Between Welfare State Retrenchments, Globalization: The Southern Continental European Middle Classes under Strain

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After Pierre Bourdieu (1979) (and Gustav Schmoller 1897 before him), the multipolarity of middle classes between higher and lower, and between cultural and economic capitals is well acknowledged. Anyway, this old vision is more and more useful now to understand the «middle classes adrift» of the last 20 years in France and in Southern Europe (Spain, Greece, Italy). The expansion of the «new middle class» of the 1960-1980 era is now an old dream of welfare state expansion, and the European social structure faces a trend of repatrimonialization, a U-turn toward a decline in the value of midqualified work and an expansion of the return to inheritance of family assets. Three points must be mentioned. The first one insists on the usefulness of a new description of the phenomenon in the specific European context of middle class societies. We need here a re-definition of the system of middle classes (plural) in a context of strong welfare state constructions, and then decline.

On a second point, we have to analyse three ruptures in the social trends of the "wage earner society" of the 1960's to 1980's. In this previous period, economic growth, social homogenization, and social protection were major contextual elements of the expansion of a «new middle class», based on educational meritocracy, valorization of credentialed skills, expansion of the average wage compared to housing and capital assets (depatrimonialization). In the post-1980's era, the rupture and reversal of these previous trends ("stagnation", "new inequalities" and "social uncertainty" being the new trends) generates a backlash in the system of middle classes.

The third point analyses the demographic and social consequences of these new trends in terms of shrinking and quartering of the middle classes in a context where the inheritance of assets and resources changes the previous equilibria. The problem of social stability in a context where large strata of the middle class have less interest in the stability of the social order must be addressed. The French case is very central, but a comparative analysis shows the general difficulties of the "Latin" or of the "Southern" part of Europe where young generations of the middle classes are sacrificed by a choice of the conservation of former equilibria: strong senior-oriented welfare states go with weak welfare state for the juniors.

Most Continental European countries appear in international social indicators and comparative statistics as comfortable intermediate middle class societies under the protection of strong and stable Welfare States. It is notably the case of France : for the last twenty years, the French Gini index and inerdecile ratio of post tax and transfer incomes has been remaining relatively low, the level of public employment and the number of civil servants show a remarkable permanence of the State, welfare indicators and health conditions of elderly population illustrate the efficiency of the French "new" middle class model of society. We could insist also deep French specificities such as the valorization of leisure, the priority to family equilibrium (with a fertility rate near to 2.0), quality of collective childcare, etc. Even if this model seems to be stable, clear signs of its destabilization have been appearing for the last decades, which have visible effects in politics.

Figure I-1. « Yes » at two European Referenda in France by occupational group %

	Maastricht treaty referendum 20 September 1992	European constitutional treaty referendum 29 may 2005	Change
Professionals & managers	66	67	1
Self employed	49	53	4
Semi prof. and lower managers	55	46	-9
Routine white collars	47	37	-10
Blue collar workers	43	30	-13

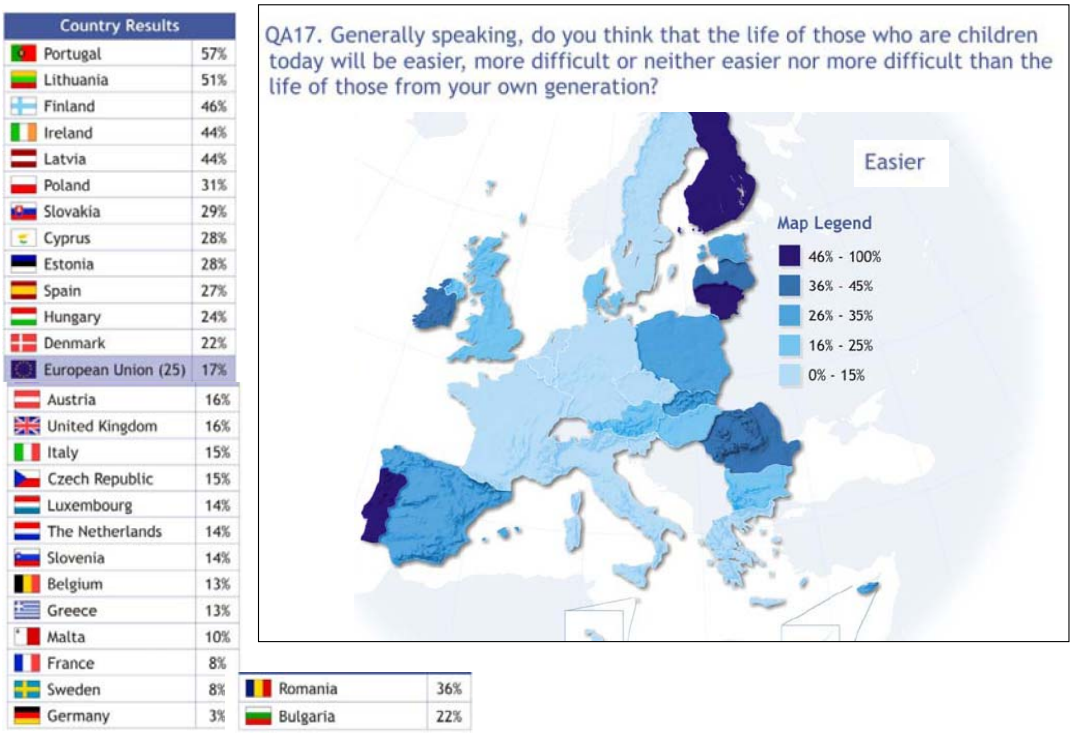
Source : My own computation of CEVIPOF 1995 postelectoral survey microdata and CSA postelectoral survey 2005.

The most visible elements of this destabilization are may be on the one hand the first turn of 2002 Presidential elections, when the socialist candidate and former Prime Minister Lionel Jospin lost the votes of lower middle classes and of workers; being the third candidate, he had to let the extreme right wing candidate Jean-Marie Le Pen challenging Jacques Chirac on the second turn. On the other hand, the French "No" to the referendum on the EU Constitution (May 2005) put into evidence the Euro-pessimism of the French semi- and associate-professionals in educational, social and health services, of the middle and lower level civil servants, and more generally of a large intermediate-lower-middle-class which had supported thirteen years ago an European project of monetary union (Referendum on the Maastricht Treaty, in September 1992), and rejected this new step in the institutional construction of the European union (fig 1). Some interpretations of this electoral rejection can be controversial (declining leadership of the President Chirac, incapacity of the political elite of the center-left and center-right to organize a convincing campaign, etc.) but the most interesting point is the destabilization of this intermediate middle class, which was a strong support for policies of modernization, of social reform and of European construction, and which felt in anxiety and see the European construction as a Trojan horse for radical competition and neo-liberal dismantlement of social protections. Twenty years ago, these fears were typical of the working class facing the fear of unemployment, and they gain now the central core of the European society (fig 2).

My intention here is not to participate to a polemical debate about the relative performances, priorities or fairness of the French model (Krugman, 2005; Smith, 2004), or about the European comfort and decline (Krugman, 1994;Baverez, 2003), but simply to elaborate a diagnosis on the stability and sustainability of the "new" middle class society and discuss this paradox: why this Continental Europe model of low degree of inequality and of strong State institutionalization seems to be so stable, when newer generations of young adults do not really benefit from its protection (Chauvel, 2006a)? That paradox is more and more visible.

My first point will be to describe the European specificity of social structure of middle class and develops a definitions of the system of middle classes (plural) in a context of strong welfare state constructions. I propose here a redefinition of the system of middle classes. My second point will be a presentation of three ruptures in the social trends of the "wage earner society" of the 1960's to 1980's. In this previous period, economic growth, social homogenization, and social protection were major contextual elements of the expansion of a "new middle class", based on educational meritocracy, valorization of credentialed skills, expansion of the average wage compared to housing and capital assets ('depatrimonialization'). In the post-1980's era, the rupture and reversal of these previous trends ("stagnation", "new inequalities" and "social uncertainty" being the new trends) generates a backlash in the system of middle classes. My third point analyses the demographic and social consequences of these new trends in terms of shrinking and quartering of the middle classes in a context where the inheritance of assets and resources ('repatrimonialization') changes the previous equilibria. The problem of social stability in a context where large strata of the middle class have less interest in the stability of the social order must be addressed.

Figure I-2. Pessimism in Europe (27 countries)

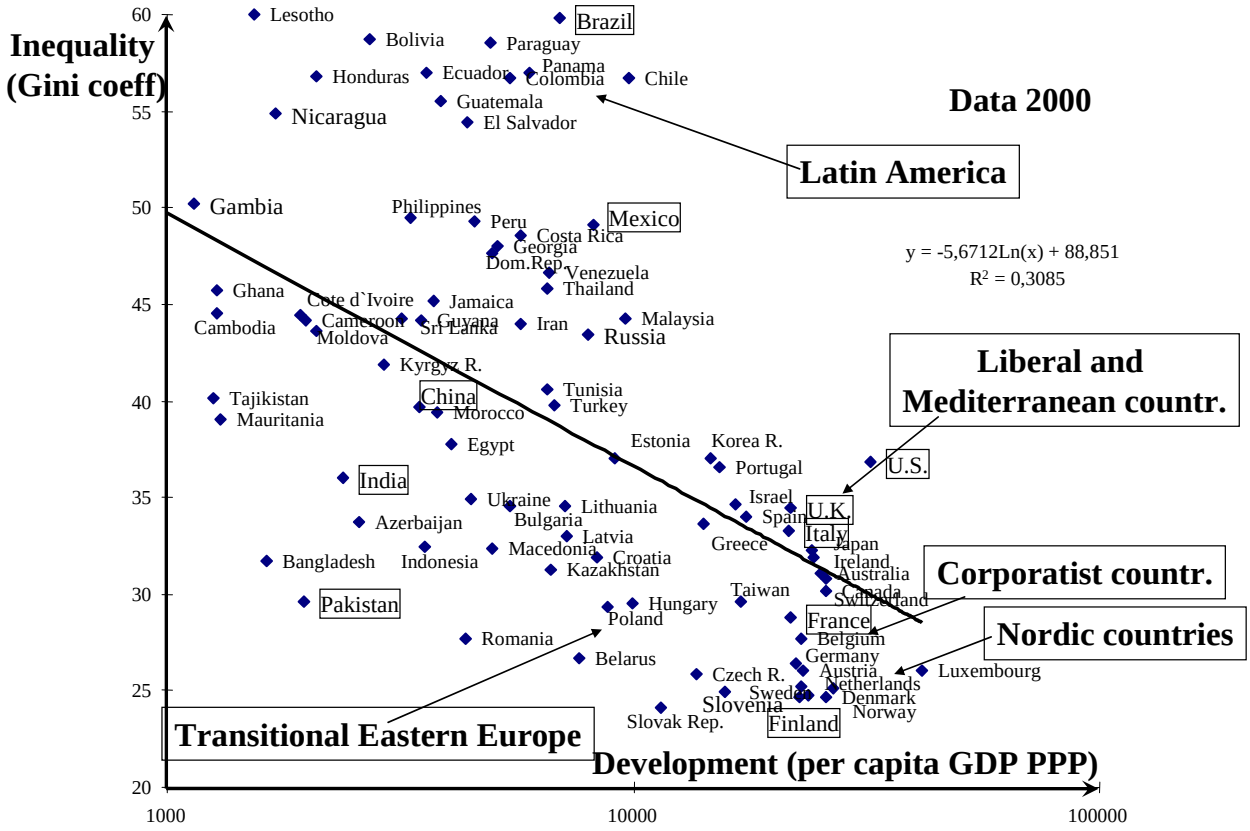


Source : Special Eurobarometer 66.3 "European Social Reality"

Part 1. Europe as a realm of middle class: past dreams, present paradise and contemporary U-turn

Seen from Sirius, when one considers economic inequalities (of net per capita incomes in households after redistributions) in the world, France, like most countries of Continental and Nordic Europe, is a typical country of equality and comfort: in terms of post tax and transfers disposable income by consumption unit, it not so far from Finland which is may be the most equal country in the world, and relatively close to Luxembourg, which is the richest for its per capita GDP in terms of purchasing power parity (PPP). A mapping of the degree of development and of inequality in the world (fig.3) present a vision of Europe as a club of rich and equalitarian nations. In fact this vision of the early 21st century is quite problematic since it does not reflect a new reality: Europe is no more a union of 15 members (like at the beginning of the 1990's) sharing similar characteristics: quite rich, old-industrial western liberal democratic nations. Europe is now a set of 27 dissimilar countries where new large members do not share the same degree of economic, social, and human development.

Figure I-3. Degree of development (horizontal axe) and inequality (vertical axe) in 2000



Source : Penn World Tables 6.1 (Heston et al., 2002) pour les revenus moyens, et pour les inégalités : World Income Inequality Database V 2.0a, United Nations University / World Institute for Development and Economics Research, june 2005, completed with Luxembourg income study (LIS) for the recent years, and French Family expenditure surveys-INSEE 2000 for France 1999-2000 (archives : Maurice Halbwachs Center).

A focus on the old members of the European union and the new ones (including Romania and Bulgaria) show clearly the difference the two projects. Here is simply one element of the

context of globalization in the old European countries, where the expansion of “outside Europe” markets fosters the competition with new industrial low labor cost countries, and at the same time the “inside Europe” competition (where importation/exportation taxes are reduced, and transaction costs reduced to transportation), factors which go with more capital volatility, competition in investment opportunities, stronger competition between workers and polarization in the marginal productivity of wage earners between specialists and managers on the one hand and standard workers on the other. The shifts from the early 1980’s to the early 2000’s period (fig. 3ter) give another vision of new inequalities inside the European Union. If France was one of the most resistive to intra-country inequality (because of stronger redistributions balancing less work income in the lower strata of the working class), most of European nations experienced an intra-country expansion of inequalities, which went with the inter-country expansion of inequalities (fig. 3bis and fig. 4).

Figure I-3bis. Evolution of development (horizontal axe) and inequality (vertical axe) from early 1980's to 2000

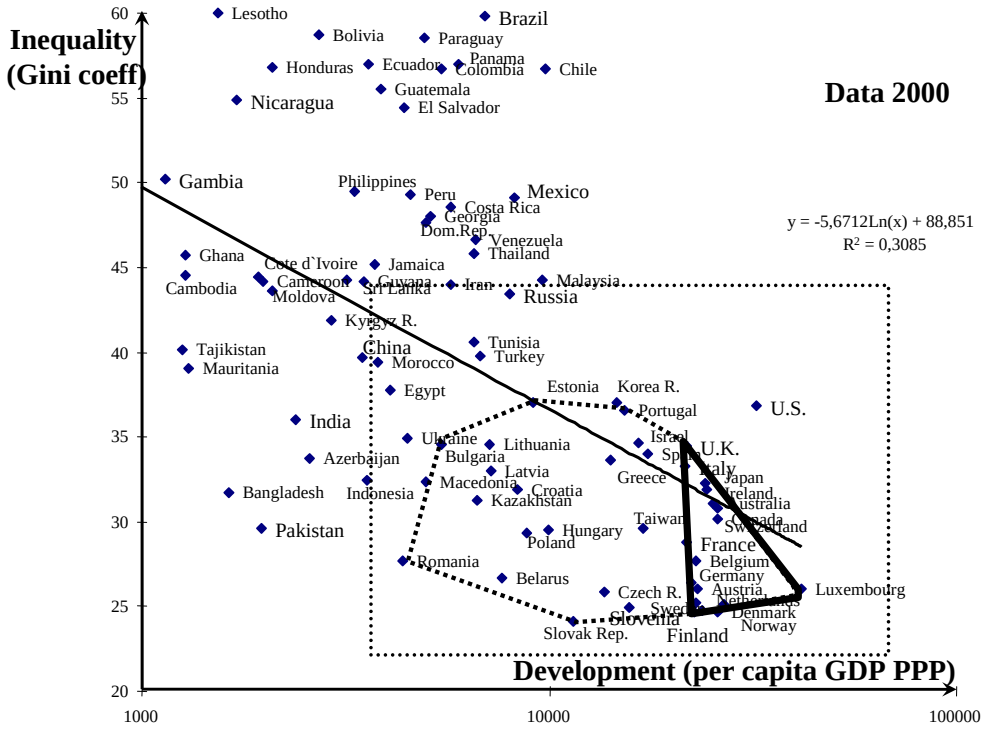
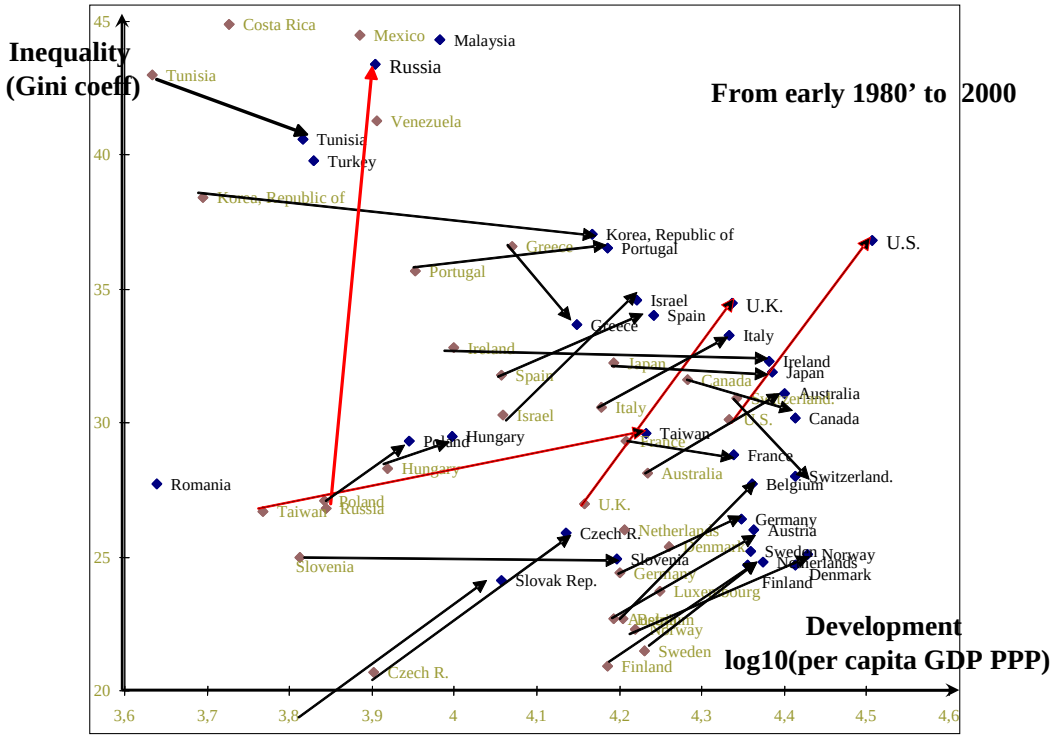


Figure I-3ter. Evolution of development (horizontal axe) and inequality (vertical axe) from early 1980's to 2000



Source : Penn World Tables 6.1 (Heston et al., 2002) pour les revenus moyens, et pour les inégalités : World Income Inequality Database V 2.0a, United Nations University / World Institute for Development and Economics Research, june 2005, completed with Luxembourg income study (LIS) for the recent years, and

French Family expenditure surveys-INSEE 2000 for France 1999-2000 (archives : Maurice Halbwachs Center). We zoom here the more than 6000 dollar per year per capita countries.

The most interesting point is the stability of France: when Nordic countries experience an increase in their Gini coefficient, French indicators of economic inequality are almost steady.

Figure I-4. Gini Coef. and interdecile ratios of after tax and transfer incomes (by consumption units)

	Near 1982			Near 2000	
	Gini Coefficent	Interdecile ratio (9th decile/1st decile)		Gini Coefficent	Interdecile ratio (9th decile/1st decile)
Belgium 1985	0,227	2,73	Belgium 2000	0,277	3,31
France 1979	0,293	3,47	France 1999	0,292	3,50
Israel 1979	0,303	4,02	Israel 2001	0,346	5,01
Mexico 1984	0,445	8,63	Mexico 2000	0,491	10,38
Spain 1980	0,318	4,37	Spain 2000	0,34	4,78
Sweden 1981	0,197	2,43	Sweden 2000	0,252	2,96
Taiwan 1981	0,267	3,29	Taiwan 2000	0,296	3,81
U.K. 1979	0,27	3,53	U.K. 1999	0,345	4,59
U.S. 1979	0,301	4,67	U.S. 2000	0,368	5,45

Source : The Luxembourg Income Study database : http://www.lisproject.org/ and French Family expenditure surveys-INSEE 2000 for France 1999-2000 (archives : Maurice Halbwachs Center).

Thus, France is a standard nation in an European club of comfortable and equal countries, but its stability in terms of economic inequalities is quite uncommon. Compared to the liberal regime (UK, US, etc.) of the three world of capitalism (Esping-andersen, 1990), which is structurally more unequal and dynamically more and more polarized between the top and the bottom of economic hierarchy, and to the Social-democrat regime (Sweden), where the most celebrated equalitarian countries of the world have been facing since end of the 1990's a new trend toward more economic inequality, France is static in terms of Gini coefficient. This French mix of moderated inequalities and of lack of clear trend toward more inequalities (in terms of post-tax, post-transfer income per capita) is a fundamental trait of the French welfare regime, based on a strongly institutionalized (State-organized) middle class. Here appears one of the heaviest problems of international comparison: how can we define "middle class" in an international comparison (Zunz, 2002)?

In fact, an international definition is almost impossible, because two traditions exists, which are quite incompatible. For the first tradition, more active in the British sociological discourse, the middle class (singular) refers to a comfortable group, located immediately below the upper classes and the higher bourgeoisie. In the other tradition, which is more usual in Continental Europe and in the 1960's American golden age (Mills, 1951), the middle classes (plural) represent an aggregation of intermediate groups, of which the incomes are close to the arithmetic mean. The first tradition is more elitist, and the corresponding "middle class" could represent 5 to 10% of the population, or even less; the second one could be much more inclusive, with a dream of a two-thirds society (in Germany: *Zwei-Drittel-Gesellschaft*) where the middle class aggregates most stable and qualified wage earners, representing perhaps more than 50% of the population, or may be 80%. Here is a major source of uncertainty in middle class representation.

