Differential Demography and Wealth Redistribution in Paris. XIXth-XXth Century. (First Draft)

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During late XIXth century, and XXth century until the "baby-boom", French demography was very specific in comparison with European standards. Data from successions show indeed that average family was small, and that a large share of individuals died with no child inheritor at all. This seems however to have been different in very rich families. In Paris for example, where top 1% individuals possessed more than 50% of total wealth before World War I, the number of children by deceased was twice as high as in the "middle-class", because small families and indirect (childless) inheritance were less frequent. To understand the effect of differential demography on capital redistribution at each generation, I designed a simulation model counting the total wealth inherited by inheritors of different social worlds. Until World War II, Malthusian France was a place where inheritors received a total amount of wealth that made them richer than each of their parents. This was especially true in a city like Paris, from the Second Empire to at least World War II. Middle-class individuals of small families experienced mechanical upward mobility because of direct and indirect inheritance, whereas a big proportion of top family inheritors experienced the opposite. Beyond the question of transmission, it is necessary to understand if family structures has long term effects on individuals, or if inheritors can compensate capital dilution by other means (e.g. work, saving). Observation from a new data set following 800 very rich Parisian families on two generations tends to prove that individuals of larger sibships never caught-up with the others. Moreover, for a given amount of total inherited wealth, it seems that larger sibships had a negative effect on the inheritor's wealth at death. This could be explained by coordination problems between brothers and sisters to manage parental estates.

Introduction

A lot of studies try to understand the way wealth is accumulated in the long run in a microeconomic perspective. Correlation of wealth between fathers and sons are a classic of sociology and economics (see Waldenstrom (2008)[4], Atkinson and Harrison (1978) [2], Harbury et Hitchens (1976) [14], Bourdieu et al. (2008) [20]).

Some research have tried to understand the impact of a particular family configurations on the individuals destiny. For example litterature about sibship effects on

level of education, and occupation have recently developped (see e.g. Mandemakers (2010) [6] or Merllié (2008)[1]). These works question empirically the existence of a quantity/quality trade-off concerning children (Becker 1981) [3]. Unfortunately few studies have focused on individual wealth (Clark and Cummins (2009) [8]).

A major issue in the studies both on sibship effect and capital transmission is that very rich families are often neglected because they are few and then harder to observe (Bourdieu et al. (2008) [20], Clark (2008) [7]). This is a major issue, considering the high levels of wealth concentration in France, and in most developed countries since the industrial revolution. Before 1914 in Paris, a few very rich families owned the bulk of estates possessed by the Parisians. In 1872 for example, the biggest 300 successions in Paris (a mere 1.5% of total deaths in this city every year) represented 60% of total wealth transmitted, 53% in 1882. As Paris represents the quarter of total french wealth, this means that these 300 individuals owned about 13-15% of total wealth of the 700.000 dead of these years. Wealth concentration raised until World War One, when top 1% of the population owned 60 to 70% of the total, which means almost 20% of total wealth in France (Piketty et al. (2006) [18].

Demography and capital accumulation issues were already object of much concern in XIXth century France. In the population, practices of fecondity limitation - e.g. the elevation of the age of marriage - were common since at least French Revolution (Weir (1984) [21]. Authors and politicians preaching neo-malthusian theories flurished (Rosental (2004) [19]. Some demographers like Dumont (1890) [10] also accused french families to reduce their fertility in order to favour the economic destiny of their children. He blamed this practice in regard to French demographic stagnation in Europe. Demographers and economists where also strucked by huge differences accross social classes for economic and cultural reasons (see Malthus (1803) [16], Dumont and Engels (1884) [11]). In a context where capital transmission is organised by abstract kinship order, as in most European countries, it is clear that different demographic patterns (mortality, fertility, marriage, divorce) will result in different accumulation patterns. This article wants to empirically observe these differences and analyse their redistribution properties.

In order to understand the redistributive effects of different family structures, I had to have a simple micro-representation of it. That's why I built a model that counts all wealth inherited by an individual over the course of his life. We'll see that indirect successions plays a big role in this story. This article will both present micro-representation and the macro-description of capital reallocation. We'll try to compare what happens in the middle classes and in the very rich classes. A major concern of this article is to better describe the "200 families" in comparison with what happens at lower levels of wealth. Doing so, it is easier to understand the patterns of reproduction or replacement of rich families.

This article is divided in four section. Section I briefly describes the sources and the construction of my micro data set. Then I present patterns of differential demography in the different social classes in Paris before World War II (section 2). In section 3, I describe my micro model of inheritance and apply it to measure upward and downward mobility in the different social classes in year 1882. In the last section, I observe wealth at death of two generations of individuals of very rich families, wondering if they can compensate tmechanical downward mobility.

1 Sources and data set building

1.1 The exploitation of the archives de l'Enregistrement

This article is based on the extensive use of the *Archives de l'Enregistrement*, namely the administration of the public treasury registering and taxing capital transmissions in France since 1790. Despite changes in tax base, tax rates, and conception of wealth inherited, this institution has been functioning with almost no interruption since then, and the source has remained formally the same. This is an observatory of the evolution of wealth for more than two centuries now. Because french taxation of successions is universal since the French Revolution[1], the administration collects information on everybody, checking first the haves and the have-nots. This information is registered in the *Tables de Successions et Absences*. Individuals with strictly positive estates have to provide a document giving informations about all the inheritors and estates of the decedent: the *Déclaration de succession* duly controlled by the civil servants.

