December 2010

The Effects of Elite Recruitment on Social Cohesion and Economic Development

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Abstract

The aim of this paper is to analyze whether the recruitment of elites in the Western world leads to social cohesion, or to the opposite -- social stratification. We show that the main change that occurred in the way the Western world trained its elites is that meritocracy became the basis for their recruitment. Although meritocratic selection should result in the best being chosen, we show that meritocratic recruitment actually leads to class stratification and auto-recruitment. In consequence meritocracy and the democratization of higher education do not lead to social cohesion. We then check the effects of the recruitment of elites and social stratification on economic growth. We show that these effects are dependent upon the type of technological changes occurring in the country.

Keywords: education, elites, meritocracy, recruitment, social mobility, social cohesion, stratification.

JEL classification: I21, O15, O40, Z13.

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I. Introduction

During this past decade, economic growth did not lead to a decrease in social inequality; on the contrary, social inequality has increased not only in the developed Western world but also in some of the new industrialized country as in China. Indeed, the social structure in industrialized countries has become more stratified in many different ways. The first type of stratification is the gap in income; over time, there was an increase in the gap between the income of the rich and the poor. But inequality in income is not the most striking way stratification can take place.

One of the main changes in social life which has taken place these last decades are the changes in class status. In all societies, there are the ones who have power and the ones who don't. It is interesting to note that even in a democratic regime in which the power is meant to reside in the *demos* ('the people'), power is really concentrated in the hands of a few. All political organizations, even democracies, tend towards domination by an oligarchy, which Mills (1956) called the *power elite*. This is the *iron law of oligarchy* as stated by Michels (1915). This stratification of society based on the accumulation of decision-making power therefore differs from the income stratification mentioned above.

These different types of stratification lead therefore to different perspectives on the meanings and consequences of social cohesion. The usual one is to focus on the minimum disparity of income between members of society. This is usually, the purpose of the line of research on inequality and economic development.

This paper will look at social cohesion from a different perspective: It will focus on the other type of stratification, i.e., the one related to the power elite. In this perspective, social mobility is not related to the relative income of generations, but to the power of the new generation vs. their parents. A cohesive society is then a society in which there is mobility between social classes.

It is interesting to note that already Pareto has put an emphasis on this type of social cohesion. He claimed that that a stable economic system needs a *circulation of elites*, so that the most capable and talented are in the governing class. He stressed that the quality of the ruling class can be maintained only if social mobility is allowed, so that the non-elite has the possibility of entering the elite: 'History is a cemetery of aristocracies' (Pareto, 1935).

The purpose of this paper is to analyze whether the recruitment of elites in the Western world leads to social cohesion, or to the opposite -- social stratification. We will then check the effects of the recruitment of elites and social stratification on economic growth. In order to check whether the recruitment of elites leads either to social cohesion or stratification, one has to analyze the ways of recruitment of the elites in the Western world.

The paper will show that the twentieth century witnessed a major change in the way the elites were recruited. Meritocracy became the basic factor for recruitment of elites, and education and success at exams have been used as prime criterion for recruitment. In consequence, from post-World War II, elites are recruited through education in elite universities to which admission was conferred following success at meritocratic exams.

We will show that recruitment to a university via a meritocratic method based on entrance exams does not lead to social cohesion and to enrollment from all classes of society according to distribution or ability, nor does it necessarily lead to the admission of the most talented. Recruitment by entrance exam still encompasses a bias in favor of elite candidates, because this type of exam requires a pattern of aptitude and thinking that favors candidates from an elite background. All elite positions may be open to all applicants with the right qualifications, but they are more accessible to those with specific social, cultural and symbolic capital (Arrow, Bowles and Durlauf, 2000).

Thus in a simple model, the paper will pinpoint under which circumstances the power elite maintains its status and power. My paper permits to give some sort of theoretical modelization of the view developed by Bourdieu, and coined a *strategy of distinction*. I show that a small difference in culture and education leads to narrow recruitment, and in turn to class-based stratification in the recruitment of the elite, despite meritocratic selection for universities.

This paper shows that a cultural bias has a *magnification* effect on class stratification. In other words, we show that an elite education leads to what Pareto has coined as a "non-circulation of elites".[1]

Although meritocratic selection should result in the best being chosen to enter the top ranks of public service or business, the framework described herein allows us to show that elite schools and universities have a tendency to recruit in a non-diversified way, resulting in certain classes being over-represented. Our model emphasizes that despite meritocratic recruitment, elite universities actually recruit from the "aristocracy", and we get a resulting "stratification" of recruitment. In consequence, the fact that over time, individuals from the same background are accepted to elite universities is due not to cronyism, but to the system itself, despite the fact that it is meritocratic.

