On the Relationship between Inequality of Educational Opportunity and Inequality of Social Opportunity: A Reassessment of the Third Section of *L'inégalité des chances* (1973)

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- I would like to offer this piece of work to my daughters, Nina and Flore -

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and Inequality of Social Opportunity: A Reassessment of the Third Section
of *L'inégalité des chances* (1973)

I was introduced to *L'inégalité des chances* as a Master student in Social Psychology during the 1978-79 academic year. I remember quite well that one of my professors in the Catholic University of Angers presented the book and I quickly bought it in my favorite bookshop, that is to say, I bought *this* second edition, dated 1978. The year after, I had the opportunity to discover large-scale empirical research on social mobility as Claude Thélot accepted me for a 50-day research training period in the regional headquarters of the INSEE, that is, the French Statistical Office, in the town of Nantes. At that moment, he was working on the 1953 French social mobility data – the very first that was statistically representative and collected within the Labour Force Survey – and he was also working with more recent data coming from the 1970 Formation-Qualification Professionnelle survey, another INSEE survey he was previously responsible for. There, I discovered the very large representative surveys conducted by the French Statistical Office as well as the statistical modeling of contingency tables with multiplicative or log-linear models. And I also began programming with the FORTRAN computing language. At the end of this period, I took the decision to switch from Social Psychology to Sociology in order to prepare a doctoral thesis on a topic related to social mobility with Raymond Boudon as my PhD mentor. I had, *and still have*, great admiration for the Raymond Boudon of the first period, the man who wrote *L'analyse mathématique des faits sociaux* (*The Mathematical Analysis of Social Facts*) and who edited famous textbooks in French together with Paul Felix Lazarsfeld, *Le vocabulaire des sciences sociales* (The vocabulary of social sciences), *L'analyse empirique de la causalité* (The empirical analysis of causality), and, with also François Chazel, *L'analyse des processus sociaux* (The analysis of social processes) – all books that I introduced in my own library in 1979, 1980 or 1981. I was simply happy to go in that direction, thinking it might well be an appropriate way to reconcile my interest in science, especially statistical science, and my interest in society.

But, coming back to *L'inégalité des chances*, I must simultaneously admit that, over decades, I have been *haunted* by a statement that Boudon made in the foreword of the 1978 second edition, and that I have spent a significant part of my academic life discussing it. On the very first page of this foreword, Raymond Boudon explained that he wrote the volume in order to account for an apparent paradox: *"All industrial societies have been characterized for several decades by a certainly slow, but also significant and*

steady decrease of inequality of educational opportunity. However, this reduction has had only modest effects on the level of social heritage." – this is my translation of Boudon's sentences. I discovered quite late, during the 1990s, in *American Journal of Sociology*, the debate between Robert M. Hauser and Raymond Boudon, that is, the rather sharp review of the American version of the book written by the former, and the response by the latter. Evoking this fascinating exchange in a footnote within a 1996 *European Sociological Review* paper, John H. Goldthorpe nicely wrote that *"Hauser wins most of the battles, but Boudon wins the war"* (12, 2, p.121). At a dinner I had with Leo Goodman, Mike Hout and Donald Treiman, the evening before the August 2001 Conference of the Research Committee on Social Stratification and Mobility in Berkeley that Mike organized, Leo – who unfortunately passed away in December 2020 – told me that the 'shock' between Hauser and Boudon was also a shock between two mentors as the former was sponsored by Otis Dudley Duncan while the latter was supported by Paul Lazarsfeld.

In this brief lecture, I will question John's 1996 view that Boudon actually "wins the war". Indeed, I will argue that *L'inégalité des chances* is a great book, certainly for the part on Inequality of Educational Opportunity, but not so much for the part on Inequality of Social Opportunity. Over the last twenty-five years, a collective effort undertaken by a group of social stratification researchers I had the great chance to belong to has provided considerable empirical evidence that Boudon's statement in the foreword of the second edition is simply wrong. <u>Within modern societies, Education and change in Inequality of Educational Opportunity are key elements and ingredients to create and to understand change in Inequality of Social Opportunity</u>. I will demonstrate this on the basis of my own work about France and I will also briefly evoke comparative work that shows that what is observed for France can also be observed in many other societies.

I will immediately add that we should not blame Boudon too much for putting forward a questionable statement about the relationship between Inequality of Educational Opportunity and Inequality of Social Opportunity. *L'inégalité des chances* was written in the early 1970s, at a time where long series of social mobility data within a country were unavailable and the statistical apparatus for the modeling of contingency tables was only emergent. Even the now classical distinction between the notion of 'absolute rates' and the notion of 'relative rates' was not clearly established as yet. It is quite clear that Boudon was interested in Inequality of Educational Opportunity and Inequality of Social Opportunity, that is to say, interested in *relative rates* on both aspects. However, when

we read *L'inégalité des chances* today, we sometimes get the impression that Raymond Boudon confounds educational expansion or 'massification', that is, change in absolute rates, with democratization of education *per se*, that is, change in relative rates. Finally, this is probably good news that we are today able to *falsify*, in Popperian sense, Boudon's statement because that suggests that sociology is indeed able *to function as a science*.

(Slide 2) After this long introduction, let me begin by emphasizing that statistical models can be fundamental tools to reveal hidden trends within a society. In the year 1900, George Udny Yule discovered or invented the odds ratio, that is, a statistics that measures the association between two categories of a row variable and two categories of a column variable and which possesses the remarkable property of being independent of the margins of the contingency table. In 1935, the British statistician Maurice Bartlett defines the notion of no three-way interaction in a contingency table that cross-classifies three dichotomous variables: the odds ratio that measures the association between two variables is rigorously constant across the categories of the third variable. Now, let me consider a set of social mobility tables observed at different dates in the same country; *i* denotes class origin, *j* denotes class destination and *t* identifies the year of the survey.