Since the XIXth century, the informations contained in the Déclarations de succession have been gathered and used on a large scale by the agents of the Ministère des Finances. To begin with, these agents were in charge of building statistical summaries about wealth at death, type of succession (direct/indirect) and succession tax. These statistics were partly published by the Ministère on a yearly basis in the *Bulletin de Statistiques et Législation comparée* (*BSLC*) after 1873, and date back from 1827. After 1902, when the succession tax becomes progressive, *BSLC* gives the distribution of successions by levels of wealth, départements, types of assets[2]). After World War II, innovations in data collecting enables the Ministère to increase the taxonomy of goods, and to produce cross tabulations.

As this article deals with demographic issue, it is interesting to note that the number of children inheritors by succession was not a major concern for the Ministère. This figure was published accurately only in 1899 and then after World War II[3]. Cross tabulations mixing levels of wealth and number of surviving children are only available in 1949 and 1950. This lack of statistics in the *BSLC* in comparison with other topics is quite surprising because in France, contrary to anglo-saxon countries, survival rates matter for fiscal issues. Indeed, tax rates are not calculated on the decedent's total wealth, but on each inheritor's share. In a proportional tax system, this doesn't do any harm, but after 1902 - as taxation becomes progressive - the larger the number of share, the lower the tax rate.

The data of the BSLC are very useful, because they give a lot of information about capital accumulation in France in the long run, with data on different regions, and giving macroeconomic data that we'll use to understand the specificity of Paris. But the very process of production of this data is not always absolutely clear, and,

[1] between 1790 and 1955, individuals pay a tax beginning at the first franc of estate. From 1956 on, successions are taxed only above a certain level of wealth

[2] Very detailed list of all published statistical *tableaux* is given in Piketty (2001)[17]

[3] During the inter-war period, number of children inheritors were published, but sibships of 4 and more were gathered in one group. These sibships were indeed not concerned by the new successoral tax created by the law of 1920.

most importantly, all the data are aggregated at the département level, or at the national level.

1.2 Building a micro-observatory of wealth on two generations

In order to build my data set, I used the data and methodology created by Thomas Piketty, Gilles Postel-Vinay and Jean-Laurent Rosenthal (see Piketty et al. (2006) [18]). Their data set is based on the observation and treatment of all parisian successions in Paris every ten years between 1812 and 1952. Thanks to these informations, I was able to identify the population of rich Parisians and built an observatory of wealth at death on two generations. I observed very high direct successions (members of top 200 in 1862, top 150 in 1867, and top 300 for 1872 and 1882), and end up with 1900 parent/child couples. Through an extensive use of public records, decennial tables, fiscal decennial tables stored at the *Archives de Paris* and web ressources, I have been able to find the location and time of death of nearly 85% of inheritors. A low proportion of inheritors moved to parisian growing suburbs, and other cities in France, and so couldn't be found in Paris. For this city on the contrary, documents produced by the administration are almost universal, so the rates of attrition is supposed to be really low. The results presented here hold for inheritors who were living in Paris and Neuilly-sur-Seine at the time of their death. They represent the vast majority of inheritors. This article will present results based on the observation of nearly 450 "couples" of parents and inheritors deceased before World War One.

1.3 strengths and limits of the methodology

1.3.1 Information in succession records

Succession records enable in the first place to observe a lot of information about the departed (marital status, age, profession) as well as the value of the assets transmitted to the children. We have total data on the number of inheritors for each succession. The succession in itself also gives the current location and profession of inheritors at the time of their parent's death. We also know if the daughters of the departed are married or not, and the names and profession of the husband. The problem is that we don't observe what asset goes to what inheritor. A Déclaration de succession is a document listing the goods owned by the departed. The sharing of the assets is not relevant for the administration, since the same tax rate apply for every kind of asset, so every inheritor pays the same amount of tax. Notarial archives could complete the dataset, but the existence of wills - which has to be mentionned in the Déclaration - are pretty rare in our sample, and it is not sure that the wills indicate the chosen destination of all assets. Basically what we'll observe is the parent's wealth composition, the parents' characteristics and children wealth. Further research relating parent's and children's wealth composition will be possible in the future.

1.3.2 Measuring wealth

The legal definition of wealth at death (and tax base) changed in many ways over our period. We have to take these changes into account in order to build coherent reasoning about inheritors wealth, to allow inter-temporal comparisons. Before 1902, succession tax rates were the same for every level of wealth. For this reason, there was no need to gather the value of all goods in one document given to one office. Basically movable properties (current accounts, government bonds, obligations, etc.) were declared at the *Bureau de l'Enregistrement* of the place of residence of the departed. Real estate and land were declared at the *Bureaux de l'Enregistrement* of their place of location. Following the procedure of Piketty et al. (2006) [18], I gathered all the Déclarations of the different parisian *Bureaux* to reconstitute the inheritors wealth at death. As a result, real estate and land owned outside the city of Paris are not taken into account before 1902. As I kept only effective parisian residents in our samples, this measure of wealth is a good proxy of individuals' wealth, except - of course - for large land owners. Another issue is that before 1902, debts are not observed by the administration, so we observe gross levels of wealth (the sum of the value of all goods owned). After 1902, since the rate of taxation now depends on the total value of the successions, all goods owned by an individual are declared at the *Bureau de l'Enregistrement* of his place of residence. On the more, debts are now observed, so we can provide gross wealth/net wealth, parisian/non-parisian real estate value. By default, I chose to observe gross total wealth. Differences between gross wealth and net wealth have proven to be of small magnitude in average (Piketty et al. (2006)[18]).