We then examine the consequences of meritocratic recruitment on economic growth. The recruitment of the elite affects the economy, as it affects the quality of leaders: Having the best citizens as leaders enables efficient and correct choices. This paper shows that the

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[1] "Circulation of the elite" is an expression coined by Vilfredo Pareto in 1902, who claimed that the elite, in recruiting itself, chose subjects of increasingly mediocre caliber: "Merely a slowing down of this circulation may have the effect of considerably increasing the number of degenerate elements within the classes still possessing power, and -- by contrast -- of increasing the number of elements of superior quality within the subject classes... The decadence originates from the fact that the elite, in recruiting itself, chose subjects of increasingly mediocre calibre" (Vol. 1, Introduction).

relationship between social cohesion and economic development is not monotonic. The effects of meritocratic selection are dependent on the type of technological changes occurring in the country in question. During times of *innovation*, i.e., minor changes in technology, the elite schools optimally fulfill their purpose, since the aptitude acquired at home by the children of the elite class is an advantage regarding the type of technology in use. These students therefore perform better on average than students recruited from the non-elite population. Thus, the non-circulation of elites in this case does not hamper growth.

But during times of *invention*, i.e., the emergence of totally new technologies, aptitude acquired via family education is useless, and so lack of circulation of elites is detrimental to the adoption of new technologies. Therefore, in an era of invention, the recruitment of the elite from elite schools actually leads to a lower growth rate, and social stratification is bad for economic growth.

This paper is divided into five parts. In the next section, we present a short survey of the evolution of elite recruitment in the Western world. In Part III, we analyze the effects of meritocratic exams on stratification; Part IV examines the effects of meritocracy on economic growth; and Part V concludes.

II. Recruitment of the Elites in the Western World

The main shifts in the recruitment of elites took place in the second half of the twentieth century, and are related to meritocratic selection. Before introducing the facts on recruitment from the twentieth century on, I will briefly present the facts on recruitment of elites in the Western world from the late eighteenth century.

A. From the Eighteenth to the Twentieth century

Changes in the recruitment and training of elites first took place in the late eighteenth century, arising from the needs of modern states. Military schools and various other institutions, such as the French *grandes écoles* were established for training experts, although only a small proportion of the elites went through these schools and universities at this period.

Then, in the late nineteenth century, in Europe as well as in the USA, two major economic changes had a strong impact. The first was the “second Industrial Revolution”, i.e., the rise of new industries, like chemicals and electricity, which were science based. The second was the rise of the “corporate economy”, and of the Chandlerian managerial enterprise that led to the process by which salaried senior managers largely took over from capital owners and heirs of the founding families. Both engineers and managers needed specialized formal training, while the pioneers of industrialisation and their heirs only had had on the job training. So there was a clear difference between the education of the leaders of the First and of the Second Industrial Revolutions (Kaelble, 1979, p.29).

On the whole, the late nineteenth and early twentieth centuries saw major changes in the education of the elite, and institutions were reformed or created to provide such training. In most countries, the old "medieval" universities were reformed and expanded during this period, and many new ones were established.

In England, in the late nineteenth century, new or "red bricks" universities had been established in provincial cities; they emphasized science and technology and also had schools of commerce. However, the proportion of business leaders who graduated from universities others than Oxbridge was low for a considerable period. Moreover, a large majority of business leaders had attended public schools before entering university, since education at a major public school was more important in terms of social prestige that a university degree.

In France, the most original character of the system for recruiting and training elites was the role played by elite institutions -- the *Grandes Ecoles*. The origins of the *grandes écoles* go back to the eighteenth century military schools, and to the creation of special schools to train engineers, that the state needed: the *Ecole des Ponts et Chaussées*, the *Ecole des Mines* and the *Ecole Polytechnique*.

During the nineteenth century and at the beginning of the twentieth, there were differences between countries in the importance of education and training of elites. In England, business leaders, most of whom had not had any higher education, were wary of university graduates. This suspicion reflected the cult of the "practical man",[2] and therefore, most of the British economic elite was recruited and trained via the traditional channels of family connections and patronage, the so-called "old boys' networks" of those who had attended public schools.

In some respects this system survived into the twentieth century. A high, though decreasing, proportion of top British executives began their careers at the end of their secondary education; they were either "heirs", i.e., members of the family that owned the firm and sons of other "good families", who received a top job at once, or men from a more modest background, who had risen within a firm. However, over time, it became necessary to attend university before entering business.