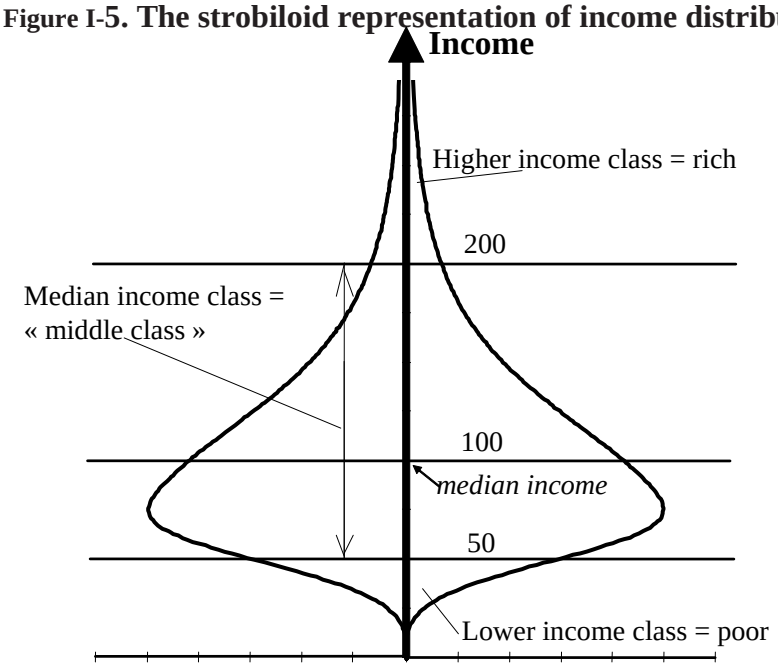
One of the first apparitions of this distinction emerged with a brilliant French social thinker who profoundly inspired Pierre Bourdieu: Edmond Goblot. In his major book *La barrière et*

le niveau (*The fence and the level*) Goblot describes the British middle class: "It has large incomes, is affluent and comfortable, is served by an abundant domesticity in luxurious mansions. It is called "middle"[1] because the *aristocracy* (the *upper class* <in English in the text>) subsists. In England, the class which is at the level of our middle classes can not be distinguished from the popular classes" (Goblot, 1925, pp. 21-22). The British "middle class" is much higher than its Continental Europe homonym.

The French and Continental Europe terminology of "middle classes" (F: *classes moyennes*, D: *Mittelstand*, E: *Classes Medias*, etc.) is often translated in "lower middle class" in the English tradition (Mayer, 1975); conversely, the English debates on the "middle class", notably in terms of gentrification (Butler, 2003), refer to a social group that, in terms of education, income and wealth, is clearly above the standard Continental Europe "middle class". However, in the political discourse, this terminological confusion is very usual in many countries where most politicians claim they represent the interests of the (lower) middle class seen as the most central and numerous social group for gaining democratic legitimacy, but shape their economic policies (tax cuts, design of social redistributions, etc.) in direction of the (very) higher middle class (Skocpol, 2000), to which most political leaders actually belong.

Beyond this problem of translation of basic notions, another difficulty is the linkage between the degree of inequality and the shape of the system of social stratification, which remain loosely developed in a comparative context. It is quite difficult to figure the social architecture resulting from the intensity of inequalities, notably in terms of economic coherence of the middle class. A solution is the analysis of the shape of the "strobiloid" curve (Chauvel, 1995), which is the smoothed density of the medianized income (or beter of level of living, defined by the post tax and transfer net income by consumption unit), a curve which is adapted to international comparisons.

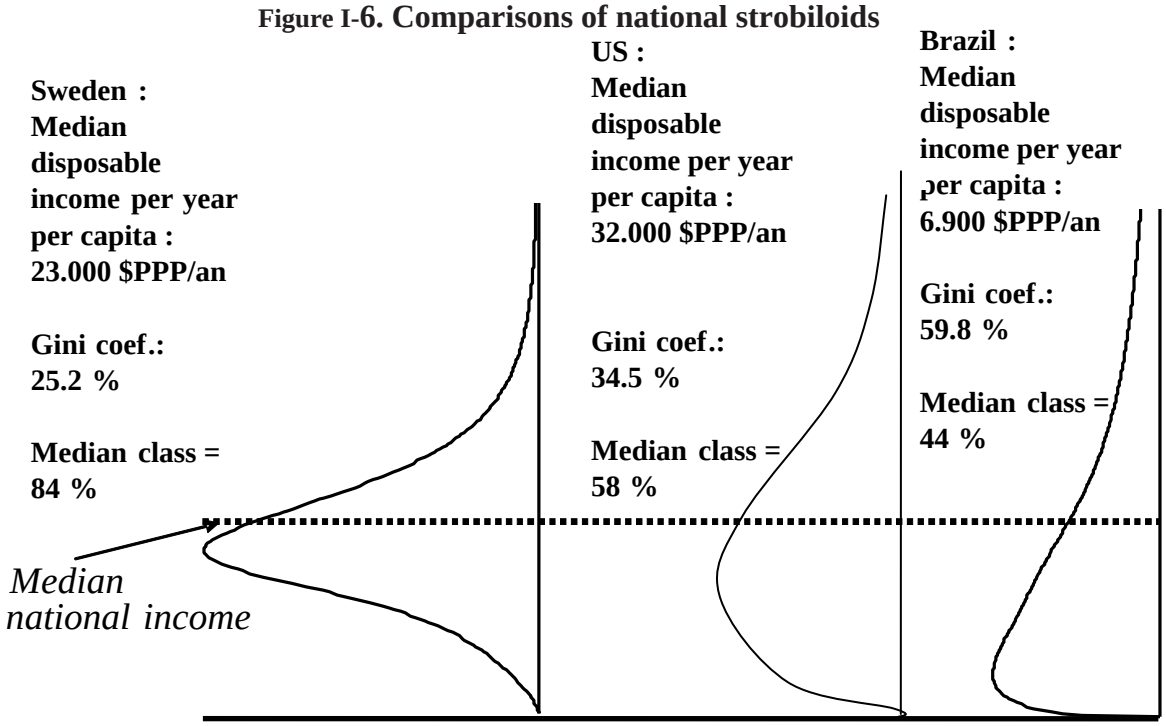
Figure I-5. The strobiloid representation of income distribution



[1] In French, we have an ambiguity with *classe moyenne* since *moyenne* is both "middle" and "average" (L.C.)

Note : In the strobiloid curve, income is the vertical axe; 100 is the median income. Generally, the curve is shrinking at the top and at the bottom (few people are extremely poor or extremely rich). The largest the curve around income = 100, the more the population is a median class society.

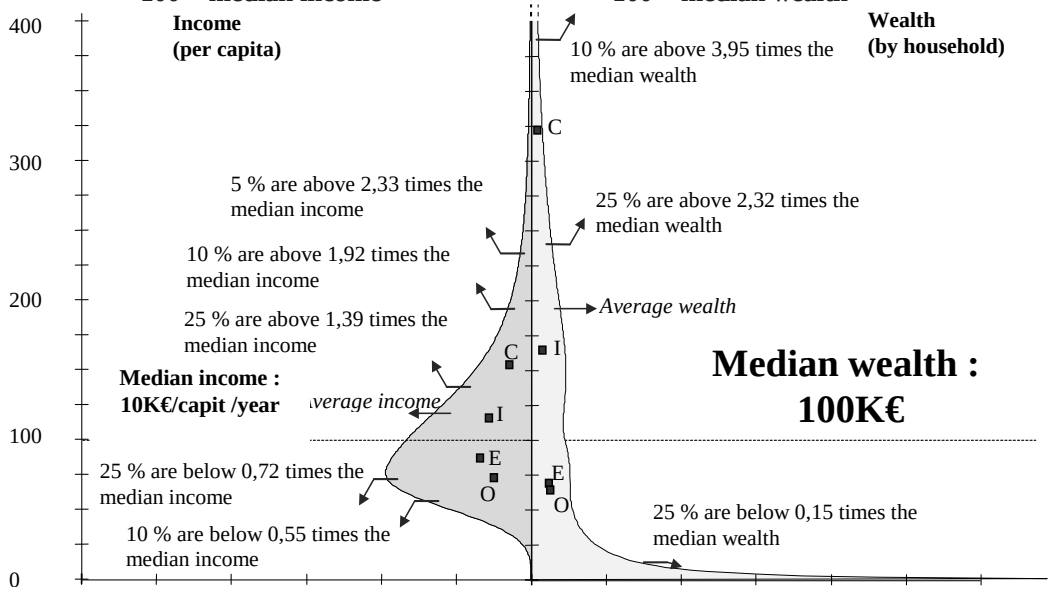
Figure I-6. Comparisons of national strobiloids



For this comparison, the two opposite poles of the international spectrum of inequalities offer interesting points of reference: on the one hand we have Sweden, with a Gini coefficient of 25.2%, one of the lowest in the world, on the other hand, Brazil, with a Gini coefficient of 59.8%. In Sweden, since the floor (the poor) is high and the ceiling (the rich) is relatively low, the larger part of the population is amassed near the median; if we define the "median class" as the population between half the median and twofold the median, 84% of the population is between these borders. At the opposite, in Brazil is a strong polarization between extreme poor, with income near to zero, and extreme rich; there, the median class is disrupted between those who climb to the top and those who remain at the bottom, with a median class of about 44%. The United States are somewhere in an intermediate position between these two extremes with 58% in the median class. The French strobiloid is closer to the Swedish one, even if its median class is less homogeneous and aggregated near the median.

Nevertheless, a complicate aspect of economic inequality is the difference between the flux (income) and the stock (accumulation of wealth). In France, if we compare the Gini coefficient of income (29%) and of wealth (75%), and the shapes of the relating strobiloids, two different visions appear: in terms of income, France is a country with a strong homogeneous "median class", while in terms of wealth, a strong polarization exist between no-wealth families and the top of the strobiloid, which show no homogeneous median class. This point can explain a part of the terminological ambiguity about the "middle class", in the English tradition and in the Continental Europe one: in French, "middle class" means the population of common citizens with normal incomes, needs, lifestyles and consumption, but in English, it defines the intermediate group between the highest economic elite based on wealth accumulation. In France, the "middle class" is a kind of "average income class", while in the English tradition it refers to much higher positions, over the average wealth.

Figure I-7. Income and Wealth Strobiloïd 2004 in euro (in France)



Note : the strobiloïd is the shape of social pyramid corresponding to the distribution of income (*versus* wealth) (see Chauvel, 1995). At a given level of income, the larger is the curve, the more people are positioned around this point. If 100 is the median income (per capita in the household) a large strobiloïd at level 100 shows a large middle class (in the Swedish situation, for instance) at an equal distance between extremes. For wealth, there is clearly no middle class, and the population is stretched between the extreme high level of accumulation and the extreme low. The points C, I, E et O shows the median C "cadres" = higher professionals, managers etc. I "professions intermédiaires" = lower professionals and intermediate white collars, E "Employés" routine white collars, and O "ouvriers" = blue collar workers. For Wealth, these are not the median but average positions.

Source : income : *Budget des ménages survey* INSEE 1995 and wealth : *Actifs financiers* INSEE 1992 , reevaluation for year 2000 (growth and inflation)

A reconstruction of middle class definition

Even if this empirical presentation of the French stratification system lacks of theoretical bases, an important trait emerge: the confusion in the definition of "middle class". In front of that confusion, we need a theoretically based reconstruction of the object. To solve the conceptual difficulty, we have to return to the German social sciences of the end of the 19th century, when the notion of « new middle class » (*neue Mittelstand*) is emerging. The context of the late 19th century Germany is clearly different from the contemporary French situation (Charle, 2002): the Wilhelm's Germany had been facing for the three decades 1870-1900 a fast socioeconomic modernization about to transform in a generation (even if the impact was regionally heterogeneous) the Germany society from feudality to a complex industrial society (Schultheis et Pfeuffer, 2002).

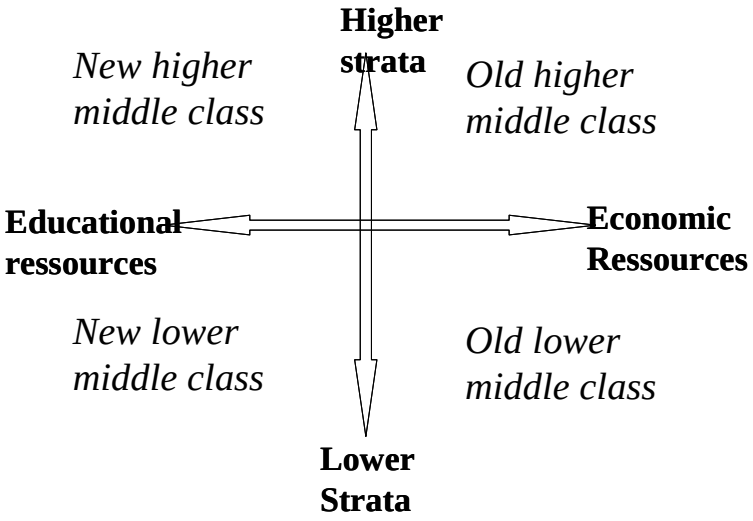
These considerable changes were deeply influenced by the contrast between archaic cultural traits and representations (for example the notion of *Mittelstand*, refer to an "intermediate State" similar to the French "Tiers Etat" of the 18th century) and the surprising rapidity of the social structure transformation, marked by high tech industrialization and elaborate burocratic organization, which was in fast expansion with the constitution of a new and strong central State and with the expansion of large industry and mass services (insurance, bank, post-offices, etc.). Inside the German social-democrat party, such social transformations produced a new debate on the (in)accuracy of the Marxist prophecy of relative or absolute proletarianization, a sociological diagnosis that Eduard Bernstein (1899) was the first to translate in political terms.

However, two years before, Gustav Schmoller (1897) was the first to face this difficulty in a seminal text which anticipates further sociological problems and diagnosis on the social structure. Indeed, Schmoller underlined the existence of two important dimensions structuring the middle class space:

- on the one hand, he pointed out the distinction between an *Obere* and an *Untere Mittelstand* — an upper and a lower middle class in contemporary terms —, a dimension that underlined the hierarchical division of middle classes, the first one reaching the limits of aristocracy, and the second one neighboring the working class;
- on the other hand, the opposition between an *Alte* and a *Neue Mittelstand* is developed, the first pole aggregating intermediate size farmers, self employed shopkeepers, small businesses owners, and the second one, which was a real social innovation, benefited of the very fast expansion of a social group of qualified wage earners in industry, in large size service companies, and of the State (*Beamten*) and private burocracy (*Angestelten*) (Kocka, 1981).

This second dimension defines and underlines the emergence of a new middle class. Here is a very influential point, many years before Lederer and Marschak (1926) and Geiger (1932) developments on the destabilization of the New middle class in the post-World-War-I context, and half a century before C. Wright Mills (1951) *White Collars* analysis of our contemporary model of middle class. In fact, in this debate between emergence or pauperization of the middle class, the strong difficulties of the 1914-1950 era reveal a long pause in the process of middle class expansion, particularly in Germany.
For today analyses of the middle classes, these two dimensions Upper/Lower and Old/New are still useful because they clarify central distinctions even nowadays. These two dimensions are complementary, and offer an analytic image of four large sets of middle classes. With these two axes, Schmoller prepared 70 years in advance the bourdieusian idea of a two dimensional social space (Bourdieu, 1979). When these two axes of differentiation inside the middle class are crossed, the two dimensional social space provides four types of middle classes:

Figure I-8. The bidimensional space and four types of middle classes



The older middle class refer to small owners and a petty bourgeoisie based on small property. The older higher middle class is neighboring aristocracy and large proprietors; typically, medium size entrepreneurs are the idealtype of “Old middle class” where patrimony (both wealth accumulation and inheritable shares of economic control on productions) is the

strategic dimensions. Some groups which can be considered as extensions of former aristocracy, such as higher military officers, may be civil servants in the traditional services and missions of the state (security, police, central bank), may be considered in this corner. The members of the higher bourgeoisie <supposed to control larger assets, and based on intergenerational strategies of wealth transmission and reproduction>, are sometimes mentioned as members of this group. Self employed without employees, specifically in manual occupation, are typical of the old lower middle class. With Schmoller, two new types emerged in the sociological vision of stratification: on the one hand, appear a new lower middle class of wage earners in occupations based on an intermediate level of responsibility or of technical qualification, such as lower engineers, semi-processionals, lower managers, and most of the intermediate bureaucracy of the State and large companies. On the other hand, a new higher middle class is defined by expertise, by the control of larger organizations, by elaborate knowledge, by the "symbolic manipulation" of complex systems, management, ruling and decision making. Schmoller is the first social scientist to have clearly detected the expansion of a social strata without patrimony about to settle its own societal independence. The opposition between the "old" and the "new" middle classes appears to be first a question of credentialed skills and of control of complex and institutionalized knowledge, mainly technical, juridical or more generally certified by diploma that are controlled by a professional group recognized by the State (in the French context). On the contrary, the "old" side of the middle classes is closer to the domination of economic resources and to the direct dependency of markets.

A dynamics of de-patrimonialization of the economic position with a better return to credentialed skills (Wright 2003) and strategic knowledge emerge even more clearly in the post- second world war era, notably in Europe, when a wage earner middle class is about to access better statuses, market positions, social protections, political control, without accumulation of economic resources but with the accumulation of cultural capital, of credentialed skills, of Welfare state recognized social rights, of political recognition (Castel and Haroche, 2001). However, with the reversal of this trend, Europe has been experiencing a backlash for the last 20 years.

The French model of social stratification in the Schmoller-Bourdieu scheme

We must remember that, historically, in the French social debate, occupational inequalities and stratifications are to a certain extent officially recognized: ever since their creation in 1954, the *Catégories socioprofessionnelles* (CSP) have constituted a commonly acknowledged "class schema", similar to the logic of the Erikson-Goldthorpe-Portocarrerro classification (Erikson and Goldthorpe, 1992).

The CSP schema defines 6 main occupational groups (more detailed schemata exist), where almost everyone can identify their position. In the French statistical system, these "socioprofessional categories" or "socio-occupational groups" CSP are a type of official classification of occupations, with no alternative and that no one can avoid (Desrosières et Thévenot, 1988; Szreter, 1993). '*Cadres*' (= senior wage earner managers, experts of professionals) are similar to the "higher service class of the EGP scheme; '*professions intermédiaires*' are second-rank professionals and managers, and can be roughly identified to the lower service class of the EGP scheme; '*employés*' are routine white-collar and service workers; '*ouvriers*' are blue-collar workers; '*agriculteurs*' and '*patrons*' are the self-employed in agriculture and of other sectors respectively. This nomenclature is widely used by official and private statistical agencies and constitutes a tool broadly adopted by individuals to describe their own social position. A book such as Bihr and Pfefferkorn's (1995) which offers a large panorama of occupational inequalities is an example of the

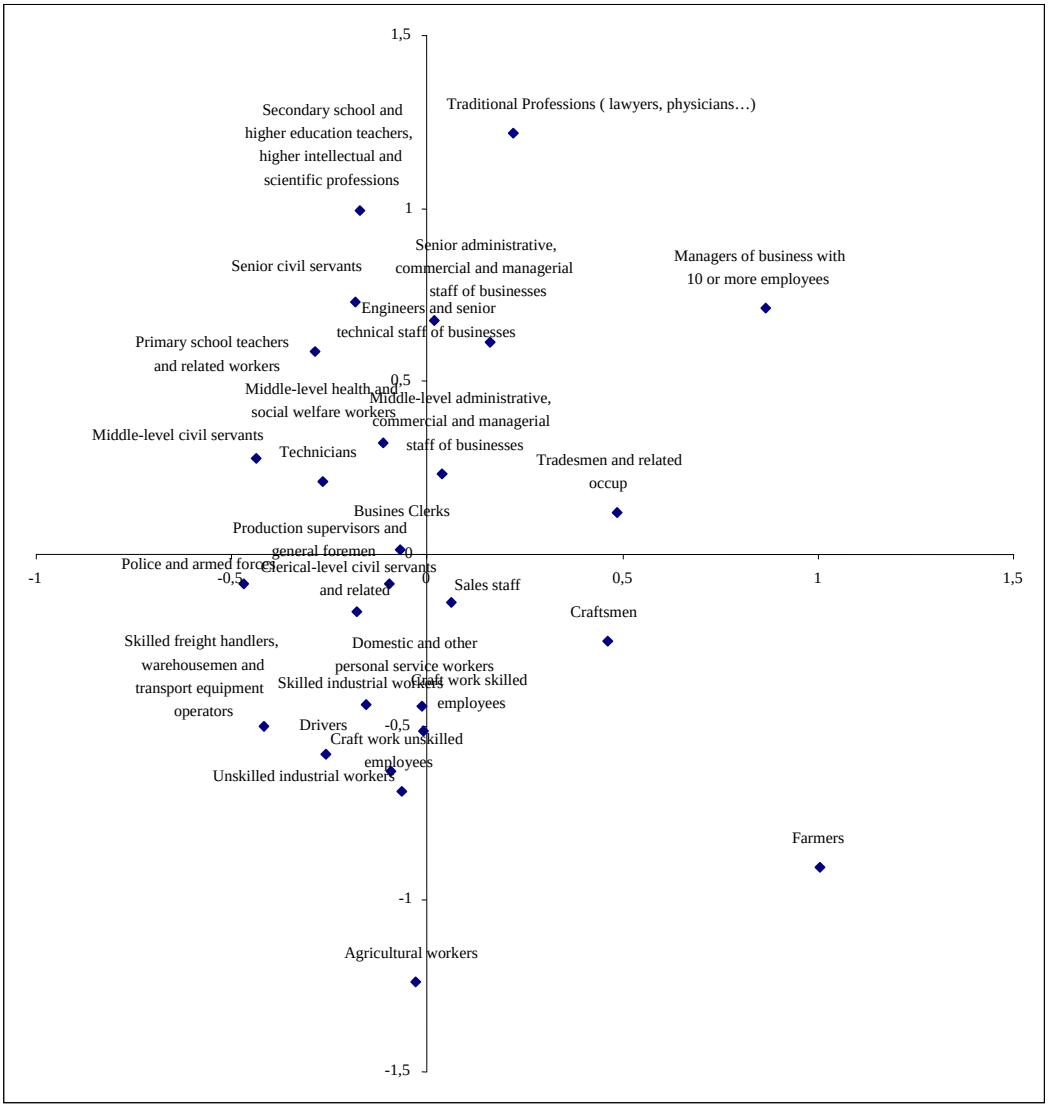
usefulness of the CSP schema.The two digits CSP scheme is very useful, since it is about to detail in 27 different elements the former 6 major groups. This detailed classification is about to prove the interest of Schmoller's theory.
This coding is about to offer a multi or bi-dimensional vision of the social space to understand how these categories are attracting or rejecting others (Chauvel, 1998a). For example, if we consider the homogamy table connecting the father's occupation of each members of a couple, the log odds ratios of any kind of occupation i with j is a symmetric table of dissimilarity: the stronger the log odds ratios, the less likely the marriage (if we aggregate Enquêtes Emploi which are French style Current population surveys, from 1982 to 2000, the number of such observation is over 300.000). If we submit such a table of dissimilarity to a multidimensional scaling procedure, we obtain a two dimensional space where the different social groups are dispatched such as the closest are more likely to exchange their children, and are father if they do not.