2 The demography of wealth transmission: 1850-1950

2.1 France's low survival rates

France's low fertility pattern, beginning at the end of the XVIIIth century is well established (Cummins (2008)[9], Weir (1984) [21]) and documented, and this was a major concern for social scientists and political leaders (Rosental (2004) [19]). As we focus on wealth transmission, we'll deal with survival rates (the number of child surviving their parents by departed), as in Clark (2008) [7] to characterize demographic patterns. Survival rates synthetize information about final descendance as well as children mortality. It gives information about the effective wealth transmission, but is unfortunately of poor help to characterize individuals' life cycle. From our point of observation, somebody having had no child at all in his life, will not be different from somebody who lost all his children, although the pattern of consumption and saving over the life cycle of this two individuals were probably very different. Survival rates are observable only for people leaving strictly positive wealth at death. We don't have the information for "poor" individuals (40% of French population in 1870, 48% in 1914, and 55% in 1945, Bourdieu et al. (2004) [5], *Annuaire statistique rétrospectif* (1966))), since there is no issue of wealth sharing or taxation. For rich people though, survival rates are easy to observe and are complete, contrary to ge-

nealogical data.

For France, we have data for the successions, provided by the Ministry of Finance for years 1899 and 1949, i.e. the number of surviving children of people born in the 1840s and in the 1890s[4]. This figure remains pretty stable over time: 2.52 children in average in 1899, 2.43 in 1949. Including people dying with no child at all (a quarter of the value of french successions according to the statistics of Ministry of Finance, but 28-30% of the population in the TRA-sample at that period), this inter-generational ratio gets down to 1.78-1.8 in 1899 and 1,83 in 1949. The demographic patterns are very stable across time despite huge social changes. These rates of reproduction are below 2 and make sense with France's demographic history. In hundred years indeed, from 1846 to 1946, french population has grown from 36.1 millions to 40.5 millions - a 12% increase - according to official French censuses, primary due to increased life expectancy and immigration flows[5]. At the french macro-level, with survival rates slightly below two, average inherited wealth per capita of inheritors is a little above average wealth of the last generation.

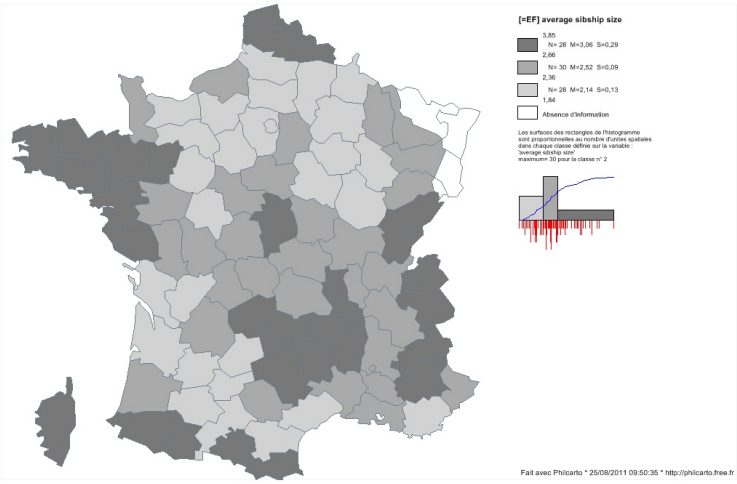
The situation in Paris is really different. Data set on Parisian successions reveal lower reproduction rates than in France in average. In the long run, average number of children in direct successions is pretty stable: it equals 2.01 in 1872, 2.03 in 1882, 2.07 in 1899 (*Annuaire Statistique*, 1900) 1.92 in 1927, 1.81 in 1937. This is 20-25% lower than in France. The total amout of children by decedent is closer to 1 (1.17 in 1872, 1.11 in 1882, 1.09 in 1927 and 1937), which is 40% smaller than french levels. Demographic patterns in Paris implied that inherited wealth of each generation was almost twice higher than the average wealth of the parents. This cannot be seen at a macro level, because Paris isn't a close economy. Had it been the case, Parisian population would have been divided by 2 every 30 years since the middle of the XIXth century, with doubling wealth per capita every time. Actually Paris population doubled in the period 1870-1914, because of huge migration flows from other regions of France and abroad. Nevertheless, it seems that the children of parisian families were more likely to be richer than their parents in average.

Paris was not the only place in France with low survival rates. The data on sibship size in the direct successions of 1899 show huge differences by Départements, ranging from 1.84 to 3.85. It is interesting to note that the poor regions of the Garonne Valley experienced lower survival rates than the paris basin (see map in figure 1). On the other hand, poor agricultural Brittany and industrial North were both region with large sibship. Spatial variations mix differences in wages, type of wealth, wealth inequality, urbanization cultural habits and religion. The study of the determinants of survival rates is a huge task at a national level, but our data on Parisian estates will enable us to better understand the relationship between wealth and demography.

[4]sources: *Annuaire Statistique*, 1900 et *Statistiques & Etudes Financières*, 1951.

[5]It may also be explained by the higher survival rates of the poor population, which is not taken into account in the public statistics nor in this study

Figure 1: Average sibship size by Départements in 1899 direct successions. *Annuaire statistique*, 1900



2.2 Demography and class in Paris and France

XIXth century Paris is a place of huge wealth inequalities. This was also a place of big differences in demographic patterns and family structure. What we observe is that, in the very high classes, total survival rates where two times higher than in the middle class at the end of the XIXth century. Sibship are indeed larger there and people are more unlikely to die childless. This phenomenon appears to be pretty stable at least until World War II. In this study we have divided the Paris population into deciles. Table 1 shows mean wealth by decile in Paris in 1872. I isolated the top 300, a class that in itself owned 55 to 60% of all estates in Paris in late XIXth century. To be part of this top 300 in 1872, an individual had to have more than 310,000 francs, which means about 40 times median succession in Paris. In this group, 72 individuals left more than a million and 21 left more than 2 million francs. Average wealth is 1.08 million francs, and median wealth about 568,000 francs. This population actually diverse and mixes well-off entrepreneurs (e.g. piano factories, leather manufacturers) as well as very rich bankers.