As for the US, until the end of the nineteenth century, the situation was not that different. Elite members were either heirs, children of rich men who inherited the family firm, or newcomers to the business world who made their fortunes through their own exertions. As in other countries, few of these "self-made men" were of truly proletarian origin, and most came from the lower middle class and the labor aristocracy. In any case, such men, *ipso facto*, had had very little formal education.

So until the twentieth century, higher education seemed irrelevant for most professional callings, and men who were to follow a business career did not attend universities.

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[2] See Rubinstein, 1993.

From the turn of the twentieth century, there was a gradual change in the recruitment and training of elites.[3] An increasing number of large companies started to hire people who had received academic education, and graduates from the new business colleges, which had been recently established, were hired in large numbers.[4] The founding, in 1908, of the Harvard School of Business Management and the creation of the MBA sanctioned this development. During the same period, graduate schools of law and medicine were established in the major American universities.

B. The Second half of the twentieth century

The recruitment of elites changed dramatically after World War II. In all countries, there was a desire on the part of politicians to "democratize" the elite, and in consequence, there were significant reforms in the way the elites were recruited, as well as in their education.

After World War II, while a "democratization" of higher education took place, reflected by an enormous increase in the number of university students, there was a concurrent emergence of two channels of education: one for the elite and the other for the rest. This was emphasized by University of California President Clark Kerr, who set the stage for university for all, but the elite university for the best.[5] In consequence, the elite was trained in elite colleges. This evolution was described by Temin for the US: "I was able to identify the colleges attended by 454 CEOs of the Fortune 500 companies. All current business leaders on whom I could find information attended college .. and almost one-fifth graduated from the Ivy League".[6] By the early 1960s, those who had not attended college were precluded from becoming part of the business elite.

In the US, the changes took place mainly during the 1940s. Until then, there was a group of people who constituted the Establishment: they were male, white, and Protestant (mostly Episcopalian). They were the elite, their children attended the elite universities, and few others could attain any power.[7] Indeed, education at an Ivy League university was the entry ticket to the elites of all kinds (except the political elite, which was more a melting pot), and before 1936, recruitment to universities was based on family and geography.

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[3] The change was gradual and clerkship still long remained the usual form of apprenticeship for a business career.

[4] As early as the 1870s, an increase took place in the number of colleges and students. The number of undergraduates rose from 52,000 in 1870 to 238,000 in 1900, and that of graduate students in doctoral programs from 50 to 6,000.

[5] Kerr wanted UC-Berkeley to become a highly selective, world-class university with a star faculty that would train the elite of California, which would be selected by testing, while the other colleges would accept all other applicants.

[6] Temin, 1999a, p.32. Of the 800 chief executives running the largest US public companies in 2003, 87 had MBAs from the three top business schools - Harvard, Stanford and Wharton (see Forbes Global, October 13, 2003, p.28).

[7] See Miller (1949, 1950). Taussig and Joslyn (1932, p. 240) have shown that in 1930, 80% of the business leaders came from the top 7% of the population.

There was, therefore, a widespread desire to break the hold of this old elite and replace it with a new elite that would be made up of people from a broad range of backgrounds from all over the country, selected on the basis of intelligence and not birth. There was a need to replace the "aristocratic" and non-democratic elite with a "brainy" one that would lead the country. This desire was already expressed by Thomas Jefferson more than a century before: "..There is a natural aristocracy among men. The grounds of this are virtue and talents…while the artificial aristocracy is founded on wealth and birth".[8]

As already emphasized above, this wish to find the "natural aristocracy" is not specific to the US, and has equivalents in Europe, especially in France. However, the American meritocratic way of selecting the most intelligent in order to recruit the best public servants, and let them run the country is different from the French one. While France opted for the system of the *grandes écoles* already existing, and that were based upon achievement exams, the US adopted SAT exams.