The first model depicted on the slide is simply a generalization of Bartlett's insight: the expected count in the *(i, j, t)* cell is the product of three parameters. The *Alpha-it* parameter guarantees that the fitted counts will exactly reproduce the distribution of class origins that is characteristic of each date. Similarly, the *Beta-jt* parameter guarantees that the fitted counts will also reproduce the distribution of class destinations observed for each date. The model therefore has the capability to take account of historical change observed in the class origin and class destination distributions within the society. Finally, the *Gamma-ij* parameter expresses the fact that there is an association between class origin *i* and class destination *j*, that is, there is inequality of social opportunity, but this association is assumed to be rigorously constant across time. Under this model, all homologous odds ratios are rigorously constant over the survey years. This is the model of Constant Social Fluidity or, we might say, the model of Constant Inequality of Social Opportunity.

The first paper using this model was published in *American Sociological Review* in 1975 and entitled "Temporal Change in Occupational Mobility: Evidence for Men in the United States". The author is Bob Hauser, together with his students John Koffel, Harry Travis and Peter Dickinson, and the conclusion is that the model satisfactorily fits the observed

data. All scholars, including me, who have subsequently estimated the same model on a series of real social mobility tables across time have been impressed by the extent to which it is actually close to the observed data. So the conclusion that social fluidity – or Inequality of Social Opportunity – is certainly characterized by very strong inertia in real societies!

The second model depicted on the slide is very close to the previous one. The only difference is that the *Gamma-ij* parameter is now elevated at the power *Delta-t*. Conventionally fixed at 1 for the first date, *Delta-t* is estimated freely for all subsequent surveys. If this parameter goes below 1, that means that the association between class origin and class destination weakens over time and, as a consequence, that all estimated odds ratios are moving towards 1. When it is applied to real mobility tables across time, the second model therefore assumes a constant structure of the association between class origin and class destination while being able to detect a change in what we might call 'the general strength of this association' – please note that the first model is just a special case of the second one with *Delta-t* equal to 1, whatever *t*. Interestingly, this very powerful model, that appeared in 1992, was proposed simultaneously from both sides of the Atlantic Ocean: on the one hand, by Yu Xie, from the University of Michigan at that time, under the name of 'Log-Multiplicative Layer-Effect Model'; on the other hand, by Robert Erikson and John Goldthorpe, from the Universities of Stockholm and Oxford, under the name of 'Uniform Difference Model'.

With the help of this powerful instrument, I will now demonstrate that Inequality of Educational Opportunity has declined monotonically, but slowly and unevenly, across cohorts born in France over the XXth century.

(Slide 3) This graph comes from my chapter in a book edited by Raymond Boudon, Nathalie Bulle and Mohamed Cherkaoui in 2001. I presented it in a conference in Sorbonne that was held in June 1999, exactly twenty-five years ago. I also presented it in Brisbane in 2002, in the context of the XVth World Congress of the International Sociological Association. In this joint work with Claude Thélot, we put together seven nationally representative INSEE surveys to get a huge sample of more than 240 000 French-born men and women belonging to 13 birth cohorts, from the oldest (1908-12) to the youngest (1968-72). For each birth cohort, father's class in 8 categories is cross-classified with educational attainment in 7 categories (from 'no diploma at all' to 'a degree of at least three years after the *baccalauréat*'). The graph illuminates how, net of

changes in the class structure and the educational expansion, Inequality of Educational Opportunity – or the general strength of the intrinsic association between class origin and educational attainment – has evolved through the XXth century. This is done by depicting the dynamics of the estimated log-multiplicative parameters (my previous *Delta-t*).

You clearly see that the trend has been downwards, with especially remarkable progress achieved between the 1933-37 and the 1943-47 birth cohorts. The parameter declines from 1 in the first cohort to 0.65 in the last one. But don't be too much impressed by this seemingly impressive 35% decline! The reason is that it is measured on the very abstract scale of the logarithm of the odds ratio. To be more sociological, it is necessary to use counterfactual analysis in order to answer the following question: how many members of the very last cohort have different diplomas than those they would have held if nothing at all had changed in France in the general strength of Inequality of Educational Opportunity over 60 years? And the answer is: 10%, only 10%. By the way, when I extended this analysis with Marion Selz in 2007, considering 7 Labor Force Surveys, more than half a million individuals, 11 class origins and 19 three-year birth cohorts, I got the signal that these 10% might well be a bit over-estimated.

Interestingly, the general and uneven trend obtained on nationally representative data is quite consistent with the conclusions of a monographical study by the French historian of education Antoine Prost who analyzed change in pupils' social origins in the lower and upper secondary schools in the town of Orléans between 1945 and 1980. Moreover, the pronounced progress for the cohorts born in the early 1940s can really be interpreted in the context of Boudon's IEO model. In 1941, a reform promulgated by the conservative Minister of Education Jérôme Carcopino integrates the *Écoles Primaires Supérieures* in the secondary school track. As a consequence, the structure of opportunity offered to children of modest class origins has probably dramatically changed, allowing them to eventually achieve ambitious school goals without being obliged to take too risky decisions. After their elementary classes, they still had the possibility of going on within the primary school track, with its concrete and labor-oriented aspects; but the reform offered to the most able children of the lower classes the possibility of preparing the *baccalauréat* after passing through the *Écoles Primaires Supérieures*.

(Slide 4) When the same analysis is replicated after distinguishing the 13 tables for men and the 13 tables for women, a striking conclusion emerges. The decline of Inequality of

Educational Opportunity has been indeed stronger in the female part of the population than in the male one, especially because, until the end of the 1930s, IEO was much more pronounced for girls than for boys. This difference progressively disappears and it is even reversed in the 1968-72 cohort, an inversion that is also confirmed when the analysis is extended to later cohorts. This is much related to the fact that, today in France, school achievement and school attainment are better for girls than for boys, with this difference being especially pronounced within the working class.