Table 1: Descriptive data by decile in Paris, 1872

decile	1	2	3	4	5	6	7	8	9	10	top 300
mean wealth	138	476	1,171	2,480	5,005	10,469	21,083	46,510	115,928	676,301	1,082,753
share of total wealth	0.015	0.057	0.13	0.28	0.57	1.2	2.39	5.29	13.2	76.9	60.1%

Wealth concentration rises from this period to 1914, then decreases. But top 1% owns at each period more than half of total Parisian capital.[6]

[6]to have full information, please report to data published in Piketty et al. (2006)[18].

2.2.1 Proportion of direct succession

A striking fact in Paris is the large proportion of individuals of the middle class having no surviving child (or grandchild) at all. The probability of direct succession is strictly increasing by level of wealth for the years 1872 and 1882. More than 62% of successions of the poorest decile were indirect in 1872, and 55% in 1882. This proportion decreases slightly to attain a quarter by the top 300. This pattern is the same in 1912, 1927, 1932 and 1937 as shown in Table 2.

Table 2: Proportion of direct inheritance by decile and by year.

decile	1872	1882	1912	1927	1932
1	42.8	44.5	43.3	48.5	49
2	52.2	49.6	50.5	51.5	54
3	54.5	52.9	56.4	55	63
4	57.2	56.2	60	54	61
5	60.8	57.0	64.4	56	59.7
6	58	60.0	65.9	59	57
7	63.4	59.7	60.5	58,2	59,6
8	64.5	66.5	64	64	65
9	69.3	67.7	65.6	64	66
10	72.7	71.5	75.9	71	71
top300	74	74	79.4	72	70

It is possible to argue that these differences are a statistical artefact though: individuals with no surviving children have no reason to save money until their death. They are more subject to the regression to the mean, and appear less at the top of the distribution. But childless individuals could also be richer than the others when they die, for at least two reasons. First of all, individuals with children have already made gifts during their life. *BSLC* data show that at all periods, more than 95% of inter-vivos gifts are made between parents and children. Second, recent research have shown that bequest motives are maybe of smaller magnitude that it was thought (Laitner (2001) [15]). Third, these authors also bring back to mind that children, and especially their education, is costly in money and time, which could hinder accumulation process as stated by Gary Becker (1981) [3]. This article is based on the idea that these differences are created by wealth and income effects. In Paris inequality of fortunes are very strong from one decile to another. So we think that assuming that individuals of the same sibship are in the same decile (or not very far from the same decile) should work for the bulk of the population. It doesn't work for families with members experiencing really strong upward or downward mobility, but in average at a more macro level, these effects should compensate.

A way to check that differences between the very rich and the middle class are real is to have a look at our micro sample concerning very rich families. What we observe is that first the effect on wealth of having surviving children is weak and

insignificant for our sample of inheritors, when controlling for large amount of variables. On the other hand, inheritors from very rich family - 3/4 of whom are in the tenth decile at the time of teir death - are only 27% not to have children. This figure is very close to what we observe in the top deciles. We do not have the same information for the middle class, but at least it is possible to say that there exist significant differences between the middle class and the very rich class.

It is still very difficult to understand the forces that link wealth levels and the probability to die childless. This issue is very far from the quality/quantity trade-off which deals with the optimal number of children. Answer this question would necessitate to have a lot of information on the individuals' life cycle: fertility, mortality and nuptiality. With Parisian estates data set, we can only observe the latter, and this explain just a little share of this difference. Indeed, in 1872 and 1882, 82% of the individuals of the 5 first deciles were married/widowed, so 8 points less than the top decile. So almost everyone was or had been married once in his life. The big difference between the middle-class and the very rich is rather the frequency of couples without surviving children. 80% of married couple in top decile had children, this was 50 to 65% for the lower deciles. So again the question is why middle class couples were so few to have children surviving them. Families with one children were very frequent at that time (Rosental (2004) [19]), so maybe higher infantile and young adult mortality in the middle class are the key explanations.

2.2.2 Average sibship

Focusing on individuals with surviving children, the data from parisian estates witness larger sibships in the very wealthy deciles. Average sibship was around 1.9 in the first deciles, then the proportion raises to almost 2.5 for top 300 direct successions. This pattern is even stronger after World War I, from less than 1.8 to more than 2.5, in 1927 and 1937: surviving rates increased a little at the top, and decreased a little at the bottom of the distribution.

Table 3: Average number of children in direct successions, by decile and by year

decile	1872	1882	1927	1932
1	1.784	1.88	1.93	1.94
2	1.84	1.85	1.79	1.71
3	1.98	1.95	1.79	1.78
4	1.88	1.94	1.78	1.75
5	1.90	2.05	1.78	1.79
6	1.95	2.06	1.81	1.8
7	2.04	2.01	1.78	1.81
8	2	2.09	1.95	1.86
9	2.19	2.11	2.08	2
10	2.31	2.38	2.46	2.26
top300	2.42	2.47	2.55	2.45

Table 3 shows the distribution of sibship size by decile in 1882. It is important to

note that families with one surviving child were half of the total of direct successions in the first 4 deciles, and still equal or above 45% until decile 8. Top 1% is the only category where families with two surviving children are more frequent than those with single child. It is to note that families of 6 and more are extremely rare at each level of wealth distribution. They account for 2% of all families, even in top deciles.