The SAT, or Scholastic Aptitude Test (itself an adaptation of the army intelligence test called the Army Alpha) was developed at Princeton University, and placed the emphasis for university admissions on aptitude instead of achievement.[9] The system was slowly adopted by all universities. It was adopted first by Harvard -- run at that time by James Conant -- who supported a selection process which would lead to the recruitment of his university elite from all social classes, and who felt that achievement tests were unfair to poor children because most had not attended good high schools. Therefore, he called for a system for choosing the meritocracy that was not based on achievement. Harvard thus adopted the SAT for use as a scholarship test during the 1930s; its use then spread as a scholarship test for all Ivy League schools. It took 20 years for the SAT to become a requirement for all applicants to the University of California, and soon afterwards to all universities. Standardized testing provided the basis for selection to elite universities.[10]

However, despite the wish to democratize selection, SAT scores were correlated with family education and wealth.[11] Meritocracy did not mean democratization and opportunity for all. The unrealized dream of the virtue of meritocracy as opposed to aristocracy, has been emphasized by Temin. He has shown that the US economic elite is still overwhelmingly made up of white Protestant males, a significant number of whom were educated at Ivy League

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[8] A letter to John Adams in 1813 (see Cappon, 1959).

[9] It was developed by Carl Brigham, a psychologist (see Brigham, 1923). It is a type of general intelligence test, and the verbal portion is similar to an IQ test. It was created and administered by the ETS, the Educational Testing Service, a privately funded, non-profit organization. For more details on the history of SAT (see Lemann, 1999).

[10] There was a fierce debate about the success of ability tests as the basis for meritocracy. For the argument against such tests, see Hoffman (1962), and also Nairn and Nader (1980), while Gardner (1995) presented a plea in favour of these tests. See also Jensen, 1989.

[11] Research on the variables affecting SAT results is numerous. See in particular Bouchard and McGue (1981), Neal and Johnson (1996), and also Hernnstein and Murray (1994).

institutions. The picture has not changed significantly from c. 1900: “The American business elite comes from elite families” (Temin 1999a., p.33), just like in France or Britain.[12] The fundamental irony of the American meritocracy is that the system finally favored the elite’s children. The wish that America would become a classless society through the use of aptitude tests did not come true: meritocracy led to aristocracy.

In consequence, in order to reduce stratification, the US has an elaborate selection system for minorities, trying to advance the best persons under an affirmative action system that can be seen as a “patch” on meritocracy to make it run better. Meritocracy is a sort of particular system of picking people for the elite based on one set of abilities, while affirmative action is trying to twist the dials a bit to get more minority representation into the meritocratic elite.

In France, despite a different system of recruitment, the situation is somewhat similar. The *grandes écoles* (GE) and especially the ENA play a role similar to the Ivy Leagues universities in the US: they are elite schools, and very selective. Indeed, France presently has 302 engineering schools with 59,000 students and 226 commerce or business schools with 64,000 students. These figures may be compared with the million and a half of students in universities, which have no entry exam and admit anyone who has graduated from high school (*baccalauréat*).

At the competitive exam (*concours*) to enter a *grande école*, the number of candidates accepted every year is fixed.[13] Moreover, one does not sit for the *concours* just after high school; students first go to specialized schools (*classes préparatoires*) where they are only accepted if they had good grades in high school or at the *baccalauréat*. They study intensively at the *classes préparatoires* for one to four years, after which they take the entry exam for one or several of the *grandes écoles*.

The *grandes écoles* have, over time, become increasingly important to the recruitment of the French business elite. From 1920 onwards, over 50% of a sample among the leaders of French industry had graduated from engineering schools, and the percentage had reached 70% in 1939. According to Lévy-Leboyer (1979, Table 6. pp. 160-1), amongst a cohort of business leaders over the period 1912-79, 29% of them had graduated from *Polytechnique*.

A very specific *grandes école*, which has over time become the most elitist of the elite schools, is the ENA. This school is the main channel for recruiting the elite. Forty-seven percent of the heads of the 200 largest French companies in 1993 came from the civil service

[12] Although the percent of workers entering the elite class in the 1960s was double in the US as compared to Britain, France and Germany (Blau and Ducan, 1967). As noted by Temin (1999a, p.32) and Kingston and Lewis (1990, p.111): “Approximately one quarter of 1986 college freshmen at highly selective universities come from families with incomes over $100,000, that is, from the extreme upper tail of the income distribution.” It should be noted that this lack of change in the economic elite occurred despite the fact that the makeup of the political elite has markedly changed over the century.

[13] In all these schools, the number of entrants was, and is not large: the students admitted per year in the five biggest engineering schools were 320 in 1860, and 1176 over the period 1919-1932 (see Lévy-Leboyer, 1979, p.152).

(and have been through ENA). In 1997, 55% of the leaders of French CAC 40 firms came from the civil service (see Baverez, 1998).[14] It is also the entry to the political elite. Indeed, from 1980 onwards, 35 percent of ministers had attended ENA.[15] Altogether, France has a system which is drastically selective, highly elitist and in which the selection becomes even more severe over time.

