polytechnique*, as the best students at *Polytechnique* often continue their training in one of these applied engineering schools. While this may explain the link between these schools, the very strong intergenerational transmission between different engineering schools remains notable. Indeed, for cohorts born since 1941, it even provides higher advantages for the admission to *Ponts* if someone's father studied at *École Polytechnique* than at *École des Ponts* itself.

Besides, darker lines of Table 6 represent schools, whose graduates provide better prospects of enrollment to their offspring at several schools. We see that this is particularly the case of *ENA* and *École Polytechnique*. In contrast, darker columns exhibit schools, which are less accessible to those whose fathers did not study in any of the *Grandes Écoles*. This is notably the case of *Ponts*, *École Polytechnique* again, as well as business schools and *ENS Ulm* for the more recent cohorts. The matrices confirm that while social reproduction was extremely high at *Sciences Po Paris* one century ago and remained substantial over the whole period,

Table 6: School of origin – school of destination matrix of intergenerational social reproduction for children born in 1971-1995 of *Grandes Écoles*' graduates.



Notes: This heat matrix reports, for children born in 1971-1995, the relative admission rate to any given school from our sample (in columns) depending on the school where their father graduated (in lines). The darker the cell, the higher the RAR. 95% confidence intervals are provided between brackets below each estimate. Complementary results for previous cohorts are reported in Appendix Tables B.11a, b, c, d.

it was nevertheless among the lowest of all schools for those born after the first World War. Indeed, the penultimate column is very dark for the first cohort (Appendix Table B.11a) and lightens in the following cohorts (Appendix Tables B.11b, c, d). The relative homogeneity of estimates in *Sciences Po*'s column in all cohorts indicates that *Sciences Po Paris* is a school of destination for children of graduates, whatever the GE their father attended. By contrast, we notice that children of graduates from *Sciences Po Paris* are admitted to business schools with similar prospects than to *Sciences Po* itself, but that their RAR to engineering schools is noticeably lower for most cohorts.

Our mapping confirms what was documented by Bourdieu (1989), namely that rather

than registering in a university, the offspring of high social status families find a refuge in the prestigious but slightly less selective schools, when they are not admitted to *ENS*, *École Polytechnique*, or *ENA*. We also confirm the singularity of *ENS*: for all cohorts, we find that children of *ENS Ulm* graduates have a considerable advantage in the admission process to *ENS*, but less so to other schools, especially if we compare to children of engineering schools, or *ENA*, who enroll at any of the 9 GE with high prospects. Besides, an apparent improvement for those born in 1941-1965 compared to the cohort 1916-1940 suggests a relative early democratization of admissions to *ENA*. Nevertheless, parental education in the GE becomes much more linked to admission to the school for the cohort 1966-1990, and even more for the pseudo-cohort 1971-1995, highlighting an increasing closure of the *École Nationale d'Administration* in the most recent period. Except at *Sciences Po Paris*, where students are considerably more numerous, confidence intervals limit the significance of these results. Nevertheless, the set of matrices provides clear conclusions with respect to how much open are specific doors to the offspring of graduates. Indeed, for the cohort 1971-1995, those with a *Polytechnician* father are 296 [209-420] times more likely to be admitted to *Polytechnique*, while the relative admission rate to *Polytechnique* of children of *Sciences Po Paris*'s graduates is significantly lower (88 [66;119]), and more comparable to the one of children of ESCP's graduates (102 [71;146]).[37] Likewise, the relative admission rate to *École des Ponts* of a child born in 1971-1995 is 279 [175;447] if his or her father graduated from *Polytechnique*, but only 42 [20;86] if the father was a student at *ESSEC*.

5.4 Women: familial support but institutional conservatism

""Daddy gladly said: Simone has the brain of a man; Simone is a man". I was nevertheless treated as a girl", wrote Simone de Beauvoir (1958) in her autobiography *Mémoires d'une jeune fille rangée*. While her father declared that he would have registered her to *Polytechnique*'s examination if she was a man, she herself stated that she suffered from being hindered and forbidden to pursue a similar education than men. A crucial structural change across the 20th century in the *Grandes Écoles* is the slow generalization of the admissions of

[37] Le Bras (1983) provides a monography of admissions to *Polytechnique* in 1979. He showed that 25% of students had a *Polytechnician* in their extended family and that among graduates, children of engineers were 400 more likely than children of skilled workers.

women as it appears on Appendix Figure A.7, which reports for relevant school categories the share of feminine students by year of admission.

Only the *École Normale Supérieure* admits women across the whole period—in distinctive schools for men and women though until 1985. We observe several bursts in the admission of women, the first one being World War 1, when women replaced men in job positions, and when they also very sporadically infiltrated into some *Grandes Écoles*. From that time on, women were admitted to *Sciences Po Paris—École libre des sciences politiques* as it was known until 1945—, although the *baccalauréat* was required for them, when it was not the case for men. The Second World War constitutes a second shock, whose tangible effects remain however limited, except at *Sciences Po Paris*. In 1941, the examination for the admission becomes different according to gender. Consequently, women's admissions to the political institute collapses during World War 2. 1945 constitutes a pivotal year, as the French women finally gain voting rights. Now facing the same examination as men, their share at *Sciences Po* starts to expand. 1945 is also the year *ENA* is founded, and women are admitted right away, although they constitute less than 10% of the promotions until 1970. The last shock is indeed the early 1970s, when women are finally granted access to all *Grandes Écoles*. Their share in the business schools increases very rapidly and was slightly below 50% in the early 2010s. The representation of women at *Sciences Po* experiences a last boom in 1971, and it kept increasing until reaching around 55% since 2000. The increase of the presence of women was much slower in engineering schools, where they hardly reach 30% by 2015, and to a lesser extent at *ENA*, where only 3 promotions had more than 36% of women. Interestingly, the presence of women at *École Normale Supérieure* is suddenly declining in 1985, year of the merger of the *École Normale Supérieure de jeunes filles* dedicated to women and the *ENS Ulm* reserved to men.[38] This slow increase and persistent under-representation of women in most *Grandes Écoles*, even in the early 21st century, contrasts with the reversed gender gap in access to higher education, which is known for many developed countries (Buchmann and DiPrete, 2006, 2013), including France.

Pooling young boys and girls, we have shown that Parisians, descendants of the French nobility and children of graduates were over-represented in the French elite schools through-

[38] Ferrand et al. (1999) describe the enrollment of women at *ENS* during the period 1985-1990.

out the 20th century. Yet we wonder if there are heterogeneities between men and women with respect to these results? Besides, is the admission of women an opportunity for higher intergenerational social mobility? It is not relevant for this gender analysis to study the baseline schools all together because the share of women among students is too distinctive between schools. We may however scrutinize sub-groups that admitted women at comparable paces, such as business schools.

To compare men and women, we measure the relative admission rates of those with a given advantage A separately among the masculine population and among the feminine population. For instance, we relate admission rates of sons of graduates to admission rates of sons of non-graduates and compare that to the admission rate of daughters of graduates relatively to daughters of non-graduates. We find no real difference between boys and girls in the geographical inequalities, whatever the region, school, group of schools, or cohort. The only small noticeable gap is for the admission to *ENS Ulm* as being born in Paris was historically less of an advantage for girls than for boys, but we recall that there were two distinct institutions until 1985, one for men and one for women. A more distinctive dimension between boys and girls has to do with the historical advantage. Families of aristocratic ascendance have invested more in the admission of their sons to *Sciences Po Paris* (Figure 5a) and to business schools (Figure 5b), than they have for their daughters. This proves to be robust to a definition of nobility exploiting surnames with particles, or surnames registered at the French Nobility Association. It is a statistical demonstration of the gendered differences of treatment in these families documented by de Saint-Martin (1993), who reports for the middle of the 20th century that boys from the ancient nobility were sent to *lycées*, while high schools' reputation was considered too bad—"*mauvaise réputation*"—for women.[39]

The two schools where women enrolled the earliest, although less numerously than men, are *ENS Ulm* and *Sciences Po Paris*. Therefore, Figure 6 reports the relative admission rates of sons versus daughters of fathers[40] that studied at *Sciences Po Paris* (Figure 6a) or at

[39] Gender differentiated parenting was also described by Duru-Bellat and Jarousse (1996) without a focus on families of noble ascendance.

[40] Although women constitute only 1.3% of the graduates until 1971 (ancestors' generations) if we exclude *ENS* and *Sciences Po* students, we also deemed important to investigate the transmission from mothers. Data limitations on spouse names was however a decisive pitfall. We attempted to hand-collect spouse names with a focus on subsets of schools and periods, notably thanks to numerous wedding announcements in *Polytechnique* alumni's magazine (*La Jaune et La Rouge*), and to official administrative positions announcements in the

Figure 5: Gender differences in the aristocratic advantage for admissions to *Sciences Po Paris* and business schools.

(a) *Sciences Po Paris.* (b) Business schools.

Notes: This figure reports, by birth cohort, the relative admission rates to *Sciences Po Paris* (panel a) or at business schools (panel b) of men versus women, whose surnames are registered in the French Nobility Association. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate.

Figure 6: Admissions of sons against daughters of *Sciences Po Paris* graduates at *Sciences Po Paris*, and of sons against daughters of *ENS Ulm* graduates at *ENS Ulm*.

(a) *Sciences Po Paris.* (b) *ENS Ulm.*

Notes: This figure reports, by birth cohort, the relative admission rates to *Sciences Po Paris* (panel a) or at *ENS Ulm* (panel b) of men versus women, whose fathers graduated from the same school. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate.

Journal Officiel, often mentioning both maiden and married names when applicable. Besides the limited number of feminine students, we could at most collect spouse names for 50% of the observations of any given maternal cohort. Selection bias with respect to marriage, as well as weddings announcements, constituted an additional threat to the validity of this approach. Maternal transmission remains therefore unaddressed.

ENS Ulm (Figure 6b). There were more students at *Sciences Po Paris*, for which confidence intervals are smaller. Trends of the RAR for sons and daughters of graduates appear quite parallel, with no significant difference in the advantage for boys or girls. While it is less the case for the two gendered-separated institutions of *ENS*, there is also no significant difference of relative admission rates for sons or daughters of *ENS* graduates.

Relative admission rates to each of the 10 schools, for sons and daughters separately, are reported in appendix, whether their father studied in the same school (Appendix Table B.12a), or in any of the 9 GE (Appendix Table B.12b). Out of the 71 comparable pairs of estimates, only 3 differ significantly, one being irrelevant due to the infinitesimal number of students, and of women in particular, at *ESPCI*. For the cohort 1891-1915, while there was no difference between sons or daughters of *Sciences Po* graduates in the admission to *Sciences Po Paris*—first line of Appendix Table B.12a—, the advantage was significantly higher for daughters than it was for sons of graduates from the baseline 9 GE—first line of Appendix Table B.12b. This suggests that at that time, *Polytechnicians* could send their sons to *Polytechnique*, but their daughters were rather oriented where they could be admitted, and notably the *École Libre des Sciences Politiques* (*Sciences Po*). The other significant difference relates to sons of graduates from any of the 9 GE who had more chances to be admitted to *ENS Ulm* than daughters in the first cohort. But again, these were two distinct schools for boys and girls at that time. To the contrary, point estimates (although not statistically different) rather indicate higher RAR for daughters in the admission to *ENS Ulm* once the school was unified. Indeed, we also find higher point estimates of social reproduction for daughters of *Polytechnique* and *Ponts* graduates for all cohorts, as well as in most schools for the more recent pseudo-cohort born in 1971-1995. Differences with point estimates for boys are however not statistically significant.

These results indicate that sons and daughters of graduates have benefited from relatively comparable advantages. If anything, social reproduction in the *Grandes Écoles* could be slightly higher from fathers to daughters, than from fathers to sons. This could be one of the mechanisms contributing to the subtle non-significant upturn in social reproduction over the last decade. Indeed, if social reproduction is higher for daughters, the rise in the share of women among graduates mechanically increases the measure of social reproduction. Yet,

this is not the only factor, as we find a comparable subtle increase of social reproduction over the last decade for sons only, by comparing the last columns of Appendix Tables B.12a and B.12b. In any case, the increasing enrollment of women constitute a progress for gender equality.

6 Discussion

While the top *Grandes Écoles* (GE) constitute the royal way to top positions in both the public and private sectors in France, this paper provides the first estimations of intergenerational social reproduction in these schools, with a historical perspective over more than a century. Our baseline sample covers cohorts born between 1866 and 1995 and is constituted of graduates from 9 of the most selective and prestigious GE, accounting for the top 0.18% of the educational distribution in France. Although the reduction of inequalities is a stated objective of educational policies, we show that the meritocratic promises rooted in the French Revolution were not fully kept. There are remanences of history in the admissions to the *Grandes Écoles*, as families of aristocratic ascendance still enroll at significantly higher rates more than two centuries after the Revolution. Geographical disparities are also very prominent: being born in Paris provides 9 to 25 times better admission prospects over the last century, with an upsurge in recent decades following the gentrification of the capital city. These geographical differences indeed encompass socio-economic inequalities, with inner Paris being the extreme illustration. Admission rates of descendants of graduates from the most prestigious *Grandes Écoles* are also very high, relatively to the rest of the population. Those born between 1971 and 1995, whose father are graduates from the *École Nationale d'Administration* had 330 times more chances than the rest of the population to be admitted to *ENA* too. These advantages are dynastical, as descendants of graduates still have 30 to 54 times more chances to also study in a *Grande École*, two to three generations after their ancestor did. Rather than low social mobility overall, the present work provides evidence that the French elites succeed at securing the education of their offspring over several generations, with what we may call a "glass floor".

It is nevertheless worth adding that the *Grandes Écoles* are not the ugly duckling of

social reproduction in an otherwise perfectly mobile French schooling system. The access to the GE is a multi-step process and is very much the paroxysm of cumulative advantages or disadvantages over the course of childhood, from nursery school to tertiary education, as conceptualized by DiPrete and Eirich (2006). Moving back only one step ahead in the preparatory classes to the admission examination, François and Berkouk (2018) show that half of the students admitted to *École Polytechnique* in 2010 and in 2012-2014 come from two single preparatory classes, which already drastically select students at the end of high school.

While previous studies on long-term intergenerational mobility in France indicated a decline of inequalities in the access to higher education over the 20$^{\text{th}}$ century, using occupation as a background characteristic (Euriat and Thélot, 1995; Vallet and Selz, 2008; Falcon and Bataille, 2018), our results show that, after a *qualitative democratization* for cohorts born in 1916-1940 compared to those born in 1891-1915, social reproduction in the most prestigious *Grandes Écoles* remained very stable for all cohorts born since World War 1. If anything, intergenerational persistence of education is surreptitiously rising in the recent decades. This may partly be a mechanical consequence of the increasing admissions of women in the French elite schools, since social reproduction from fathers to daughters is possibly slightly higher than the one from fathers to sons. As defended by Bernardi et al. (2018) for the American case, the recent surge in higher education fees—a phenomenon also occurring in France to a lesser extent—may even foster increasing access inequalities in the short future.