2.3 rate of reproduction by social class

Because sibship were larger at the top of the distribution, and indirect successions less frequent, the ratio of intergenerational reproduction is almost twice higher in top deciles than in the middle class. There were 0.8 child by departed in the lower deciles, although this figure was up to 1.7 for decile 10 in 1872 and 1882. In the bigger part of the middle class, rates of reproduction are equal or below 1. In the interwar period, this is true for the 7 first deciles. This means that average inheritor in these categories inherited large estates in comparison with their parent's estate.

Table 4: Total rate of reproduction of generation of 1872, 1882, 1927 and 1932

decile	1872	1882	1927	1932
1	0,765	0,77	0,91	0,95
2	0,94	0,8	0,895	0,92
3	1,03	0,91	0,95	1,12
4	1,058	1	0,93	1,06
5	1,139	1,07	0,96	1,07
6	1,108	1,136	1,02	1,026
7	1,272	1,08	1	1,08
8	1,246	1,264	1,2	1,21
9	1,494	1,293	1,28	1,32
10	1,65	1,575	1,63	1,6
top 300	1,72	1,72	1,84	1,71

3 A general framework of wealth transmission

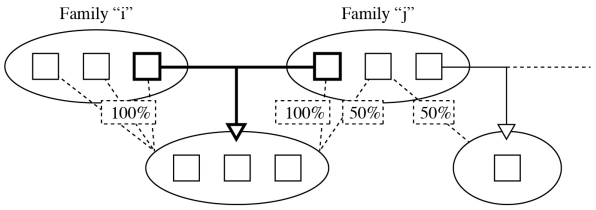
The parisian data base gives us a lot of information on wealth transmission among which the proportion of direct vs indirect succession, the numbers of inheritors by succession each year. But it is static, i.e. we observed people at the moment of their death. In order to understand the general pattern of the reallocation of all wealth, we have to bring extended family in the picture.

3.1 The point of view of the inheritor

Consider an individual with two siblings (see diagram of figure 2). His father has two unmarried old sisters with no child. His mother has two siblings, one unmarried aunt with no child, and one married uncle with children. In order to calculate all inheritance received by our individual, let's first compute joint sibship inheritance.

Surviving sibship (of 3) will receive the wealth of the mother and the father. Then all wealth of the two childless patrilineal aunts, and just one half of the matrilinear aunt, the other half going to the sibship of first cousins. Sibship receives wealth from 4.5 individuals. Our individual has to share this wealth with his two siblings, and inherits finally from 1.5 relatives.

Figure 2: An example of total inheritance received by a sibship



We don't have these structural informations for every family in our sample. However we've calculated sibship size and the proportion of indirect successions in each decile. It is then possible to build an ideal-typical family of each decile. Consider the average inheritor of 1882 top 300. He has on average 1.42 brothers/sisters. Consider that demographic patterns are stable from one generation to another (as we observe in Paris between the 1870s and the 1930s), this means that his parents had themselves 1.42 brothers/sisters. So this individual had on average 2.84 uncles/aunts. He shares his parents' wealth with all his brothers/sisters, etc.

This approach is nevertheless limited: we've got to represent actual families, with different numbers of children and relatives. Thanks to the estate data we can observe actual distribution of sibships by decile. To clarify these issues, I created a model randomly generating families, marriages, births and inheritance. It is parametrized with observed variables in the data set on paris estates in 1882. For each decile, 100 sibships are created. The size of each sibship is simulated randomly according to the observed distribution of sibship (see table 8). The individuals are matched to create couples that have children, with probabilities that again respect observations of 1882. For the sake of simplicity, people are either married with children, or single with no child. Moreover the model creates a world where succession takes place only in descending line (this is the case in 95% of direct successions in France in 1904 according to BSLC). This means that all individuals of the old generation die before those of the other. In the model, there is also at least one mariage in each family. Otherwise, there would have been vacant successions, and we would have had to create an older generation, to determine cousins, grand-cousins, etc. Indirect successions exist therefore only between aunts/uncles and nieces/nephews. This simplified representation gives nevertheless the idea on the most common type of indirect succession[7]. Succession issues between husbands and wives are neglected, because in the final analysis, when the two spouses are deceased, wealth will go to children or nephews. Inheritance in this model is generated following legal rules

[7]successions between two brothers/sisters, or between someone and the children of his/her brother/sister account for 3 quarters of indirect successions in 1904

(order of kinship, equality among inheritors).

As in our first example, once family is generated, it is really straightforward to calculate the total inheritance received (in the model, each individual of the old generation has a wealth level of "one"). An individual "l" born of parents of family "i" and "j" receives:

$$\frac{2 + \frac{UnmarriedUncles(i)}{MarriedUncles(i)} + \frac{UnmarriedUncles(j)}{MarriedUncles(j)}}{sibshipsize(l)}$$

3.2 Different patterns of wealth accumulation

Table 5 shows the calculation of total wealth inherited by individual for different deciles. Individuals of decile 1 inherits in average of 2.6 individuals. As we consider in a first approach that each member of a social class has the same wealth, this figure means that inherited wealth of these individuals is 2.6 times wealth at death of their parents. As we mentioned it, this Table makes sense if one makes the assumption that parents and parents siblings are part of the same decile. In real world however, wealth of brothers and sisters may vary a lot, so a model with some variance would be more accurate. We make the hypothesis here that in average, wealth of uncles and wealth of parents are the same, considering that some people experience downward relative mobility and some upward mobility. This exercise is anyway useful, since it clarifies the way our two variables acts on wealth transmission, and since it gives a general framework that can be made more accurate with future data.