From World War II onwards, the path to elite positions has required attendance at an exclusive school or university, in which recruitment is based on meritocracy. In the US, university applicants take the SATs, and those earning the highest scores are usually admitted to the elite universities. Of 2,000 colleges, 50 are considered elite colleges (including the "Ivy League"). In contrast, in France, of 450,000 students who obtain the *Baccalaureat*, only 36,000 enter the *classes préparatoires*, from which only 10,000 will reach the first rank of *grandes écoles* in the next couple of years. So in the US, the relative numbers of such "favorites of fortune" are higher than the graduates of the ENA and the *grandes écoles*.

However, both systems ultimately lead to a very narrow recruitment process. Both countries tried to react to this narrowing and stratification. The American reaction to its recruitment system was affirmative action for minority group members, whereas the French reaction to its system was the "second entry exam" for admission to the ENA, and open access to universities. [16]

In the next section, we examine the reasons why elites are auto-recruited. Temin (1999b) has proposed three causes for auto-recruitment, which he terms "the stability of the elite": discrimination, signalling, and education. Temin rejects the first two,[17] and concludes that unequal access to education might explain the demographic stability of the elite.[18]

In the next section, we show that recruitment to elite universities by meritocratic exams might be the cause of this stability of elites. We will also analyze how different recruitment methods as SAT or achievement tests affects stratification.

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[14] Includes the shares of the 40 most important firms in France, the French Dow-Jones.

[15] Presidents Giscard d'Estaing and Chirac, Prime Ministers Laurent Fabius, Michel Rocard, Alain Juppé and Lionel Jospin also went to ENA.

[16] The two main differences between the French and American recruitment systems lay in the method of selection chosen. The first difference is in the type of exam: achievement tests (France) vs. aptitude tests (the US). The second difference is in the number of times selections are made, and the relative number of recruits. Another main difference is the tuition paid. While in the US, tuition at elite universities can run around $100,000, in France, not only the universities and *grandes écoles* are almost free, but in the *grandes écoles* with a vocation of serving the state (*Polytechnique*, ENS and ENA), students are paid! Actually, many of them serve the state for a few years and afterwards enter the business world.

[17] Temin also rejects the possibility raised by Taussig and Joslyn (1932) of a fundamental inequality of native endowments.

[18] Indeed, primary and secondary education, especially in public or state schools, has fallen into crisis in all Western countries, owing to ill-conceived reforms, the breakdown of discipline, and the low quality of many teachers (see Temin, 2002). This markedly restricts opportunities for bright young people from modest backgrounds to excel in their studies, win scholarships, and attend university. In France today, only children from the middle class, or even upper middle class families can obtain a good high school education.

III. The effects of meritocratic recruitment on social cohesion and stratification

In this section, in order to examine the effects of meritocratic exam on the intergenerational mobility of elites, we incorporate elements specific to recruitment in countries like the US and France. In France, there is an entrance exam to the elite schools, based on very broad subjects rather than on specific technical knowledge; they are some sort of achievement tests. In the US, entrance exams are tests of ability and not achievement: the SAT.

A. The basic model

In each country, we have a given population of total size 1 consisting of "elite and "non elite", where their respective proportion is of σ and 1-σ (it corresponds to the 8% of the previous section in the Western world).

In the same way, the student population of total size 1 is consisting of students who come from the elite milieu, and their parents belong to the elite. For sake of simplicity, we assume that their proportion is the same as their parents, σ.

The proportion of students from the elite milieu inside the elite school is γ.

B. The definition of social cohesion and stratification

The ratio of γ over σ is in fact the amount of mobility in the system, which we denote by β.

$$\beta = \gamma / \sigma \qquad (1)$$

β is in fact the parameter which measures the amount of social cohesion or stratification in the economy. When β is 1, then the percent of students from the elite milieu in these elite schools is equal to the percentage of the elite in the population, which means that there is no auto-recruitment and there is total mobility in the system.

When β is greater than 1, that is γ is greater than σ, there is auto-recruitment; and the bigger β, the greater the stratification effect in this economy. We will now show how meritocratic exams affect β.

In a world without meritocracy, β is exogenous and can be as big as the system decides upon.

When the system is meritocratic, we will check the determinants of the element of social cohesion, β.