(Slide 5) You may wonder whether the temporal dynamics I have exhibited is sensitive to the categorization of the educational attainment variable. In a 2018 *European Sociological Review* paper, Julie Falcon and Pierre Bataille have revisited the same research question with all French Labor Force Surveys between 1982 and 2014, 11 cohorts born between 1918 and 1984, and much detail for degrees in tertiary education – indeed, their lowest educational category is 'less than *baccalauréat*'. You can easily see that the decline of the association is very general and more pronounced for women than for men; it also appears for degrees at the upper tertiary level and for degrees from the '*Grandes écoles*'. So, there is considerable empirical evidence that Inequality of Educational Opportunity has diminished in France, rather monotonically but also slightly.

What about trends in Inequality of <u>Social</u> Opportunity within French society? I will also argue that there is considerable empirical evidence that ISO has diminished, again slightly but quite regularly, at least from the middle of the XXth century. In 1999, I published a sixty-page paper in the *Revue française de sociologie* and I also presented it in the University of Wisconsin-Madison – it was my very first visit and conference in the US, and Bob Hauser was in the room! Using again the same powerful model on social mobility tables for French men aged 35 to 59, I found that, fixed at 1 in 1953, the log-multiplicative parameter is estimated at 0.91 in 1970, 0.87 in 1977, 0.85 in 1985 and 0.81 in 1993. Indeed, the decline appears so regular that I was able to entirely capture it with a linear trend: social fluidity has increased, or Inequality of Social Opportunity has diminished, at the rate of half-a-percent per year over 40 years. Again, this change of nearly 20% in the general strength of the association between class origin and class destination looks impressive, but you now have in mind the problem of the scale. Counterfactual analysis shows that about 4% of men in the 1993 mobility table have changed their class destinations, only as a result of the decline in the association over forty years. Only 4%. This is quite clearly something that we cannot perceive with the

naked eye or in everyday life. Again, the trend was similar in father-daughter mobility tables and slightly more pronounced than in father-son tables.

(Slide 6) It is possible to be less abstract by considering odds ratios computed from the observed or real mobility tables. Here, for all Formation-Qualification Professionnelle surveys between 1977 and 2014-2015, I examine the odds ratios that involve the four official socio-occupational groups composed of salaried people: 'Cadres et Professions Intellectuelles Supérieures' (or the higher service class), 'Professions Intermédiaires' (or the lower service class), 'Employés' (or routine non manual employees), 'Ouvriers' (or manual workers). In computing all odds ratios, I consider the same groups for both class origin and class destination. You can perceive a general tendency for all, or nearly all, odds ratios to move towards 1 from 1977 to 2014-2015. Let me take only one very striking example. In 1977, among French women aged 35 to 59, the odds for belonging to the higher service class rather than being a manual worker were 410 times higher for daughters of a man in the higher service class than for daughters of a manual worker. The same odds ratio declines to 109 in 1985, 67 in 1993, 63 in 2003 and 36 in 2014-2015.

(Slide 7) When male social mobility data from the same surveys conducted between 1977 and 2014-2015 are submitted to general statistical modeling, the result I obtained in 1999 exactly reappears. The Bayesian Information Criterion shows that the model of uniform change must be preferred to the constant social fluidity model; the estimated log-multiplicative parameter regularly declines from 1 in 1977 to 0.80 in 2014-15; finally, that can be captured by a diminishing linear trend of, again, half-a-percent per year over 38 years.

(Slide 8) Results obtained on the corresponding social mobility data for women are quite similar, albeit with an interesting difference. Over the covered period that has been characterized by an increasing involvement of women on the labor market, the increase in intergenerational social fluidity, or the decrease in Inequality of Social Opportunity, has clearly been stronger among women than among men: the last parameter attains 0.74 as against 0.80 for men, and the estimated linear trend is -0.75% per year compared to minus half-a-percent for men.

Clearly, the evidence in favor of a decline in Inequality of Social Opportunity is therefore rather strong in France. We now want to appreciate to what extent change in Inequality of Social Opportunity has been related to change in education and change in Inequality of

Educational Opportunity. As education typically is a cohort phenomenon – education evolves from one birth cohort to another one – it is first of all necessary to analyze change in social fluidity across cohorts rather than survey years.

(Slide 9) This is what I have done for men in this analysis. From Model 2 (see the first red line), we get the impression that Inequality of Social Opportunity has only slightly diminished, from 1 in the 1906-24 birth cohort to 0.90 in the 1965-73 one. However, let me emphasize that analyzing change in social fluidity in a cohort perspective is indeed more complicated than pursuing the same sort of analysis across survey years! The reason is that, by design, the oldest cohorts are observed at an advanced age in the first surveys while the youngest cohorts are observed at a rather young age in the most recent surveys. So, there is a risk of confounding generational change in social fluidity with age effect on social fluidity. Further analysis indeed confirms this expectation. In Model 3 that controls for age, change in social fluidity reveals itself as more important than previously seen: from 1 in the 1906-24 cohort to 0.81 in the 1965-73 one; and we also learn that social fluidity increases with age advancement, that is, over the course of the occupational career.

(Slide 10) The same analysis on women's data reveals that generational change in social fluidity has been considerable in the female part of the population: according to Model 3, from 1 in the 1906-24 cohort to 0.58 in the 1965-73 one; and, interestingly, an age effect on social fluidity again appears, but its size is more limited than among men.