Table 5: Simulated direct/indirect inheritance by decile (calibration with 1882 data, mean on 100 sampling).

decile	inherited shares	direct shares	indirect shares	aftertax inheritance
1	2.6	1.16	1.44	2.45
2	2.35	1.176	1.185	2.27
3	2.08	1.106	0.97	2.01
4	1.97	1.1	0.87	1.90
5	1.92	1.09	0.83	1.85
6	1.83	1.09	0.74	1.766
7	1.81	1.08	0.73	1.75
8	1.59	1.047	0.54	1.54
9	1.55	1.045	0.5	1.50
10	1.31	0.94	0.37	1.28
top300	1.21	0.89	0.32	1.18
total	1.90	1.08	0.82	1.83

Column 2 is the sum of column 3 and 4.

Column 5 of the table gives us the average number of inheritor's share that a surviving individual can expect to receive in each social class[8]. Individuals of the

[8]it is to mention that in 1882, the difference between before tax and after tax wealth is very low. This is not the case for generation dying after 1902 when tax rates go up, especially for indirect successions

first 5 deciles will receive about 2 times average wealth of the last generation. This figure then decreases progressively until the top 300, where individuals can expect to receive 1.17 times average wealth. It is to be noted that in average, just with inheritance, individuals are made richer at each level of the social ladder, hence natural growth rate of the population is negative everywhere. Individuals from the middle class receive more wealth, because they have more shares both directly and indirectly. Direct inheritance premium is obvious because of sibship size differences. Indirect inheritance is lower by the rich because probability of indirect succession is lower. This doesn't seem to be compensated by the existence of larger sibships at the parents' generation.

So in Paris, capital transmission seem to have make people richer than their parents, in the sense that total wealth inherited is high: two times higher for the middle class, just a little higher for the very rich population. Without looking at labor income, individuals were made two times richer than their parents by the simple rule of inheritance in the middle class. This phenomenon is not limited to Paris, and is susceptible to work in France in general, especially in the cities. This will be the object of future research.

3.3 Upward and downward mobility by decile

The model allowed us to calculate total wealth inherited by decile and also by sibship size. The results are shown in table 6. In the first decile, even individuals of sibships of 4 are made richer than their parents by inheritance. This is true just for sibship of 1 and 2 in top deciles.

Table 6: Total individual inheritance by sibship size and by decile (calibration with 1882 data).

sibship size	decile 1	decile 2	decile 3	decile 4	decile 5	decile 6
1	4.5	3.95	3.72	3.55	3.54	3.36
2	2.22	2.01	1.81	1.77	1.78	1.65
3	1.48	1.26	1.22	1.21	1.16	1.12
4	1.09	0.96	0.91	0.97	0.84	0.84
5	0.9	0.73	0.73	0.71	0.68	0.68
sibship size	decile 7	decile 8	decile 9	decile 10	top 300	Paris average
1	3.36	2.97	2.93	2.87	2.7	3.44
2	1.7	1.5	1.49	1.45	1.35	1.72
3	1.11	0.98	0.99	0.94	0.9	1.14
4	0.83	0.75	0.72	0.72	0.67	0.87
5	0.67	0.58	0.61	0.57	0.53	0.67

It is important to have in mind the distribution of sibships by decile, and above all the distribution of individuals by sibship size (see Table 7). In decile 9 and 10 the majority of individuals experience downward mobility. In lower classes, the bulk of the population goes up. Some individuals - those of small sibships - will also experience high absolute upward absolute mobility. Single children (16% of top decile individuals, and 12% of top 300) will still be in average almost three time richer than each of their parents.

Table 7: Distribution of individuals by sibship size and decile (1882), percent of total

sibship size	decile 1	decile 2	decile 3	decile 4	decile 5	decile 6
1	30,15	33,63	27,06	28,01	25,56	25,78
2	33,50	25,57	32	28,89	31,00	33,44
3	23,28	21,46	19,2	25,03	22,36	22,29
4	7,760	14,00	14,4	12,45	15,14	14,40
5	5,291	5,327	7,333	5,603	5,917	4,065
sibship size	decile 7	decile 8	decile 9	decile 10	top 300	Paris average
1	24,02	23,47	20,46	16,33	12,60	25,45
2	33,59	30,17	40,15	32,17	29,67	32,05
3	26,02	27,51	24,73	26,48	29,26	23,84
4	10,23	13,41	9,311	18,81	20,32	12,99
5	6,117	5,424	5,334	6,188	8,130	5,660

4 Beyond Transmission: long-term sibship effects

The effect of sibship on inheritance that has been presented in the previous section is pretty simple and mechanical. It is not obvious however that individuals of larger sibships will be totally constrained by capital division. Do they have other ressources that allow the to catch-up with the others, and first of all sibship itself?

4.1 Sibship effects by the very rich

What this section aims at studying is the total effect of sibship on the inheritors wealth at death, so several years or decades after the parents' death. The inheritors of larger sibship are disadvantaged as far as successions are concerned. But other effects relative to sibship can mitigate this shock on wealth. It is not sure that the initial inheritance gap can still be observed at the end of inheritors life.

First of all, larger sibship can be a place of positive externalities in very rich dynasties as it is described in a lot of historical monographs. In the second volume of his work about *The House of the Rothschild* ([13]), Ferguson insists on the fact that the spread of brothers and cousins in several cities and countries all over Europe was of major reason for the Rothschild's financial success before World War I. The author insists on the fact that gathering information from different sources and countries, and having connections with a lot of governments were assets when issuing bonds or obligations[9]. Although the Rothschild family was very specific in many ways, positive externalities could be at work in a lot of sibships: brothers, sisters and in-laws - if cooperative - could benefit from each other's network, information, and credit. This hypothesis is developped in Zalio (1999) [22] in his work about very rich families in Marseille.