Figure I-10. The French CSP: codes of "socio-occupational groups"

#	CSP Socio-occupational group
1	*Farmers*
10	Farmers on large farms
2	*Self employed and employers*
21	Craftsmen
22	Tradesmen and related workers
23	Managers of business with 10 or more employees
3	*Higher service class*
31	Liberal professions
33	Senior civil servants
34	Secondary school and higher education teachers, higher intellectual and scientific professions
35	Information professionals, creative and performing artists
37	Senior administrative, commercial and managerial staff of businesses
38	Engineers and senior technical staff of businesses
4	*Lower service class*
42	Primary school teachers and related workers
43	Middle-level health and social welfare workers
44	Ministers of religion and members of religious orders
45	Middle-level civil servants
46	Middle-level administrative, commercial and managerial staff of businesses
47	Technicians
48	Production supervisors and general foremen
5	*Routine white collars*
52	Clerical-level civil servants and related
53	Police and armed forces
54	Businesses clerical workers
55	Sales staff
56	Domestic and other personal service workers
6	*Blue collars*
62	Skilled industrial workers
63	Craft work skilled employees
64	Drivers
65	Skilled freight handlers, warehousemen and transport equipment operators
67	Unskilled industrial workers
68	Craft work unskilled employees
69	Agricultural workers

The first axe is typically a hierarchical one: on the top are social groups defined by the accumulation of both economic and educational capitals (such as liberal professions), and on the bottom the most deprived groups on both aspects. The second axe is more complicate, since it is both an axe of educational *versus* economic resources, and also a State *versus* Market based positions. Far on the left are mainly State civil servants and public occupations, and far on the right are independents, self employed and employers, and between the two extremes are private status wage earners.

Figure I-9. The bidimensionnal social space of mobility



Sources : Enquêtes emploi 1982-2002 INSEE, Lasmas Iresco/ Institut Quételet.

The Schmoller quadripartition of the middle classes appear on the higher part of the figure, were we find the opposition between higher and lower middle classes, and between old (on the right) and "new" middle classes (on the left). This second opposition is also an opposition between cultural resources and state positions on the left, and economic capital based positions on the market on the right. When we analyse the social determinants of the access to the social groups on the left, the first determination I educational level when on the right side, social inheritance dominates. The difference between "old" and "new" middle class is also an opposition between ascribed *versus* achieved status: education is a major agency of selection

or of control of the access to the "new middle class". In weberian terms, the opposition is also in terms of bureaucratic legitimacy of social positions on the left, and economic resource based on the right.

The demographic crisis of the "new" middle class

In the 1960-1975 period, and quite later too[2], the expansion of the new middle class, was seen as an inherent trend of modernity. Even if C. Wright Mills posited the fundamental political conservative vision and also instability of this class[3], from the late 1960's to the mid 1980's, a strong optimistic view of the transformations of the French society hypothesised a kind of soft cultural revolution brought by the "*nouvelle classe moyenne salariée*" (the "new wage-earners middle class", Touraine, 1969). The declining intensity of class cleavages was about to blur class borders (Aron, 1969). Evidently, strong debates emerged such as the controversy between Pierre Bourdieu (1979), who claimed that the "dominated fractions of the dominant classes" were intrinsically frustrated by their ambiguous position, and Catherine Bidou (1984), who demonstrated that during the late 1970, the young members of the new middle classes were bringing a new culture of self fulfilment and emerged as central political actors, mainly at the local level.

Anyway, this largely acknowledged cultural dynamics of the "new middle class" was based first on a spectacular growth of this social category. During the "*Trente Glorieuses*" (1945-1975, see Fourastié 1979) era of full employment, fast growth (an annual growth of about 4% for the worker's real wage), the French State fostered a model of Welfare regime employing a large middle class population in public services about to improve health, education, and human development (hospitals, universities, welfare services of any kind) and developed the project of large scale intervention in the industrial and service economy, nationalizing or launching public companies engaging a large technical and service middle class in businesses and infrastructures such as trains and electricity (SNCF, EDF), high tech companies in nuclear industry, telecommunications and space (CEA, PTT, Aérospatiale), and even in (so called) strategic industries (the automobile industry Renault, steal, mining), but also banks and insurance. The trend was also the protection of wage earners in a salaried society (Aglietta and Brender 1984). From these policies emerged a trend of "*moyennisation*" (middleization) analysed by Mendras (1988) that pushed between 1969 and 2002 from 4,3% to 11,8% the population of "higher service class" and from 12,5 to 16,9% the population of the "lower service class". The skyrocketing growth of these populations was about to create an optimistic culture of middle class, far away from the risk of poverty, downward mobility, unemployment and exploitation. However, after 1984 and the conversion of the governmental elite of both left and right political moderate parties to monetarism and to public debt control, the capacity to feed this middle class expansion disappeared.

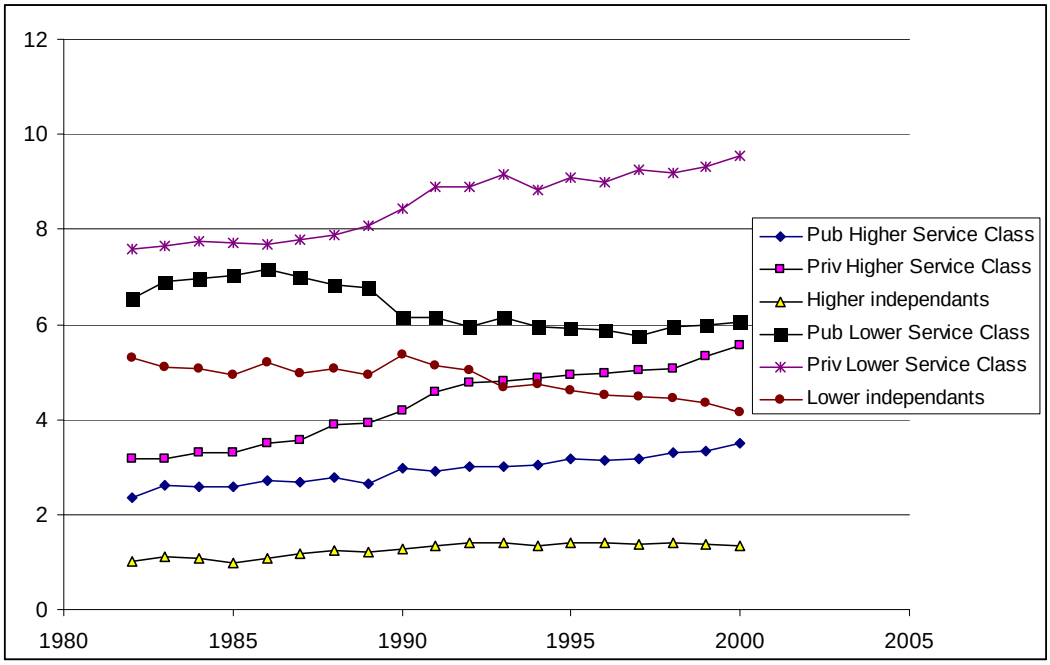
Since 1982, the size of the middle classes remains the same (about 30% of the 20 to 59 year old population). The most important aspect is the redistribution from public status to private status. Even if the public higher service class prolongs its expansion, the downward trend of the Public lower service class appears quite clearly. The most visible growth is for the private sector lower and higher service classes. However, during the two decades 1980 and 1990, on the adult population, stability seems to be the clearest trend.

[2] See Henri Mendras 1988.

[3] Mills, who had been translated in French in 1970, read Lederer and Marschak (1926), who were the first systematic analysts of the destabilisation of the "new middle class" in the post WW I Germany (Mills, 1951, p. 357). However, Mills ignored Geiger's (1932) contribution on the German middle class auto destruction.

That apparent stability hides in reality a considerable generational U-turn that the average percents on the 20 to 59 year old population can not reveal. The French society, in terms of social stratification and in terms of culture and politics, is marked by a strong generational fracture, between on the one hand the first generations of the baby-boom (born between 1945 and 1955) who were young adults in may 1968 and during a period of full employment and fast growth, and on the other hand, the cohorts born after 1955 who faced during their youth a depressive period of strong unemployment, wage moderation, housing crisis, among other problems (Chauvel, 2006). The implicit model of socialization relating to these two periods of entry in the labour market produced divergent trends in the social structure, culture and representations of the respective middle classes. When we compare the dynamics of cohorts which have recently reached 50 years old and those who were 30 during the last decade, a complete divergence in life chances is observed.

Figure I-10. The demography of the middle classes
(% of the total population, 20 to 59 year old)



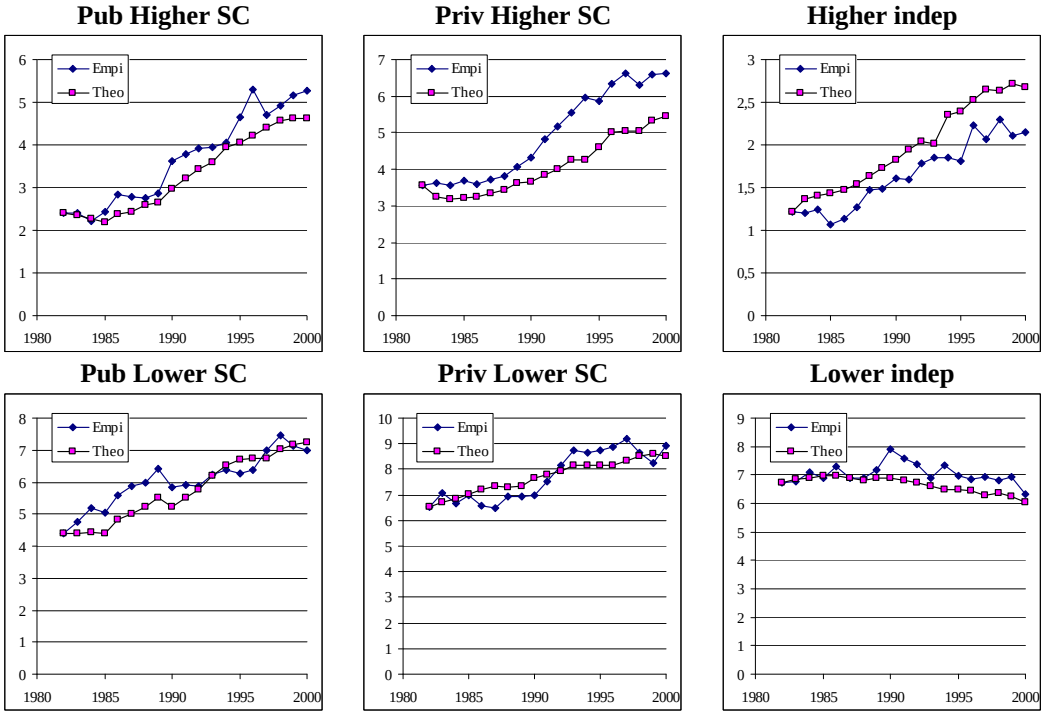
Sources : Enquêtes emploi 1982-2002 INSEE, Lasmas Iresco/ Institut Quételet.

Note : Higher independents are self-employed professionals, managers of private companies with 10 employees or more; Lower independents are self employed craftsmen and tradesmen. Pub is for public status wage earners in public or national companies, public hospitals or in local government administrations. Private is for other wage earners.

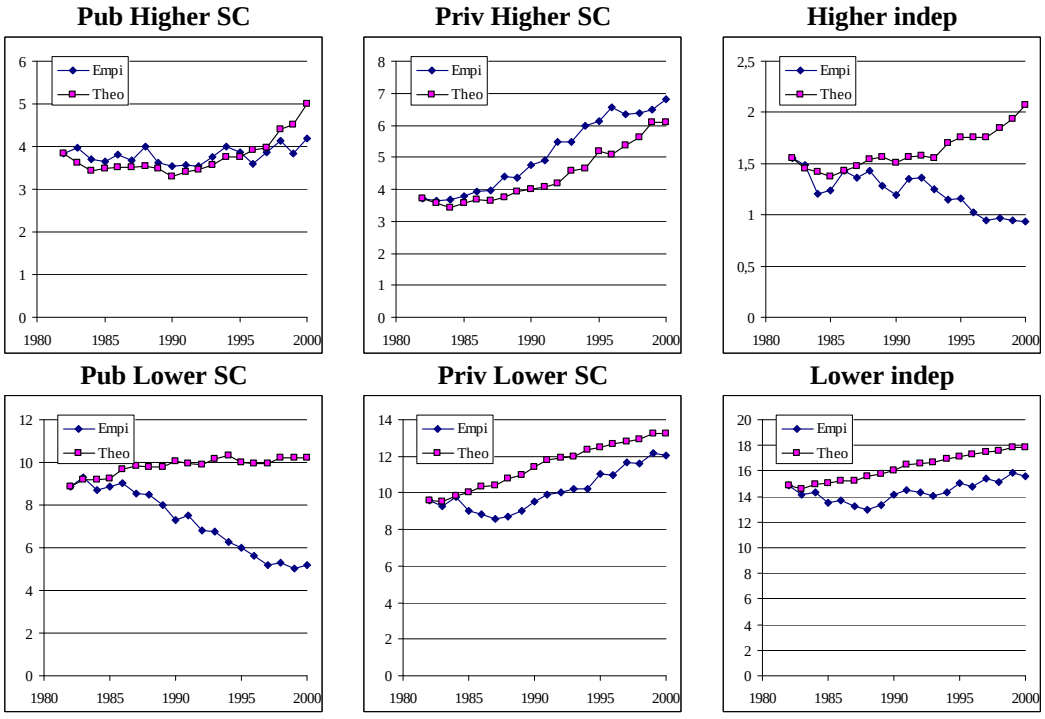
If we consider the empirical evolution of the different social groups (**Empi** on the figure 11), if we except the independents (employers plus non salaried professionals), the 50 to 55 year old age group is marked by a strong dynamics of middle class expansion (+177% of Pub higher Service Class, +85% for the Private one, +59% and +36%, respectively, for lower service class). The cohort born in 1945 (55 year old in 2000) benefited of a considerable boom compared to the cohort 1927 (age 55 in 1982), particularly at the top ranks of the new middle class. These evidence can not explain the trouble in the middle classes consciousness, that "*angoisse des classes moyennes*", a kind of collective "status panic" (Mills, 1951, p.237).

Figure I-11. Empirical and theoretical (under the hypothesis of stable value of education) evolution of different social groups in %

Age Group 50-55 year old



Age Group 30-35 year old



Sources : Enquêtes emploi 1982-2002 INSEE, Lasmas Iresco/ Institut Quételet.

If we compare now the evolution of the 30 to 35 age group, a completely different trend appears. If the higher Private higher service class follows the previous tend, the Public one nearly stagnates (+9,8% for the public compared to +82% for the private), and at the lower ranks of the middle classes, the public one faces a strong decline (-41%) and the private one a moderate expansion (+25%). This shrinking public middle class appear between the cohort

born in 1947 (age 35 in 1982) and the 1965 one (age 35 in 2000). The evidence of this shrinking dynamics is quite different to the trend shown by Wright and Dwyer (2003) who are focused on a unidimensional hierarchy, but the result is in fine the same: the intermediate middle class looses its substance.
Another central aspect is the comparison between the empirical trend and what would have happened if the effect of social origins (father's occupation), gender and level of education had remained unchanged over the period? To answer this question, we fix in 1982 for each age group the effect of the three variables (origins, gender, education), and compute each year the theoretical proportion of social groups required to let unchanged the effect of the three characteristics[4]. Year after year, the new cohorts are better educated than the previous ones, come from families of higher origins, and, thus, we can expect a mechanic increase of access to higher positions; the cohort dynamics of the reduction of inequalities between women and men (Chauvel, 2004) could imply a similar evolution. In reality, the most substantial changes are led by education.
Which are the results? Since the first cohorts of the baby-boom enjoyed longer education (the *baccalauréat*, the French SAT test, was passed by 15% of the 1935 birth cohort and 27 in the 1946 birth cohort), the access to the Higher service classes is expected to increase too. However, in most social groups, the empirical curve is over the theoretical one: the actual increase of positions exceeded the growth of "usual" candidates, and then to fill these positions, candidates with lower achievements were required. The strongest gap between empirical and theoretical increase appears for Private higher service class, but in relative terms, the empirical increase of Public higher service class is quite stronger.
Conversely, the evolution of the 30 to 35 age group is much less optimistic: the expansion of the level of education is quite strong, and then the theoretical curves generally rise. However, the drastic reorganisation of the Welfare and interventionist State produce a strong decline in the Public lower middle class which was the archetype of the "new" middle class. In 2000, the gap between the theoretical expansion (10,4%) and the empirical one (5,2%) represent a lack of 5,2 percentage points: it means that for 2 "natural" candidates to these positions (because of their education, social origins and gender), a single one will be employed in this group. The other one has to find a social position in other groups, in Private lower service class which faces also a deficit (of 0,8 percentage point), or lower on the social ladder, in the "routine" categories of lower white collars or in blue collars, or he or she remains unemployed.

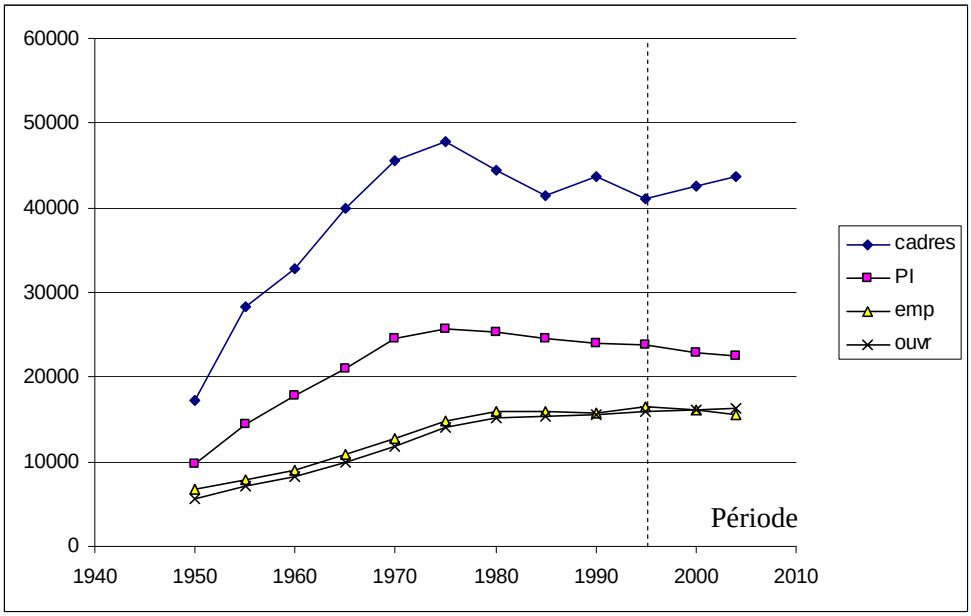
The quartering of the middle classes

This demographic challenge where the number of potential candidates (given the degree of education) exceeds the number of empty slots about to be filled inside the "new intermediate middle class" positions (creating a strong trend of educational *déclassement* = declining value of education in terms of prestige and positions) is just a facet of the phenomenon. The other one is the collective decline of the value of wages compared to the value of assets, where the wage earner middle class shares with the working class the problems of the declining value of work. The long term data on the average value of net wages by social groups offer a clear vision of the problems of the wage earner middle class.
A long term analysis of wage incomes, capital incomes and fluctuation in the asset values on the long term (Piketty 2001b) shows that the post-second-world-war period was marked by the increasing capacity of wage earners of the middle classes to access to owned housing,

[4] For that calculations, we use a polytomic logistic model explaining social destiny (social groups of occupation) in 1982 given three independent variables: gender, origin, education, and we assign the same coefficients for following years (we use the expected probabilities of belonging to the groups) to compute the percentage of the different groups resulting from the change of their characteristics.

even without family support: high wages and low capital costs were about to offer more capacity to property. On the contrary, the last twenty years are marked by an acceleration of housing costs for renters and by a boom on the property prices: new cohorts of adults, even with higher incomes, can not expect better housing than their own parents. For older cohorts, the trend is positive since the value of their former accumulation increases, but, conversely, for the young adults, the dependence on family (when its economic support is significant) is strengthened and the capacity of access to independence through work declines. In countries such as Spain, Italy, Germany, here is a dimension of the dramatic decline of fertility rates.