We are now close to the end of the analytical process. Let me consider the triangle Class Origin – Education – Class Destination. In a theoretical perspective and in order to explain the declining trend observed in Inequality of Social Opportunity, four basic mechanisms are potentially relevant and can be invoked:
- first, the declining trend observed in Inequality of Educational Opportunity, that is, democratization of education *per se*;
- second, a change in the association between Education obtained and Class Destination, that is, a change in the (relative) occupational returns to education;
- third, a change in the 'direct' effect of Class Origin on Class Destination – 'direct' meaning here 'controlling for Education';
- fourth, a more subtle compositional effect caused by educational expansion; more precisely, educational expansion increases the size of the more educated groups within the population and these more educated groups are characterized by a weaker

association between Class Origin and Class Destination; please note that I was able to demonstrate the latter statement for France in my contribution to the 2004 *Social Mobility in Europe* book.

(Slide 11) How can we reveal the relative importance of these four mechanisms for explaining the observed change in Inequality of Social Opportunity in France? We can again use counterfactual analysis or simulation analysis. The general principle is as follows. We start from a very simple model (we can call it '*Baseline*') that only incorporates elementary hypotheses: level of education obtained only depends from class origin; class destination depends on the birth cohort and it also depends on class origin, level of education obtained and their interaction. We begin by simulating the consequences of these baseline hypotheses on the variation of social fluidity over cohorts (this is the blue line called *Baseline*). Then we progressively incorporate within the model the terms associated with the different explanatory mechanisms in order to reveal, in the same way, their specific impact on change in social fluidity or Inequality of Social Opportunity over cohorts. The terms are introduced in the following order: educational expansion or 'massification' and its associated compositional effect (this is the line called *Expand*); democratization of education or reduction in Inequality of Educational Opportunity (this is the line called *Equalize*); change in the relative occupational advantage afforded by education (this is the line called *EducReturn*); change in the direct effect of class origin on class destination (this is the line called *OriginReturn*); finally, the very last terms that saturate the model and therefore exactly reproduce the really observed variation in social fluidity (this is the line called *Saturated*). This slide for men and the following for women synthesize all the results of this analysis: between the curves *Baseline* and *Saturated*, we can perceive the relative importance of the contribution of the four explanatory mechanisms.

(Slide 12) For both men and women and whether we consider the 1945-54, 1955-64 or 1965-73 cohorts, it is indeed the two changes relating to education which have produced most of the decline in Inequality of Social Opportunity in France. Their relative importance has, however, changed. For men and women born between 1945 and 1954, the effect of the democratization of education is larger than the effect of its 'massification'. This is, however, the opposite in the two most recent cohorts where the latter effect (*Expand*) clearly dominates the former (*Equalize*). Comparatively, the weakening of the relative advantage afforded by education for accessing the different class positions (*EducReturn*) has affected the variation of social fluidity very little,

probably because it has concerned men and women from all class origins rather uniformly.

Do the results established for France also apply to any other society? In their concluding chapter in the 2004 *Social Mobility in Europe* book, Richard Breen and Ruud Luijkx wrote on page 389: "The results from our eleven countries then point to a fairly clear conclusion: there is a widespread tendency for social fluidity to increase, even though this might not be a statistically significant trend in every case." The analyzed countries were: Germany, France, Great Britain, Hungary, Ireland, Israël, Italy, Norway, the Netherlands, Poland and Sweden. In their concluding chapter in the 2020 book entitled *Education and Intergenerational Social Mobility in Europe and the United States*, Richard Breen and Walter Müller wrote on page 287: "Considering the broad picture, taking each country over the whole period we have studied, we find no cases in which social fluidity increased without either an equalizing effect of educational expansion or equalization in the relationship between origins and education, or both." The eight analyzed countries were: Germany, Spain, the United States, France, Italy, the Netherlands, Sweden and Switzerland.

Let me conclude by expressing in English two statements that I already made in the conclusion of my presentation in Sorbonne twenty-five years ago. I am a bit confused in revealing that I do not change *any word* in these statements.

First, I do not have an 'enchanted' vision of the increase in social fluidity or the decline in Inequality of Educational Opportunity. That actually means that people are living in a more 'competitive' society, but this is also a society where social determinism is less strong, that is to say, a society in which the 'games' are a little less decided initially than they were a few decades ago, and this point is, in my view, more important than the previous one.

Second, reflections that come from the epistemology of science also apply to sociology and the social sciences. When we study social change and we are particularly interested in statistical relationships that are characterized by very strong inertia – because they are located at the very heart of social organization – we are confronted with a problem of the power of our analytical instruments. In other words, we run the risk of not perceiving a change that, while real, remains tenuous and occurs slowly. It is in reality nothing other than the problem of the astronomer and his telescope, and, in matters of quantitative

macro-sociology, this is often the statistical model selected for the analysis that plays the role of the telescope. Ladies and gentlemen, dear colleagues, I am very grateful for your attention.

Statistical Models are Fundamental Tools to Discover Hidden Trends in Society

The Multiplicative Model with No Three-Way Interaction,
i.e. the Constant Social Fluidity Model (circa 1975)