C. The elements affecting the parameter of social cohesion, β in a meritocratic environment.

The *raison d'être* of elite schools is to recruit the most capable students. If information were perfect, the exact value of a given applicant would be known, and elite schools would then choose the best candidates. However, since the information available is imperfect, the best approximation is performance in the entrance exams.[19]

We define $I \in [0,1]$ as the minimum grade necessary to be accepted to the school. If the grade α_i of student *i* is greater than *I* he is accepted to the elite school:

$$\alpha_i > I. \qquad (2)$$

The performance of a student on the test is based on two elements. The first is his ability; more able students get better grades at their exams. We assume that the ability a_i for all students is uniformly distributed on [0,1], i.e., whatever the social class, the ability is distributed uniformly.[20]

The second element takes into consideration that tests are not perfectly objective, but reflect a culture related to the milieu of the elite with which the examiners for a school are associated. Akerlof and Kranton (2010) have emphasized that Identity Economics is an important element of homo economicus. Thus people's identity and their own culture may be the most important factor affecting them.

In consequence, a person coming from the periphery will have another "identity" and therefore "culture" than the person living among the elite. Tests cannot be completely objective, and in fact incorporate a small amount of culture and identity. Therefore, students with an equivalent ability, but who are born to the elite and raised in this milieu, will perform better on tests.

The grade of student *i* who is not part of the "elite milieu" corresponds to his inherent ability, while the grade of a student from a family in the elite incorporates not only his ability, but also the cultural background from his family -- the inside knowledge specific to the elite milieu, which we define as *f*.[21] Without loss of generality, we assume that the relation is linear, the grade the student receives is therefore:

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[19] Moreover, tests also display a reliability problem, i.e., that there is similarity in a given subject's exam scores on different runs of the exam. We discuss this problem below.

[20] As mentioned above, the bias is only due to cultural background. We are aware that some empirical results show that ability is not uniformly distributed (Herrnstein and Murray, 1994), and some theoretical models explaining why effort, and therefore ability, would be different in the different social classes (see Durlauf, 1999, and Arrow et al., 2000). However, the assumption that ability is uniformly distributed is often adopted in models on mobility; see, for instance, Galor and Tsiddon (1997).

[21] The problem of reliability of exams can be incorporated in the parameter f. Exams such as those in France are subject to reliability problems higher than the SAT, due to subjectivity problems. Moreover, students who are

$$\alpha_i = a_i \quad \text{for student } i \text{ outside the elite system,} \qquad (3)$$
$$a_i + f \quad \text{for student } i \text{ being raised in the milieu.}$$

Since for the whole population, the success is only due to ability, then the percentage of accepted students from the entire population denoted ρ_p is $1-I$:

$$\rho_p = 1 - I = \lambda \qquad (4)$$

where λ is defined as λ = 1- I. λ is a factor that represents the tightness of enrolment. We will show that λ affects the size of the stratification effect.

For the students of elite milieu, f affects the percentage of accepted students, ρ_E , which is:

$$\rho_E = 1 - I + f = \lambda + f \qquad (5)$$

Recall that β is the ratio of the percentage of the elite children in the elite school over the percentage of elite in the total population, then:

$$\beta = \gamma / \sigma = \rho_E / \rho_p \qquad (6)$$

Therefore:

$$\beta = (1 - I + f)/(1 - I) = 1 + \frac{f}{\lambda} \qquad (7)$$

Equation (7) shows that β is a function of f and λ. As explained earlier, β is the parameter which measures the amount of auto-recruitment and stratification in the economy; when β is greater than 1, we get a decrease in diversity of elites and in social cohesion. This framework permits us to show that a very small cultural bias (small f) will lead to a strong effect on class stratification, as underlined in the next proposition:

D. The Results

Proposition 1

(i) A school for elites based on meritocracy leads to social stratification. The parameter of auto-recruitment, β*, is related to cultural bias and tight recruitment level. An increase in*

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not "great" but on this particular day felt well would be accepted, while some more brilliant were not, because it was not the subject in which they were good at, or it was not the right day. This problem is less acute in the US.

one of them lead to an increase in social stratification. A small cultural bias brings about that children born in the elite are represented by much higher percentages than their ratio to the population.

(ii) Assuming that ability tests are less prone to subjectivity than achievement tests, the system of recruitment by ability tests leads to less stratification than achievements tests.

(iii) Countries with tighter recruitment level (I higher) will have more stratification.

(iv) Having two levels of recruitment tests lead to less stratification than one test.

Proof

Homogeneity and stratification is measured by β; the bigger β, the greater the stratification effect in this economy. Since f/λ is greater than 0, β is greater than 1 which means that despite meritocratic exams, stratification exists.

Moreover, from equation (7), the higher f, the greater β. On the other hand the higher I, the lower λ and therefore β is bigger.