On top of these issues of coordination, individuals from larger sibship can also be

[9] At the same time, as Ferguson reminds us in his *The House of the Rotschilds, vol 1.* (1999) ([12]), large families are obviously not a place of pure cooperation*Fathers were disappointed by sons. Brothers resented brothers. [...] Marriage was imposed on unwilling cousins, and husbands and wives quarelled. In all this, the Rothschilds had much in common with the large families which populate so much nineteenth- and early twentieth-century fiction*

willing to recover their parents' level of wealth in order to maintain a standard living and to pertain a certain social world. Strategies of high saving (harder work, lower consumption) may potentially allow individuals of large sibships to compensate physical and human capital dilution, and to catch-up with others.

Is there really a sibship effect that is observable in the data?

4.1.1 By which measure does sibship affect the inheritors' wealth at death

In order to measure the total effect of sibship, I regress the inheritors wealth at death on sibship size (number of surviving and represented children) and parental wealth, and a set of control variables. Comparing two individuals having equally rich parents, the coefficients of variable "sibship size" represent the loss or eventually gains of having more or fewer siblings. I chose a parabolic estimation of sibship size (n=2), because the effect of having one more sibling is stronger from 1 to 2 than from 3 to 4. Table 3 shows the statistical results of this regression for different subsamples. First column gives results for the 441 inheritors.

Total sibship effect is strongly negative in all samples. The absolute effect is stronger for inheritors from richer families (members of top 150 parisians), but proportionnaly, the total impact of sibship is stronger by the poor. Indeed, in top 150 successions, estimated mean wealth of only children is less than two times higher than mean wealth of individuals of sibships of 4 or 5. In the lower successions, this figure is superior to 3. But at each level, the effect is strongly and significantly negative. It seems again that sibship size was proportionnaly lower by the very very rich. This mixed result is interesting because it is both in accordance and disaccordance with common view of the very rich. Having more children has always a negative impact, but this impact is lower in the less wealthy families.

4.1.2 Sibship as a last beyond inheritance?

Beyond capital dilution, it is important to understand if sibship represents an asset for individuals. The question could be asked in these terms: consider two individuals having inherited a million francs. The first one has two brothers (having themselves inherited a million francs), the other is an only child. Which of the two will be better off at the end of his life? As mentioned earlier, we observed so far wealth at death of 441 inheritors (from top 300) deceased between 1887 and 1917. For each inheritor, we know surviving sibship size and one of the parent's wealth at death. To answer this question, I regressed the inheritors' wealth at death on sibship size and wealth effectively inherited, and other control variables. In each of our sub-samples the sibship effect is negative, but not very strong (see Table 11). It is significant only for the poorer people of our sample, and also for inheritors of generation 1872-1882 (where the variance of inheritance and wealth is maximal). Top 150 people seem not to be affected by sibship, or less.

4.1.3 Is there such a thing as compensation by individuals of larger sibships?

I used the first regression to simulate average wealth at death by size of sibship. The results are summed up in table 8. In our sample the average amount of time between the death of a parent and the death of the inheritor is 28 years. When we compare wealth at death to the average amount of direct inheritance in our sample[10], it seems that individuals from sibships of 2 or 3 hardly catch-up with single children. Individuals of sibships of 4 and 5 did experience some catch-up. But their bigger rate of accumulation enabled them to catch-up just with individuals of sibships of 3. Micro-economic effects of sibship are very strong, and last a long time.

Table 8: Average inherited wealth and wealth at death by sibship size, parabolic estimations

sibship size	observations	direct inh. (fcs 1882)	wealth at d. (fcs 1882)	increase	catch-up rate
1	54	1,566,328	2,315,223	47.8%	/
2	134	1,203,754	1,793,598	49%	1.025
3	119	912,278	1,435,125	57.3%	1.198
4	79	691,900	1,239,804	79.2%	1.65
5	50	542,620	1,207,635	122.5%	2.56
Total	436	908,598	1,682,392	79.31%	/

Last Column is the ratio of increase normalized to the average increase of single children

Conclusion

Demographic patterns were very different from one social category to another in XIXth and early XXth century Paris. Capital accumulation through inheritance was made easier (in relative terms) in the middle class, because families were smaller, and people inherited from uncles, cousins, etc. Individuals of sibships of 1 or 2 were few in top deciles families. Therefore a lot of them experienced downward absolute mobility, as well as downward relative mobility. They were indeed caught up by individuals of small sibships of lower classes. Focusing on very rich inheritors, it seems that it was very hard in large sibships to catch-up with the others. The advantages of large sibships were by far surpassed by the effect of capital dilution. This is true in average, but we still have to understand why some individuals of large sibship still managed to stay at the top of distribution. It is possible that while successions are divided equally, some children are favoured in the sense that they receive assets with higher rates of return. This necessitate to analyse the goods owned by the parents and by the inheritors and we'll be the object of future research.

Anyway, contrary to the common view that the J-curve of demographics disappeared after demographic transition, it seems that differential demography mattered

[10]In this part, we don't take indirect succession into account, as we cannot properly observe it. Anyway sibship size has the same division effect on indirect inheritance, and there is no reason to believe that sibships of 4 or 5 benefit from higher indirect inheritance than the others.

at least until the 1950s in France (*Statistiques et Etudes financières*, 1951). This allowed some replacement of a part of economic elites from one generation to another. It is true however, that this curve exist only at the very top of the distribution, making it's observation harder. There is no proof at all that it disappeared until today, we just lack the appropriate observatory for it.