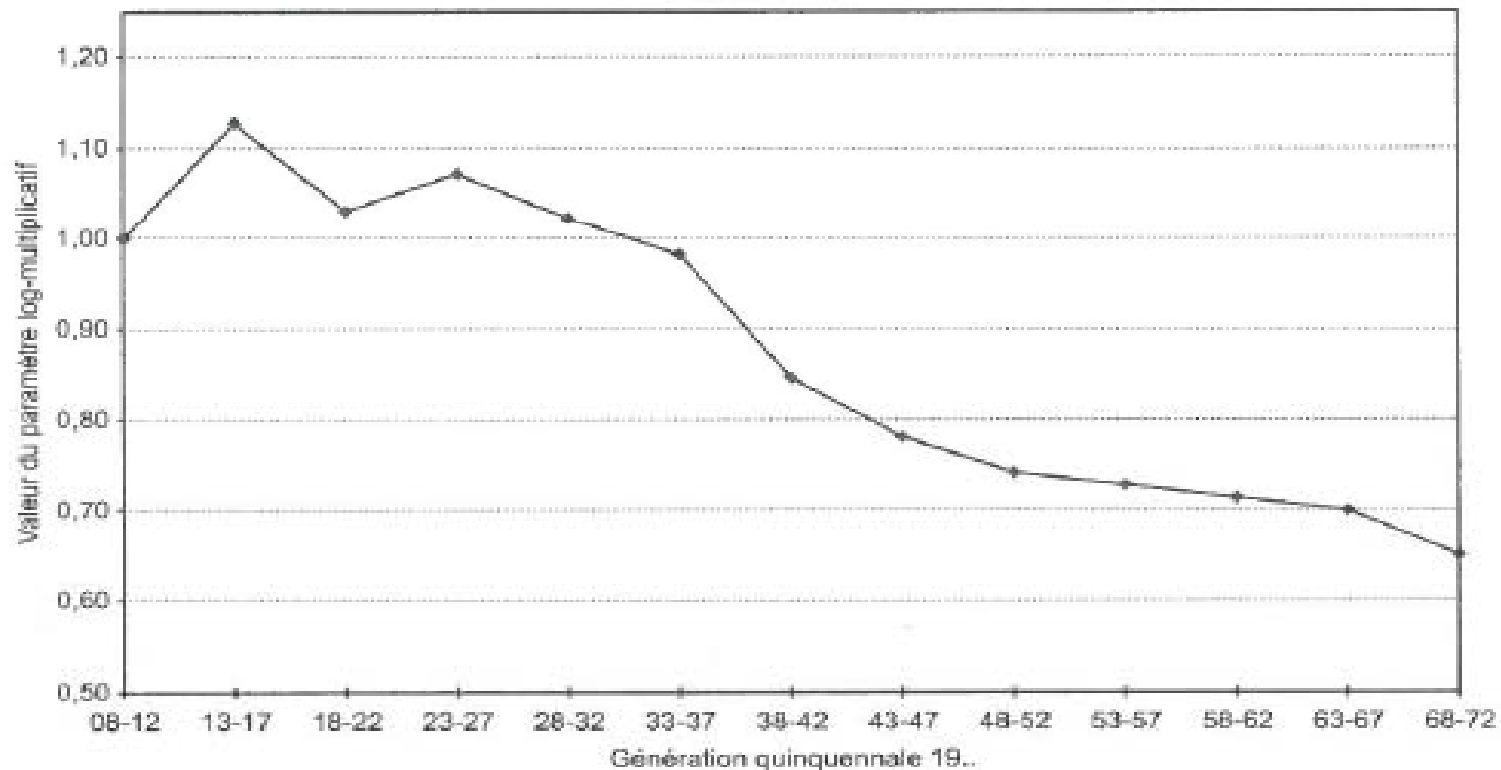$$m_{ijt} = \alpha_{it} * \beta_{jt} * \gamma_{ij}$$

The Log-Multiplicative Layer-Effect Model,
i.e. the Model of Uniform Difference in Social Fluidity (beginning in 1992)

$$m_{ijt} = \alpha_{it} * \beta_{jt} * \gamma_{ij}^{\delta t}$$

(with δt fixed at 1 for the first date and estimated freely for subsequent dates)

Fig. 1. — Modèle UNIDIFF ou modèle de Xie (1992)
8 origines sociales × 7 niveaux de diplôme et 13 générations quinquennales

Source : Enquêtes FQP de 1964 à 1993 et enquêtes Emploi de 1993 et 1997 (N = 240 367).

Vallet L.-A., 2001, p. 201 in Boudon R., Bulle N., Cherkaoui M. (dir.), École et société. Les paradoxes de la démocratie, 2001, Paris, PUF, coll. Sociologies

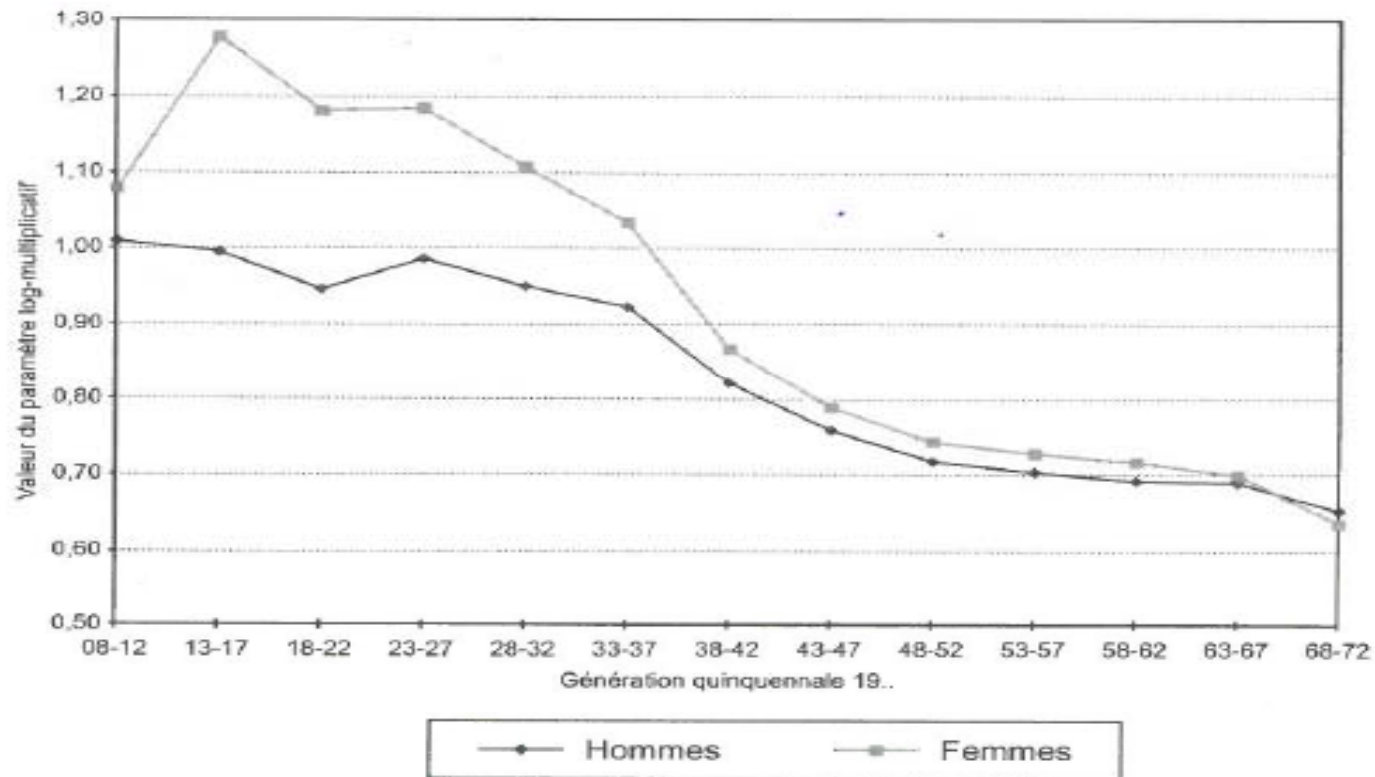Fig. 2. — Modèle UNIDIFF ou modèle de Xie (1992)
8 origines sociales × 7 niveaux de diplôme et 13 générations quinquennales
(en distinguant les deux sexes)