Part (iv) is somehow counter-intuitive. In the case of two levels of exams as in France, equation (7) becomes:

$$\beta = (\lambda_1 + f)(\lambda_2 + f)/\lambda_1\lambda_2 = 1 + \frac{f(\lambda_1 + \lambda_2 + f)}{\lambda_1\lambda_2} \qquad (8)$$

Comparing equations (7) and (8) by taking as equal the level of recruitment (i.e. assuming that the percentage of students recruited is the same ($\lambda_1\lambda_2 = \lambda$) then β of equation (8) is smaller than that of equation (7) since we assume that the sum ($\lambda_1+\lambda_2+f$) is smaller than one.

This proposition states that stratification is a consequence of the advantage to the students raised in the elite milieu due to their cultural background, *f*. This is similar to the theory emphasized by Bourdieu and which was coined as *the strategy of distinction*. He has emphasized that these cultural differences is leading to less social cohesion and to more stratification.

To give a sense of magnitude to our parameters: for f of 0.07 -- the milieu gives an advantage of 7% (it is very reasonable to assume that children raised in the elite get an advantage of around 7-10%), this will lead to β = 8 (by assuming that *I* = 0.99, which is the case in many countries).

A stratification effect, β, of 8 means that the percentage of children from the elite milieu who are accepted is 8 times higher than the percentage of children from the total population. In other words, if the elite represents 8% of the population (σ), then the elite milieu will supply 64% of the students in the elite schools (γ).

This matches perfectly the facts shown in part II, for France and the US. For France, we have shown that 8% of the population supplies 63% of the ENA students, which corresponds to a β of 8. So a small advantage for the elite milieu of 7% leads to a major auto-recruitment effect as found for France.

This simple model shows that the fact that, over time, individuals from the same milieu are accepted to a school for elites is not due to cronyism, but to the system itself, even if it is meritocratic. Elite schools freeze the circulation of elites. Auto-recruitment and stratification are not due to some favoritism, but to imperfect information on the true value of students.

No system can be perfect when there is imperfect information on the genuine talent of people. Recruitment by education and exams automatically advances those who are educated inside the system. Thus, under imperfect information, selection of students through tests leads to a bias, i.e., for the same objective ability, students who are not part of the elite milieu will not be accepted, while a student of the milieu will be.[22]

This effect of stratification and auto-recruitment due to meritocratic exams takes place only over time, and equation (7) is representing the value of stratification in steady state. However, when the system of meritocracy is put in place and is a "new system", then there is no stratification. When new schools are emerging, there is no bias in favor of the elite, and therefore in this case we get that β is equal to 1.

The fact that a bias does not exist when a new system of recruitment occurs may explain why after World War II, there was higher social mobility than in the 1930s. However, in the 1980s and 1990s, as shown by proposition 1, there is much less social mobility toward the top.

In this section, we have analyzed the effect of meritocratic recruitment on social cohesion and stratification. We now turn to analyze the impact on output.

IV. Meritocracy and economic growth

We assume that the quality of the elites has an influence on the level of output, since they are in power positions and take decisions affecting the economy. We therefore assume that output is a function of the factors of production: capital, *K*, and labor, *L*; of the technology

[22] Parts (ii) to (iv) of proposition 1 permits us to compare the levels of stratification in France and the US. Indeed, the exams in France are based on achievements and knowledge tests vs. SAT tests in the US. It means that in France f is higher than in the US. Moreover λ is higher in the US, since in France recruitment levels are tighter. However, the two levels of recruitment that exist in France lead to an opposite effect. So, the difference between these two countries is not unidirectional, but the two first effects seem more important and we can therefore conclude that the system chosen in the US leads to a lower β, i.e., to lower auto-recruitment than in France.

level, *A*, and the average quality (that we term "value") of the elites, $\overline{V}$, as displayed in equation (9). [23]

$$Y = A\overline{V}F(K,L) \quad . \tag{9}$$

So the productivity level is a function of the value of the elites, $\overline{V}$, and of technological progress, *A*. Technological progress can be due to a change in techniques strictly speaking, but it also includes changes in processes of production, business culture and methods of management. The evolution over time of technological progress takes two different forms: innovation and invention.[24] Innovation occurs in the context of a given technology; it leads to an increase in productivity based on the current technology and infrastructure (bureaucratic, technocratic). In this type of progress (built on the same structure), the value of students who come from the elite milieu has a value added, *f*, since they already are familiar with this structure. We can therefore write that the value of a student *i* in time of innovations, V_i^n, is a function of its ability as well as the education and culture received in its family environment, and without loss of generality, we assume that the influence of the milieu, *f*, enters V_i^n linearly.