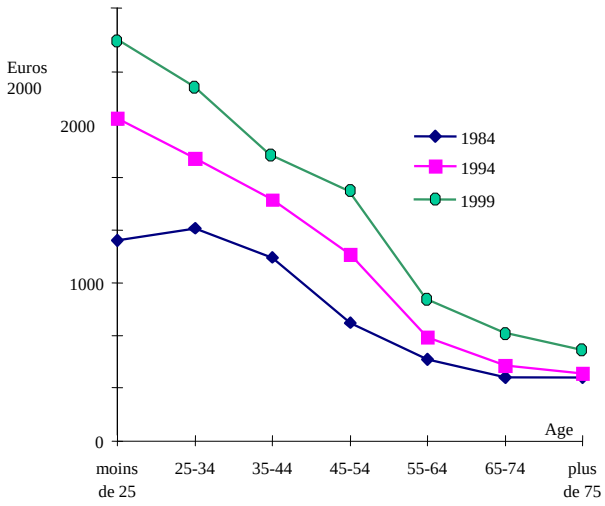
Figure I-12. Net yearly average wage of full time full year employed wage earners of 4 social groups (constant euros 2004) (cadres = higher professionals, PI = lower professionals and credentialed clerks, emp = service sector standard workers; ouvr = industrial sector workers)



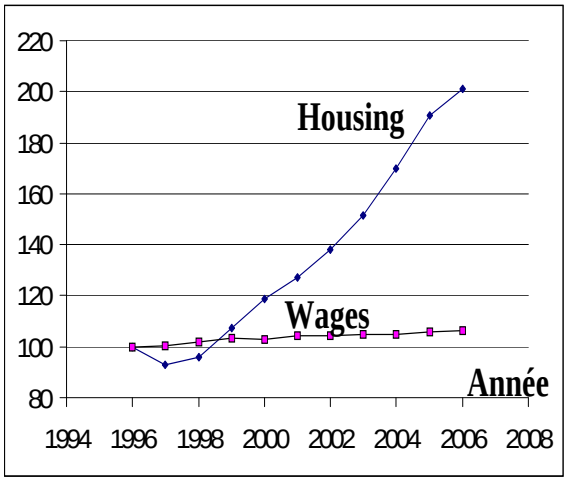
Source : INSEE series longues sur les salaires

Figure I-13. Housing costs and wage earner society

1984 to 1999 average yearly cost for 1 room Per age group



1996-2006 comparison of Paris wages and of Paris housing index



Source : left : Insee, Budget des ménages 1984-2000 ; right : Insee, Notaires d'Île de France - Base BIEN

These constraints on the access to capital (such as housing, *via* rent or acquisition) create a distortion between the children of families having access to accumulation and the others. In France, between 1992 and 2004, the household's income as an explicative factor is declining, like occupation, when having received heritage or *inter-vivo* gift are better explicative variables of wealth inequalities (Cordier and al, 2006).
This point underlines the new fragmentation inside the middle classes between on the one hand the wage earners having and intermediate level of cultural capital, and having no family support (who were the typical representatives of the "new middle class" of the 1960's, but who face real difficulties nowadays) and on the other hand strata of privileged upper middle class having better positions in the market based economy, and having access (through their parents) to inherited patrimony. Such a situation goes with less meritocratic and more unequal configurations of development.

Part 2. The "Latin" dynamics of middle class in a comparative perspective

My aim in this second part of this paper is to connect the dynamics of the middle classes to the problem of birth cohort replacement. My point here is that we have in Latin countries of Europe a visible transformation of middle classes based on birth cohort socialisation and replacement. I mean that "period" (our usual vision of time) is not the real index of the transformation of middle classes, but cohort, since the specific access to education, the opportunities for a better or worse entry in the labour market, the models of socialisation to economic roles, depend on the socioeconomic context an individual faces when he or she is twenty something. This context of entry is strategic since the "value" of a cohort over life-course depends on the risks of unemployment, precarity of labour contracts, capacity of negotiation of better positions: to some cohorts much is given in a context of economic affluence, when of other cohorts much is expected because of a context of relative scarcity. In the context of middle class transformation, the former expansion of the "new middle class" of the 1960-1980 era is over, and the first victims of this retrenchments are the new cohorts of adults, who will live the consequences of the new context, when the older cohorts will follow on their previous trajectory. I show here with a comparative analysis that the dynamics is quite contrasted, countries or welfare regimes having a large diversity of answers to the contemporary stresses that result from globalization.

Different responses of welfare regimes to economic stresses

To analyze more precisely the probable responses of different welfare regimes to the challenges of postindustrial societies, I consider the standard typology of Welfare regimes (Esping-Andersen, 1999); we could focus on four types of regimes, respectively corporatist (or conservative), liberal, universalist (or social democrat) and familialistic:

- Since it is based on the recognition of long term and institutionalized social rights of members of protected social groups, the probable response of the **corporatist regime** (including France) to economic slow down, international competition and economic shortage of the Welfare regime as such (as a redistributive agency, as a ruler of the

labor force, and as an employer), will be a more expensive protection of insiders (stable workforce with higher seniority and high rates of trade-union memberships) at the expense of young adults leaving education, women and immigrants, who have less opportunities to defend their interests. Youth unemployment results from the scarcity of (decent) jobs in the labor market (because of the lack of competition with insiders), and the stronger internal competition of the young for obtaining less available positions generates a decline in relative or absolute wages, and specific renegotiations and retrenchments of social rights of the new social generations. If seniors are victims of early retirement, they benefit also from better protections of incomes and opportunities to access comfortable pensions schemes and/or acceptable conditions of pre-retirement (generally better than the usual unemployment schemes of younger adults). The social generations of seniors are more equal because they are the homogeneous cohorts of the "wage earner society" (Castel and Haroche, 2003) of the Golden period of 1960s'-1980s' (intracohort inequality falls for seniors), with better pensions schemes developed for all (seniors relative income increases); conversely, the new cohorts of adults face a stronger polarization between winners and losers (Brzinsky-Fay, 2007). Another aspect we do not face here is the (declining) value of education; since a probable collective answer to the difficulties of the young is a massive increase in the (postsecondary) education of young cohorts (Van De Velde, 2008) but working in tandem with a lack of improvement in labour market entry a trend of strong educational inflation (decline in the nominal value of grades, particularly for the less selective ones) can be observed (Duru Bellat, 2006).

- The **liberal regime** (including the United-States) is characterized by another probable answer to the same challenges: because of the centrality of market in this regime, the response to economic shortage is Welfare State retrenchments, limitation of redistributions to worse-off populations, stronger market competition, denunciation of former social rights considered as rent-economy devices and as distortions for market equilibrium. The logics therefore is a strengthening competition between juniors and seniors (who have less intangible rights), in order to renegotiate seniors' better positions previously obtained in the context of affluence. The consequence is smoother inter-cohort inequality (the new cohorts benefit relative to the seniors). However, strengthening competition means stronger intra-cohort inequalities. In terms of educational value, since there is a stronger linkage (by comparision to the corporatist regime of educational expansion) between the individual cost of education and the expected returns to education, the market regulation of educational expansion promotes a more stable social and economical value of grades, with no clear decline in their nominal or relative value.

- The **universalistic regime** (including Finland) is defined by a collective scope for long term stability, progress and development for all, with a strong sense of collective responsibility. The quality of integration of newer cohorts is then considered as a priority, since a failure in the early socialization of young adults is clearly seen as a massive problem for future development of society. Strong rates of youth unemployment and economic devalorization of young adults could go with long term risks of anxiety, sentiment of self devaluation of the young, increasing suicide rates or decline in the fertility index. More generally, a better control of social risks over the complete life course is a central dimension of the Nordic Welfare state model. In terms of education, the global context of competition and massive pressure on lower and now intermediate levels of skills, the problem of old age and the necessity to maintain elders in the workforce in better conditions, all these constraints request a better

distribution of qualifications on the life course and an effort of flexicurity shared by individuals and the collectivity. The consequence is a stronger control, relatively to the two previous models, of both intra- and inter-cohort inequalities. The increase of the level of education for all could generate a slight process of overeducation, defined as an excess of level of education in the workforce relatively to the prestige of social positions or to the level of wages, but since it is shared by all age groups, its specific cohort dimension is not obvious.

- The **familialistic regime** (including Italy) shares many aspects of the corporatist one, but families are here a legitimate institution in the process of re-distribution of resources, both culturally and for the regulatory activities of the State. More precisely, in this regime, some sectors of the economy are strongly protected (mainly the core sectors of the public economy and of large companies such as banks, insurance, etc.) and most of the labor regulations there are based on seniority rights; in most middle and small size companies, the regulation is based notably on family interconnections, where both localism and long term fidelity of workers are fundamental institutions. In the context of post-affluent societies, and of scarcity of jobs, housing and other resources, parents of young adults are supposed to offer help and protection, and most families act in conformity with these social pressures. The consequence is a trend of increasing dependence of young adults till age 35 (or even over) in a context of declining levels of wages and standard of living for the cohorts of new entrants into the labor market. Consequently seniors exert a political pressure to obtain better pensions, in order to support their own children. The context of dependency generates stronger constraints for young families, increases the social pressures on women to choose between work and children, and is accompanied by a strong decline in the fertility rates, which creates a paradoxical context of "familialism without families", and becomes a major problem in the long term sustainability of the pensions and Welfare regime (shorter and less affluent careers of juniors, generational collapse of one children families, etc.). Conversely, the decline of incomes for young families is offset by the reduction of family size. In this regime, the national homogeneity may be weaker compared to other regimes since the inter-provincial imbalances (strong unemployment rates in some localities could go with a lack of appropriate workforce in others) are structural traits of a labor market where localism and strong ties are important aspects of social regulations, implying less geographic mobility. Thus, national heterogeneity is stronger than in other regimes. Another recent dimension is a strong development of mass tertiary education, which generates a strong trend towards overeducation: a multiplication of university graduates who can not find positions in the Mediterranean labor markets where middle and small size companies seek intermediate technical and managing clerks more than specialists or experts.

While the welfare regime logics and transformations are central issues, other factors could influence these results. These include:

- economic acceleration: even in the short term, a better economic situation could diminish pressure for welfare retrenchments;
- quality of the transition from school to work: close relations between the educational system and the labor market, organized internships, strong network of alumni, etc. limit the risk of "outsiderization" of young adults;

- shape of demography: a boom in fertility rates may generate 20 or 25 years later a phenomenon of "overcrowding" in the labor market (Easterlin, 1961; Easterlin and al., 1993).

The combinations of these factors are much more complex than expected. Because of the diversity of potential configurations, we should expect that the welfare regime explanation outlined here is only a part of the real history of each nation. While the welfare regime offers strong constraints, historical ascribed configurations (demography, level of development and opportunities for growth, etc.) and achievements of social policies (educational booms, structural reforms on the labor market, etc.) could also be important explanatory factors.

Definitions and tools of generational research

The use of "generations" in European social science is more permissive than in the American academic context: for American sociologists, "generation" refers to the sociology of kinship and to family issues, while "cohort" (or "birth cohort") refers to people born in the same year (Ryder, 1965). Therefore, in American academic journals, the expression "social generation" is quite uncommon (except in the discussions of Karl Mannheim's theories). If some economists in the American tradition (Easterlin, 1966) write about "generations" and "generational accounting", the birth cohorts they consider are also engaged in kinship relations of generational transmissions (gifts, education, legacy, etc.). The European tradition is different: here (Mannheim, 1929) "social generation" is defined as specific groups of cohorts exposed to a common pattern of social change and/or sharing collective identity features such as ethnicity, gender, or class.

Historically, four definitions of "generation" exist (Mentré, 1922). The first one is less important to our argument: *genealogical generations* pertain to the sociology of family and kinship. The three others relate respectively to *demographic*, *social* and *historic* generations. A *demographic generation* is identical to a "birth cohort": the group of individuals born in the same year. This is the most neutral clustering criterion that assumes no common trait. Conversely, the *historical generation* is a set of cohorts defined by a common culture, shared interests, consciousness of the generation's specificity and its historical role, and occasionally conflict with other generations. A historical generation may define itself by the time of its coming of age in history: a decisive example is the so-called "*génération 1968*", which refers to the first cohorts of the baby-boom (born between 1945 and 1950). The "*génération 1914*", the generation of young adults of the First World War, is another dramatic example. *Social generation* is then defined as a link between these two polar definitions. In the empirical social sciences, we first look at demographic generations, and then we define historical generations from the results of sociological analysis, assessment and interpretation of the diversity or homogeneity of cohorts, as well as their objective and subjective identities and consciousness.

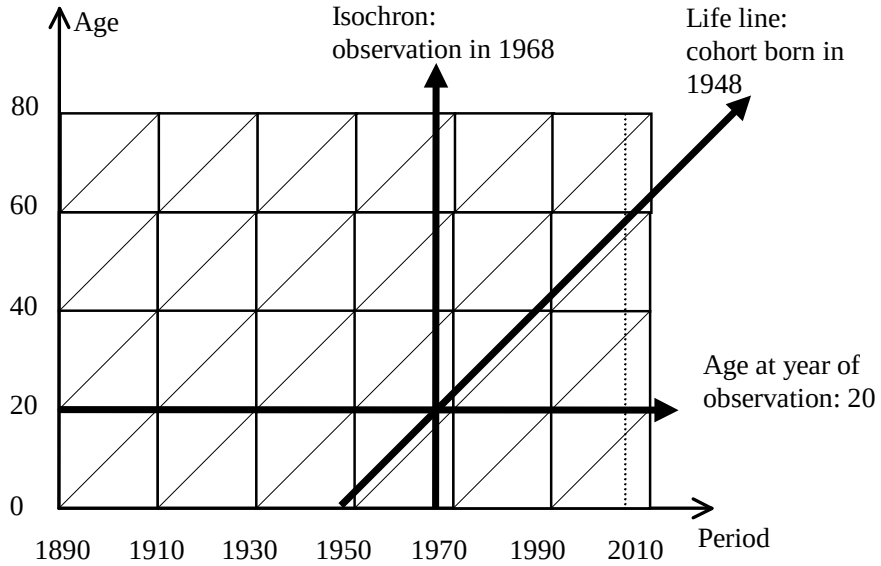
First we must look at "socialization" in general, without delving into a systematic theorization. During youth, between the end of school and the stabilization of adulthood, there is a specific period of "transitional socialization", which is a pivotal point in the formation of individuals' choices for the future: in a short period, usually some months, the potentialities offered by family and education turn into concrete positions from which people will construct their life courses. That individual process has collective consequences when a cultural or historical polarization has a "socialization effect" on most individual members of the new generation (Mannheim, 1929).

For people at age 20, collective historical experiences such as May 1968 or July 1914 could form durable opportunities or scars, since they face a major transition in their lives within a dramatic social or historical context. Children cannot completely participate yet, and older people could be less affected, since they are already influenced by other experiences

accumulated in other historical contexts (Ryder, 1965). This “transitional socialization” is not necessarily sufficient to create or promote durable generational traits: they need a continuous process of collective recall to reinforce the social generation’s identity that would progressively vanish otherwise (Becker, 2000).

Figure II-1

1-Lexis diagram



Note: the Lexis diagram offers a synthetic view of the interactions of social times: when we cross periods, horizontally, and age, vertically, the time of cohorts appears on the diagonal (a = p – c). In year p = 2005, people at age 58 are born in 1948; they were 20 in 1968. At each period, young and old age groups are also different birth cohorts for whom socialization occurred in different contexts: the 75-year-old age group of 2005 (born in 1930) is also the “welfare generation” that has had abundant access to public pensions and health systems, while the same age group in period 1968 was the remains of the “sacrificed generation” born in 1893 (21 years old in 1914).

A major problem in generational social change analysis is the intersection of three social times: age, period and cohort. The most common time is “period” and pertains to the succession of historical epochs; the second time relates to “age” and the aging process; the third one is the *time of generations*, which consists of the continuous process of replacement of elder cohorts by new ones. These three times are organized in a two-dimensional plane (see Figure 1) that implies a profound indeterminacy. In any given period, different age groups coexist (defined by age thresholds, age statuses and roles), but they also represent different generations who have been socialized in different historical contexts. When we compare different age groups at a given date (period), we cannot know *a priori* whether their differences result from age or from generation: in year 2008, on the Lexis diagram, if the age group at age 60 (born in 1948) is at the top of income scale, we do not know whether it is an age effect (any cohort will enjoy better income at age 60) or a cohort effect (the 1948 cohort has faced the best career opportunities of the 20th century since its entry into the labor

market). Age-period-cohort models have been developed to reveal generation effects, which can be discerned when specific traits appear in the "life line" of specific cohorts (Mason and *al*. 1973).

It is possible to mobilize Mannheim's theory of early adulthood socialization, where the newer generation, which has just experienced its transitional socialization, is generally reacting strongly to new trends. In periods of sudden social change, the newer cohorts are the most influenced by the discontinuities of history because they are the first to experience the new contexts of socialization that previous cohorts could not anticipate and in which they do not participate (Mead, 1970). More precisely, during an economic acceleration, the young generation of adults generally do better than older ones because they can move easily to better positions; conversely, during an economic slowdown, the newcomers are generally more fragile because they have less room in the social structure, and no past accumulation of human or social capital, nor do they possess social rights to smooth the downward shock they face. We can expect such fluctuations in the distribution of well-being by cohorts, with a succession of "sacrificed" and "elect" generations emerging over time; and if the effect of socialization is strong and durable, each generation retains the consequences of its difficult or favorable entry. These fluctuations in the distribution of well-being before any redistribution could correspond to even stronger inequalities after redistribution, since the generations marked by prosperity tend to accumulate larger contributive social rights than the generations marked by deprivation.

For the analysis of these cohort-effects in the access to middle class position, I will make use the Yang Yang and colleagues (the main reference is Yang and al. 2004) model of Age-Period-Cohort - Intrinsic Estimator (APC-IE) which is now one of the most acknowledged strategy to disentangle effects of age, period and cohort in series of cross-sectional surveys.

These APC models are able to detect the existence of cohort effects, their intensity and their statistical significance, notably with the estimation of 95% confidence intervals. Before we use these models, we first analyze cohort effects of changes in the stratification system in the French case, which is known for its extreme intercohort imbalances.

The multidimensional "*fracture générationnelle*" in France

In France, the economic slowdown has provoked a dramatic multidimensional "*fracture générationnelle*" since the late 1970s (Chauvel, 2002: "preface"; 2003). This portrait is grim, but it is founded on strong empirical bases, and alternative sets of microdata offering convergent results. Three principal topics will be highlighted here: first, the economic marginalization of new entrants into the labor market and its direct effects on social structure; second, the long-term consequences of this deprivation in terms of socialization and life chances; and finally, the consequences for the political participation of these cohorts, and their support for the contemporary welfare regime.

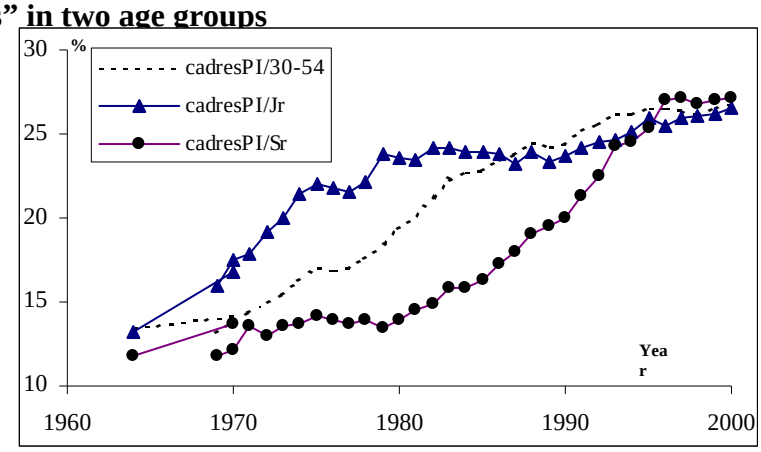
How could we explain this increasing gap? In fact, this is a consequence of a changing collective compromise, which occurred happened during the mid-1970s and early 1980s. This transition in the social value of generations brought from a relative valorization of newer generations, as a positive future we had to invest in, to a relative valorization of the protection of the adults' and seniors' stability, even at the expense of the young. The main factor in the redistribution of well-being concerned unemployment. High unemployment rates were socially acceptable for young workers, provided that adult employees with dependent children could avoid these difficulties. In 1974, the unemployment rate of those who left school 24 months before or less was about 4%; by 1985, those who left school recently had an unemployment rate of 35%, which remained the case through 1996; in 2002, at the end of the

recent wave of economic recovery, it was close to 18 %. The unemployment rates of recent school leavers are strongly reactive to the economic situation whereas the middle-aged and senior rates remain more stable: an economic slowdown has serious consequences for younger adults, and recovery first benefits new entrants in the labor market. Evidently, the perverse consequence of that collective compromise for the protection of adults at the expense of newcomers is the lack of socialization of the new sacrificed generations: even if they are now adults, with dependent children of their own, their unemployment rates remain much higher, and their earnings abnormally low when compared to other age groups, because of a kind of "scarring effect". At the end of the eighties, the unemployment rate of the group at age 40 to 44 was still about 4% and is now over 8%. The age compromise for the protection of adults with dependent children is unclear now. This "scarring effect" is even clearer concerning earnings: the cohorts of new entrants in the labor market in a time of downturn have to accept lower wages; conversely, for young workers, a strong economy allows them to negotiate better earnings. After this entry point, the earning gaps remains because of the lack of catch up effect on earnings (Chauvel, 2003, chap. 3): some generations are about 10 points above or below the long-term trend, because of the point at which they entered the workforce, and after age 30, the relative benefit or handicap remains stable.

A complementary factor relates to the dynamics of occupational structure and the stratification system. In France as in the US (Mendras, 1988; Bell, 1973), the standard hypothesis of stratification change suggests that the long-term educational expansion of the twentieth century, and the emergence of a knowledge-based society, have stimulated the enlargement of the middle and upper middle classes; thus, the newer generation could have mechanically benefited from the expansion of the occupational groups of experts, managers or professionals ("*cadres et professions intellectuelles supérieures*", in French[3]), to whom we often add middle management and lower professionals in the private and public sectors (such as school teachers and nurses), who exemplify the "new technical middle class", whose social hegemony was predicted in the seventies ("*professions intermédiaires*" in the official French nomenclature of occupations).