Source : Enquêtes FQP de 1964 à 1993 et enquêtes Emploi de 1993 et 1997
(N = 240 367).

Falcon J., Bataille P. (European Sociological Review, 2018) – All French Labor Force Surveys between 1982 and 2014, 11 cohorts born between 1918 and 1984, and much detail for degrees in tertiary education
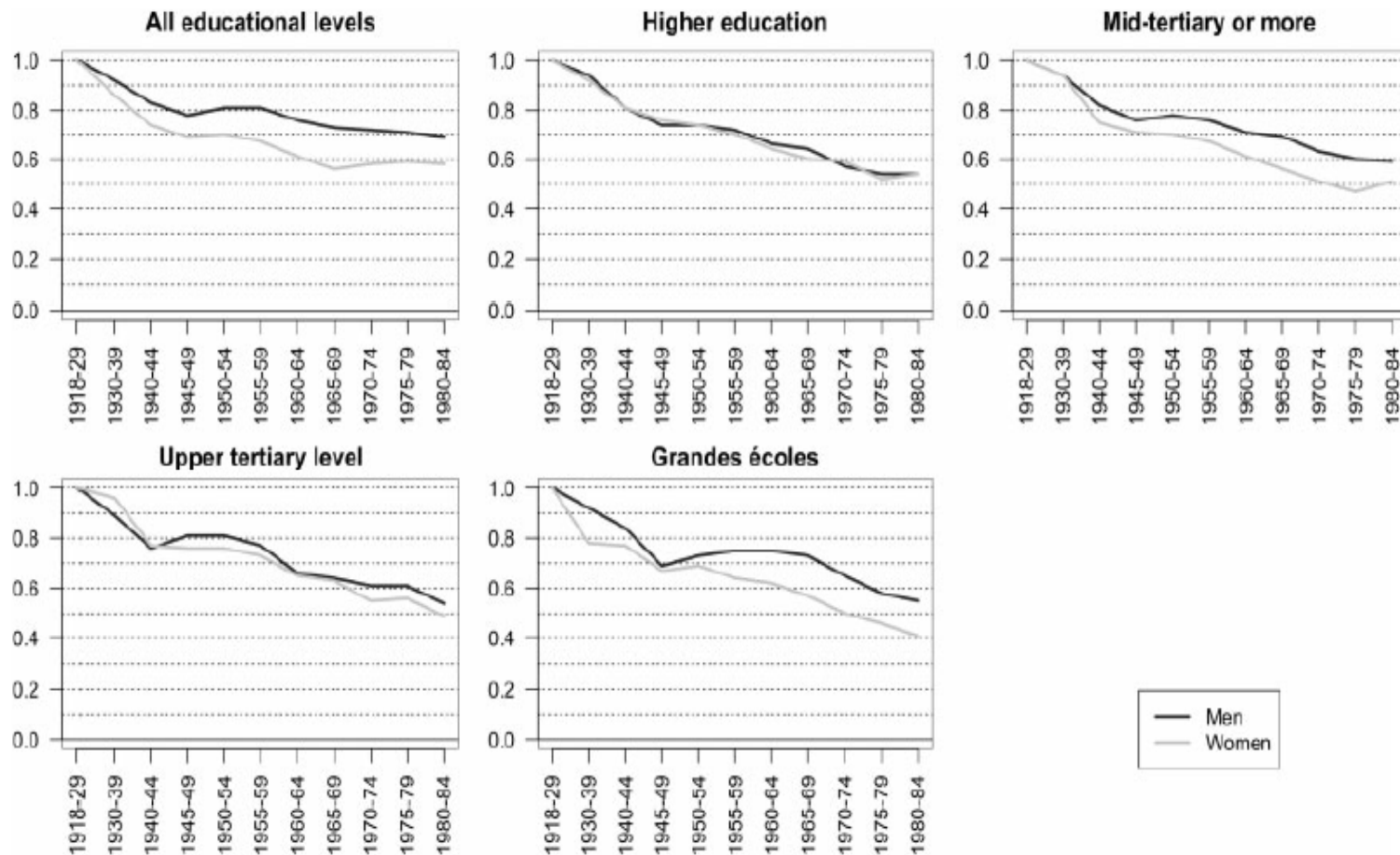

Figure 3. Unidiff parameters for the association between social background and educational attainment across cohorts.