$$\begin{aligned} V_i^n &= a_i && \text{for } i \text{ outside the elite system,} \\ &a_i + f && \text{for } i \text{ being raised in the } \textit{elite} \text{ milieu.} \end{aligned} \tag{10}$$

The other type of progress is inventions. While innovations are based on previous technology, major breakthroughs that change the nature of technology fundamentally require that one starts anew and most previous learning is lost. This means that the culture the elite has assimilated in his home is no longer useful (in some cases it could even be counterproductive, but not in this model). So the value of a student *i* in periods of inventions, V_i^v is a function only of its ability (and not of its family environment), so that:

$$V_i^v = a_i \text{ for all } i. \tag{11}$$

Thus, in periods of innovation the students' value is distributed on [*I*, 1+*f*], while in periods of invention it is distributed on [*I-f*, 1]. (Since the students' ability is, in all cases,

[23] see Brezis and Crouzet, 1999.

[24] We use the typology formulated by Arrow. The effects of these different types of technology on the economy were already analyzed in other models (see Brezis et al., 1993; and Galor and Tsiddon, 1997). However they were not incorporated in an analysis of the recruitment of elites.

distributed on [*I-f,* 1].) The average value of elites in periods of invention[25] and innovation is respectively:

$$\overline{V}^{n} = (1 + f + I)/2 \quad for \quad \text{innovation,} \qquad (12)$$
$$\overline{V}^{v} = (1 - f + I)/2 \quad for \quad \text{invention.}$$

The interpretation of equation (12) is that during periods of innovation, but not of technological revolution, the students from the elite milieu contribute an average value of $(1+f+I)/2$, which is a higher value than the average population accepted in the school $(1+I)/2$. Those from the elite milieu increase the average value of the elite in times of innovations, and this results in a higher output (or growth rate). By contrast, during periods of inventions, i.e., of technological revolutions, the home culture is not useful, and only pure ability has an effect on output. The students from the elite milieu reduce the average ability and therefore reduce the average value of the elites. We summarize this effect in proposition 2.

Proposition 2

When the world faces innovations, the best elite is the one coming from the elites' schools; but, when the world faces inventions and big changes, diversity of elites is optimal. Homogeneity is, therefore, bad for growth, and elites schools are not optimal. Non-circulation of elites resulting from elite schools hampers growth during periods of invention, while it enhances it in times of innovation.

V. Conclusion

Over the centuries, there were changes in the way elites were recruited. From the end of the nineteenth century, the ticket to set foot into the elite was to enter an elite university, and until World War II, access to these elite universities was largely restricted to the upper class. After World War II, entry to elite universities was achieved through meritocratic recruitment and was not dependent anymore upon wealth; the best were chosen.

The idea of meritocracy made inroads, and new blood entered elite universities in the US, Oxbridge in the UK, and the *grandes écoles* and the ENA in France. Consequently, the first post-change elite were recruited in a diverse way, by successful performance in exams. For the first generation after these changes in recruitment, elite universities were not only enabled to choose the best, but also provided an opportunity for some who did not belong to the elite milieu to enter the best schools. We get social cohesion.

[25] In equation (12), the average value of elites is given only for students belonging to the elite milieu, and we did not take into consideration the other students, since their average value, during periods of inventions or innovations, is always $(1+I)/2$.

In succeeding generations, however, exams have not permitted opportunity for all, as shown by our model. In the second post-change generation, the children of the elite enter the elite schools in greater proportions, due to a cultural bias. In other words, whenever a new system is introduced, the nascent class system is destroyed, yielding a fluid, mobile society. However, from the second post-change generation on, the children of the elite again have an advantage. Our model has shown that meritocratic exams lead to an auto-recruitment of elites, resulting in a stratification effect. Meritocratic choice is therefore not equivalent to equal opportunity, since success in exams is correlated with family wealth and education.

The second part of our paper has checked the effect of this type of recruitment on economic growth. We have shown that these systems work very well in times of minor changes in technology, and they do allow for economic growth. However, during times of major technological change, the system of elite recruitment can actually cause a slowdown in the adoption of new technologies.

In conclusion, this paper has shown that the stratification effect in the recruitment of elites is due to the entry exams to universities. The democratization of the universities has led to education of masses but not to a "democratization" of the elites. Meritocracy does not lead to social cohesion despite the democratization of higher education.

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