Our results cannot be interpreted as the fact that the French *Grandes Écoles* are definitely not accessible to those who do not benefit from these advantages. If we show that across the past century, one third to one half of graduates are born in Paris, that students of noble ascendance roughly account for 0.5% of the population but about 4% of graduates, and that children of *Grandes Écoles* graduates are a very tiny minority but trust up to 17% of the admissions, there remains some degree of regeneration. But while the emphasis is often put on the few individual successes of upward mobility, to promote the meritocratic qualities of the *concours* for the admission to the *Grandes Écoles*, our work shows that French citizens do not share a common starting line. Most of the measures undertaken by the most prestigious schools over the past 20 years—*Convention d'Éducation Prioritaire* at *Sciences Po Paris*,

Cordées de la réussite, etc.—have targeted a very narrow base polarized at the bottom of the educational distribution (Oberti, 2013), without addressing a selection process, which proves to be structurally unequal. Besides, the abundant public funding allocated to the most prestigious *Grandes Écoles* compared to the universities, as well as the privileged access to the top positions offered to their graduates, must be examined at the light of the admission inequalities extensively exposed by this study.

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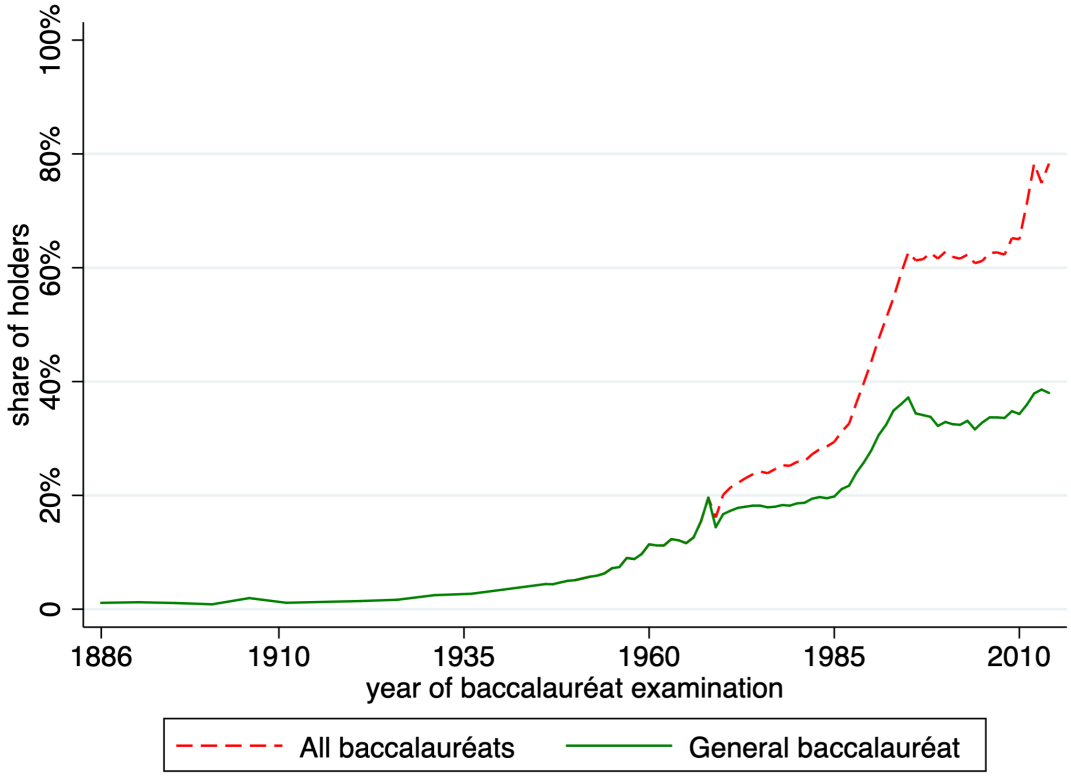
Appendices

A. Complementary figures

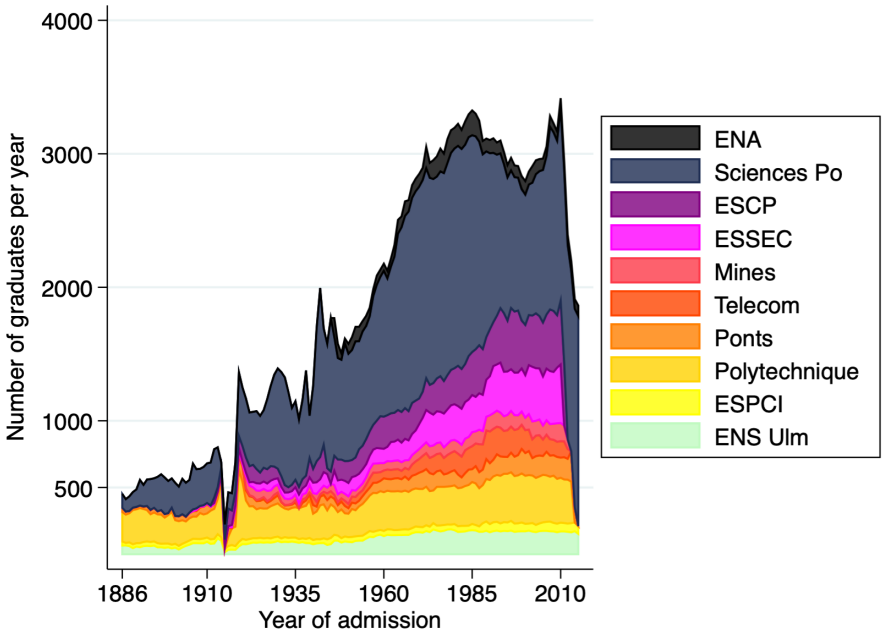
Figure A.1: Historical evolution of the share in the French population of *baccalauréat* holders, who constitute potential applicants to the *Grandes Écoles*.



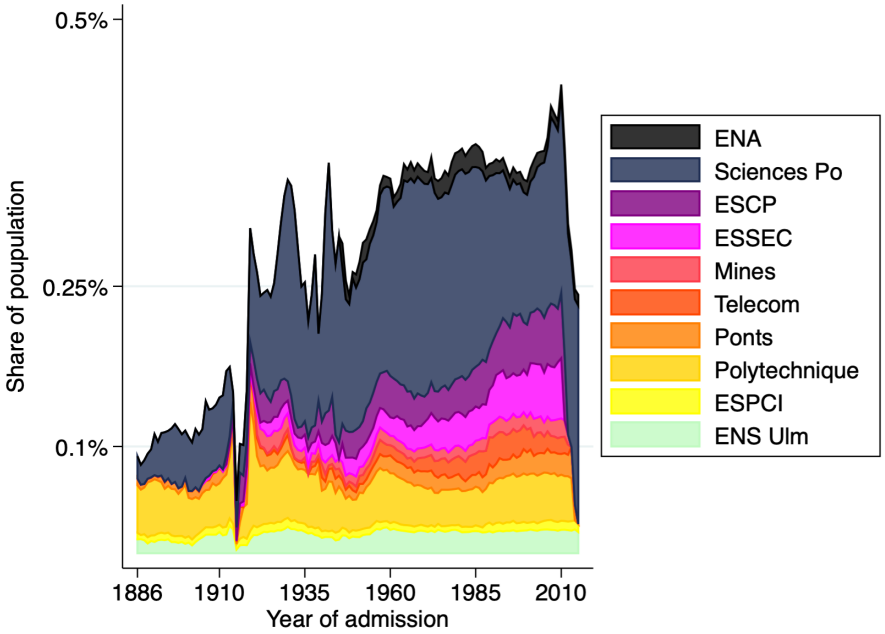
Notes: We report the share of *baccalauréat* holders for each year of examination from different sources. This provides a measure of the evolution of the population, statutorily entitled to apply to the preparatory classes to the *Grandes Écoles*, as holding a *baccalauréat* degree constitutes a necessary requirement. Until 1949, we exploit data from the Ministry of National Education—*L'évolution du nombre des bacheliers (1851-1979)*. From 1950 to 1969, data comes from the Ministry of Higher Education and Research—*Les évolutions de l'enseignement supérieur depuis 50 ans : croissance et diversification*. From 1970 onwards, we use data from `data.gouv.fr`—*La proportion de bacheliers dans une génération*. The drop in 1970 may therefore be explained by the change of data source.

Figure A.2: Evolution of the size of *Grandes Écoles* cohorts (1886-2015).

(a) Number of graduates.

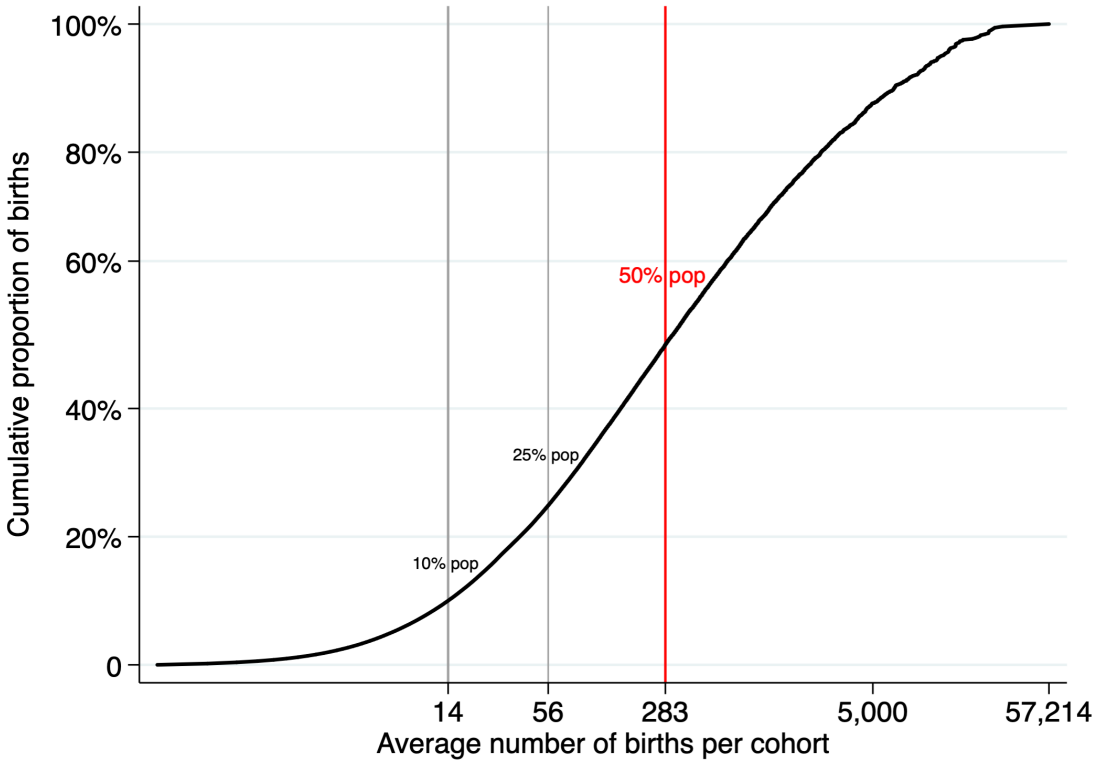


(b) Population share.



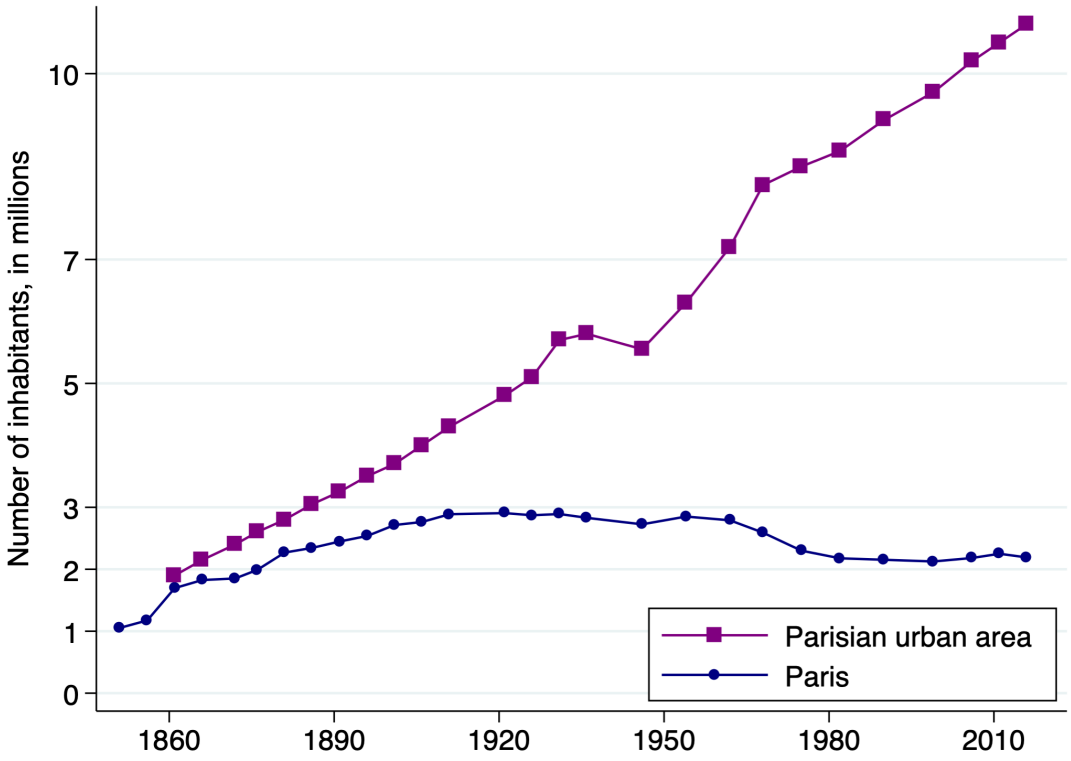
Notes: Panel (a) reports over time the evolution of the number of graduates in each school. Panel (b) reports over time the evolution of the share of the population admitted to each school. We stack for each year the number of graduates of the different schools, only including students with "native" surnames—as defined in section 3—, which are the ones considered in the study. For Panel (b), we then divide the number of graduates by the number of births per year at the national level provided by INSEE (https://www.insee.fr/fr/statistiques/4192361).

Figure A.3: Surnames' frequency in France.