At the aggregated level, the expansion of these middle and higher occupational groups in France seems to be a demonstration of that idea: for the aggregated age group between 30 and 54, the rise is from 14% in 1970 to 26% of the total population (Figure 2). However, when we make a distinction between age groups, the dynamics are much more complicated: at age 30, the percentage of those in middle and higher white collar occupational groups jumped from 14% to 23% from 1965 to 1975, and reached 24.5% in 1980. In the earlier period, the trend strongly accelerated for these "juniors", but stalled after 1980: a 1.5-point increase in the two decades between 1980 and 2000, compared to a 9-point increase in the 1970s.

Figure II-2 "Cadres et professions intellectuelles supérieures" plus "Professions intermédiaires" in two age groups



Source: Enquêtes *Emploi* 1969-2000 et *Formation-qualification-professionnelle* 1964 et 1977, INSEE; archives LASMAS-Quételet

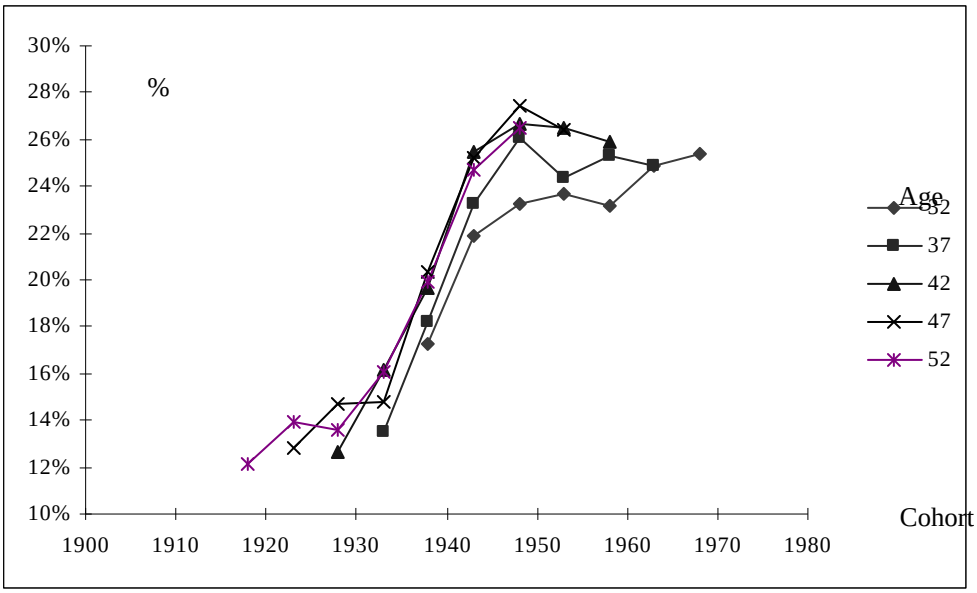
Note: In 2000, 26% of "juniors" (=age group 30 to 34) are in the middle or higher occupational groups; the figure for seniors (=50 to 54) is 27%. The proportions were respectively 24.5% and 14% in 1980. The percentages are calculated using the total age group population.

In the middle of the "Trente glorieuses", France experienced a dramatic expansion of the public sector and high-tech large companies (Airbus, France Télécom, civil nuclear electricity planning, health system, universities and research centers, etc.), creating strong demand for highly qualified employees with higher education. The first cohorts of the baby-boom (the 1945 cohort, which was 30 years old in 1975) were surely not a sacrificed generation since they enjoyed longer education in the context of a dynamic labor market, and did not face the diminishing returns to education that subsequent cohorts have faced. In 2000, 25 years later, the portion of 30-year-old in mid-level and higher white-collar occupational groups is quite similar and stable (26%), compared to 23% in 1975 and 24.5% in 1980. In this respect, the cohort born in 1970 knows no clear progress. However, during the 1990s, the expansion for "seniors" (that is, the "juniors" of the seventies) is obvious. Thus, the expansion of mid-level and higher occupational groups' across generations is not linear. The apparent linear growth results from the inappropriate aggregation of a strong expansion — for the early baby-boomers — and of a strong slowdown for the succeeding generations.

Scarring effect

These evolutions would have had no significant social impact if, for the new generations, these early difficulties had no permanent effect. If the new entrants in the labor force in a period of scarcity could catch up from their early difficulties later in their lives, the problem would be anecdotal or residual. The assessment of the long-term impact of these early difficulties is central to the interpretation; if young, deprived generations do not catch up, a kind of long-term *hysteresis* effect appears that we can call a "scar" or "scarring effect", since the handicap seems definitive. The age-period-cohort analysis shows that cohorts who experienced a difficult (favorable) entry because of a context of recession (expansion), continue to suffer (benefit) from a relative delay (advancement) in upward mobility when they are compared to the average situation. The relative position of a collective cohort at age 30 is rapidly crystallized, and there does not appear to be a substantial catch-up effect later on (Figure 3).

Figure II-3 Proportion of service class positions (*cadres et professions intermédiaires*) by age and cohort: cohort diagram



Source: compilation Enquêtes FQP - Enquêtes Emploi (1964-2000).

Note: The cohort diagram is a strong instrument for the analysis of cohort effects. It compares the achievement at the same age of different cohorts. If the curves are linear, we have a stable progress by cohort. If we see cohort accelerations and decelerations affecting the same cohorts, we can analyze long-term cohort effects. The 1948 cohort benefits from an acceleration of its position at age 32 (23% compared to 17% for the 1938 cohort, and less than 12% for the 1933 cohort — as we can suppose). The 1958 cohort, which at age 32 stalls relative to the 1948 one, does not catch up by age 42. At age 32, the rate for the cohort 1968 was 2 points higher than that of the 1948 one, whereas the rate for the 1948 cohort was about 13 points higher compared to that of the 1928 cohort. Since the opportunity for growth is neither similar nor linear from one cohort to another, some benefit from better careers than others. Generational history is not linear.

How can we explain the lack of a generational catch-up dynamics? Those who had benefited from a period of entry marked by a strong demand for skilled jobs experienced faster career and earlier labor experience at higher levels of responsibility, with better wages; these individuals (and the cohort they constitute at an aggregated level) retain the long term benefits of the early opportunities they enjoyed, which will positively influence their future trajectory at any later age. For those who entered the labor market under difficult economic conditions, the periods of unemployment they faced, the necessity to accept less qualified jobs with lower wages, and the consecutive delays in career progression, imply negative *stimuli* for their own trajectories (decline in ambition, lack of valued work experiences) and could appear as a negative signal for future potential employers. The hypothesis we present here for France is that cohort-specific socialization contexts imply long-term opportunities and life chances for individuals and for their cohorts; when the difficulties disappear, the cohorts who faced these problems continue to suffer from long-term consequences of past handicaps.

In more concrete terms, the cohorts born during the forties, who benefited from the economic acceleration of the late sixties, were relatively privileged compared to the previous cohorts when young, and are relatively advantaged when compared to the newer ones, because of the lack of progress for the young from 1975 to the present. We can generalize this observation: the cohorts who entered the labor force after 1975 and experienced an economic slump and mass unemployment, have been the early victims of the new generational dynamics, and they retain the long-term scars of their initial difficulties in the labor market.

An important point we cannot develop at length here is the consequences of educational expansion. If the level of education has increased in the cohorts born in 1950 to 1975, that positive trend was accompanied by a strong social devalorization of grades (Chauvel, 2000). More specifically, the first cohorts of the baby boom have benefited from an expansion of education at a time when the rewards to education remained stable: even if there were twice as many *Baccalauréat* recipients in the 1948 cohort than in the 1935 one, their likelihood of access to higher social or economic positions did not shrink. On the other hand, the generations that followed had to deal with a strong trend of devaluation in terms of the economic and social returns to education. The first consequence is a rush to the most valued and selective grades (in the "*Grandes écoles*" of the elite such as *Ecole Polytechnique, Ecole Nationale d'Administation, Sciences-Po Paris*, etc.) whose value remains stable, but whose population becomes more and more specific and may be discriminatory in terms of social origins. The second consequence is a strong devalorization of less prestigious universities, which are less exclusive but have much smaller per capita endowments in comparison to the *Grandes écoles*. In the same way, the best secondary schools become more selective, with major consequences in terms of urban segregation. In the French case, the school system was traditionally the central institution of the Republic and at the heart of its idea of Progress, providing the strongest support for French-style social democracy and meritocracy. The collapse of the value of grades implies a destabilization of this myth and a pessimistic outlook on progress, developments that we can expect to have political consequences.

Now that we are nearing the end of this long-term slowdown, which began 25 years ago, we can compare two social and genealogical generations[4]. For the first time in a period of peace, the youth of the new generation are not better off than their parents at the same age. In fact, the "1968 generation", born in 1948, are the children of those born in 1918 who were young adults in World War II, and who worked in difficult conditions at the beginning of the "Trente glorieuses". The condition of the baby boomers was incomparably better than their parents'. But the following genealogical generation, born around 1978 — that is now between 25 and 30 years old — faces diminished opportunities of growth, not only because of an economic slump, but also because of their relatively poor outcomes in comparison to those of their own parents, who did very well.[5]We now observe rising rates of downward social mobility connected to the proliferation of middle class children who can not find social positions comparable to their parents'.

Consequently, France offers an ideal typical example of a failure of a corporatist regime, since it is unable to distribute its benefits to young adults, since it sacrifices the interests of large fractions of its population and since it is unable to organize its own transmission to newer generations. This case is very interesting, indeed, since we have with France a country presenting specific traits: France is defined by an homogeneous culture, notably by a political culture of refusal of market rules, is homogeneously governed by a centralized system of governance about to produce for long periods the same erroneous diagnoses and decisions on the totality of the territory, is based on a culture of stop-and-go policies of alternate periods of excessive investments and of scarcity, about to create backlashes and counter-backlashes. France is also a country where the first years on the labor market are strategic for future life-chances of individuals: early successes or early failures become respectively positions of rent

or conversely lifelong handicaps. France could be an exception about to experience exceptional intercohort inequalities. More decentralized countries (like the United-States or Italy) could blur these fractures; more responsible political regimes could avoid stop and go policies or accept more rapidly the diagnosis of previous mistakes, and act to balance them. Societies where life course is characterized by more instability or by less conservative processes than in France, could be more propitious to redistribution of opportunities between cohorts.

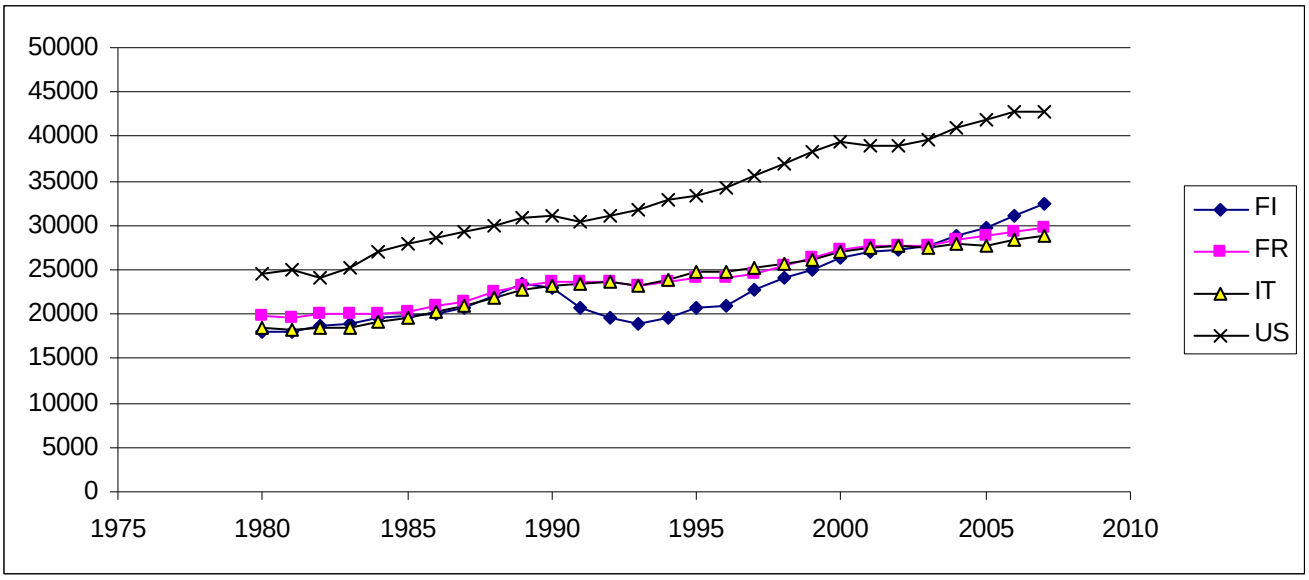
Is France an exception? An international comparison of cohorts

A solution to test this idea of a possible French exceptionalism is to compare the dynamics of transformation of the stratification system in contrasted nations. Here, I follow a strategy close to Pressman's (2009) measurement of upper (or "rich", in the definition of figure I-5), middle and lower (=poor) classes, defined by positions on a scale of Relative adjusted disposable incomes (RADI). If Presman prefer the 75 versus 125 % of median RADI, we chose here larger borders from the relative poverty threshold (50% of the median) to the relative richness threshold, its symmetric, at 200% of the median RADI. These borders are large, but we will be able to test the difference between larger and narrower definitions in the future.

The idea here is to analyze less the period transformation than the intensity of cohort transformations in the access to middle, upper and lower class brackets. To do so, we will analyze the APC Logit models of being upper/middle/lower class[5].

Four countries will be considered here: France, Italy, Finland and the United-States. This choice gives one country by typical welfare regime. The four countries are characterized by similar level of development and the trends are roughly parallel, even if the behavior of the American economy was somehow better during the 1990's (Figure 4).

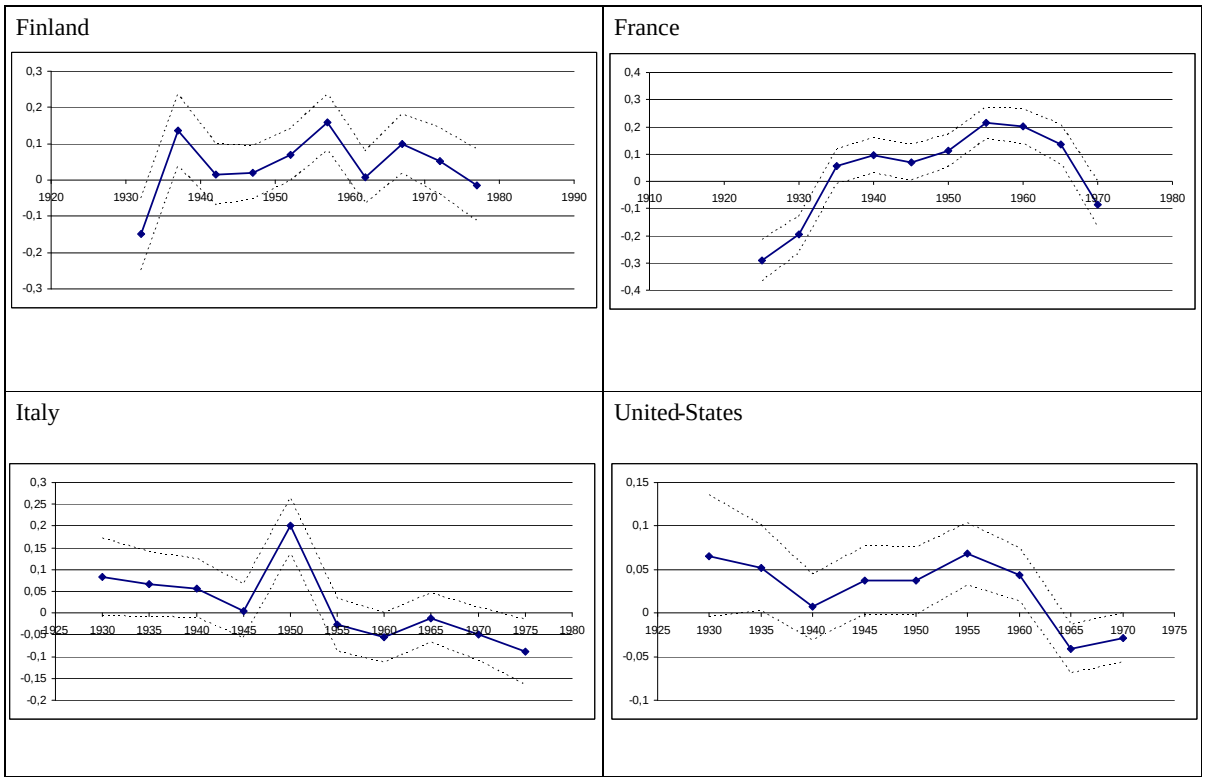
Figure II-4 Annual per capita GDP of four countries Real GDP (Constant Prices: Laspeyres), international $ in 2005 Constant Prices



Source: Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.3, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.

The four selected countries pertain to samples of microdata available in the *Luxembourg Income Study Project*, but other typical countries could have been selected with consistent results. Since in this paper the major concern is about consumption, the focus will be on household level standards of living and not on personal earnings. The LIS project data offers the possibility to compute relative adjusted disposable income (total net income after taxes and transfers, adjusted by household size, where the equivalence scale is the square-root of the number of residents of the household) in order to compare the living standards of age groups at four/five different periods, respectively around 1985, 1990, 1995, 2000 and 2005, depending on the country specific availability in the waves of LIS collection.

Figure II-5 cohort coefficients of being middle class *versus* other class



Source: LISproject microdata, the author's calculation. The birth cohort coefficients pertain to thee variation of the value after control of period and age transformations.

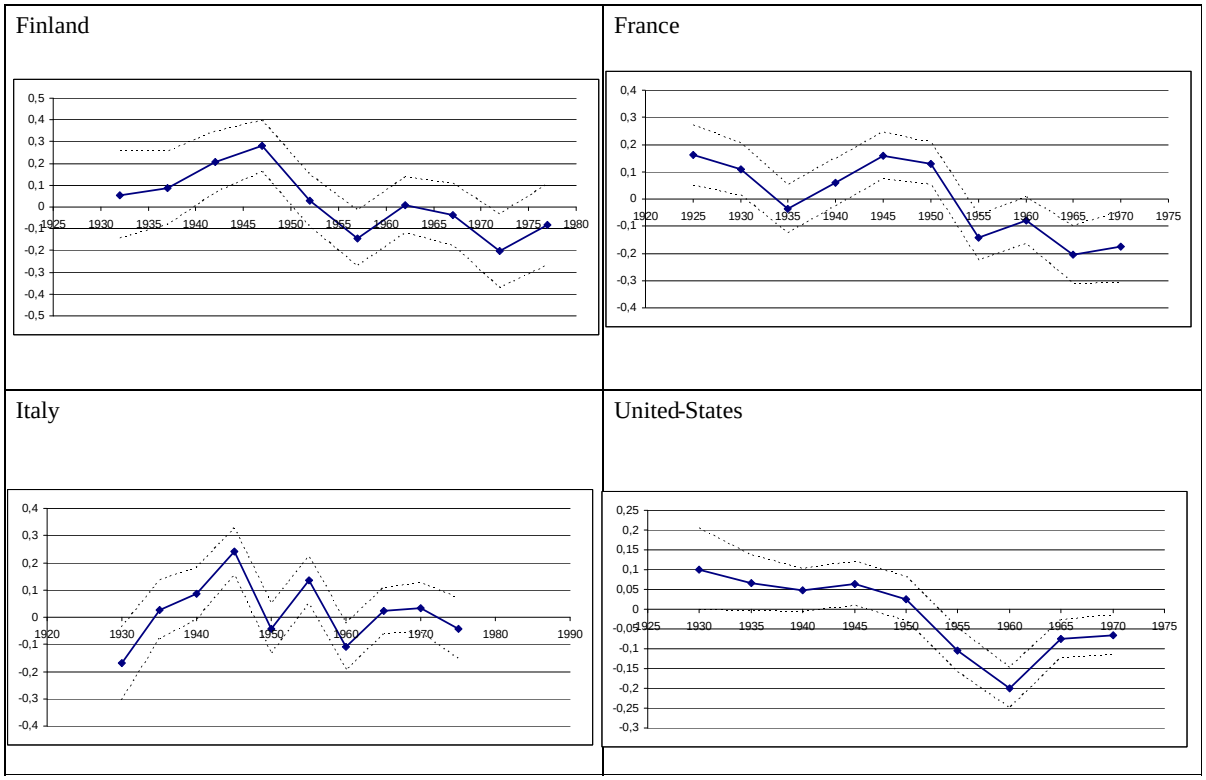
[5] Since the stata `ssc install apc` device did not implement ordinal logit models, we will analyze the three

The main results of the comparison of the birth cohort coefficients of being middle class (Figure 5) are:

- France shows the strongest transformations of cohort coefficients, with a decline of middle class membership for newer birth cohort; the variance of the cohort coefficients;
- Italy shows a specific situation of the early baby-boom generations, and a slow decrease in the birth cohort coeffient;
- In the United-States, the decline of the cohort coefficient is significant but the intensity of transformation is much weaker;
- In Finland, if we except the older cohort of the 1930's, no intense transformation is noticed.

The main point is that France is the only one country to show profound transformations in the share of the middle class. Anyway, for the understanding of the middle class dynamics, the share of the middle class is important, but the relative risks of being poor or rich matter. The condition of the middle class is certainly better in case of expansion of upper classes than in case of strong risk of socioeconomic downward mobility.