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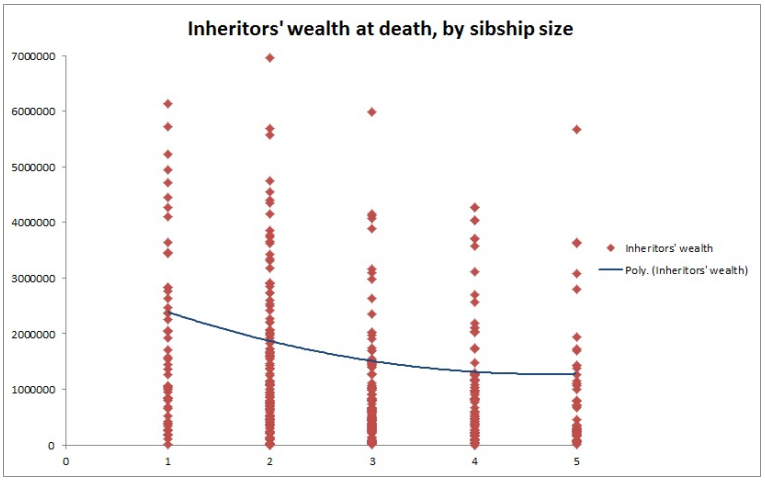

Figure 3: Inheritors' wealth at death, by sibship size

Appendix

Table 9: Distribution of direct successions by number of children (1882), percent of total.

sibship size	decile 1	decile 2	decile 3	decile 4	decile 5	decile 6
1	52,29	57,85	49,63	50,90	47,78	47,43
2	29,05	21,98	29,33	26,24	28,98	30,76
3	13,45	12,30	11,73	15,15	13,93	13,67
4	3,363	6,020	6,601	5,656	7,079	6,623
5 and more	1,834	1,832	2,689	2,036	2,212	1,495
sibship size	decile 7	decile 8	decile 9	decile 10	top 300	Paris average
1	45,09	44,99	39,21	34,61	28,70	46,98
2	31,52	28,92	38,47	34,09	33,79	29,93
3	16,28	17,58	15,79	18,70	22,22	14,86
4	4,801	6,427	4,460	9,965	11,57	6,100
5 and more	2,296	2,079	2,044	2,622	3,703	2,114

Table 10: Model 1: Total effect of sibship on inheritors wealth

Dependent variable: Wealth of inheritors at death (francs of 1882)	(1) All	(2) top rich	(3) others	(4) 1872-1882
Intercept	-363934	-1132400	792826	1718750**
	(858128)	(1687506)	(922110)	(746262)
Woman	-470761*	-628160	-188286	-122715
	(276332)	(489082)	(150503)	(210826)
Sibshipsize	-770028***	-1001710**	-804683***	-1274103***
	(271325)	(472091)	(228477)	(308875)
Sibshipsize^2	71595**	89520*	93751***	139431***
	(31847)	(49980)	(36036)	(44122)
1890s	-154279	-798708	81490	177103
	(520911)	(955934)	(278515)	(450881)
Belle Époque	-226129	-720868	44139	524289
	(569077)	(1067189)	(305111)	(537935)
Difference	18873	19480	11061	-13705
	(18370)	(33061)	(10442)	(18342)
Age	37209***	72605***	7845	21865***
	(11563)	(22123)	(5761)	(8355)
R.E. in parent's wealth	-8164**	-13369*	-5009***	-6095**
	(3631)	(7326)	(1742)	(2782)
parent's wealth	1.31909***	1.192***	3.23	0.73635***
	(0.17441)	(0.28)	(2.831)	(0.08679)
parent's wealth^2	-4.74E-8***	-4.11E-8***	-2.7E-6	
	(1E-8)	(1.52E-8)	(-2.28E-6)	
R^2	0.201	0.1875	0.179	0.317
Observations	441	239	202	283

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Model 2: Sibship effect controlling for wealth effectively inherited

Dependent variable: Wealth of inheritors at death (francs of 1882)	(1) All	(2) top rich	(3) others	(4) 1872-1882
Intercept	-1434048	-2307467	1056605	284995
	(885588)	(1749644)	(762006)	(765454)
Woman	-503616*	-616233	-195484	-123418
	(275349)	(485379)	(149437)	(206093)
Sibshipsize	-168681	-255399	-585687*	-545839*
	(277478)	(494940)	(311981)	(315021)
Sibshipsize^2	37585	41045	70845*	77856*
	(32087)	(50922)	(42315)	(44129)
1890s	-50890	-535650	109462	149685
	(516321)	(937045)	(275530)	(440843)
Belle Époque	-48859	-395321	54378	483433
	(563388)	(1039626)	(297524)	(525756)
Difference	16779	14009	14280	-7338
	(18218)	(32465)	(10278)	(17939)
Age	37364***	71357***	6806	18536*
	(11500)	(21972)	(5731)	(8182)
R.E. in parent's wealth	–8589*	–14686*	-4635***	-6047*
	(3614)	(7256)	(1703)	(2713)
inheritor's share	2.09581***	1.83052***	0.78008	1.83233***
	(0.25050)	(0.3733)	(0.79469)	(0.19543)
R^2	0.204	0.1916	0.177	0.347
Observations	441	239	202	283

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Mean wealth by familly category (frcs 1882)

Social class	Inheritors	Parents	Increase
top rich	2.4 millions	1.74 millions	+37%
others	875.000	520.000	+68%
all	1.7 millions	1.17 millions	+45%

To read this table: "Rich" means families of parents in top 150.

"Poor" means families of parents in top 300 but not in top 150.