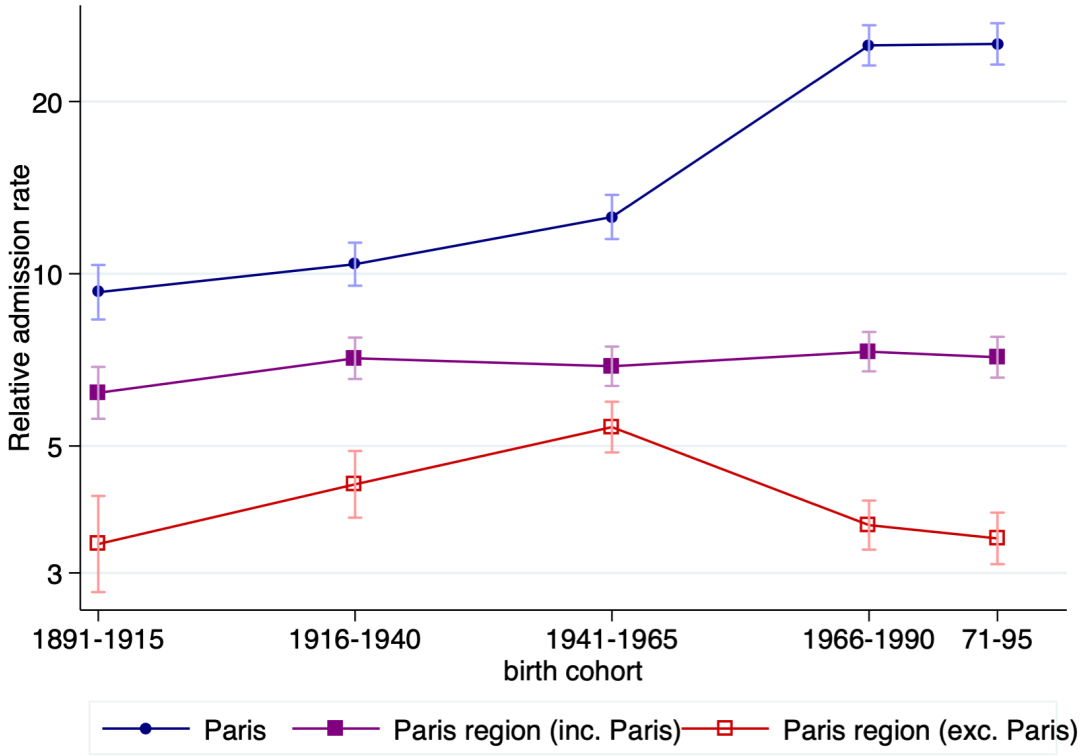
Notes: The figure is based on the number of births by surname per 25-year cohort averaged over the period 1891-1990. We use a logarithmic scale for the abscissa to emphasize the importance of rare surnames. While the number of births per cohort for a single surname ranges from 0.5 to 57,214 (*Martin*), the figure shows that surnames with less than 14 births per cohort account for 10% of all births over the period (*10% pop* vertical line). Surnames with at most 56 births per cohort account for 25% of the population (*25% pop* vertical line), whereas half of the population born between 1891 and 1990 had a surname with less than 283 births per cohort (*50% pop* vertical line). This only includes "native" surnames, as defined in section 3. Including all surnames, the 10%, 25% and 50% cut-offs would correspond to even rarer surnames, with averages of 11, 48 and 246 births per cohort respectively.

Figure A.4: Historical population of inner Paris and of the Parisian urban area (1850-2015).



Notes: This is a reproduction from *Paris Atlas Historique*: paris-atlas-historique.fr/resources/Croissance_population_Paris.png. Dots and squares correspond to dates with censuses. Until 1860, there is about no population in the surroundings of the capital city. Then, the demographical weight of the capital city within the capital region has shrunk from 80% in 1880, to about 50% around 1950, and less than 20% nowadays. Before World War 1, only the very limitrophe area around Paris (*la Petite couronne*) was significantly populated. This is only in the interwar years that the Parisian suburb really expanded. Despite a halt in rural exodus due to the 1929 crisis, the suburb has more inhabitants than the capital city since the 1930s. The phenomenon was reinforced during the *Trente glorieuses* (1945-1973) with numerous constructions, including the *villes nouvelles* project (new cities created in the suburb), which was accompanied by the express suburban train (RER). Fostered by a sudden increase in house prices (Friggit, 2008), as well as by the reduction in the number of persons per household (Rochas, 1994), the population of inner Paris decreased rapidly, from 2.8 million in 1960 to 2.2 million inhabitants in 1980, a level which remained relatively stable since. Both world wars were followed by large decrease in Parisian house prices, which were divided by 15 between 1900 and 1950. On the contrary, the second half of the 20th century sees a constant price increase. Housing in the suburb becomes more attractive, notably during a crisis of high prices in inner Paris between 1987 and 1995 (refer to Friggit, 2008 for more details).

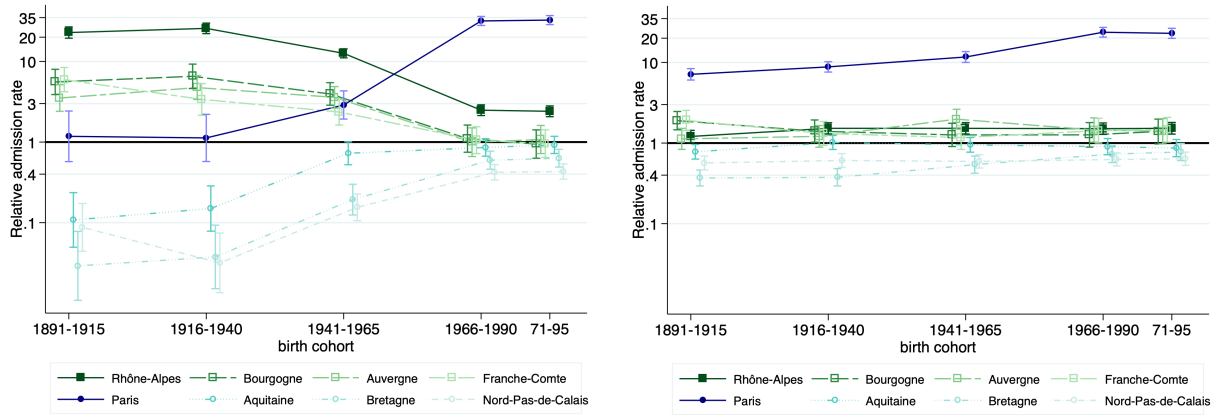
Figure A.5: Complementary results: relative admission rates to any of the 9 *Grandes Écoles* of individuals born in Paris, in the Parisian area, or in the Parisian area to the exclusion of inner Paris.



Notes: This figure reports by birth cohort the relative admission rates to the baseline 9 *Grandes Écoles* of children whose surnames indicate that they are born in Paris, in the Parisian region, or alternatively in the Parisian region to the exclusion of the city of Paris itself. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate.

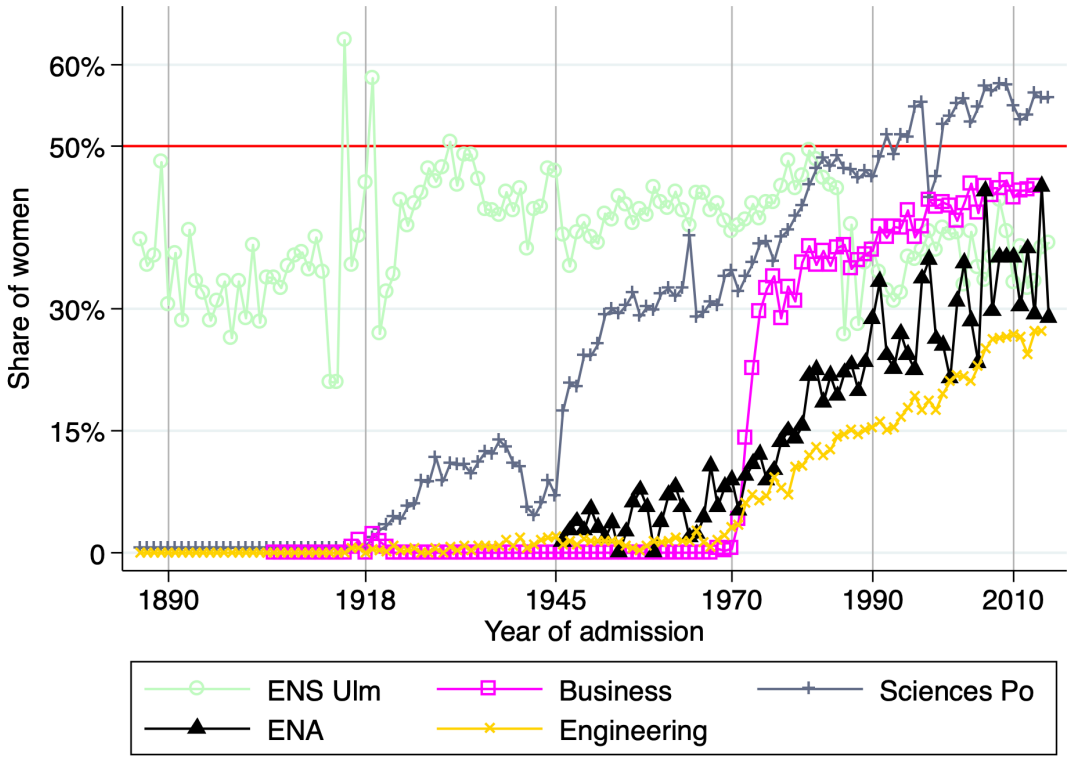
Figure A.6: Relevance of the geographical dimension of surnames: *EM Lyon*, the rise of a regional school.

(a) *EM Lyon*. (b) *École Polytechnique*.



Notes: Both figures report the relative admission rates, to *EM Lyon* (a) or to *École Polytechnique* for comparison (b), of people born in *Rhône-Alpes* (Lyon area), in the three surrounding regions of *Bourgogne*, *Auvergne* and *Franche-Comté*, but also in three regions distant from Lyon, namely *Aquitaine* (south-west), *Bretagne* (north-west), and *Nord-Pas-de-Calais* (north), as well as in inner Paris. Brackets refer to 95% confidence intervals. We use a logarithmic scale for the ordinate. We observe that the recruitment of *EM Lyon* was mostly regional for cohorts born in 1891-1915 or 1916-1940: Parisians were evenly represented in the school, while individuals born in *Rhône-Alpes* but also in the surrounding regions were highly over-represented. By contrast, individuals from distant regions were highly under-represented. The cohort 1941-1965 operates the transition towards what we observe in the schools of our baseline: Parisians become highly over-represented. At the same time, there is a convergence between regions, independently of their geographical proximity to Lyon, except for those born in *Rhône-Alpes* itself, whose prospects of admissions to *EM Lyon* remain higher than to *École Polytechnique*. Figure (b) indeed serves as a counterfactual, representative of the schools from our baseline sample, with *École Polytechnique* being located in the Parisian area. Registers of students at *EM Lyon* include 13,136 students born between 1891 and 1992. They are not included in any of the statistics in the paper besides the present figure. The regional dimension of the school until the recent cohort implied indeed that it was not historically comparable to the rest of our sample. The very high over-representation of students born in the area at *EM Lyon*, when the school did not benefit from a national reputation, underlines how accurately surnames identify regional origin.

Figure A.7: Share of women among enrolled students, by school category (1886-2015).



Notes: The figure reports by year of admission the share of women among students at each school or school category between 1886 and 2015. A small data manipulation is done to improve readability, as the share of women admitted to *ENS* in 1915 is actually a 100%. The school dedicated to men recruited no student that specific year. Anyway, until the reunification of the two gender-separated schools in 1985, the share of women at *ENS* rather constitutes a ratio of relative size between the two institutions.

B. Complementary Tables

Table B.1: Decomposition by cohort of the contribution of each school to the total number of graduates in the baseline sample.

Cohort	Polytech-nique	Ponts	ESPCI	Mines	Télécom	ESCP	ESSEC	ENS Ulm	ENA
1866-1890	67%	10%	10%	0%	1%	0%	1%	13%	0%
1891-1915	45%	10%	6%	7%	2%	15%	7%	15%	0%
1916-1940	31%	7%	5%	7%	5%	19%	12%	13%	9%
1941-1965	22%	8%	3%	6%	9%	19%	17%	13%	11%
1966-1990	20%	9%	4%	7%	10%	23%	20%	10%	4%
1971-1995	21%	10%	4%	7%	9%	22%	19%	11%	4%

Notes: The table reports by cohort the fraction of the total number of graduates in the baseline sample of the 9 *Grandes Écoles* attending each given school. By definition, lines sum to more than 100% because some students are counted multiple times in different schools, when they followed several curricula.

Table B.2: Historical, geographical, and lineal advantages: descriptive statistics.