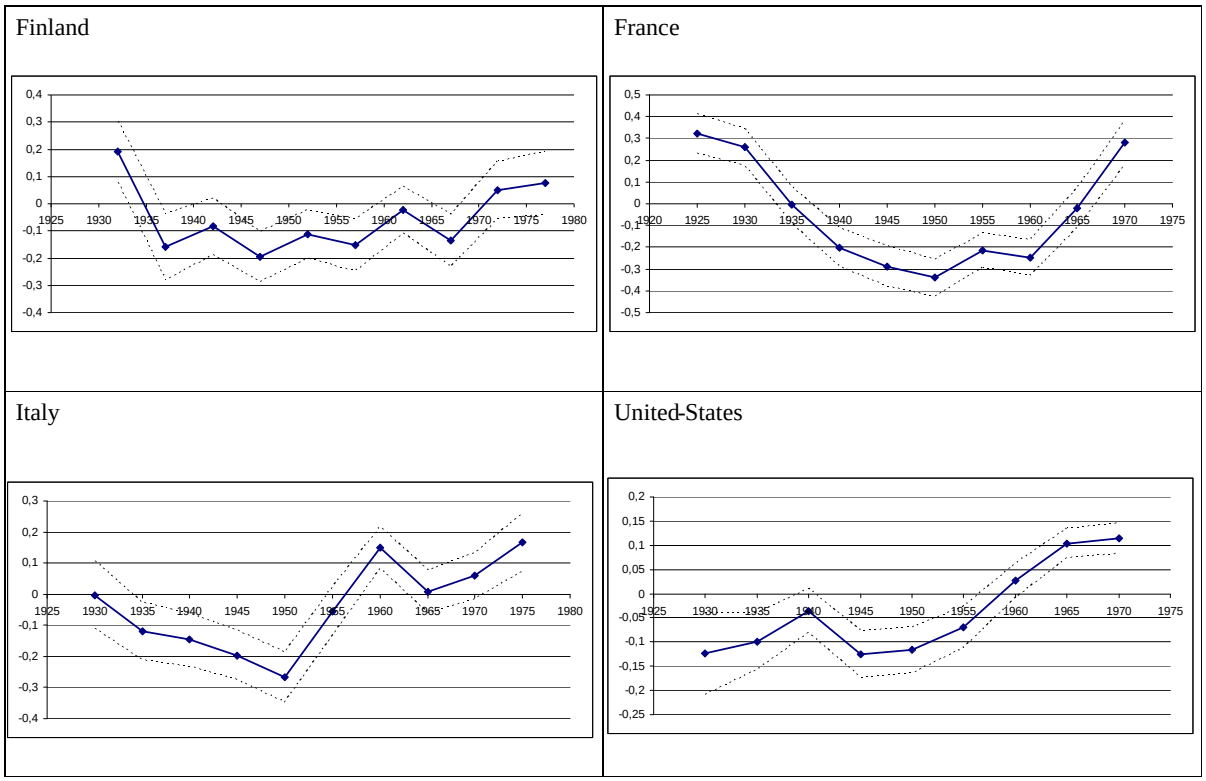
Figure II-6 Cohort coefficients of being upper class *versus* other class



Source: LISproject microdata, the author's calculation. See previous figure.

0/1 models pertaining to each class, having in mind that being middle class means being not rich nor poor.

Figure II-7 Cohort coefficients of being lower class *versus* other class



Source: LISproject microdata, the author's calculation. See previous figure.

The comparison of cohort dynamics of upper and lower class (figure 6 and 7) shows large contrasts between the different countries:

- France shows a firm decrease in the probability of reaching the upper class for the newer cohorts and a strong U-curve in the risk of being poor. This means that for the newer cohorts of adults born after 1960, the perspective is an increase in the risks of downward mobility; the intensity of the change is the largest; thee U curve of poverty risks shows that a set of cohorts born between 1940 and 1960 enjoyed lower poverty risks at given age/periods.
- Italy shows no clear transformation of the probabilities of being upper class; by the contrary, the risks of being lower class increases after the cohorts born in the 1950's.
- In the United-States, the access to the upper class declined significantly for the cohorts of the so-called X generation, born in the late 1950's, early 1960's; we notice however a recovery for the cohorts born in the 1970's. Anyway, the most important aspect is the risk of poverty that exploded for the late baby-boomers. The contrast with France is that it is not a U curve, since former American cohorts born in the 1930 had lower poverty rates.
- In Finland, the access to upper classes was significantly stronger for the cohorts born in the mid 1940's, but there is no clear trend of cohort specific change in poverty ratees.

Welfare regime ruptures and consumption

The main conclusion is that the answers of the different welfare regimes to the economic slow down of the post 1970's period differ substantially. The Finnish model of welfare faced the challenge with a universalistic objective of stabilization and protection of all age groups equally; the young adults are not the specific victims of any kind of retrenchments in the model. For the middle class population, there is no trend toward stronger risks of poverty. At the opposite part of the inequality spectrum, the United-States did not diverge from their principle of competitive market, and the latest birth cohorts experience an increase in their access to both upper and lower class, which means a trend of shrinking middle class.

Conversely, the French and the Italian answers to the new challenges, with a stronger protection and more affluent positions of seniors and more difficulties for the younger cohorts (lower relative income, difficulties in gaining access to economic independence and in entering the job market, and stronger inequality in Italy), creates a paradoxical situation where social democracy seem to improve in the older cohorts (more middle or upper class positions) while the young are destabilized with lower opportunities to climb in the upper classes and stronger risks of downward mobility to the lower class.

The central point of my conclusion pertains to the long-term sustainability of welfare regimes. To be stable in the long term, a social system must arrange its own reproduction from one generation to the next. In France and in Italy, today's seniors benefit from a large welfare state, but the vast social rights they were able to accumulate was the consequence of their relatively advantaged careers; we assert that the new generations, when they become seniors themselves, will not be able to benefit from the same rights, and the large size of the present welfare state will mechanically erode with cohort replacement, since the reproduction of the welfare regime is not ascertained.

In France, where the generational dynamics of the different social strata are parallel if not similar, the major problem is not generational inequalities, but the fact that newer generations heavily support a welfare system that could collapse before they benefit from it. The problem is not stagnation, but lack of preparation in the long-term, at the expense of the most fragile population: the young and the recently socialized generations. Here lies the problem of sustainability for the current welfare regime: it appears large, strong and durable, but its decline is almost certain; the security it offers to seniors is often at the expense of young cohorts facing radical uncertainty.

In the United States, the case is more complicated. For the young generations, the highest classes enjoy exceptionally better positions while the median classes see their fortunes stagnate and the poor are subjected to relative, if not absolute, deprivation. For the moment, this regime is stable and seems durable. At the opposite, the Finnish one shows the high standards of protection, equality and solidarity could be inter generationally stable too, since newer cohorts benefit from similar conditions and rights than their elders.

The key questions are: will younger generation in France or in Italy continue to sustain a system where their social condition is devalued compared to the older generations, with no clear prospects of improvement? For the moment, these intergenerational inequalities are accepted, since they are generally unknown, their social visibility is low and their political recognition null. These examples of the corporatist and familialistic impasse show that if we want solidarity, there is no other way than in a universalistic model (similar to the Nordic one) which support equally the young, the mid-aged and the elders, in a long term perspective of

socialization. In terms of consumption, these results give a better understanding of differences in the national life course perspective of standards of living. In France, compared to the United-States, the young generation faces real difficulties, and, at the opposite, the nowadays seniors benefit from a specific economic boom and from economic homogenization (more equality); in France, seniors appear attractive targets for marketing products while the young are often framed in terms of social problems. The Italian situation is similar, but the demographic collapse of young generations of adults (less numerous with less children) and their increasing degree of familialistic dependence reduces the degree of immediate visibility of the social problem; but this problem will necessarily appear raising the questions who will care for elders? At the opposite Finland seem to be a stable model of development of a universalistic solidaristic regime of collective improvement. The social problems which appear elsewhere (deepening gap between the rich and the poor, accumulation of social problems for the newer generations, destabilization of the young educated middle class, etc.) seem to be relativized and smoothed, and the general atmosphere is more propitious to a socially homogeneous and the development of a "wage earner middle class" in a knowledge based society. While recognizing there are limitations to the welfare regime model approach this analysis suggests the universalistic welfare regime is sustainable and maintains its own capacity for long term development.
Here, if I had more time, I would have provided the same results with controls of variable such as the size of family and the level of education, to show the stability of these results. I would have had to show how the choices of income thresholds do not change strongly these results. Another question I would have to raise is that: one century after Schmoller, what is ever "new" in the "new" middle class?

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Bio :

Louis Chauvel is Professor of sociology, director of the PhD program of sociology at Sciences Po Paris, and member of Institut Universitaire de France. He is specialized in the sociology of inequalities, of welfare regimes, of youth and generations, and of social change in a comparative perspective. His main books, *Le destin des générations, structure sociale et cohortes en France au XX^{e} siècle* (the fate of generations) (PUF 1998 & 2002), and *Les classes moyennes à la dérive* (the middle class adrift) (Seuil 2006) pointed the difficulties of overeducation and downward mobility in post-developed countries where economic stagnation challenge new cohorts of "baby looser".

Annex

Finland APC logit models

```
.  apc_ie moy  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  s
> cale (x2) ;
Iteration 0:   log likelihood = -24142.018
Iteration 1:   log likelihood = -23505.595
Iteration 2:   log likelihood = -23497.135
Iteration 3:   log likelihood = -23497.129
Iteration 4:   log likelihood = -23497.129
Intrinsic estimator of APC effects                 No. of obs      =     82358
Optimization     : ML                              Residual df     =     82336
                                                   Scale parameter =         1
Deviance         =  46994.25839                    (1/df) Deviance =   .570762
Pearson          =  82277.39104                    (1/df) Pearson  =  .9992882
Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]
                                                   AIC             =  .5711438
Log likelihood   =  -23497.1292                    BIC             =   -884953
------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .1114196   .0380733     2.93   0.003     .0367973    .1860418
       age_6 |   .3176769   .0375232     8.47   0.000     .2441327    .3912211
       age_7 |   .3363861   .0379079     8.87   0.000      .262088    .4106843
       age_8 |   .1453434   .0354808     4.10   0.000     .0758024    .2148845
       age_9 |   -.014579   .0344847    -0.42   0.672    -.0821678    .0530099
      age_10 |  -.2851175    .033171    -8.60   0.000    -.3501315   -.2201035
      age_11 |  -.3747296   .0321199   -11.67   0.000    -.4376835   -.3117757
      age_12 |  -.2363999   .0359631    -6.57   0.000    -.3068863   -.1659136
    period_1 |   .2909034    .026381    11.03   0.000     .2391976    .3426092
    period_2 |   .1504894   .0269708     5.58   0.000     .0976276    .2033513
    period_3 |   .1011278   .0290326     3.48   0.000     .0442248    .1580307
    period_4 |  -.2574286   .0239891   -10.73   0.000    -.3044463   -.2104109
    period_5 |   -.285092   .0248174   -11.49   0.000    -.3337333   -.2364507
  cohort_-11 |  -.2902786   .0695276    -4.18   0.000    -.4265503    -.154007
  cohort_-10 |  -.1485226   .0503987    -2.95   0.003    -.2473022    -.049743
   cohort_-9 |   .1361244   .0509401     2.67   0.008     .0362837    .2359652
   cohort_-8 |   .0142371   .0428067     0.33   0.739    -.0696624    .0981366
   cohort_-7 |   .0209169   .0369375     0.57   0.571    -.0514793    .0933131
   cohort_-6 |   .0700391   .0365518     1.92   0.055    -.0016012    .1416794
   cohort_-5 |   .1588118   .0394072     4.03   0.000     .0815751    .2360485
   cohort_-4 |   .0080856   .0367739     0.22   0.826    -.0639899     .080161
   cohort_-3 |   .0994856   .0412771     2.41   0.016     .0185839    .1803872
   cohort_-2 |   .0523121   .0464175     1.13   0.260    -.0386644    .1432887
   cohort_-1 |  -.0147389   .0506988    -0.29   0.771    -.1141067     .084629
    cohort_0 |  -.1064724   .0791814    -1.34   0.179    -.2616652    .0487203
       _cons |   2.352951   .0160009   147.05   0.000      2.32159    2.384312
------------------------------------------------------------------------------
. apc_ie roc  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;
Iteration 0:   log likelihood = -13578.324
Iteration 1:   log likelihood = -10832.967
Iteration 2:   log likelihood = -10765.768
Iteration 3:   log likelihood = -10764.469
Iteration 4:   log likelihood = -10764.469
Intrinsic estimator of APC effects                 No. of obs      =     82358
Optimization     : ML                              Residual df     =     82336
                                                   Scale parameter =         1
Deviance         =  21528.93702                    (1/df) Deviance =  .2614766
Pearson          =  82366.54341                    (1/df) Pearson  =  1.000371
Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]
```

```
                                                AIC             =   .261941
Log likelihood   = -10764.46851                 BIC             = -910418.3
------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |  -.6378773   .0860744    -7.41   0.000      -.80658   -.4691746
       age_6 |  -.1253731   .0646566    -1.94   0.052    -.2520977    .0013514
       age_7 |  -.4092076   .0698441    -5.86   0.000    -.5460995   -.2723157
       age_8 |  -.0210294    .058312    -0.36   0.718    -.1353188    .0932599
       age_9 |   .1962863   .0541988     3.62   0.000     .0900586     .302514
      age_10 |   .5611977   .0495151    11.33   0.000     .4641499    .6582455
      age_11 |   .4867432   .0503686     9.66   0.000     .3880224    .5854639
      age_12 |  -.0507397   .0629843    -0.81   0.420    -.1741866    .0727072
    period_1 |  -.4869681   .0475688   -10.24   0.000    -.5802013   -.3937349
    period_2 |  -.3437353   .0471913    -7.28   0.000    -.4362285   -.2512421
    period_3 |   .0705964    .044164     1.60   0.110    -.0159635    .1571563
    period_4 |   .3358832    .038175     8.80   0.000     .2610615    .4107049
    period_5 |   .4242238    .039433    10.76   0.000     .3469365    .5015111
  cohort_-11 |    .170093   .1485272     1.15   0.252     -.121015    .4612011
  cohort_-10 |   .0549688   .1020321     0.54   0.590    -.1450104     .254948
   cohort_-9 |   .0876458   .0865265     1.01   0.311     -.081943    .2572345
   cohort_-8 |   .2075984   .0717529     2.89   0.004     .0669653    .3482315
   cohort_-7 |   .2794979    .060299     4.64   0.000     .1613142    .3976817
   cohort_-6 |   .0280306   .0607328     0.46   0.644    -.0910035    .1470647
   cohort_-5 |  -.1436402   .0657026    -2.19   0.029     -.272415   -.0148655
   cohort_-4 |   .0080649   .0661092     0.12   0.903    -.1215067    .1376366
   cohort_-3 |  -.0354709   .0733353    -0.48   0.629    -.1792054    .1082635
   cohort_-2 |  -.2015838   .0869094    -2.32   0.020    -.3719231   -.0312446
   cohort_-1 |  -.0839421   .0945803    -0.89   0.375    -.2693161    .1014319
    cohort_0 |  -.3712623   .1937687    -1.92   0.055    -.7510421    .0085174
       _cons |  -3.599318   .0312178  -115.30   0.000    -3.660504   -3.538132
------------------------------------------------------------------------------
. apc_ie pov  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;
Iteration 0:   log likelihood = -18600.863
Iteration 1:   log likelihood = -17235.873
Iteration 2:   log likelihood = -17226.772
Iteration 3:   log likelihood =  -17226.76
Iteration 4:   log likelihood =  -17226.76
Intrinsic estimator of APC effects              No. of obs      =     82358
Optimization     : ML                           Residual df     =     82336
                                                Scale parameter =         1
Deviance         =  34453.52034                 (1/df) Deviance =  .4184503
Pearson          =  82278.62991                 (1/df) Pearson  =  .9993032
Variance function: V(u) = u*(1-u)               [Bernoulli]
Link function    : g(u) = ln(u/(1-u))           [Logit]
                                                AIC             =  .4188727
Log likelihood   = -17226.76017                 BIC             = -897493.7
------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .0923852    .042538     2.17   0.030     .0090123    .1757582
       age_6 |    -.36082   .0457235    -7.89   0.000    -.4504365   -.2712036
       age_7 |  -.2474224   .0446819    -5.54   0.000    -.3349974   -.1598475
       age_8 |  -.1509044   .0440814    -3.42   0.001    -.2373024   -.0645064
       age_9 |  -.0527759    .043814    -1.20   0.228    -.1386497    .0330979
      age_10 |   .0766232   .0437279     1.75   0.080    -.0090819    .1623283
      age_11 |   .2763437   .0405734     6.81   0.000     .1968212    .3558662
      age_12 |   .3665707   .0429676     8.53   0.000     .2823556    .4507857
    period_1 |  -.1683051   .0314832    -5.35   0.000     -.230011   -.1065992
    period_2 |  -.0441585   .0325031    -1.36   0.174    -.1078634    .0195464
    period_3 |  -.2133103   .0376762    -5.66   0.000    -.2871543   -.1394664
```

```
    period_4 |   .2123777    .030051     7.07   0.000     .1534788    .2712765
    period_5 |   .2133963    .031271     6.82   0.000     .1521063    .2746863
  cohort_-11 |   .2783894   .0780891     3.57   0.000     .1253376    .4314412
  cohort_-10 |   .1926169    .057148     3.37   0.001     .0806088    .3046249
   cohort_-9 |  -.1587719   .0625456    -2.54   0.011     -.281359   -.0361848
   cohort_-8 |  -.0841537   .0529706    -1.59   0.112    -.1879742    .0196668
   cohort_-7 |  -.1948353   .0471024    -4.14   0.000    -.2871543   -.1025163
   cohort_-6 |  -.1137515   .0454521    -2.50   0.012    -.2028361    -.024667
   cohort_-5 |  -.1523662   .0487864    -3.12   0.002    -.2479858   -.0567466
   cohort_-4 |  -.0233244   .0439027    -0.53   0.595    -.1093721    .0627232
   cohort_-3 |  -.1358054   .0495718    -2.74   0.006    -.2329644   -.0386464
   cohort_-2 |   .0505732   .0542999     0.93   0.352    -.0558527    .1569991
   cohort_-1 |   .0766295   .0591086     1.30   0.195    -.0392213    .1924802
    cohort_0 |   .2647995   .0868444     3.05   0.002     .0945876    .4350114
       _cons |  -2.804303   .0190726  -147.03   0.000    -2.841684   -2.766921
------------------------------------------------------------------------------
```