Intergenerational social fluidity has increased in France, i.e. Inequality of social opportunity has declined
Odds ratios (same origins and destinations) for French **men (women)** aged 35-59
1977, 1985, 1993, 2003 and 2014-2015 INSEE Formation-Qualification Professionnelle Surveys

		Professions intermédiaires	Employés	Ouvriers
Cadres et Professions Intellectuelles Supérieures	1977	**3,5 (2,7)**	**10,8 (9,4)**	**91,7 (410,4)**
	1985	**2,5 (2,3)**	**7,6 (11,1)**	**110,8 (109,4)**
	1993	2,3 (2,2)	4,4 (5,2)	40,9 (67,1)
	2003	2,3 (1,8)	5,8 (8,1)	28,8 (63,0)
	2014-2015	**2,3 (1,8)**	**5,4 (6,7)**	**24,5 (36,2)**
Professions Intermédiaires	1977		**1,8 (1,8)**	**6,3 (9,2)**
	1985		**1,8 (1,8)**	**4,6 (6,4)**
	1993		1,5 (1,5)	4,3 (7,3)
	2003		2,1 (1,6)	3,8 (6,6)
	2014-2015		**1,6 (1,8)**	**2,7 (6,0)**
Employés	1977			**3,6 (2,3)**
	1985			**3,3 (2,6)**
	1993			2,4 (2,5)
	2003			2,4 (1,9)
	2014-2015			**1,9 (2,1)**

Statistical Modeling of Change in Intergenerational Social Fluidity in France between 1977 and 2014-2015 – French MEN aged 35-59 (O for Class Origin (Father), D for Class Destination, T for Time (Survey))

Model	G^2	df	test	DI (%)	rG^2	bic
Men (N=41 014) –	*On the 6 INSEE socio-occupational groups*					
Conditional Independence {TO TD}	13 945,1	125	p < 0,001	20,5	-	12 617,4
Constant Social Fluidity {TO TD OD}	268,3	100	p < 0,001	2,6	98,1	-793,8
Uniform Change {TO TD φ_TOD}	**215,6**	**96**	**p < 0,001**	**2,2**	**98,5**	**-804,0**
φ_T estimated parameters	*1,000(1977)*	*0,960(1985)*	*0,900(1993)*	*0,891(2003)*	*0,803(2014)*	
Uniform Change (Constraint 1993=2003)	215,7	97	p < 0,001	2,2	98,5	-814,6
φ_T estimated parameters	*1,000(1977)*	*0,960(1985)*	*0,894(1993)*	*0,894(2003)*	*0,803(2014)*	
Uniform Change (Linear Trend)	**217,6**	**99**	**p < 0,001**	**2,2**	**98,4**	**-834,0**
Annual trend estimated	***-0,0050***					
Goodman-Hout Model {TO TD OD γ_TOD}	65,8	72	ns	1,2	99,5	-699,0

Statistical Modeling of Change in Intergenerational Social Fluidity in France between 1977 and 2014-2015 – French WOMEN aged 35-59 (O for Class Origin (Father), D for Class Destination, T for Time (Survey))

Model	G^2	df	test	DI (%)	rG^2	bic
Women (N=34 811) – On the 6 INSEE socio-occupational groups						
Conditional Independence {TO TD}	7 663,2	125	p < 0,001	16,5	-	6 356,0
Constant Social Fluidity {TO TD OD}	216,5	100	p < 0,001	2,3	97,2	-829,3
Uniform Change {TO TD φ_TOD}	**140,6**	**96**	**p < 0,01**	**1,7**	**98,2**	**-863,4**
φ_T estimated parameters 1,000(1977) 1,020(1985) 0,880(1993) 0,828(2003) 0,741(2014)						
Uniform Change (Constraint 1993=2003)	142,5	97	p < 0,01	1,7	98,1	-871,9
φ_T estimated parameters 1,000(1977) 1,020(1985) 0,847(1993) 0,847(2003) 0,742(2014)						
Uniform Change (Linear Trend)	**146,6**	**99**	**p < 0,01**	**1,8**	**98,1**	**-888,7**
Annual trend estimated -0,0075						
Goodman-Hout Model {TO TD OD γ_TOD}	92,8	72	p < 0,10	1,4	98,8	-660,2

Change in Social Fluidity in France across Cohorts and Age – MEN

Vallet L.-A., 2020, p. 108 in Breen R. and Müller W. (eds), Education and Intergenerational Social Mobility in Europe and the United States, 2020, Stanford, Stanford University Press –

French version in Revue de l'OFCE, 2017, 150, pp. 27-68

Model		G^2	df	p	Δ(%)	Bic
Men (N = 64 801)						
1. CSO CSD OD		1147.06	684	.000	4.19	-6431.03
2. CSO CSD β_COD		1090.18	679	.000	4.04	-6432.52
Difference 1-2		56.88	5	.000		
β_C	1 (1906-24)	1.105 (.027)	1.030 (.026)	0.958 (.025)	0.961 (.030)	0.897 (.036)
3. CSO CSD $\beta_C\beta_A$OD		1033.20	675	.000	3.93	**-6445.18**
Difference 2-3		56.98	4	.000		
β_C (deviation)	0 (1906-24)	+0.072	-0.029	-0.108	-0.089	-0.191
β_A (deviation)	0 (middle)	-0.019 (old)	-0.097 (old+)	+0.073 (young)	+0.187 (young+)	
4. CSO CSD $\beta_C\beta_A\beta_S$OD		1030.05	671	.000	3.92	-6404.01
Difference 3-4		3.15	4	ns		
5. CSO CSD β_{CA}OD		1020.85	665	.000	3.90	-6346.74
Difference 3-5		12.35	10	ns		