Category of advantage	Variable	Mean (among positive)	Number of surnames	Population share
Historical	Particle_surnames_1891_1915	1.00	14,363	0.36%
Historical	Particle_surnames_1916_1940	1.00	14,363	0.44%
Historical	Particle_surnames_1941_1965	1.00	14,363	0.48%
Historical	Particle_surnames_1966_1990	1.00	14,363	0.59%
Historical	Particle_surnames_1971_1995	1.00	14,363	0.59%
Historical	Registered_nobility_1891_1915	1.00	2,486	0.12%
Historical	Registered_nobility_1916_1940	1.00	2,486	0.14%
Historical	Registered_nobility_1941_1965	1.00	2,486	0.15%
Historical	Registered_nobility_1966_1990	1.00	2,486	0.20%
Historical	Registered_nobility_1971_1995	1.00	2,486	0.20%
Lineal	Father_at_Sciences_Po_1891_1915	0.21	4,314	0.10%
Lineal	Father_at_Sciences_Po_1916_1940	0.21	7,666	0.18%
Lineal	Father_at_Sciences_Po_1941_1965	0.17	12,073	0.26%
Lineal	Father_at_Sciences_Po_1966_1990	0.12	16,837	0.28%
Lineal	Father_at_Sciences_Po_1971_1995	0.12	16,696	0.28%
Lineal	Father_at_ENA_1891_1915	0.00	0	0.00%
Lineal	Father_at_ENA_1916_1940	0.00	0	0.00%
Lineal	Father_at_ENA_1941_1965	0.10	1,527	0.03%
Lineal	Father_at_ENA_1966_1990	0.08	2,553	0.03%
Lineal	Father_at_ENA_1971_1995	0.07	2,450	0.03%
Lineal	Father_at_ENS_Ulm_1891_1915	0.08	909	0.02%
Lineal	Father_at_ENS_Ulm_1916_1940	0.09	1,047	0.02%
Lineal	Father_at_ENS_Ulm_1941_1965	0.10	1,274	0.02%
Lineal	Father_at_ENS_Ulm_1966_1990	0.07	1,980	0.03%
Lineal	Father_at_ENS_Ulm_1971_1995	0.08	2,118	0.03%
Lineal	Father_at_espci_1891_1915	0.10	678	0.01%
Lineal	Father_at_espci_1916_1940	0.11	700	0.01%
Lineal	Father_at_espci_1941_1965	0.12	707	0.01%
Lineal	Father_at_espci_1966_1990	0.06	798	0.01%
Lineal	Father_at_espci_1971_1995	0.06	838	0.01%
Lineal	Father_at_Polytechnique_1891_1915	0.12	4,012	0.10%
Lineal	Father_at_Polytechnique_1916_1940	0.13	4,530	0.11%
Lineal	Father_at_Polytechnique_1941_1965	0.11	4,625	0.09%
Lineal	Father_at_Polytechnique_1966_1990	0.08	5,436	0.08%
Lineal	Father_at_Polytechnique_1971_1995	0.08	5,410	0.08%
Lineal	Father_at_Ponts_1891_1915	0.12	733	0.01%
Lineal	Father_at_Ponts_1916_1940	0.11	1,165	0.02%
Lineal	Father_at_Ponts_1941_1965	0.11	1,285	0.02%
Lineal	Father_at_Ponts_1966_1990	0.07	2,226	0.03%
Lineal	Father_at_Ponts_1971_1995	0.07	2,307	0.03%
Lineal	Father_at_Télécom_1891_1915	0.10	50,	0.00%
Lineal	Father_at_Télécom_1916_1940	0.10	263	0.00%
Lineal	Father_at_Télécom_1941_1965	0.09	992	0.02%
Lineal	Father_at_Télécom_1966_1990	0.07	2,328	0.03%
Lineal	Father_at_Télécom_1971_1995	0.07	2,742	0.04%
Lineal	Father_at_mines_1891_1915	0.00	0,	0.00%
Lineal	Father_at_mines_1916_1940	0.14	885	0.02%
Lineal	Father_at_mines_1941_1965	0.10	1,211	0.02%
Lineal	Father_at_mines_1966_1990	0.07	1,704	0.02%
Lineal	Father_at_mines_1971_1995	0.07	1,832	0.02%
Lineal	Father_at_ESSEC_1891_1915	0.00	0,	0.00%
Lineal	Father_at_ESSEC_1916_1940	0.13	767	0.02%
Lineal	Father_at_ESSEC_1941_1965	0.10	1,947	0.03%
Lineal	Father_at_ESSEC_1966_1990	0.08	3,622	0.05%
Lineal	Father_at_ESSEC_1971_1995	0.08	3,764	0.05%
Lineal	Father_at_ESCP_1891_1915	0.00	0,	0.00%
Lineal	Father_at_ESCP_1916_1940	0.10	1,781	0.04%
Lineal	Father_at_ESCP_1941_1965	0.10	3,148	0.06%
Lineal	Father_at_ESCP_1966_1990	0.09	3,975	0.05%
Lineal	Father_at_ESCP_1971_1995	0.09	3,913	0.05%
Lineal	Father_at_9_GE_1891_1915	0.13	5,502	0.14%
Lineal	Father_at_9_GE_1916_1940	0.14	8,602	0.23%
Lineal	Father_at_9_GE_1941_1965	0.13	12,072	0.27%
Lineal	Father_at_9_GE_1966_1990	0.10	16,651	0.29%
Lineal	Father_at_9_GE_1971_1995	0.10	16,972	0.30%
Lineal	Father_at_Polyt_ENS_ESPCI_1891_1915	0.12	5,139	0.13%
Lineal	Father_at_Polyt_ENS_ESPCI_1916_1940	0.13	5,776	0.15%
Lineal	Father_at_Polyt_ENS_ESPCI_1941_1965	0.12	6,073	0.12%
Lineal	Father_at_Polyt_ENS_ESPCI_1966_1990	0.08	7,466	0.11%
Lineal	Father_at_Polyt_ENS_ESPCI_1971_1995	0.08	7,579	0.12%
Lineal	Father_at_Engineering_1891_1915	0.13	4,851	0.12%
Lineal	Father_at_Engineering_1916_1940	0.14	6,111	0.15%
Lineal	Father_at_Engineering_1941_1965	0.12	6,648	0.13%
Lineal	Father_at_Engineering_1966_1990	0.09	8,953	0.14%
Lineal	Father_at_Engineering_1971_1995	0.08	9,267	0.15%
Lineal	Father_at_Business_1891_1915	0.17	47,	0.00%
Lineal	Father_at_Business_1916_1940	0.11	2,390	0.05%
Lineal	Father_at_Business_1941_1965	0.11	4,636	0.09%
Lineal	Father_at_Business_1966_1990	0.09	6,531	0.09%
Lineal	Father_at_Business_1971_1995	0.09	6,507	0.09%
Geographical	Paris_1891_1915	0.31	128,453	6.7%
Geographical	Paris_1916_1940	0.33	166,487	6.7%
Geographical	Paris_1941_1965	0.24	159,330	6.0%
Geographical	Paris_1966_1990	0.19	133,616	4.0%
Geographical	IDF_without_Paris_1891_1915	0.23	80,121	4.4%
Geographical	IDF_without_Paris_1916_1940	0.26	128,547	5.8%
Geographical	IDF_without_Paris_1941_1965	0.27	169,828	8.4%
Geographical	IDF_without_Paris_1966_1990	0.30	204,127	12.3%
Geographical	IDF_with_Paris_1891_1915	0.38	153,281	11.1%
Geographical	IDF_with_Paris_1916_1940	0.42	211,547	12.6%
Geographical	IDF_with_Paris_1941_1965	0.39	221,707	14.4%
Geographical	IDF_with_Paris_1966_1990	0.38	231,765	16.3%
Geographical	Alsace_1891_1915	0.60	28,757	3.6%
Geographical	Alsace_1916_1940	0.44	31,901	3.1%
Geographical	Alsace_1941_1965	0.32	39,061	3.0%
Geographical	Alsace_1966_1990	0.24	50,309	3.0%
Geographical	Aquitaine_1891_1915	0.51	60,665	5.3%
Geographical	Aquitaine_1916_1940	0.44	75,742	5.2%
Geographical	Aquitaine_1941_1965	0.34	83,371	5.1%
Geographical	Aquitaine_1966_1990	0.28	86,829	4.8%
Geographical	Auvergne_1891_1915	0.32	28,899	3.3%
Geographical	Auvergne_1916_1940	0.28	37,832	3.1%
Geographical	Auvergne_1941_1965	0.22	45,090	2.9%
Geographical	Auvergne_1966_1990	0.18	43,986	2.5%
Geographical	Bassse_Normandie_1891_1915	0.28	26,047	2.6%
Geographical	Bassse_Normandie_1916_1940	0.26	37,126	3.0%
Geographical	Bassse_Normandie_1941_1965	0.21	39,275	2.9%
Geographical	Bassse_Normandie_1966_1990	0.17	41,953	2.7%
Geographical	Bourgogne_1891_1915	0.28	36,333	3.5%
Geographical	Bourgogne_1916_1940	0.25	49,623	3.3%
Geographical	Bourgogne_1941_1965	0.21	54,821	3.1%
Geographical	Bourgogne_1966_1990	0.18	56,857	2.9%
Geographical	Bretagne_1891_1915	0.50	38,366	6.8%
Geographical	Bretagne_1916_1940	0.41	44,434	6.4%
Geographical	Bretagne_1941_1965	0.30	48,602	5.5%
Geographical	Bretagne_1966_1990	0.23	60,007	5.4%
Geographical	Centre_1891_1915	0.29	41,643	4.4%
Geographical	Centre_1916_1940	0.26	55,252	4.3%
Geographical	Centre_1941_1965	0.21	65,290	4.2%
Geographical	Centre_1966_1990	0.17	71,649	4.0%
Geographical	Champagne_Ardenne_1891_1915	0.27	35,536	2.7%
Geographical	Champagne_Ardenne_1916_1940	0.25	50,197	2.8%
Geographical	Champagne_Ardenne_1941_1965	0.21	51,774	2.8%
Geographical	Champagne_Ardenne_1966_1990	0.18	53,068	2.6%
Geographical	Corse_1891_1915	0.48	6,696	0.9%
Geographical	Corse_1916_1940	0.35	7,357	0.6%
Geographical	Corse_1941_1965	0.20	8,481	0.4%
Geographical	Corse_1966_1990	0.14	11,517	0.4%
Geographical	Franche_Comte_1891_1915	0.30	25,086	2.3%
Geographical	Franche_Comte_1916_1940	0.27	31,116	2.2%
Geographical	Franche_Comte_1941_1965	0.21	34,715	2.1%
Geographical	Franche_Comte_1966_1990	0.18	38,392	2.0%
Geographical	Haute_Normandie_1891_1915	0.26	31,392	2.9%
Geographical	Haute_Normandie_1916_1940	0.24	45,006	3.2%
Geographical	Haute_Normandie_1941_1965	0.20	46,854	3.1%
Geographical	Haute_Normandie_1966_1990	0.17	53,334	3.2%
Geographical	Languedoc_Roussillon_1891_1915	0.39	33,371	3.6%
Geographical	Languedoc_Roussillon_1916_1940	0.36	42,705	3.2%
Geographical	Languedoc_Roussillon_1941_1965	0.25	50,593	2.9%
Geographical	Languedoc_Roussillon_1966_1990	0.18	62,806	2.8%
Geographical	Limousin_1891_1915	0.36	24,580	2.5%
Geographical	Limousin_1916_1940	0.28	27,257	2.0%
Geographical	Limousin_1941_1965	0.20	29,951	1.7%
Geographical	Limousin_1966_1990	0.16	28,907	1.3%
Geographical	Lorraine_1891_1915	0.44	54,335	4.9%
Geographical	Lorraine_1916_1940	0.38	70,673	4.8%
Geographical	Lorraine_1941_1965	0.31	76,670	4.6%
Geographical	Lorraine_1966_1990	0.26	73,170	4.3%
Geographical	Midi_Pyrenees_1891_1915	0.45	37,697	4.7%
Geographical	Midi_Pyrenees_1916_1940	0.39	53,518	4.5%
Geographical	Midi_Pyrenees_1941_1965	0.29	66,427	4.4%
Geographical	Midi_Pyrenees_1966_1990	0.23	69,695	3.9%
Geographical	Nord_Pas_de_Calais_1891_1915	0.54	55,755	7.9%
Geographical	Nord_Pas_de_Calais_1916_1940	0.49	83,065	7.5%
Geographical	Nord_Pas_de_Calais_1941_1965	0.43	79,546	7.5%
Geographical	Nord_Pas_de_Calais_1966_1990	0.37	78,371	7.2%
Geographical	PACA_1891_1915	0.47	55,406	4.3%
Geographical	PACA_1916_1940	0.42	79,077	4.2%
Geographical	PACA_1941_1965	0.31	98,439	4.5%
Geographical	PACA_1966_1990	0.26	117,907	5.3%
Geographical	Pays_de_la_Loire_1891_1915	0.33	38,687	5.5%
Geographical	Pays_de_la_Loire_1916_1940	0.29	49,596	5.8%
Geographical	Pays_de_la_Loire_1941_1965	0.24	54,563	5.9%
Geographical	Pays_de_la_Loire_1966_1990	0.20	63,060	6.0%
Geographical	Picardie_1891_1915	0.28	36,562	3.4%
Geographical	Picardie_1916_1940	0.27	55,174	3.3%
Geographical	Picardie_1941_1965	0.22	54,505	3.3%
Geographical	Picardie_1966_1990	0.18	57,970	3.1%
Geographical	Poitou_Charentes_1891_1915	0.34	33,172	3.6%
Geographical	Poitou_Charentes_1916_1940	0.29	40,897	3.5%
Geographical	Poitou_Charentes_1941_1965	0.23	46,909	3.4%
Geographical	Poitou_Charentes_1966_1990	0.18	47,061	3.0%
Geographical	Rhones_Alpes_1891_1915	0.44	62,094	7.8%
Geographical	Rhones_Alpes_1916_1940	0.43	87,324	7.9%
Geographical	Rhones_Alpes_1941_1965	0.35	101,839	8.3%
Geographical	Rhones_Alpes_1966_1990	0.30	119,458	8.9%

Notes: The table reports descriptive statistics on explanatory variables. We include the mean value of the variable among non-null observations, the number of surnames concerned by non-null values, as well as the population share concerned by each characteristic. For the lineal explanatory variables, the population share is adjusted as detailed in Appendix C.4. The last eleven characters of each variable name corresponds to the birth cohort. Lineal variables relate to fathers graduating from a school or group of schools, including the 9 baseline *Grandes Écoles* (9GE), and the set of schools with stable class sizes (Polyt_ENS_ESPCI). For the geographical variables, *IDF* stands for *Île-de-France* and *PACA* for *Provence-Alpes-Côte-d'Azur*.

Table B.3: Complementary results: risk ratios from a multivariate analysis of admissions to the 9 baseline *Grandes Écoles*.

	1891-1915	1916-1940	1941-1965	1966-1990	1971-1995
Historical: registered nobility	**8.2**	**6.4**	**7.0**	**3.7**	**3.8**
	[6,7-9,8]	[5,3-7,5]	[6-7,9]	[3,2-4,2]	[3,3-4,3]
Geographical: Parisian-born	**7.1**	**8.2**	**8.8**	**16.2**	**16.4**
	[6,3-8]	[7,4-8,9]	[8-9,7]	[14,7-17,7]	[14,9-18]
Lineal: children of graduates	**46.5**	**23.2**	**25.4**	**18.1**	**18.4**
	[35,3-61,2]	[18,3-29,2]	[21,3-30,2]	[15,2-21,4]	[14,9-22,5]

Notes: This table reports, by cohort, risk ratios of admissions to the baseline 9 *Grandes Écoles* for historical, geographical, and lineal advantages from a multivariate analysis. We provide exponential forms of estimates from Poisson regressions, as log-binomial estimations do not systematically converge with multivariate analyses. As 38 to 48% of graduates are Parisians across cohorts, having a father who graduated from a *Grande École* highly correlates with being born in Paris. This multivariate analysis is rather indicative. To properly describe the association of historical, geographical, and lineal characteristics with admissions to the *Grandes Écoles*, we rely on the bivariate analyses presented in Section 5.

Table B.4: Complementary results: historical advantage per school.