US APC logit models

```
.  apc_ie moy  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  s
> cale (x2) ;

Iteration 0:   log likelihood = -126025.53
Iteration 1:   log likelihood = -125742.64
Iteration 2:   log likelihood = -125742.38
Iteration 3:   log likelihood = -125742.38
Intrinsic estimator of APC effects                 No. of obs      =    218799
Optimization     : ML                              Residual df     =    218779
                                                   Scale parameter =         1
Deviance         =  251484.7632                    (1/df) Deviance =  1.149492
Pearson          =   219829.214                    (1/df) Pearson  =    1.0048

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =   1.14957
Log likelihood   = -125742.3816                    BIC             =  -2438602

------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .0543863   .0195797     2.78   0.005     .0160108    .0927618
       age_6 |    .108676   .0148755     7.31   0.000     .0795205    .1378315
       age_7 |   .1643094   .0151078    10.88   0.000     .1346987    .1939201
       age_8 |   .1417285    .016118     8.79   0.000     .1101377    .1733193
       age_9 |   .0518191    .017005     3.05   0.002       .01849    .0851483
      age_10 |  -.0902618    .017209    -5.25   0.000    -.1239908   -.0565328
      age_11 |  -.1949158   .0168163   -11.59   0.000    -.2278752   -.1619564
      age_12 |  -.2357418   .0181865   -12.96   0.000    -.2713866    -.200097
    period_1 |   .2835858   .0153777    18.44   0.000     .2534461    .3137254
    period_2 |  -.0469346   .0154365    -3.04   0.002    -.0771895   -.0166797
    period_3 |  -.0811168   .0094534    -8.58   0.000    -.0996452   -.0625884
    period_4 |  -.1555344   .0092105   -16.89   0.000    -.1735867   -.1374821
  cohort_-11 |  -.2968034    .043752    -6.78   0.000    -.3825558   -.2110509
  cohort_-10 |   .0656857   .0357754     1.84   0.066    -.0044328    .1358041
   cohort_-9 |   .0513731   .0248542     2.07   0.039     .0026598    .1000865
   cohort_-8 |   .0069976   .0193749     0.36   0.718    -.0309765    .0449716
   cohort_-7 |   .0373141   .0200131     1.86   0.062    -.0019107     .076539
   cohort_-6 |    .036993   .0196985     1.88   0.060    -.0016153    .0756014
   cohort_-5 |   .0678966   .0181529     3.74   0.000     .0323176    .1034755
   cohort_-4 |   .0437953   .0155879     2.81   0.005     .0132436    .0743471
   cohort_-3 |  -.0412181   .0140391    -2.94   0.003    -.0687343   -.0137019
   cohort_-2 |  -.0285013   .0145778    -1.96   0.051    -.0570734    .0000708
   cohort_-1 |   .0564673   .0259254     2.18   0.029     .0056543    .1072802
```

```
       _cons |   1.084595   .0089177   121.62   0.000     1.067117    1.102074
------------------------------------------------------------------------------

. apc_ie roc  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;

Iteration 0:   log likelihood = -69717.568
Iteration 1:   log likelihood = -68401.311
Iteration 2:   log likelihood = -68383.925
Iteration 3:   log likelihood = -68383.868
Iteration 4:   log likelihood = -68383.868
Intrinsic estimator of APC effects                 No. of obs      =    218799
Optimization     : ML                              Residual df     =    218779
                                                   Scale parameter =         1
Deviance         =  136767.7365                    (1/df) Deviance =  .6251411
Pearson          =  219809.8692                    (1/df) Pearson  =  1.004712

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .6252667
Log likelihood   = -68383.86823                    BIC             =  -2553319

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |  -.4589905   .0350091   -13.11   0.000    -.5276071    -.390374
       age_6 |  -.3755907   .0257851   -14.57   0.000    -.4261285   -.3250528
       age_7 |  -.2133234   .0250012    -8.53   0.000    -.2623249   -.1643218
       age_8 |   .0322052   .0250123     1.29   0.198     -.016818    .0812285
       age_9 |   .1726799   .0247817     6.97   0.000     .1241087    .2212511
      age_10 |   .3652863   .0238587    15.31   0.000     .3185241    .4120485
      age_11 |   .3386259    .023424    14.46   0.000     .2927158     .384536
      age_12 |   .1391072   .0261863     5.31   0.000     .0877829    .1904315
    period_1 |  -.4248843   .0255308   -16.64   0.000    -.4749238   -.3748448
    period_2 |   .0728487    .023673     3.08   0.002     .0264505     .119247
    period_3 |   .0914813   .0148608     6.16   0.000     .0623546     .120608
    period_4 |   .2605543   .0136897    19.03   0.000      .233723    .2873857
  cohort_-11 |   .3858241    .068195     5.66   0.000     .2521643    .5194838
  cohort_-10 |   .1009329   .0524488     1.92   0.054     -.001865    .2037307
   cohort_-9 |   .0664405   .0361834     1.84   0.066    -.0044778    .1373587
   cohort_-8 |   .0482118   .0281347     1.71   0.087    -.0069313    .1033548
   cohort_-7 |   .0640519    .028449     2.25   0.024     .0082929     .119811
   cohort_-6 |    .025626   .0287181     0.89   0.372    -.0306604    .0819125
   cohort_-5 |  -.1034687   .0282492    -3.66   0.000    -.1588361   -.0481013
   cohort_-4 |  -.1989649   .0263156    -7.56   0.000    -.2505425   -.1473873
   cohort_-3 |  -.0749091   .0241324    -3.10   0.002    -.1222078   -.0276103
   cohort_-2 |  -.0661857   .0255298    -2.59   0.010    -.1162233   -.0161482
   cohort_-1 |  -.2475587   .0467397    -5.30   0.000    -.3391669   -.1559506
       _cons |  -2.337241    .013426  -174.08   0.000    -2.363555   -2.310926
------------------------------------------------------------------------------

. apc_ie pov  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;

Iteration 0:   log likelihood = -98017.361
Iteration 1:   log likelihood = -97956.121
Iteration 2:   log likelihood = -97956.069
Iteration 3:   log likelihood = -97956.069
Intrinsic estimator of APC effects                 No. of obs      =    218799
Optimization     : ML                              Residual df     =    218779
                                                   Scale parameter =         1
Deviance         =  195912.1375                    (1/df) Deviance =  .8954796
```

```
Pearson          =  219857.5149                  (1/df) Pearson  =   1.00493

Variance function: V(u) = u*(1-u)                [Bernoulli]
Link function    : g(u) = ln(u/(1-u))            [Logit]

                                                 AIC             =  .8955806
Log likelihood   = -97956.06876                  BIC             =  -2494174

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .1172606   .0220132     5.33   0.000     .0741155    .1604057
       age_6 |   .0521148   .0167746     3.11   0.002     .0192371    .0849925
       age_7 |  -.0647087   .0174178    -3.72   0.000    -.0988469   -.0305704
       age_8 |  -.1560416   .0193029    -8.08   0.000    -.1938746   -.1182087
       age_9 |  -.1378343   .0209468    -6.58   0.000    -.1788892   -.0967793
      age_10 |  -.1132373   .0216609    -5.23   0.000    -.1556919   -.0707827
      age_11 |   .0544847   .0206527     2.64   0.008     .0140063    .0949632
      age_12 |   .2479618    .021649    11.45   0.000     .2055306     .290393
    period_1 |  -.1497094   .0179617    -8.33   0.000    -.1849136   -.1145051
    period_2 |   .0316555   .0182491     1.73   0.083    -.0041122    .0674232
    period_3 |   .0634853    .011114     5.71   0.000     .0417022    .0852684
    period_4 |   .0545685   .0111548     4.89   0.000     .0327056    .0764315
  cohort_-11 |   .2076352   .0500851     4.15   0.000     .1094701    .3058002
  cohort_-10 |   -.124293   .0428157    -2.90   0.004    -.2082102   -.0403759
   cohort_-9 |  -.0988496   .0296507    -3.33   0.001    -.1569638   -.0407353
   cohort_-8 |  -.0352689   .0230698    -1.53   0.126    -.0804849    .0099471
   cohort_-7 |  -.1251301   .0246412    -5.08   0.000    -.1734259   -.0768343
   cohort_-6 |  -.1163742   .0242648    -4.80   0.000    -.1639323    -.068816
   cohort_-5 |  -.0694511    .021688    -3.20   0.001    -.1119588   -.0269434
   cohort_-4 |   .0274928   .0179467     1.53   0.126    -.0076821    .0626676
   cohort_-3 |   .1041928   .0158452     6.58   0.000     .0731368    .1352488
   cohort_-2 |   .1148324   .0163734     7.01   0.000     .0827412    .1469237
   cohort_-1 |   .1152137   .0290586     3.96   0.000     .0582599    .1721674
       _cons |  -1.655127   .0106034  -156.09   0.000    -1.675909   -1.634344
------------------------------------------------------------------------------

. keep if d4!=. &  educ !=.;
(0 observations deleted)

. gen educ1= educ==1;

. gen educ2= educ==2;

. apc_ie moy d4 educ1 educ2 [iw = weight  ] ,  age(ag1) period(y1) family(bin) l
> ink(logit)  scale (x2) ;

Iteration 0:   log likelihood = -123414.41
Iteration 1:   log likelihood = -123225.11
Iteration 2:   log likelihood = -123224.97
Iteration 3:   log likelihood = -123224.97
Intrinsic estimator of APC effects               No. of obs      =    218799
Optimization     : ML                            Residual df     =    218776
                                                 Scale parameter =         1
Deviance         =  246449.9492                  (1/df) Deviance =  1.126494
Pearson          =  219820.2801                  (1/df) Pearson  =  1.004773

Variance function: V(u) = u*(1-u)                [Bernoulli]
Link function    : g(u) = ln(u/(1-u))            [Logit]

                                                 AIC             =  1.126586
Log likelihood   = -123224.9746                  BIC             =  -2443600
```

```
------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |   .0676342   .0034746    19.47   0.000     .0608242    .0744442
       educ1 |  -.7870481   .0146357   -53.78   0.000    -.8157335   -.7583627
       educ2 |   .1817283   .0111602    16.28   0.000     .1598548    .2036019
       age_5 |  -.0338665   .0198728    -1.70   0.088    -.0728164    .0050835
       age_6 |   .0375476   .0151361     2.48   0.013     .0078815    .0672137
       age_7 |   .1130331   .0154041     7.34   0.000     .0828416    .1432246
       age_8 |   .1228996   .0163989     7.49   0.000     .0907584    .1550408
       age_9 |     .07585   .0172531     4.40   0.000     .0420344    .1096655
      age_10 |  -.0292128   .0175002    -1.67   0.095    -.0635125    .0050869
      age_11 |  -.1260698   .0172224    -7.32   0.000     -.159825   -.0923145
      age_12 |  -.1601813   .0187081    -8.56   0.000    -.1968485   -.1235141
    period_1 |    .323397   .0156394    20.68   0.000     .2927443    .3540498
    period_2 |  -.0358583   .0156747    -2.29   0.022    -.0665802   -.0051364
    period_3 |  -.0879497   .0095887    -9.17   0.000    -.1067431   -.0691562
    period_4 |  -.1995891   .0094501   -21.12   0.000    -.2181109   -.1810673
  cohort_-11 |  -.1780104   .0447535    -3.98   0.000    -.2657256   -.0902952
  cohort_-10 |   .1093687    .036535     2.99   0.003     .0377614     .180976
   cohort_-9 |     .09069   .0253926     3.57   0.000     .0409214    .1404585
   cohort_-8 |  -.0117443   .0197344    -0.60   0.552    -.0504231    .0269344
   cohort_-7 |  -.0176962   .0203666    -0.87   0.385     -.057614    .0222216
   cohort_-6 |  -.0441953   .0200152    -2.21   0.027    -.0834243   -.0049663
   cohort_-5 |  -.0053271   .0184188    -0.29   0.772    -.0414273    .0307731
   cohort_-4 |  -.0029077   .0157701    -0.18   0.854    -.0338165     .028001
   cohort_-3 |  -.0569228   .0142005    -4.01   0.000    -.0847552   -.0290904
   cohort_-2 |  -.0058795   .0147672    -0.40   0.691    -.0348226    .0230637
   cohort_-1 |   .1226247   .0262673     4.67   0.000     .0711418    .1741076
       _cons |   .9759984   .0153899    63.42   0.000     .9458347    1.006162
------------------------------------------------------------------------------

. apc_ie roc d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood = -65640.045
Iteration 1:   log likelihood =  -61577.42
Iteration 2:   log likelihood =  -61405.81
Iteration 3:   log likelihood = -61403.095
Iteration 4:   log likelihood = -61403.095
Intrinsic estimator of APC effects                 No. of obs      =    218799
Optimization     : ML                              Residual df     =    218776
                                                   Scale parameter =         1
Deviance         =  122806.1893                    (1/df) Deviance =   .561333
Pearson          =  219240.9916                    (1/df) Pearson  =  1.002125

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .5614842
Log likelihood   = -61403.09466                    BIC             =  -2567244

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |  -.1864146   .0060588   -30.77   0.000    -.1982896   -.1745397
       educ1 |  -2.924543   .0491669   -59.48   0.000    -3.020909   -2.828178
       educ2 |  -1.414124   .0162445   -87.05   0.000    -1.445963   -1.382286
       age_5 |  -.6628201   .0359084   -18.46   0.000    -.7331993   -.5924409
       age_6 |  -.4888265   .0265385   -18.42   0.000    -.5408411    -.436812
       age_7 |  -.2331301   .0259939    -8.97   0.000    -.2840773   -.1821829
       age_8 |   .1143598    .025945     4.41   0.000     .0635086     .165211
```

```
       age_9 |   .3192829   .0256225    12.46   0.000     .2690637     .369502
      age_10 |   .4788847   .0250031    19.15   0.000     .4298795      .52789
      age_11 |   .3579276   .0247993    14.43   0.000     .3093219    .4065333
      age_12 |   .1143217    .027693     4.13   0.000     .0600444    .1685989
    period_1 |  -.2804808   .0264967   -10.59   0.000    -.3324133   -.2285483
    period_2 |   .1738326   .0246011     7.07   0.000     .1256155    .2220498
    period_3 |   .0679093   .0154146     4.41   0.000     .0376972    .0981214
    period_4 |   .0387389   .0143379     2.70   0.007     .0106371    .0668407
  cohort_-11 |   .5894887   .0715838     8.23   0.000     .4491871    .7297903
  cohort_-10 |   .1728869   .0548905     3.15   0.002     .0653036    .2804703
   cohort_-9 |   .1694693   .0378195     4.48   0.000     .0953446    .2435941
   cohort_-8 |   .0391026   .0294743     1.33   0.185    -.0186659    .0968712
   cohort_-7 |  -.0492002    .029906    -1.65   0.100    -.1078149    .0094144
   cohort_-6 |  -.1732083   .0299857    -5.78   0.000    -.2319792   -.1144374
   cohort_-5 |  -.2747267   .0290591    -9.45   0.000    -.3316814   -.2177719
   cohort_-4 |  -.2767971   .0268415   -10.31   0.000    -.3294054   -.2241887
   cohort_-3 |  -.0560568   .0247949    -2.26   0.024    -.1046539   -.0074596
   cohort_-2 |  -.0166461   .0261442    -0.64   0.524    -.0678879    .0345956
   cohort_-1 |  -.1243125   .0478009    -2.60   0.009    -.2180006   -.0306244
       _cons |  -.8169696   .0229099   -35.66   0.000    -.8618721    -.772067
------------------------------------------------------------------------------

. apc_ie pov d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood = -90121.265
Iteration 1:   log likelihood = -89152.782
Iteration 2:   log likelihood = -89144.914
Iteration 3:   log likelihood =  -89144.91
Intrinsic estimator of APC effects                 No. of obs      =    218799
Optimization     : ML                              Residual df     =    218776
                                                   Scale parameter =         1
Deviance         =  178289.8205                    (1/df) Deviance =  .8149423
Pearson          =    220535.87                    (1/df) Pearson  =  1.008044

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .8150669
Log likelihood   = -89144.91027                    BIC             =  -2511760

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |  -.0215511   .0040518    -5.32   0.000    -.0294924   -.0136097
       educ1 |   2.376208   .0193851   122.58   0.000     2.338214    2.414202
       educ2 |    1.06167   .0170245    62.36   0.000     1.028302    1.095037
       age_5 |   .3117076   .0231712    13.45   0.000     .2662928    .3571224
       age_6 |   .1952612   .0177197    11.02   0.000     .1605312    .2299911
       age_7 |   .0151771   .0183233     0.83   0.408    -.0207358    .0510901
       age_8 |  -.1681411   .0202326    -8.31   0.000    -.2077963   -.1284858
       age_9 |  -.2401153   .0219873   -10.92   0.000    -.2832096   -.1970211
      age_10 |  -.2401262   .0226887   -10.58   0.000    -.2845953   -.1956571
      age_11 |  -.0361782   .0217616    -1.66   0.096    -.0788302    .0064737
      age_12 |   .1624149   .0229871     7.07   0.000     .1173611    .2074687
    period_1 |  -.2943839   .0187358   -15.71   0.000    -.3311054   -.2576624
    period_2 |  -.0408846   .0190918    -2.14   0.032    -.0783039   -.0034654
    period_3 |   .0838166   .0116274     7.21   0.000     .0610274    .1066059
    period_4 |   .2514519   .0117886    21.33   0.000     .2283467     .274557
  cohort_-11 |   .0118882   .0525462     0.23   0.821    -.0911004    .1148768
  cohort_-10 |  -.2222702   .0447889    -4.96   0.000    -.3100549   -.1344855
   cohort_-9 |  -.2172925     .03122    -6.96   0.000    -.2784826   -.1561024
   cohort_-8 |  -.0286502   .0242295    -1.18   0.237    -.0761391    .0188387
```

```
   cohort_-7 |  -.0233757   .0257635    -0.91   0.364    -.0738712    .0271198
   cohort_-6 |   .0735767   .0253485     2.90   0.004     .0238946    .1232588
   cohort_-5 |   .1122355   .0227616     4.93   0.000     .0676237    .1568473
   cohort_-4 |   .1328327   .0188038     7.06   0.000     .0959779    .1696874
   cohort_-3 |   .1218724   .0166204     7.33   0.000     .0892971    .1544477
   cohort_-2 |   .0716831   .0172536     4.15   0.000     .0378667    .1054995
   cohort_-1 |     -.0325   .0306402    -1.06   0.289    -.0925537    .0275538
       _cons |  -2.828867   .0214299  -132.01   0.000    -2.870869   -2.786865
------------------------------------------------------------------------------
```