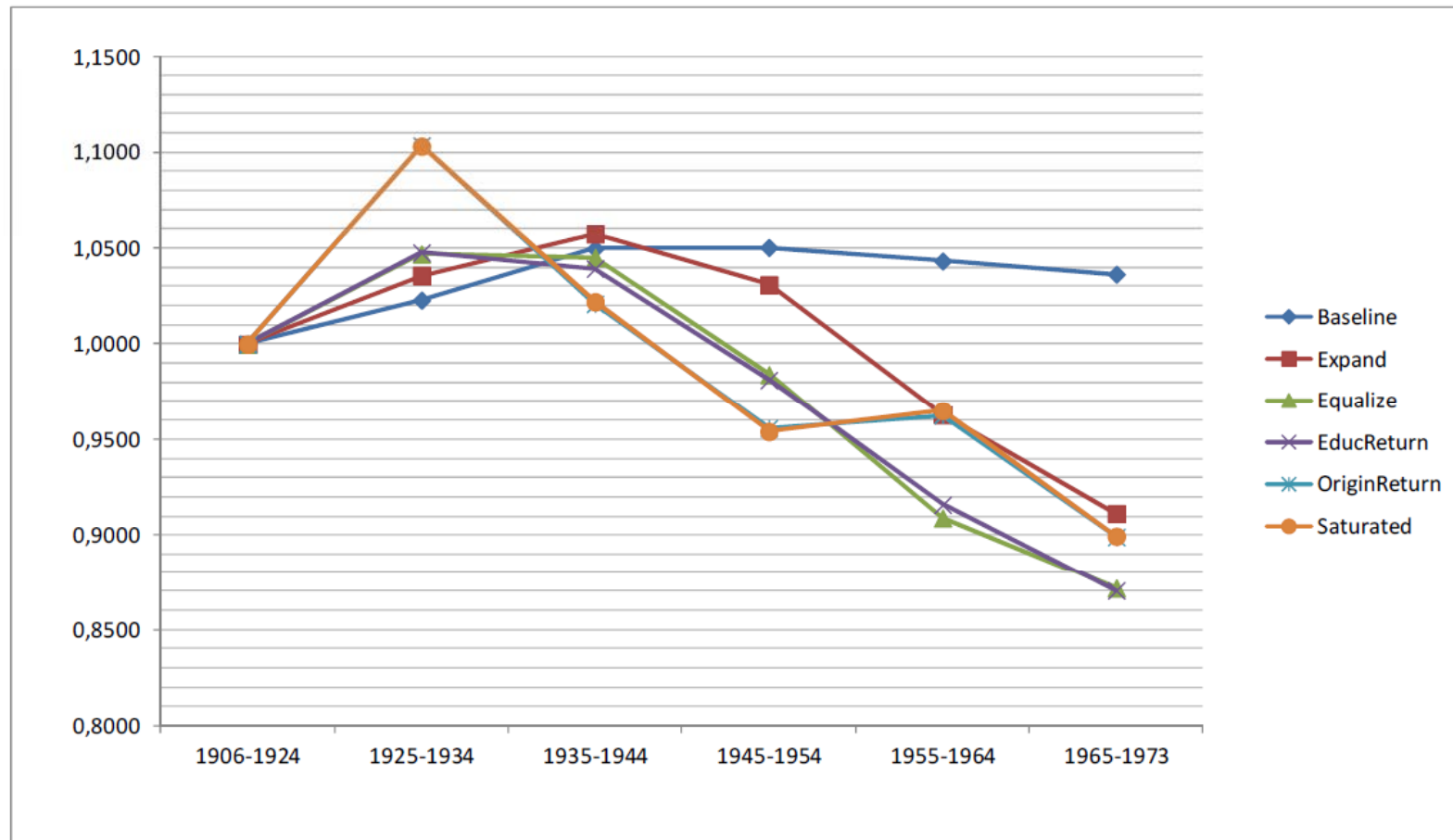## Change in Social Fluidity in France across Cohorts and Age – WOMEN

Vallet L.-A., 2020, p. 108 in Breen R. and Müller W. (eds), Education and Intergenerational Social Mobility in Europe and the United States, 2020, Stanford, Stanford University Press –

French version in Revue de l'OFCE, 2017, 150, pp. 27-68

Model		G^2	df	p	Δ(%)	Bic
	Women (N = 46 079)					
1.	CSO CSD OD	1239.75	684	.000	5.06	-6105.12
2.	CSO CSD β_COD	1091.44	679	.000	4.61	**-6199.74**
	Difference 1-2	148.31	5	.000		
β_C	*1 (1906-24)*	*0.966 (.031)*	*0.896 (.029)*	*0.790 (.027)*	*0.682 (.030)*	*0.666 (.035)*
3.	CSO CSD $\beta_C\beta_A$OD	1063.67	675	.000	4.50	-6184.56
	Difference 2-3	27.77	4	.000		
β_C (deviation)	*0 (1906-24)*	*-0.057*	*-0.139*	*-0.251*	*-0.358*	*-0.419*
β_A (deviation)	*0 (middle)*	*-0.024 (old)*	*-0.064 (old+)*	*+0.072 (young)*	*+0.122 (young+)*	
4.	CSO CSD $\beta_C\beta_A\beta_S$OD	1060.00	671	.000	4.47	-6145.27
	Difference 3-4	3.67	4	ns		
5.	CSO CSD β_{CA}OD	1049.66	665	.000	4.41	-6091.18
	Difference 3-5	14.01	10	ns		

Contribution of Four Mechanisms to the Increase in Social Fluidity over Cohorts – MEN

Vallet L.-A., 2020, p. 116 in Breen R. and Müller W. (eds), Education and Intergenerational Social Mobility in Europe and the United States, 2020, Stanford, Stanford University Press –

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