Cohort	Sciences Po Paris	ENA	ENS Ulm	ESPCI Paris	Polytech -nique	Ponts	Télécom Paris	Mines Paris	ESSEC	ESCP
Particle surnames nobility										
1891-1915	**38.5**	**-**	**1.9**	**3.2**	**15.0**	**8.4**	**6.3**	**18.0**	**34.2**	**4.0**
	[35.6-41.8]	-	[1.1-3.2]	[1.6-6.1]	[13.0-17.2]	[6.0-11.7]	[2.8-14.1]	[13.7-23.8]	[27.3-42.9]	[2.7-5.9]
1916-1940	**16.8**	**12.6**	**2.4**	**4.6**	**9.1**	**4.9**	**5.3**	**9.3**	**25.0**	**11.0**
	[15.5-18.1]	[10.0-15.9]	[1.6-3.6]	[2.9-7.4]	[7.8-10.7]	[3.3-7.1]	[3.5-7.9]	[7.0-12.4]	[21.4-29.1]	[9.3-13.0]
1941-1965	**10.6**	**11.4**	**2.8**	**6.3**	**6.8**	**6.8**	**4.0**	**5.4**	**11.1**	**11.1**
	[9.8-11.4]	[9.6-13.4]	[2.1-3.7]	[4.4-9.1]	[5.8-7.9]	[5.4-8.5]	[3.0-5.3]	[4.0-7.3]	[9.7-12.8]	[9.7-12.6]
1966-1990	**5.2**	**5.5**	**3.8**	**2.9**	**6.2**	**5.6**	**4.0**	**4.9**	**8.6**	**8.0**
	[4.8-5.7]	[4.2-7.2]	[3.0-4.7]	[2.0-4.3]	[5.4-7.1]	[4.6-6.8]	[3.3-5.0]	[3.9-6.2]	[7.7-9.7]	[7.2-9.0]
1971-1995	**5.4**	**5.0**	**4.1**	**3.2**	**6.2**	**6.2**	**3.8**	**5.4**	**9.2**	**8.3**
	[5.0-6.0]	[3.7-6.9]	[3.3-5.0]	[2.3-4.6]	[5.4-7.2]	[5.2-7.5]	[3.0-4.9]	[4.3-6.9]	[8.1-10.4]	[7.4-9.4]
French Nobility Association register										
1891-1915	**51.3**	**-**	**0.4**	**3.2**	**21.0**	**10.0**	**9.6**	**21.7**	**40.5**	**5.5**
	[45.5-57.9]	-	[0.1-3.1]	[1.0-10.1]	[17.1-25.8]	[6.0-16.8]	[3.1-30.0]	[14.2-33.0]	[28.7-57.1]	[3.1-9.9]
1916-1940	**23.1**	**16.9**	**3.8**	**4.9**	**11.1**	**6.2**	**7.6**	**9.0**	**36.9**	**16.1**
	[20.6-26.0]	[12.1-23.7]	[2.2-6.7]	[2.2-10.9]	[8.7-14.1]	[3.5-11.0]	[4.2-13.9]	[5.5-14.8]	[29.7-45.9]	[12.5-20.9]
1941-1965	**15.0**	**17.9**	**4.0**	**11.6**	**9.4**	**8.0**	**5.0**	**8.1**	**17.4**	**16.6**
	[13.3-16.8]	[14.3-22.6]	[2.7-6.1]	[7.3-18.7]	[7.4-12.1]	[5.6-11.5]	[3.1-7.9]	[5.1-12.8]	[14.3-21.2]	[13.7-20.1]
1966-1990	**6.6**	**6.2**	**5.3**	**4.2**	**8.3**	**7.3**	**5.1**	**7.7**	**12.1**	**10.2**
	[5.7-7.6]	[4.0-9.8]	[3.8-7.3]	[2.4-7.4]	[6.8-10.2]	[5.5-9.8]	[3.7-6.9]	[5.6-10.6]	[10.1-14.3]	[8.6-12.1]
1971-1995	**6.8**	**6.4**	**5.9**	**4.0**	**8.6**	**7.8**	**4.5**	**7.8**	**12.9**	**10.9**
	[5.9-7.8]	[3.9-10.6]	[4.4-8.0]	[2.3-6.9]	[7.0-10.5]	[5.9-10.3]	[3.2-6.5]	[5.4-11.3]	[10.7-15.4]	[9.1-13.0]

Notes: This table reports by cohort (lines) the relative admission rate to each given school (columns) of members of families bearing a surname with a particle (upper panel) or of families registered at the French Nobility Association (bottom panel). 95% confidence intervals are reported between brackets below each point estimate.

Table B.5: Complementary results: Parisian advantage across births' cohorts.

Cohort	Parisians born 1891-1915	Parisians born 1915-1940	Parisians born 1941-1965	Parisians born 1966-1990
1891-1915	**9.3** [8.3-10.4]	**13.4** [12.0-14.9]	**14.2** [12.8-15.9]	**23.7** [21.3-26.4]
1916-1940	**8.2** [7.4-9.1]	**10.4** [9.5-11.3]	**14.6** [13.4-16.0]	**25.8** [23.6-28.1]
1941-1965	**5.8** [5.2-6.4]	**7.9** [7.3-8.7]	**12.6** [11.5-13.7]	**30.5** [28.1-33.0]
1966-1990	**4.6** [4.2-5.1]	**5.8** [5.3-6.3]	**8.6** [7.9-9.5]	**25.1** [23.1-27.2]
1971-1995	**4.8** [4.3-5.3]	**5.7** [5.2-6.2]	**8.7** [7.9-9.5]	**25.2** [23.2-27.4]

Notes: Each column reports, by cohort of birth, the relative admission rates to the 9 baseline *Grandes Écoles* of families of those born in Paris in a given cohort. As an illustration, the last column reports, for each successive cohort, the RAR of those who bear the same surname as Parisians, who were (or will be) born in Paris between 1966 and 1990. This implies that while those born in Paris in 1891-1915 were 9.3 times over-represented in the GE, the ones whose descendants will be born in Paris 3 generations later were at that time 23.7 times over-represented. More generally, for any given cohort (rows), bearing a surname, that is more and more represented in Paris (moving from left to right within a given row) is associated with higher prospects of admissions. This suggests that the remaining Parisian families have a higher socio-economic status, while families of lower status progressively left Paris, possibly replaced by families of higher status. The increase of the relative admission rates to the *Grandes Écoles* for Parisians in the recent cohort is therefore a consequence of the gentrification process of Paris. Indeed, the over-representation in the GE of the families born in Paris since 1966 was already of comparable magnitude in the previous cohorts.

Table B.6: Complementary results: detailed results on the geographical analysis of admissions to the baseline 9 *Grandes Écoles*.

	Population share					Relative admission rate*									
Region	1891 -1915	1916 -1940	1941 -1965	1966 -1990	1971 -1995	1891-1915		1916-1940		1941-1965		1966-1990		1971-1995	
Paris	6.7%	6.7%	6.0%	4.0%	4.0%	**9.3**	[8.3-10.4]	**10.4**	[9.5-11.3]	**12.6**	[11.5-13.7]	**25.1**	[23.1-27.2]	**25.2**	[23.2-27.4]
Ile-de-France (inc. Paris)	11.1%	12.6%	14.4%	16.3%	16.3%	**6.2**	[5.6-6.9]	**7.1**	[6.5-7.7]	**6.9**	[6.4-7.5]	**7.3**	[6.8-7.9]	**7.1**	[6.6-7.8]
Ile-de-France (exc. Paris)	4.4%	5.8%	8.4%	12.3%	12.3%	**3.4**	[2.8-4.1]	**4.3**	[3.7-4.9]	**5.4**	[4.9-6]	**3.6**	[3.3-4]	**3.4**	[3.1-3.8]
Alsace	3.6%	3.1%	3.0%	3.0%	3.0%	**0.7**	[0.6-0.9]	**1.1**	[0.9-1.3]	**1.4**	[1.2-1.7]	**2.1**	[1.8-2.5]	**2.1**	[1.8-2.5]
Aquitaine	5.3%	5.2%	5.1%	4.8%	4.8%	**0.7**	[0.6-0.9]	**0.9**	[0.8-1.1]	**1.1**	[0.9-1.2]	**1.1**	[1-1.3]	**1.1**	[1-1.3]
Auvergne	3.3%	3.1%	2.9%	2.5%	2.5%	**1.1**	[0.9-1.4]	**1.2**	[1-1.5]	**1.5**	[1.2-1.8]	**1.1**	[0.9-1.5]	**1.1**	[0.8-1.4]
Basse-Normandie	2.6%	3.0%	2.9%	2.7%	2.7%	**1.0**	[0.7-1.4]	**0.6**	[0.4-0.7]	**0.4**	[0.3-0.5]	**0.3**	[0.2-0.4]	**0.3**	[0.2-0.4]
Bourgogne	3.5%	3.3%	3.1%	2.9%	2.9%	**2.0**	[1.6-2.4]	**1.6**	[1.3-2]	**1.1**	[0.9-1.3]	**0.9**	[0.7-1.1]	**0.8**	[0.6-1.1]
Bretagne	6.8%	6.4%	5.5%	5.4%	5.4%	**0.4**	[0.3-0.5]	**0.4**	[0.4-0.5]	**0.6**	[0.5-0.7]	**0.6**	[0.5-0.7]	**0.6**	[0.5-0.7]
Centre	4.4%	4.3%	4.2%	4.0%	4.0%	**1.3**	[1-1.6]	**1.1**	[0.9-1.4]	**0.8**	[0.7-1.1]	**0.5**	[0.4-0.7]	**0.5**	[0.3-0.6]
Champagne-Ardennes	2.7%	2.8%	2.8%	2.6%	2.6%	**2.3**	[1.9-2.9]	**1.1**	[0.9-1.4]	**0.7**	[0.6-1]	**0.5**	[0.4-0.7]	**0.5**	[0.4-0.7]
Corse	0.9%	0.6%	0.4%	0.4%	0.4%	**0.7**	[0.5-1]	**0.9**	[0.6-1.3]	**1.7**	[1.1-2.6]	**2.0**	[1.3-3.2]	**2.3**	[1.4-3.5]
Franche-Comte	2.3%	2.2%	2.1%	2.0%	2.0%	**2.1**	[1.7-2.6]	**1.5**	[1.2-1.8]	**1.2**	[0.9-1.5]	**1.2**	[0.9-1.5]	**1.3**	[1-1.6]
Haute-Norman	2.9%	3.2%	3.1%	3.2%	3.2%	**0.8**	[0.6-1.1]	**0.5**	[0.3-0.6]	**0.3**	[0.2-0.5]	**0.2**	[0.2-0.3]	**0.3**	[0.2-0.4]
Languedoc-Roussillon	3.6%	3.2%	2.9%	2.8%	2.8%	**1.2**	[1-1.5]	**1.5**	[1.2-1.8]	**1.6**	[1.3-1.9]	**1.6**	[1.3-2]	**1.5**	[1.2-1.9]
Limousin	2.5%	2.0%	1.7%	1.3%	1.3%	**0.7**	[0.6-0.9]	**1.1**	[0.8-1.4]	**1.4**	[1.1-1.8]	**1.3**	[0.9-1.7]	**1.2**	[0.8-1.6]
Lorraine	4.9%	4.8%	4.6%	4.3%	4.3%	**1.1**	[0.9-1.4]	**0.9**	[0.7-1.1]	**1.1**	[0.9-1.4]	**1.3**	[1-1.6]	**1.3**	[1-1.6]
Midi-Pyrenees	4.7%	4.5%	4.4%	3.9%	3.9%	**1.1**	[0.9-1.3]	**1.2**	[1.1-1.5]	**1.3**	[1.1-1.6]	**1.3**	[1.1-1.6]	**1.3**	[1-1.5]
Nord-Pas-de-Calais	7.9%	7.5%	7.5%	7.2%	7.2%	**0.6**	[0.5-0.7]	**0.5**	[0.4-0.6]	**0.5**	[0.5-0.6]	**0.5**	[0.4-0.6]	**0.5**	[0.4-0.6]
Provence-Alpes-Cote d'Azur	4.3%	4.2%	4.5%	5.3%	5.3%	**0.9**	[0.8-1.1]	**1.2**	[1-1.4]	**1.7**	[1.5-1.9]	**1.9**	[1.7-2.2]	**1.9**	[1.7-2.2]
Pays de la Loire	5.5%	5.8%	5.9%	6.0%	6.0%	**0.6**	[0.4-0.7]	**0.6**	[0.4-0.7]	**0.4**	[0.3-0.5]	**0.4**	[0.3-0.5]	**0.4**	[0.3-0.5]
Picardie	3.4%	3.3%	3.3%	3.1%	3.1%	**1.0**	[0.7-1.3]	**0.6**	[0.5-0.8]	**0.3**	[0.2-0.4]	**0.2**	[0.1-0.3]	**0.2**	[0.1-0.3]
Poitou-Charentes	3.6%	3.5%	3.4%	3.0%	3.0%	**0.7**	[0.6-1]	**0.7**	[0.6-1]	**0.5**	[0.4-0.7]	**0.4**	[0.3-0.5]	**0.3**	[0.2-0.5]
Rhone-Alpes	7.8%	7.9%	8.3%	8.9%	8.9%	**1.1**	[0.9-1.2]	**1.3**	[1.2-1.5]	**1.5**	[1.3-1.7]	**1.5**	[1.3-1.7]	**1.5**	[1.3-1.7]

Notes: This table reports by cohort (columns) the population share as well as the relative admission rates to the baseline 9 *Grandes Écoles* of those born in each of the 22 Metropolitan regions of France (lines). 95% confidence intervals for the RAR are provided between brackets at the right of each point estimate.

Table B.7: Complementary results: robustness to the inclusion of *Sciences Po Paris*. Admissions to any of the 10 *Grandes Écoles* of children of graduates from any of the 10 *Grandes Écoles*.

Cohort	Global admiss. rate	Number of surnames	Number of births*	Popula -tion share*	Number of students*	Share among students*	Group admiss. rate*	Relative admiss. rate**
1891-1915	0.23%	8,806	24,581	0.33%	5,767	24.3%	23.5%	**132** [119-148]
1916-1940	0.29%	14,276	55,174	0.55%	9,765	17.2%	17.7%	**59** [53-66]
1941-1965	0.37%	20,289	92,984	1.03%	11,539	26.1%	12.4%	**53** [48-58]
1966-1990	0.41%	27,341	92,616	1.02%	13,301	35.7%	14.4%	**55** [50-60]
1971-1995	0.38%	27,613	92,525	1.02%	13,920	37.3%	15.0%	**60** [55-66]

Notes: *admiss.* stands for admission. This table reports by cohort the relative admission rates to the 10 *Grandes Écoles* for children of graduates from these schools. We recall the *global admission rate* to the 10 schools in the general population. We also report by cohort the *number of surnames* with fathers in any of the 10 schools. * Also reported in this table, the *number of births* and the *number of students* corresponding to descendants versus non-descendants—and therefore the *shares* and *group admission rates*—are adjusted per surname with respect to the probability of the direct paternal link with the graduates in the ancestor generation and the RAR computed between descendants and non-descendants. Refer to Appendix C.4 for technical details. ** 95% confidence intervals are reported between brackets.

Table B.8: Complementary results: robustness of the lineal advantage.

(1) Cohort	(2) Main result (recalled)	(3) Inclusion of immigrant surnames	(4) 50% pop. with rarer surnames	(5) 30% pop. with rarer surnames	(6) 20% pop. with rarer surnames	(7) surnames ≤100 masc. births	(8) surnames ≤50 masc. births	(9) surnames ≤25 masc. births
1891-1915	**154** [127-187]	**142** [118-171]	**161** [132-195]	**157** [128-191]	**151** [123-185]	**161** [132-195]	**158** [129-192]	**156** [127-190]
1916-1940	**81** [69-96]	**57** [45-72]	**86** [73-102]	**84** [71-100]	**80** [67-95]	**86** [72-102]	**85** [71-100]	**83** [69-98]
1941-1965	**72** [63-83]	**57** [47-69]	**77** [67-88]	**74** [64-85]	**69** [60-80]	**76** [66-87]	**74** [64-85]	**70** [60-80]
1966-1990	**75** [66-86]	**36** [28-46]	**83** [72-94]	**78** [68-89]	**71** [61-81]	**81** [71-92]	**78** [68-89]	**72** [63-83]
1971-1995	**84** [73-96]	**60** [50-72]	**92** [80-104]	**86** [75-98]	**78** [67-89]	**90** [78-102]	**87** [75-99]	**79** [69-91]

Notes: *pop.* stands for population and *masc.* for masculine. This table reports by cohort our main measure of social reproduction—the relative admission rates—to the baseline 9 *Grandes Écoles* for children of graduates from these 9 schools. 95% confidence intervals are reported between brackets. The second column recalls the baseline estimates from Table 5. The third column provides similar estimates with the complete sample of students, including the bearers of surnames identified as immigrant ones. Columns 4 to 9 report results on sub-samples of rare surnames. Column 4 includes the rarer surnames that account for 50% of the total population, column 5 restricts to 30% of the population with rarer surnames, and column 6 to 20% of the population. Column 7 restricts to surnames with at most 100 masculine births in the cohort of interest, while columns 8 and 9 restrict to individuals bearing surnames with at most 50 and 25 masculine births per cohort respectively. The rarer the surnames, the more precisely we track lineages. Rarer surnames are also associated with higher social status. For instance, the 50% of the population with rarer surnames is 1.135 times more likely to be admitted to a *Grande École* for the cohort born in 1891-1915. Therefore, we adjust estimates according to the over-representation of each group of rare surnames. Trends and orders of magnitude of estimates from robustness tests are very comparable to our baseline results. Only for the inclusion of "immigrant" surnames do we find notable discrepancies for the more recent cohorts when the *Grandes Écoles* started to open much more widely to international students. For these surnames, we incompletely track the number of births per cohort and find newly appearing names in schools' registers, without properly relating them to a population size. Mechanically, the measured relative admission rates are slightly lower when including this mismeasurement.

Table B.9: Complementary results: admissions to any of the 9 *Grandes Écoles* of children of graduates from engineering schools, *ENS Ulm*, or business schools.

	Fathers in Engineering schools			Fathers in ENS Ulm			Fathers in Business schools		
Cohort	Popula -tion share*	Share among stud.*	Relative admiss. rate**	Popula -tion share*	Share among stud.*	Relative admiss. rate**	Popula -tion share*	Share among stud.*	Relative admiss. rate**
1891-1915	0.12%	10.93%	**143** [117-174]	0.02%	1.58%	**93** [47-183]	-	-	**-** [-]
1916-1940	0.15%	8.28%	**71** [59-87]	0.02%	1.50%	**83** [50-135]	0.07%	2.55%	**41** [29-56]
1941-1965	0.13%	7.26%	**66** [55-80]	0.02%	1.61%	**90** [61-131]	0.10%	3.80%	**43** [34-54]
1966-1990	0.14%	8.22%	**76** [62-92]	0.02%	1.40%	**59** [40-87]	0.12%	6.16%	**61** [51-75]
1971-1995	0.14%	9.25%	**88** [73-107]	0.03%	1.63%	**69** [47-100]	0.12%	6.40%	**65** [53-78]

Notes: *admiss.* stands for admission; *stud.* stands for students. This table reports by cohort the *population share*, *share among students* and *relative admission rates* to the baseline 9 *Grandes Écoles* for children of graduates from engineering schools, children of graduates from *ENS Ulm*, and children of graduates from business schools. * As discussed in the notes of Appendix Table B.7, technical details on the computations are presented in Appendix C.4. ** 95% confidence intervals are reported between brackets.

Table B.10: Complementary results: admissions to *Polytechnique*, *ENS Ulm* or *ESPCI* of children of graduates from the same schools.

		Fathers in *Polytechnique / ENS Ulm / ESPCI*		
Cohort	Global admiss. rate	Popula -tion share*	Share among students*	Relative admiss. rate**
1891-1915	0.08%	0.13%	15.66%	**210** [169-261]
1916-1940	0.07%	0.14%	12.51%	**121** [95-153]
1941-1965	0.07%	0.12%	11.89%	**137** [111-169]
1966-1990	0.08%	0.11%	12.42%	**158** [122-204]
1971-1995	0.08%	0.11%	13.28%	**181** [140-233]

Notes: This table reports by cohort the population share (*pop. share*), share among students (*share among stud.*) and relative admission rates (RAR) to *École Polytechnique*, *ENS Ulm* or *ESPCI* for children of graduates from these same three schools. We also provide the global admission rate to these schools, which is very stable across the period. * As discussed in the notes of Appendix Table B.7, technical details on the computations are presented in Appendix C.4. ** 95% confidence intervals are reported between brackets. 10% confidence intervals are as follows: 1891-1915 : 210 [175;252] ; 1916-1940 : 121 [99;148] ; 1941-1965 : 137 [115;163] ; 1966-1990 : 158 [127;195] ; 1971-1995 : 181 [146;223].

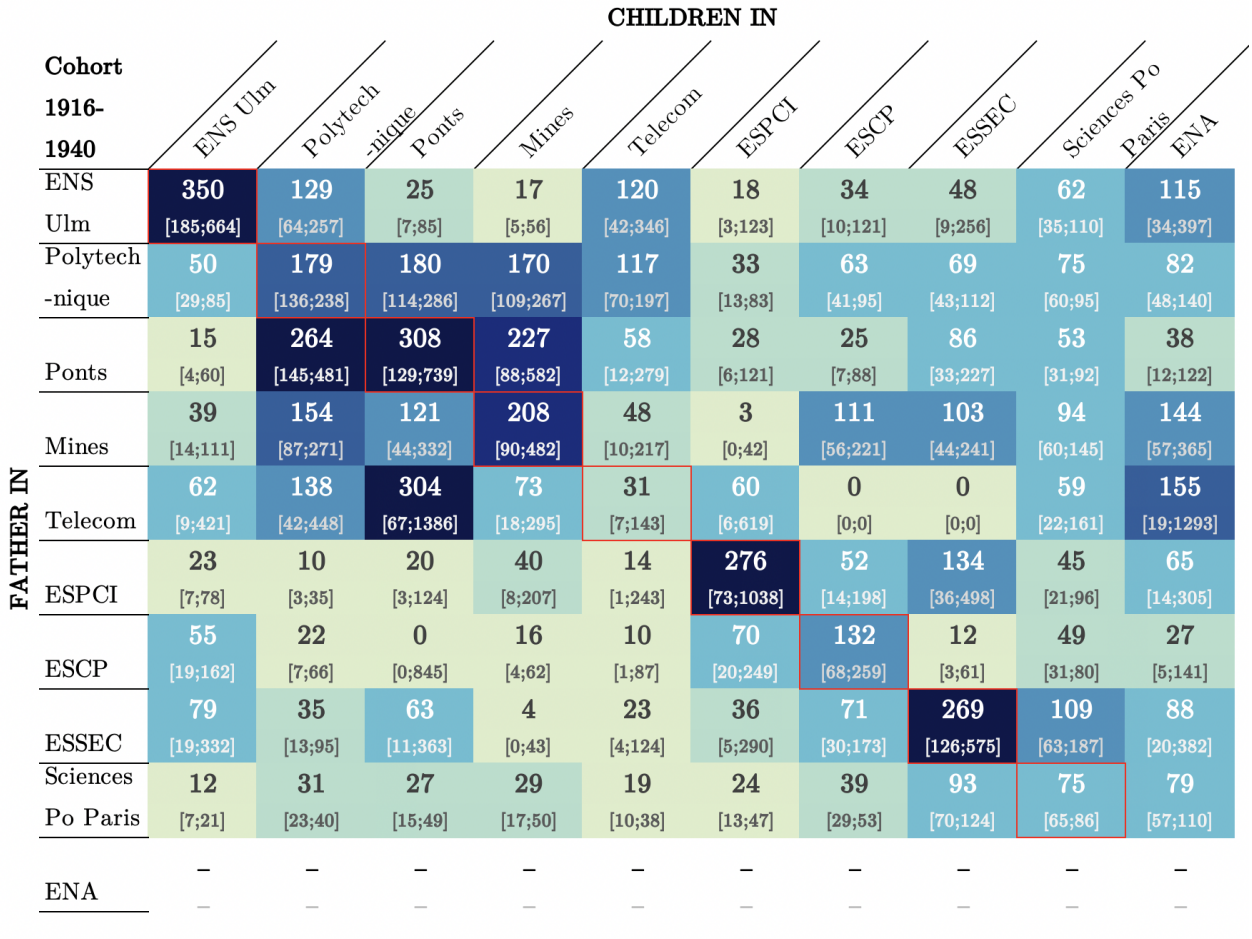
Table B.11: Complementary results: school of origin – school of destination matrices of intergenerational social reproduction for children of *Grandes Écoles*' graduates.

(a) Cohort of children born in 1891-1915.

Cohort 1891-1915 — FATHER IN \ CHILDREN IN	ENS Ulm	Polytech -nique	Ponts	Mines	Telecom	ESPCI	ESCP	ESSEC	Sciences Po Paris	ENA
ENS Ulm	458 [197;1064]	79 [38;164]	38 [13;108]	327 [117;918]	430 [65;2859]	47 [13;169]	6 [0;88]	0 [0;0]	135 [73;251]	–
Polytech -nique	56 [29;106]	309 [240;398]	267 [170;421]	396 [244;645]	264 [48;1455]	174 [78;390]	17 [6;48]	81 [41;159]	191 [152;240]	–
Ponts	6 [1;29]	180 [95;342]	367 [139;969]	434 [125;1505]	0 [0;0]	19 [4;82]	4 [0;36]	102 [22;486]	214 [129;356]	–
Mines	–	–	–	–	–	–	–	–	–	–
Telecom	–	–	–	–	–	–	–	–	–	–
ESPCI	2 [0;244]	46 [12;176]	39 [9;161]	0 [0;0]	2 [0;1585]	1166 [518;2627]	107 [25;448]	5 [0;108]	48 [17;138]	–
ESCP	–	–	–	–	–	–	–	–	–	–
ESSEC	–	–	–	–	–	–	–	–	–	–
Sciences Po Paris	12 [4;37]	59 [44;80]	67 [36;125]	145 [85;246]	4 [0;25]	21 [9;50]	20 [9;45]	165 [102;269]	245 [211;285]	–
ENA	–	–	–	–	–	–	–	–	–	–

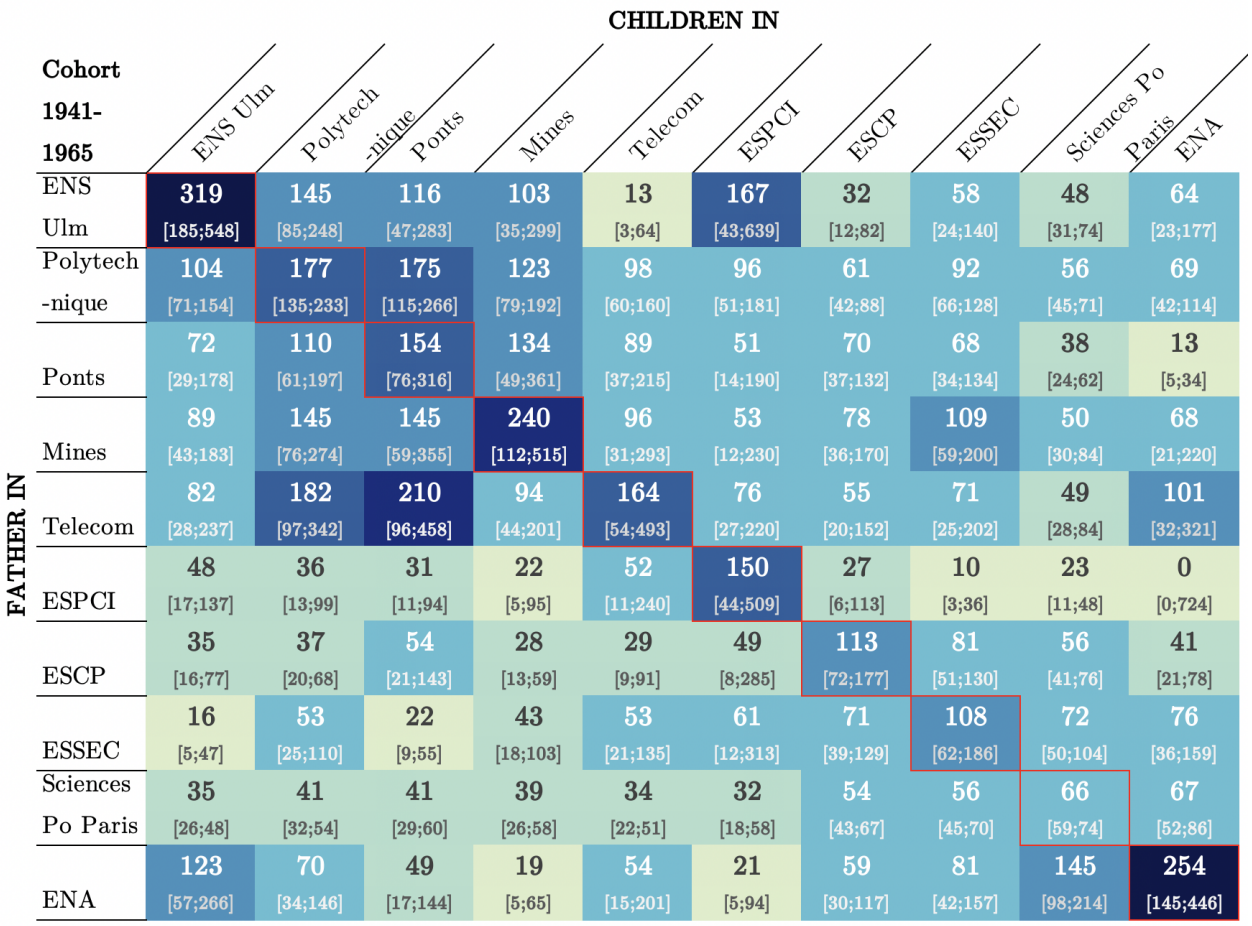
Notes: This heat matrix reports, for children born in 1891-1915, the relative admission rate to any given school from our sample (in columns) depending on the school where their father graduated (in lines). The darker the cell the higher the RAR. 95% confidence intervals are provided between brackets below each point estimate. The association with paternal schooling is not available for *Mines*, *ESCP*, *ESSEC*, *ENA* as there was no student in the first ancestors' cohort (born between 1866-1890). There were too few students at *Télécom* to provide relevant estimations. Besides, there is no student born between 1891 and 1915 at *ENA*, implying that the last column is also empty.

(b) Cohort of children born in 1916-1940.



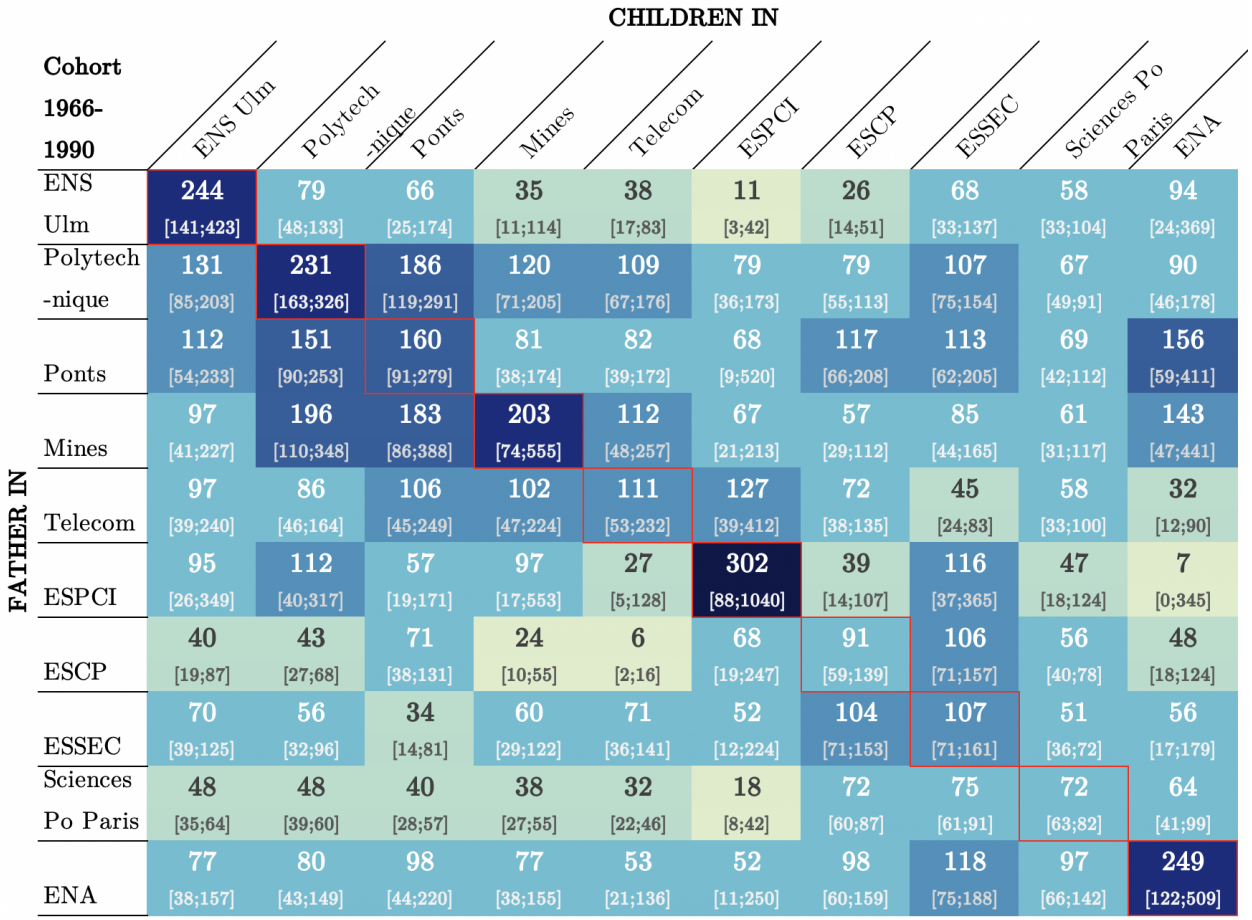
Notes: This heat matrix relates to children born in 1916-1940. The reading is similar to Appendix Table B.11a. The association with paternal schooling is not available for *ENA* as there was no student in the second ancestors' cohort (born between 1891 and 1915).

(c) Cohort of children born in 1941-1965.



Notes: This heat matrix relates to children born in 1941-1965. The reading is similar to Appendix Table B.11a.

(d) Cohort of children born in 1966-1990.



Notes: This heat matrix relates to children born in 1966-1990. The reading is similar to Appendix Table B.11a.

Table B.12: Complementary results: gender disadvantage, admissions of sons against daughters of graduates.

(a) In a given school, where the father graduated.

Grande Ecole		1891-1915	1916-1940	1941-1965	1966-1990	1971-1995
Sciences Po Paris	sons	**204** [179-234]	**72** [63-83]	**62** [55-71]	**76** [65-89]	**87** [75-103]
	daughters	**194** [121-313]	**77** [62-96]	**71** [61-82]	**67** [57-78]	**66** [56-78]
ENA	sons	**-** -	**-** -	**265** [147-477]	**265** [114-616]	**290** [124-678]
	daughters	**-** -	**-** -	**170** [63-458]	**213** [73-621]	**416** [144-1204]
ENS Ulm	sons	**639** [251-1624]	**495** [249-985]	**355** [203-620]	**228** [117-441]	**211** [108-413]
	daughters	**170** [44-658]	**135** [50-365]	**279** [129-607]	**274** [129-583]	**366** [189-709]
ESPCI	sons	**1190** [544-2602]	**305** [75-1242]	**34*** [8-153]	**435** [122-1551]	**555** [145-2123]
	daughters	**-** -	**50** [6-435]	**834*** [215-3234]	**37** [6-242]	**5** [0-7054]
Polytechnique	sons	**266** [210-338]	**173** [132-226]	**161** [123-212]	**219** [153-314]	**272** [187-395]
	daughters	**-** -	**-** -	**476** [200-1130]	**246** [150-403]	**361** [229-568]
Ponts	sons	**348** [134-900]	**304** [128-719]	**135** [63-291]	**132** [70-246]	**195** [96-396]
	daughters	**-** -	**-** -	**410** [87-1924]	**273** [122-613]	**287** [130-630]
Télécom	sons	**-** -	**31** [7-143]	**171** [56-521]	**108** [47-244]	**158** [64-388]
	daughters	**-** -	**-** -	**59** [19-189]	**121** [37-396]	**120** [39-366]
Mines Paris	sons	**-** -	**206** [89-474]	**245** [112-532]	**180** [51-636]	**292** [82-1035]
	daughters	**-** -	**-** -	**146** [43-493]	**275** [102-740]	**418** [155-1128]
ESSEC	sons	**-** -	**263** [125-555]	**112** [61-204]	**125** [78-203]	**93** [58-148]
	daughters	**-** -	**-** -	**72** [25-202]	**84** [45-154]	**123** [70-217]
ESCP	sons	**-** -	**130** [67-252]	**113** [69-185]	**88** [53-146]	**87** [54-141]
	daughters	**-** -	**-** -	**108** [47-247]	**93** [51-169]	**86** [49-149]

Notes: This table reports by cohort (columns) the relative admission rate to each given *Grande École* of sons versus daughters (lines), with fathers who studied in this exact school. We relate admission rates of sons of graduates to those of sons of non-graduates and compare that to the admission rate of daughters of graduates relatively to daughters of non-graduates. 95% confidence intervals are provided between brackets at the right of each point estimate in bold. * The stars identify significant differences between sons and daughters. It only concerns sons against daughters of *ESPCI* graduates born in 1941-1965 but this result is fragile due to the very small number of students at *ESPCI* (1,016 for this cohort, among which only 160 women).

(b) In a given school, while the father graduated from any of the baseline 9 *Grandes Écoles*.

Grande Ecole		1891-1915	1916-1940	1941-1965	1966-1990	1971-1995
Sciences Po Paris	sons	**136*** [111-166]	**62** [52-73]	**55** [47-64]	**53** [44-64]	**63** [52-76]
	daughters	**363*** [224-588]	**83** [64-108]	**64** [54-76]	**59** [48-71]	**63** [53-76]
ENA	sons	**-** -	**68** [45-103]	**64** [47-86]	**84** [52-134]	**84** [48-148]
	daughters	**-** -	**100** [12-827]	**87** [49-153]	**73** [36-147]	**84** [37-190]
ENS Ulm	sons	**123*** [70-217]	**80** [53-121]	**83** [60-114]	**77** [57-104]	**72** [53-97]
	daughters	**24*** [9-59]	**35** [18-68]	**85** [59-121]	**98** [68-142]	**130** [91-185]
ESPCI	sons	**258** [148-449]	**43** [22-85]	**61** [36-102]	**60** [31-115]	**47** [25-87]
	daughters	**-** -	**35** [7-179]	**153** [59-397]	**84** [44-161]	**100** [53-190]
Polytechnique	sons	**207** [166-259]	**121** [96-153]	**96** [79-117]	**99** [79-124]	**114** [90-143]
	daughters	**-** -	**-** -	**180** [86-377]	**147** [103-210]	**162** [114-230]
Ponts	sons	**214** [143-321]	**122** [83-181]	**89** [65-121]	**87** [63-119]	**98** [70-135]
	daughters	**-** -	**-** -	**228** [101-511]	**135** [81-225]	**169** [102-281]
Télécom	sons	**214** [51-906]	**72** [46-114]	**65** [46-92]	**52** [38-72]	**64** [45-91]
	daughters	**-** -	**-** -	**53** [17-167]	**77** [41-143]	**96** [47-196]
Mines Paris	sons	**296** [192-456]	**111** [76-163]	**82** [58-116]	**75** [51-110]	**98** [65-146]
	daughters	**-** -	**-** -	**71** [35-148]	**71** [40-126]	**93** [52-169]
ESSEC	sons	**65** [35-122]	**77** [55-108]	**73** [58-92]	**95** [75-120]	**90** [69-117]
	daughters	**-** -	**-** -	**82** [53-127]	**86** [68-110]	**102** [79-132]
ESCP	sons	**23** [10-52]	**68** [51-91]	**66** [51-85]	**84** [67-105]	**91** [71-116]
	daughters	**-** -	**-** -	**49** [29-80]	**71** [55-92]	**72** [56-93]

Notes: This table relates to admissions to each given *Grande École* of sons versus daughters, with fathers who graduated from any of the baseline 9 *Grandes Écoles*. The reading is similar to Appendix Table B.12a. Significant differences only concern sons against daughters of graduates born in 1891-1915 in the admission to *Sciences Po Paris* and to *ENS Ulm*.

C. Complementary Information

C.1 Complementary contextual details on the schools in our sample

Our sample corresponds to the schools, which are particularly relevant in the formation of the French elite—to the notable exception of the absent *HEC Paris* and *École Centrale Paris*, for which we could not collect data. The oldest school in our sample is *École nationale des Ponts et chaussées*, which dates back to 1747, and the more recently founded is *École Nationale d'Administration* (1945). As discussed in the paper, the 10 schools work together as a system of elite formation, but each one has its specificities. We broadly categorized the schools in three dimensions: schools of administration and research, engineering schools, and finally business schools. The two latter categories are self-evident, but the first one may be subject to debate. If *Sciences Po Paris* and *ENA* are strongly linked—the former serving as a preparation school for the later[41]—, *ENS Ulm* remains unique in many aspects. In any case, we never study these schools together in the paper. Tables 6 and B.11 rather suggest that, in terms of intergenerational social reproduction, *ENS Ulm* is more linked to engineering schools, than it with to *Sciences Po* or *ENA*.

We precede the presentation of each school's specificities below, with more general dimensions, common to several schools. As explained in section 2, a fundamental characteristic of the *Grandes Écoles* is the admission process through highly competitive examinations, called *concours*. They take the form of written tests as a first screening, followed for those eligible by oral examinations and interviews. This process takes place after two years of dedicated post-secondary school preparatory program—*classes préparatoires aux Grandes Écoles*.

Tuition fees used to be the exception until recent decades, being negligible in the beginning of our period of study in most institutions but the business schools. There are no fees at *ENA*, and they remain very limited at *ENS Ulm*. It was also inexpensive to study at *Sciences Po Paris* until the late 1980s, after which the increase was continuous, although combined with substantial options for grants. At *Sciences Po*, annual fees range nowadays from 0 to 18,000€ with an average around 6,000€. The five engineering schools of our sample are public institutions with limited tuition fees—historically almost free and costing approxima-

[41] 53% of students at ENA in our sample passed by *Sciences Po*.

tively 2,500€ per year in recent years—, except at the ESPCI, where studies remain fully subsidized. Like all business schools in France, the two in our sample are private institutions, and always had tuition fees.[42] They currently average around 15,000€ annually. Reductions and grants may however be provided conditionally on households' resources.

A specificity also concerns students of *ENA*, *ENS* and *École Polytechnique*, who have a status of civil-servant trainees. This comes during their education with a monthly payment, usually slightly over the minimum wage, implying for recent years about 16,000€ annually.

Grandes Écoles of administration and research.

Sciences Po Paris. *Sciences Po Paris*—originally *École libre des sciences politiques*—was founded in 1872 to train a new political elite, as the one in place was blamed for plowing France into an unwinnable war against Prussia (Suleiman, 1978). Its founder Émile Boutmy initially designed the school as a liberal private institution opposed to the traditional model of the *Grandes Écoles*. Yet, the school shares many characteristics with the other GE. In a momentum including the foundation of the *École Nationale d'Administration*, *Sciences Po* was partially nationalized in 1945 and divided in two distinct institutions, operating alongside since. The *Institut d'études politiques de l'université de Paris* is a public institution in charge of education. The *Fondation nationale des sciences politiques* is a private one, which manages administrative and financial matters. Since 2001, part of the recruitment is done through a dedicated affirmative action process, targeting pupils from Educational priority areas. The school appears as a pioneer in the movement towards more equality of opportunities. Students are trained in many different disciplines, including political science, humanities, law, sociology, economics, or history. Professional trainings have progressively emerged, notably in journalism, management, urbanism, or communication. Women were admitted to *Sciences Po* in 1919 for the first time.

École Nationale d'Administration (ENA). After several pre-existing attempts, notably one by the *Front Populaire*, the *École Nationale d'Administration*—a public school—was founded in 1945 to train senior civil servants. Its status is peculiar as it is attended slightly older, mostly after studies in another *Grande École*. Students are civil servant trainees and receive a payment during their education. Women may enroll the school since its foundation. Until 1978, *ENA* is hosted in a Parisian building owned by the *Fondation*

[42] Universities have since the 1950s a public competitor to business schools with the almost free curriculum in the *Institut d'Administration des Entreprises* (*IAE*).

nationale des sciences politiques, literally only separated by one garden from the facilities of the political science school. This illustrates the proximity of the two institutions, as *Sciences Po* designed specific preparatory programs for the preparation of *ENA*'s *concours*. In 1991, *ENA* is relocated in Strasbourg. About 100 students are trained in each promotion. They are ranked at the end of studies, and the 15 best ranked students (called *la botte*) may directly choose their assignment in the public service, and especially their *grands corps*.[43]

École Normale Supérieure (ENS Ulm). *École Normale Supérieure* was founded in 1794. This public institution is located rue d'Ulm in Paris since 1841, hence the usual reference to *École Normale Supérieure de la rue d'Ulm* to distinguish it from the other *ENS* in Cachan, Lyon, or Fontenay. Its mission is to provide an academic curriculum of excellence in science or humanities, in order to train researchers and professors. Since 1948, students have a status of civil servant trainee and should spend at least 10 years in serving the State—although this is not fully enforced. This is accompanied by a monthly payment during the years of education, that are counted in the 10-year service. In 1985, the school merged with the *École Normale Supérieure de jeunes filles*. The latter school was founded in 1881 and located in Sèvres until the German occupation of World Ward 2, and then moved to Paris in 1948. It was dedicated to training feminine professors.

Engineering schools.

École supérieure de physique et de chimie industrielles de la ville de Paris (ESPCI Paris). The municipality of Paris founded *ESPCI Paris* in 1882 and remained the supervisory institution since. The school is sometimes called *l'école des Prix Nobel* because although promotions are very small, six Nobel-prize laureates worked there: Marie and Pierre Curie, Frédéric and Irène Joliot-Curie, Pierre-Gilles de Gennes, and Georges Charpak. Although Marie Curie produced her research with her husband in the facilities of the schools, the first feminine students only enrolled in 1919, still being much in advanced compared to other engineering schools. Before a specialization in the last phase of the program, students of *ESPCI* receive a generalist scientific education both in physics and chemistry, as well as in biology since 1994. This pluridisciplinary approach was always a particularity of the school. There was also never any tuition fee charged to students.

[43] One may refer to Suleiman (1978) for a comprehensive study of the *grands corps*, which are official civil servant groups with corresponding status, positions, and salaries.

École Polytechnique. *École Polytechnique* is among the most prestigious schools in the world, and is usually simply referred as "*X*", an allusion to the mathematical symbol and to the crossed canon barrels of its military logo. The school was founded in 1794 and conserved until today the military status granted by Naopléon Bonaparte in 1804. It was instituted as a prerequisite to enter the *École des Ponts* or *École des Mines de Paris*, that served as *écoles d'application* (schools for applied engineering). Although the latter schools recovered direct accessibility later, *Polytechnique* has always provided a more general and "*poly-technician*" curriculum, and Polytechnicians still often spend one year of specialization in *Ponts*, *Mines*, *Télécom*, or other *école d'application*. The initial missions of *École Polytechnique* were rather oriented towards dissemination of science, and its graduates mostly worked in the public sector. After World War 2, the school adds a stated objective of training the industrial elite. It is for instance the most effective curriculum to become either administrator of the French National Statistical Institute (INSEE), or CEO of the major French companies, as detailed in section 2. Located in Paris until 1976, the school then moved to a campus in Palaiseau, in the Parisian suburb. Women are admitted since 1972.

École nationale des Ponts et chaussées. *École nationale des Ponts et chaussées* was founded in 1747. As its name suggests, it was designed to train engineers for the construction and development of bridges (*ponts*) and roads (*chaussées*), and more generally for town and country planning. Between 1795 and 1848, the school was only accessible after studies at *Polytechnique* and served for specializations. Since then, the school still trains students of *Polytechnique* for a one-year specialization, but also restored a proper engineering track of its own. Similarly to *École Polytechnique*, the training of the engineers of the *Ponts* became more oriented towards the private sector after World War 2. Women are admitted since 1962.

Télécom Paris. The school was founded as the *École supérieure de télégraphie* in 1878, when the French government structured its Posting and Telegraph administration. It was located in Paris until 2019, when it moved to Palaiseau, near *École Polytechnique*. Studies focus on communications, networks, with an increasing importance of computer sciences. New fields of study have completed the program, since the last decades of the 20^{th} century, even including a dedicated program in economics. Women are admitted since 1963.

École des Mines de Paris. This is one of the oldest *Grandes Écoles*, with a foundation in 1783. Its original mission was to train directors for the booming mining industry. The

primary specialties of the school necessarily reoriented, and they now include energy and raw materials. Its facilities are located in Paris, and women are admitted since 1969.

Business schools.

École supérieure des sciences économiques et commerciales (ESSEC). *ESSEC* was founded in 1907 by Jesuits. In its early years, the school suffered from several crises: it had to close temporarily during World War 1, due to insufficient number of students, and was impacted by the crisis of the 1930s, when fewer could afford tuition fees. Until the 1960s, law constituted an important share of the curriculum, which also comprised trade, languages, accounting, and political economy. The school was located in Paris, under the supervision of the Parisian Catholic Institute. In the early 1970s, *ESSEC* gained some degree of autonomy and moved to Cergy, one of the *nouvelles villes* (new cities project), in the Parisian suburb. After new financial difficulties, the school was saved in 1980 by the Chamber of Commerce of Versailles, which became its new supervisor. The admission *concours* was instituted only in the 1940s, which makes the school slightly different than the other ones in the sample until that period. Indeed, it was not open to those in the public preparatory classes until 1951. Women are admitted since 1969.

École Supérieure de Commerce de Paris (ESCP). Founded in 1819 by two merchants, and often associated to an early patronage by Jean-Baptiste Say, *ESCP* is considered the doyenne of business schools in the world. The school was bought by the Chamber of commerce of Paris in 1869, at a time when regional chambers of commerce founded their own business schools, e.g. in 1872 for Lyon, Marseille, and Lille. Studies were highly oriented towards trade, including merchant shipping, or hospitality trade. The school always remained located in Paris, with the addition of new European campuses in the recent decades. Indeed, in 1973, the Chamber of Commerce of Paris also founded the *European School of Management*, known by its French acronym EAP. This latter school,—which had campuses in France, Germany, United Kingdom, and Spain—merged in 1999 with *ESCP*, reinforcing the international nature of the school. Women are admitted to *ESCP* since 1972.

Sources: This set of information predominantly relies on the institutional presentations of the schools available on their websites. It was complemented with documentation in Suleiman (1978) for several schools, Belhoste (2002) and Picon et al. (1994) for *École Polytechnique*, as well as Passant (2020) for *ESCP*.

C.2 Description of the identification of individuals with multiple curricula

With observations at the curriculum level, we identify distinct curricula as being followed by a unique individual if one of the following conditions—1 to 4—applies.

1. Observations share the same non-missing first name, spouse name and patronym. In addition, there is at most a 9-year gap in the admission years, or 24 years between the admission to any other school and a later admission at *ENA*.

2. Observations share the same non-missing spouse name or patronym, as well as the same set of first name and 2 middle names (first, second and third *prénoms* are non-missing and similar). There is at most a 9-year gap in the admission years, or 24 years between the admission to any other school and a later admission at *ENA*.

3. Observations share the same non-missing spouse name or patronym, as well as the same set of first name and 1 middle name (first and second *prénoms* are non-missing and similar). There is at most an 8-year gap in the admission years, or 19 between the admission to any other school and a later admission at *ENA*.

4. Observations share the same non-missing spouse name or patronym. They also share at least two names among first name and middle names (there are two common *prénoms* among the list of first, second, third and sometimes fourth *prénoms*). In addition, at least one of the following conditions (a), (b), (c), or (d) applies.

   (a) There is at most an 8 year-gap in the admission years, or 19 years for a later admission at *ENA*. There are less than 10,000 births over 1891-1990 for the surname, which is common to the observations—be it the spouse name or the patronym.

   (b) There is at most a 4 year-gap in the admission years, or 9 years for a later admission at *ENA*. There are less than 20,000 births over 1891-1990 for the surname, which is common to the observations—be it the spouse name or the patronym.

   (c) There is at most a 3-year gap in the admission years, or 6 years for a later admission at *ENA*. There are less than 50,000 births over 1891-1990 for the surname, which is common to the observations—be it the spouse name or the patronym.

(d) There is at most a 1-year gap in the admission years, or 4 years for a later admission at *ENA*.

In addition to the above-mentioned criteria, we ensure that when spouse names are similar, patronyms are not distinct, and vice versa, when patronyms are similar, spouse names shall not be distinct. We also ensure that genders are not different, which matters only for gender-neutral first names.

Besides, we screened on an ad-hoc basis most matches, and especially all those with 3 or more identified curricula, as well as those with uncommon sequence of schools, and those with highly occurring surnames—more than 12,000 births per cohort. We discarded wrong ones due to homonyms by comparing biographies and curricula, birth dates, maiden names, or middle names. To this end, we used *LinkedIn*, *Wikipedia* and *Who's who in France* entries, lesbiographies.com, viadeo.journaldunet.com, and lemoniteur.fr websites, biographies published by the newspaper *Les Échos*, as well as institutional biographies available from firms' or institutions' websites.

We also used bigram and token fuzzy matching of observations to increase the quality of our identification. To that end, we defined for each curriculum a string of characters, containing the patronym, spouse name if applicable, and first names. With a visual screening of higher scores and comparing complementary observables, we were able to identify potential misspelling, but also different forms of names in the distinct school registers (e.g. the politician *Laurent Wauquiez* also appears as *Laurent Wauquiez-Motte*). We consequently matched these curricula.

C.3 Description of the identification of "foreign" surnames

We identify foreign surnames in two ways. First, we use the evolution of births by surname in the national census. Then, we compare the frequency of surnames among students to their frequency in the French births' records.

Using the birth census, we qualify as "foreign" the 490,565 surnames with only one birth in the births' registers over the period 1891-1990. Out of the 786,531 remaining surnames,

we classify as foreign those for which there is no birth on the timeframe of the two first generations (1891 to 1940). We also consider of foreign origin the surnames, whose natality is 10 times higher in the last cohort (1966-1990), as compared to the mean of the first two cohorts (1891-1940), or whose natality is 10 times higher from one cohort to the previous one (e.g. in 1941-1965 compared to 1916-1940). Finally, we compute by surname S two coefficients of variation of the number of births per cohort. A surname for which the number of births experiences notable volatility between cohorts is understood as a process of immigration in a specific generation, followed by children born in France in the following generations. We compute $CV^s_{1891-1990}$ for the four generations between 1891 and 1990 and $CV^s_{1891-1966}$ over the period 1891-1966, targeting specifically early immigration of the 20^{th} century.[44] Surnames with an average number of births per cohort μ^s_t above 30 and a coefficient of variation above 0.6 over the period t are classified as immigrants. These choices are based on visual inspection at different potential thresholds. We complete these conditions using the *Grandes Écoles* data and classify a surname as foreign if there are more students than there are births in France bearing this surname in any given cohort.

The conditions imply that we consider as "native" the surnames, for which the immigration phase happened at last in the first cohort, between 1891 and 1915. Indeed, surnames of foreign origin, which immigrated before our period of study are considered native. Therefore, we literally study a stable set of surnames over the period, more than a "native" set of surnames *per se*. Above all, it ensures that the census of the number of births in France provides a proper image of potential applicants to the *Grandes Écoles* for each generation.

C.4 Computation of adjusted number of students with continuous explanatory variables

We identify our explanatory variables either with a dummy (for noble families), or with the probability of a dummy (for the birth in a region, or for having a father who graduated from a *Grande École*). The number of births in cohort c of those with the advantage A defined by variable X (historical H, geographical G, or lineal L) bearing a given surname is $N^{adjusted}_{c,A(s)} = X_{S,c}.N_{c,S}$. When studying nobility, $X_{S,c}$ (Hp_S or Hr_S) is a dummy variable,

[44] $CV^s_t = \frac{\mu^s_t}{\sigma^s_t}$ where μ^s_t stands for the average number of births of bearers of the surname s over the timeframe t—here either 3 or 4 cohorts—and σ^s_t for the standard deviation.

and we directly know the number of births by surname $N_{c,S}$. For the geographical ($G_{R,c,S}$) and lineal ($L^{M,Gen-t}_{GE,c,S}$) advantages, the number of births per surname of those with the given characteristic $N^{adjusted}_{c,S}$ is a proportion of $N_{c,S}$ (all births with this surname in cohort c). Indeed, not all bearers of the surname share this characteristic and $0 < X_{S,c} < 1$.[45]

At the surname level, we can also approximate by cohort the number of students with the characteristic of interest—born in a given region or with a father who studied in a given school—using the definition of the relative admission rate (RAR) in the school(s) GE for cohort c and advantage A, as given in section 4.2. The reader may refer to section 4 for reminders of all notations. We detail the computation below:

$$RAR_{GE,c,A(S)} = \frac{AR_{GE,c,A(S)}}{AR_{GE,c,A'(S)}}$$

$$\Leftrightarrow RAR_{GE,c,A(S)} = \frac{\frac{St_{GE,c,A(S)}}{N_{c,A(S)}}}{\frac{St_{GE,c,A'(S)}}{N_{c,A'(S)}}}$$

$$\Leftrightarrow \frac{St_{GE,c,A(S)}}{N_{c,A(S)}} = RAR_{GE,c,A(S)}.\frac{St_{GE,c,A'(S)}}{N_{c,A'(S)}}$$

$$\Leftrightarrow St_{GE,c,A(S)} = RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}.St_{GE,c,A'(S)}$$

$$\Leftrightarrow St_{GE,c,A(S)} = RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}.(St_{GE,c,S} - St_{GE,c,A(S)})$$

$$\Leftrightarrow St_{GE,c,A(S)} = RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}.St_{GE,c,S} - RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}St_{GE,c,S}$$

$$\Leftrightarrow St_{GE,c,A(S)}(1 + RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}) = RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}.St_{GE,c,S}$$

$$\Leftrightarrow St_{GE,c,A(S)} = \frac{RAR_{GE,c,A(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}}{1+RAR_{GE,c,A'(S)}.\frac{N_{c,A(S)}}{N_{c,A'(S)}}}.St_{GE,c,S}$$

$$\Leftrightarrow St_{GE,c,A(S)} = \frac{RAR_{GE,c,A(S)}.\frac{X_{A(S),c}.N_{c,S}}{(1-X_{A(S),c}).N_{c,S}}}{1+RAR_{GE,c,A(S)}.\frac{X_{A(S),c}.N_{c,S}}{(1-X_{A(S),c}).N_{c,S}}}.St_{GE,c,S}$$

[45] The number of births by region by surname may alternatively be directly constructed from the raw data of the census, but in practice we used the aforementioned method, which provides identical numbers.

$$\Leftrightarrow St_{GE,c,A(S)} = \frac{RAR_{GE,c,A(S)} \cdot \frac{X_{A(S),c}}{(1-X_{A(S),c})}}{1+RAR_{GE,c,A(S)} \cdot \frac{X_{A(S),c}}{(1-X_{A(S),c})}} . St_{GE,c,S}$$

Therefore, we use the following two formula to compute the adjusted number of births and adjusted number of students at the surname level for the geographical and lineal advantages:

$$N^{adjusted}_{c,A(s)} = X_{S,c} . N_{c,S}$$

$$St^{adjusted}_{GE,c,A(S)} = \frac{RAR_{GE,c,A(S)} \cdot \frac{X_{A(S),c}}{(1-X_{A(S),c})}}{1+RAR_{GE,c,A(S)} \cdot \frac{X_{A(S),c}}{(1-X_{A(S),c})}} . St_{GE,c,S}$$