France APC logit models

```
.  apc_ie moy  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  s
> cale (x2) ;

Iteration 0:   log likelihood = -34285.274
Iteration 1:   log likelihood = -34230.166
Iteration 2:   log likelihood = -34230.105
Iteration 3:   log likelihood = -34230.105
Intrinsic estimator of APC effects                 No. of obs      =     69076
Optimization     : ML                              Residual df     =     69054
                                                   Scale parameter =         1
Deviance         =  68460.21081                    (1/df) Deviance =  .9914011
Pearson          =  73465.82493                    (1/df) Pearson  =  1.063889

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .9917223
Log likelihood   =  -34230.1054                    BIC             = -701005.9

------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .3770154   .0313567    12.02   0.000     .3155573    .4384734
       age_6 |   .3056025   .0275562    11.09   0.000     .2515934    .3596117
       age_7 |   .1540423   .0282727     5.45   0.000     .0986289    .2094558
       age_8 |    .021681   .0285261     0.76   0.447    -.0342291    .0775912
       age_9 |   -.244541   .0273463    -8.94   0.000    -.2981387   -.1909432
      age_10 |  -.3091138   .0270875   -11.41   0.000    -.3622043   -.2560233
      age_11 |  -.3004972   .0265324   -11.33   0.000    -.3524998   -.2484945
      age_12 |  -.0041893   .0302837    -0.14   0.890    -.0635443    .0551657
    period_1 |   .2275221   .0204351    11.13   0.000       .18747    .2675742
    period_2 |  -.2818726   .0187706   -15.02   0.000    -.3186623   -.2450829
    period_3 |  -.2077158   .0211949    -9.80   0.000     -.249257   -.1661746
    period_4 |   .0861799   .0207369     4.16   0.000     .0455364    .1268234
    period_5 |   .1758864   .0233932     7.52   0.000     .1300366    .2217361
  cohort_-11 |  -.1676553   .0672261    -2.49   0.013    -.2994159   -.0358946
  cohort_-10 |  -.2908521   .0384953    -7.56   0.000    -.3663014   -.2154027
   cohort_-9 |  -.1965492   .0348893    -5.63   0.000     -.264931   -.1281674
   cohort_-8 |   .0550388   .0334082     1.65   0.099    -.0104401    .1205177
   cohort_-7 |   .0944966   .0330351     2.86   0.004      .029749    .1592442
   cohort_-6 |   .0691578   .0336147     2.06   0.040     .0032743    .1350413
   cohort_-5 |   .1130699   .0305188     3.70   0.000     .0532541    .1728856
   cohort_-4 |   .2137242   .0299658     7.13   0.000     .1549923    .2724561
   cohort_-3 |   .2017478   .0315144     6.40   0.000     .1399807    .2635149
   cohort_-2 |   .1358205   .0367643     3.69   0.000     .0637639    .2078771
   cohort_-1 |  -.0858102   .0421527    -2.04   0.042    -.1684279   -.0031924
    cohort_0 |  -.1421888   .0764941    -1.86   0.063    -.2921144    .0077368
       _cons |   1.457312    .013461   108.26   0.000     1.430929    1.483695
------------------------------------------------------------------------------

. apc_ie roc  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;
```

```
Iteration 0:   log likelihood = -22482.636
Iteration 1:   log likelihood = -21942.567
Iteration 2:   log likelihood = -21936.882
Iteration 3:   log likelihood = -21936.878
Iteration 4:   log likelihood = -21936.878
Intrinsic estimator of APC effects                 No. of obs      =     69076
Optimization     : ML                              Residual df     =     69054
                                                   Scale parameter =         1
Deviance         =  43873.75604                    (1/df) Deviance =  .6353543
Pearson          =  73129.61336                    (1/df) Pearson  =  1.059021

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .6357889
Log likelihood   = -21936.87802                    BIC             = -725592.4

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   -.456851     .04657    -9.81   0.000    -.5481266   -.3655754
       age_6 |  -.3342169   .0393361    -8.50   0.000    -.4113143   -.2571195
       age_7 |  -.1571879   .0381815    -4.12   0.000    -.2320222   -.0823535
       age_8 |  -.0112508   .0372915    -0.30   0.763    -.0843408    .0618393
       age_9 |    .370752   .0344721    10.76   0.000      .303188    .4383161
      age_10 |   .4341553   .0344279    12.61   0.000     .3666778    .5016327
      age_11 |   .2694714    .035806     7.53   0.000      .199293    .3396499
      age_12 |  -.1148722   .0430985    -2.67   0.008    -.1993436   -.0304008
    period_1 |  -.3148103    .028465   -11.06   0.000    -.3706007   -.2590199
    period_2 |   .1967184   .0250531     7.85   0.000     .1476152    .2458216
    period_3 |   .2979911   .0270024    11.04   0.000     .2450674    .3509149
    period_4 |  -.0661234   .0276195    -2.39   0.017    -.1202566   -.0119902
    period_5 |  -.1137758   .0309386    -3.68   0.000    -.1744143   -.0531373
  cohort_-11 |   .1391458   .1013709     1.37   0.170    -.0595375    .3378292
  cohort_-10 |   .1615697   .0564989     2.86   0.004      .050834    .2723054
   cohort_-9 |   .1101519   .0489497     2.25   0.024     .0142122    .2060915
   cohort_-8 |  -.0364375   .0460413    -0.79   0.429    -.1266768    .0538017
   cohort_-7 |   .0610902   .0441503     1.38   0.166    -.0254429    .1476232
   cohort_-6 |   .1599156   .0437457     3.66   0.000     .0741757    .2456556
   cohort_-5 |   .1303346   .0401258     3.25   0.001     .0516895    .2089798
   cohort_-4 |  -.1436132   .0421035    -3.41   0.001    -.2261346   -.0610918
   cohort_-3 |  -.0798687   .0439722    -1.82   0.069    -.1660526    .0063153
   cohort_-2 |  -.2049189   .0541507    -3.78   0.000    -.3110523   -.0987855
   cohort_-1 |  -.1764222   .0665754    -2.65   0.008    -.3069076   -.0459367
    cohort_0 |  -.1209474   .1205977    -1.00   0.316    -.3573147    .1154198
       _cons |  -2.347604   .0198984  -117.98   0.000    -2.386605   -2.308604
------------------------------------------------------------------------------

. apc_ie pov  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;

Iteration 0:   log likelihood = -22577.031
Iteration 1:   log likelihood = -22120.021
Iteration 2:   log likelihood = -22118.193
Iteration 3:   log likelihood = -22118.193
Intrinsic estimator of APC effects                 No. of obs      =     69076
Optimization     : ML                              Residual df     =     69054
                                                   Scale parameter =         1
Deviance         =  44236.38525                    (1/df) Deviance =  .6406057
Pearson          =  73511.42282                    (1/df) Pearson  =   1.06455

Variance function: V(u) = u*(1-u)                  [Bernoulli]
```

```
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .6410386
Log likelihood   = -22118.19262                    BIC             = -725229.8

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |  -.2316747   .0397342    -5.83   0.000    -.3095524    -.153797
       age_6 |  -.2003739   .0361179    -5.55   0.000    -.2711637   -.1295842
       age_7 |  -.0823337   .0386419    -2.13   0.033    -.1580703    -.006597
       age_8 |  -.0042389   .0398902    -0.11   0.915    -.0824222    .0739444
       age_9 |   .0410026   .0393513     1.04   0.297    -.0361245    .1181298
      age_10 |   .0871758   .0380139     2.29   0.022     .0126699    .1616818
      age_11 |   .2641095   .0343704     7.68   0.000     .1967448    .3314743
      age_12 |   .1263331   .0382154     3.31   0.001     .0514323     .201234
    period_1 |  -.0693349   .0268996    -2.58   0.010    -.1220572   -.0166126
    period_2 |   .3095379   .0248199    12.47   0.000     .2608918     .358184
    period_3 |    .055938   .0297811     1.88   0.060     -.002432    .1143079
    period_4 |  -.0967012   .0284852    -3.39   0.001    -.1525311   -.0408713
    period_5 |  -.1994397   .0327523    -6.09   0.000    -.2636331   -.1352464
  cohort_-11 |    .124903   .0826401     1.51   0.131    -.0370686    .2868747
  cohort_-10 |   .3237059   .0466872     6.93   0.000     .2322008    .4152111
   cohort_-9 |   .2594181    .043644     5.94   0.000     .1738774    .3449587
   cohort_-8 |  -.0050056   .0434745    -0.12   0.908    -.0902141    .0802029
   cohort_-7 |  -.2012885   .0450106    -4.47   0.000    -.2895077   -.1130693
   cohort_-6 |  -.2881054   .0476279    -6.05   0.000    -.3814544   -.1947564
   cohort_-5 |  -.3400209   .0434653    -7.82   0.000    -.4252113   -.2548306
   cohort_-4 |  -.2144209   .0396826    -5.40   0.000    -.2921973   -.1366445
   cohort_-3 |  -.2459237   .0421583    -5.83   0.000    -.3285524    -.163295
   cohort_-2 |   -.021075   .0470889    -0.45   0.654    -.1133675    .0712175
   cohort_-1 |   .2792881   .0518335     5.39   0.000     .1776963    .3808798
    cohort_0 |   .3285249   .0945679     3.47   0.001     .1431753    .5138745
       _cons |  -2.234675   .0171954  -129.96   0.000    -2.268377   -2.200972
------------------------------------------------------------------------------

. keep if d4!=. &  educ !=.;
(15345 observations deleted)

. gen educ1= educ==1;

. gen educ2= educ==2;

. apc_ie moy d4 educ1 educ2 [iw = weight  ] ,  age(ag1) period(y1) family(bin) l
> ink(logit)  scale (x2) ;

Iteration 0:   log likelihood = -27196.501
Iteration 1:   log likelihood = -27131.358
Iteration 2:   log likelihood = -27131.235
Iteration 3:   log likelihood = -27131.235
Intrinsic estimator of APC effects                 No. of obs      =     58231
Optimization     : ML                              Residual df     =     58208
                                                   Scale parameter =         1
Deviance         =  54262.46964                    (1/df) Deviance =  .9322167
Pearson          =  58591.25102                    (1/df) Pearson  =  1.006584

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .9326385
Log likelihood   = -27131.23482                    BIC             = -584405.8

------------------------------------------------------------------------------
```

```
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |   .0406989   .0085459     4.76   0.000     .0239493    .0574485
       educ1 |   .8127933   .0304323    26.71   0.000     .7531471    .8724395
       educ2 |   .8976074   .0313916    28.59   0.000      .836081    .9591338
       age_5 |   .3037709   .0329544     9.22   0.000     .2391814    .3683604
       age_6 |   .2683723   .0297723     9.01   0.000     .2100196     .326725
       age_7 |   .1613719   .0311814     5.18   0.000     .1002575    .2224864
       age_8 |   .0429784   .0323579     1.33   0.184    -.0204418    .1063987
       age_9 |   -.195125   .0314183    -6.21   0.000    -.2567037   -.1335464
      age_10 |  -.2768992   .0307391    -9.01   0.000    -.3371467   -.2166518
      age_11 |  -.2716278   .0305594    -8.89   0.000    -.3315231   -.2117325
      age_12 |  -.0328415   .0359931    -0.91   0.362    -.1033868    .0377037
    period_2 |  -.2697501    .017633   -15.30   0.000    -.3043101     -.23519
    period_3 |  -.1771656   .0200988    -8.81   0.000    -.2165586   -.1377727
    period_4 |   .1850793     .01996     9.27   0.000     .1459584    .2242002
    period_5 |   .2618364   .0217903    12.02   0.000     .2191283    .3045445
  cohort_-10 |  -.2699785   .0514214    -5.25   0.000    -.3707625   -.1691944
   cohort_-9 |  -.2855156   .0378789    -7.54   0.000    -.3597568   -.2112744
   cohort_-8 |  -.0380608   .0349833    -1.09   0.277    -.1066268    .0305051
   cohort_-7 |  -.0220465   .0341731    -0.65   0.519    -.0890245    .0449316
   cohort_-6 |  -.0330236   .0360015    -0.92   0.359    -.1035852     .037538
   cohort_-5 |   .0104739   .0340942     0.31   0.759    -.0563496    .0772973
   cohort_-4 |   .1380057   .0336829     4.10   0.000     .0719884    .2040231
   cohort_-3 |   .1939329   .0313219     6.19   0.000     .1325431    .2553228
   cohort_-2 |   .1787572   .0363194     4.92   0.000     .1075724     .249942
   cohort_-1 |   .0075019   .0410876     0.18   0.855    -.0730283    .0880321
    cohort_0 |   .1199533   .0752826     1.59   0.111    -.0275978    .2675045
       _cons |   .6328891   .0344763    18.36   0.000     .5653168    .7004614
------------------------------------------------------------------------------

. apc_ie roc d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood = -17410.206
Iteration 1:   log likelihood =  -16560.61
Iteration 2:   log likelihood = -16553.905
Iteration 3:   log likelihood = -16553.895
Iteration 4:   log likelihood = -16553.895
Intrinsic estimator of APC effects                 No. of obs      =     58231
Optimization     : ML                              Residual df     =     58208
                                                   Scale parameter =         1
Deviance         =  33107.79092                    (1/df) Deviance =  .5687842
Pearson          =  57815.27975                    (1/df) Pearson  =  .9932532

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .5693495
Log likelihood   = -16553.89546                    BIC             = -605560.5

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |  -.0104818   .0115821    -0.91   0.365    -.0331823    .0122187
       educ1 |  -2.074594   .0392387   -52.87   0.000    -2.151501   -1.997688
       educ2 |   -1.51009   .0370109   -40.80   0.000     -1.58263    -1.43755
       age_5 |   -.405898    .047516    -8.54   0.000    -.4990278   -.3127683
       age_6 |  -.4469409   .0429853   -10.40   0.000    -.5311906   -.3626913
       age_7 |  -.3272742   .0430066    -7.61   0.000    -.4115655   -.2429829
       age_8 |  -.1074791   .0427077    -2.52   0.012    -.1911847   -.0237735
       age_9 |   .3045737   .0399749     7.62   0.000     .2262243     .382923
```

```
      age_10 |   .4665334    .039284    11.88   0.000     .3895381    .5435287
      age_11 |   .4028588   .0408681     9.86   0.000     .3227588    .4829589
      age_12 |   .1136264   .0508491     2.23   0.025     .0139641    .2132888
    period_2 |   .2748488   .0237857    11.56   0.000     .2282296    .3214679
    period_3 |   .3129643   .0263296    11.89   0.000     .2613591    .3645694
    period_4 |  -.2486084   .0270641    -9.19   0.000    -.3016531   -.1955637
    period_5 |  -.3392046    .029266   -11.59   0.000    -.3965648   -.2818444
  cohort_-10 |   .1794061   .0749562     2.39   0.017     .0324947    .3263176
   cohort_-9 |   .2580326   .0530002     4.87   0.000     .1541541    .3619112
   cohort_-8 |   .1480944    .047985     3.09   0.002     .0540456    .2421432
   cohort_-7 |   .2755249   .0452201     6.09   0.000     .1868951    .3641547
   cohort_-6 |    .273361   .0470576     5.81   0.000     .1811298    .3655923
   cohort_-5 |   .2523433   .0449726     5.61   0.000     .1641987    .3404879
   cohort_-4 |  -.0066034    .046469    -0.14   0.887     -.097681    .0844743
   cohort_-3 |  -.0999222   .0442208    -2.26   0.024    -.1865933   -.0132511
   cohort_-2 |  -.3037241   .0539295    -5.63   0.000    -.4094239   -.1980242
   cohort_-1 |  -.3298662   .0650844    -5.07   0.000    -.4574293   -.2023031
    cohort_0 |  -.6466465   .1176678    -5.50   0.000    -.8772712   -.4160218
       _cons |  -.9472451   .0432604   -21.90   0.000    -1.032034   -.8624562
------------------------------------------------------------------------------

. apc_ie pov d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood =   -17721.2
Iteration 1:   log likelihood = -17221.831
Iteration 2:   log likelihood = -17216.152
Iteration 3:   log likelihood = -17216.148
Iteration 4:   log likelihood = -17216.148
Intrinsic estimator of APC effects                 No. of obs      =     58231
Optimization     : ML                              Residual df     =     58208
                                                   Scale parameter =         1
Deviance         =   34432.2967                    (1/df) Deviance =  .5915389
Pearson          =  58107.58659                    (1/df) Pearson  =  .9982749

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .5920952
Log likelihood   = -17216.14835                    BIC             =   -604236

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |  -.0764795   .0115473    -6.62   0.000    -.0991118   -.0538472
       educ1 |   1.214779   .0591055    20.55   0.000     1.098934    1.330624
       educ2 |   .6176969   .0613677    10.07   0.000     .4974185    .7379753
       age_5 |   -.156587   .0426695    -3.67   0.000    -.2402178   -.0729563
       age_6 |  -.0379691   .0384791    -0.99   0.324    -.1133868    .0374486
       age_7 |   .0554676   .0420714     1.32   0.187    -.0269909    .1379262
       age_8 |   .0540236   .0453965     1.19   0.234    -.0349519    .1429991
       age_9 |   .0334948   .0458238     0.73   0.465    -.0563182    .1233078
      age_10 |  -.0042263   .0442735    -0.10   0.924    -.0910007    .0825482
      age_11 |    .090309   .0407889     2.21   0.027     .0103641    .1702538
      age_12 |  -.0345125   .0459857    -0.75   0.453    -.1246427    .0556177
    period_2 |   .2495182   .0237676    10.50   0.000     .2029345    .2961018
    period_3 |   .0159273   .0279506     0.57   0.569    -.0388549    .0707094
    period_4 |  -.1230992   .0273335    -4.50   0.000    -.1766719   -.0695265
    period_5 |  -.1423462   .0303218    -4.69   0.000    -.2017758   -.0829166
  cohort_-10 |   .2344188   .0633909     3.70   0.000     .1101748    .3586627
   cohort_-9 |   .2492004   .0470293     5.30   0.000     .1570246    .3413762
   cohort_-8 |  -.0194389   .0454508    -0.43   0.669    -.1085208    .0696431
   cohort_-7 |  -.2081772   .0471971    -4.41   0.000    -.3006818   -.1156727
```

```
   cohort_-6 |  -.2201784   .0509578    -4.32   0.000    -.3200539   -.1203029
   cohort_-5 |  -.2935862   .0486326    -6.04   0.000    -.3889044    -.198268
   cohort_-4 |  -.2325381   .0455921    -5.10   0.000     -.321897   -.1431792
   cohort_-3 |  -.2382273   .0415391    -5.74   0.000    -.3196424   -.1568122
   cohort_-2 |  -.0244733   .0462739    -0.53   0.597    -.1151685    .0662219
   cohort_-1 |   .2609309    .050348     5.18   0.000     .1622505    .3596112
    cohort_0 |   .4920694   .0931563     5.28   0.000     .3094863    .6746524
       _cons |  -2.878511   .0630354   -45.66   0.000    -3.002058   -2.754963
------------------------------------------------------------------------------
```

Italy APC logit models

```
.  apc_ie moy  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  s
> cale (x2) ;

Iteration 0:   log likelihood = -32984.807
Iteration 1:   log likelihood = -32940.192
Iteration 2:   log likelihood = -32940.151
Iteration 3:   log likelihood = -32940.151
Intrinsic estimator of APC effects                 No. of obs      =     59387
Optimization     : ML                              Residual df     =     59365
                                                   Scale parameter =         1
Deviance         =  65880.30225                    (1/df) Deviance =   1.10975
Pearson          =  63694.02251                    (1/df) Pearson  =  1.072922

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =   1.11008
Log likelihood   = -32940.15112                    BIC             = -586649.7

------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |   .0599177   .0281467     2.13   0.033     .0047512    .1150842
       age_6 |  -.0278769   .0255057    -1.09   0.274    -.0778671    .0221133
       age_7 |   .0612553   .0271751     2.25   0.024     .0079931    .1145174
       age_8 |   .0076921   .0275592     0.28   0.780    -.0463229     .061707
       age_9 |   .0065085    .028675     0.23   0.820    -.0496935    .0627105
      age_10 |   -.034151   .0282758    -1.21   0.227    -.0895706    .0212685
      age_11 |  -.0518924   .0285772    -1.82   0.069    -.1079027    .0041179
      age_12 |  -.0214532   .0308826    -0.69   0.487    -.0819819    .0390756
    period_1 |    .103696   .0200638     5.17   0.000     .0643718    .1430203
    period_2 |   .2243546     .02145    10.46   0.000     .1823134    .2663957
    period_3 |  -.1548416    .020006    -7.74   0.000    -.1940526   -.1156306
    period_4 |  -.1251942   .0197375    -6.34   0.000    -.1638789   -.0865094
    period_5 |  -.0480148   .0221355    -2.17   0.030    -.0913997     -.00463
  cohort_-11 |  -.2565306   .0571304    -4.49   0.000    -.3685041   -.1445571
  cohort_-10 |   .0827034   .0453573     1.82   0.068    -.0061953    .1716021
   cohort_-9 |    .067353   .0380655     1.77   0.077     -.007254      .14196
   cohort_-8 |   .0564067   .0342942     1.64   0.100    -.0108086    .1236221
   cohort_-7 |   .0043823   .0319507     0.14   0.891      -.05824    .0670045
   cohort_-6 |   .2002046   .0327132     6.12   0.000     .1360879    .2643214
   cohort_-5 |  -.0273963   .0314095    -0.87   0.383    -.0889578    .0341652
   cohort_-4 |  -.0563614   .0285791    -1.97   0.049    -.1123753   -.0003475
   cohort_-3 |  -.0111949   .0292594    -0.38   0.702    -.0685423    .0461525
   cohort_-2 |  -.0487307   .0311654    -1.56   0.118    -.1098138    .0123523
   cohort_-1 |  -.0893397   .0387261    -2.31   0.021    -.1652414    -.013438
    cohort_0 |   .0785036   .0739752     1.06   0.289    -.0664851    .2234922
       _cons |   1.284785   .0129724    99.04   0.000      1.25936    1.310211
------------------------------------------------------------------------------

. apc_ie roc  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;
```

```
Iteration 0:   log likelihood = -19186.881
Iteration 1:   log likelihood = -18829.784
Iteration 2:   log likelihood = -18828.576
Iteration 3:   log likelihood = -18828.575
Intrinsic estimator of APC effects                 No. of obs      =     59387
Optimization     : ML                              Residual df     =     59365
                                                   Scale parameter =         1
Deviance         =   37657.1504                    (1/df) Deviance =  .6343325
Pearson          =  63673.70962                    (1/df) Pearson  =   1.07258

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .6348384
Log likelihood   =  -18828.5752                    BIC             = -614872.9

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |  -.0005983   .0419845    -0.01   0.989    -.0828865    .0816899
       age_6 |   .1151912   .0368717     3.12   0.002      .042924    .1874584
       age_7 |   -.218591   .0422154    -5.18   0.000    -.3013316   -.1358504
       age_8 |  -.0844742   .0404563    -2.09   0.037    -.1637671   -.0051812
       age_9 |   .0402306    .040178     1.00   0.317    -.0385168     .118978
      age_10 |   .0385155   .0394785     0.98   0.329     -.038861    .1158919
      age_11 |   .1277019   .0396282     3.22   0.001     .0500321    .2053718
      age_12 |  -.0179758   .0446994    -0.40   0.688     -.105585    .0696334
    period_1 |   .0282751    .028149     1.00   0.315     -.026896    .0834462
    period_2 |  -.2267782   .0314352    -7.21   0.000    -.2883901   -.1651663
    period_3 |   .0263908   .0294121     0.90   0.370    -.0312558    .0840374
    period_4 |   .0717539   .0287862     2.49   0.013     .0153339    .1281738
    period_5 |   .1003585    .031698     3.17   0.002     .0382315    .1624854
  cohort_-11 |   .0435392   .0851426     0.51   0.609    -.1233373    .2104156
  cohort_-10 |  -.1693993   .0679573    -2.49   0.013    -.3025932   -.0362055
   cohort_-9 |   .0271372   .0548776     0.49   0.621    -.0804209    .1346952
   cohort_-8 |   .0851491   .0485496     1.75   0.079    -.0100064    .1803046
   cohort_-7 |   .2422263   .0438543     5.52   0.000     .1562735    .3281792
   cohort_-6 |    -.04245   .0469294    -0.90   0.366      -.13443      .04953
   cohort_-5 |   .1359044   .0445165     3.05   0.002     .0486536    .2231552
   cohort_-4 |  -.1099354   .0440042    -2.50   0.012    -.1961821   -.0236886
   cohort_-3 |   .0240931   .0438114     0.55   0.582    -.0617757    .1099619
   cohort_-2 |   .0337992   .0464274     0.73   0.467    -.0571969    .1247952
   cohort_-1 |  -.0430765   .0570409    -0.76   0.450    -.1548746    .0687216
    cohort_0 |  -.2269873   .1112682    -2.04   0.041    -.4450689   -.0089056
       _cons |  -2.376929   .0193149  -123.06   0.000    -2.414785   -2.339073
------------------------------------------------------------------------------

. apc_ie pov  [iw = weight  ] ,  age(ag1) period(y1) family(bin) link(logit)  sc
> ale (x2) ;

Iteration 0:   log likelihood = -24135.785
Iteration 1:   log likelihood = -24046.697
Iteration 2:   log likelihood = -24046.572
Iteration 3:   log likelihood = -24046.572
Intrinsic estimator of APC effects                 No. of obs      =     59387
Optimization     : ML                              Residual df     =     59365
                                                   Scale parameter =         1
Deviance         =  48093.14361                    (1/df) Deviance =  .8101262
Pearson          =   63659.0057                    (1/df) Pearson  =  1.072332

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]
```

```
                                                AIC             =   .810567
Log likelihood   = -24046.57181                 BIC             = -604436.9

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       age_5 |  -.0823183   .0342365    -2.40   0.016    -.1494207   -.0152159
       age_6 |  -.0386632   .0313802    -1.23   0.218    -.1001672    .0228408
       age_7 |   .0456633   .0324496     1.41   0.159    -.0179367    .1092633
       age_8 |   .0467806   .0338821     1.38   0.167     -.019627    .1131883
       age_9 |  -.0352746   .0364644    -0.97   0.333    -.1067434    .0361942
      age_10 |   .0305179   .0359112     0.85   0.395    -.0398668    .1009027
      age_11 |  -.0135812   .0365205    -0.37   0.710    -.0851602    .0579977
      age_12 |   .0468754    .038215     1.23   0.220    -.0280247    .1217755
    period_1 |  -.1815118   .0257321    -7.05   0.000    -.2319458   -.1310779
    period_2 |     -.1759   .0268033    -6.56   0.000    -.2284335   -.1233666
    period_3 |   .2138212   .0243386     8.79   0.000     .1661184     .261524
    period_4 |   .1374197   .0241118     5.70   0.000     .0901615    .1846779
    period_5 |    .006171   .0274895     0.22   0.822    -.0477074    .0600495
  cohort_-11 |   .3644877   .0688115     5.30   0.000     .2296197    .4993557
  cohort_-10 |  -.0031128   .0555572    -0.06   0.955    -.1120029    .1057773
   cohort_-9 |  -.1187463   .0474357    -2.50   0.012    -.2117186    -.025774
   cohort_-8 |   -.146521   .0431894    -3.39   0.001    -.2311707   -.0618712
   cohort_-7 |  -.1961242   .0412386    -4.76   0.000    -.2769504   -.1152979
   cohort_-6 |  -.2665779    .041265    -6.46   0.000    -.3474558      -.1857
   cohort_-5 |  -.0560061   .0394039    -1.42   0.155    -.1332364    .0212242
   cohort_-4 |   .1492707    .034265     4.36   0.000     .0821125    .2164289
   cohort_-3 |   .0078993    .035351     0.22   0.823    -.0613874     .077186
   cohort_-2 |   .0585839   .0373949     1.57   0.117    -.0147087    .1318765
   cohort_-1 |   .1666357   .0467594     3.56   0.000      .074989    .2582824
    cohort_0 |   .0402109   .0897935     0.45   0.654     -.135781    .2162029
       _cons |  -1.898911   .0158247  -120.00   0.000    -1.929927   -1.867895
------------------------------------------------------------------------------

. keep if d4!=. &  educ !=.;
(0 observations deleted)

. gen educ1= educ==1;

. gen educ2= educ==2;

. apc_ie moy d4 educ1 educ2 [iw = weight  ] ,  age(ag1) period(y1) family(bin) l
> ink(logit)  scale (x2) ;

Iteration 0:   log likelihood = -32795.335
Iteration 1:   log likelihood = -32752.365
Iteration 2:   log likelihood = -32752.329
Iteration 3:   log likelihood = -32752.329
Intrinsic estimator of APC effects              No. of obs      =     59387
Optimization     : ML                           Residual df     =     59362
                                                Scale parameter =         1
Deviance         =  65504.65736                 (1/df) Deviance =  1.103478
Pearson          =  63726.46582                 (1/df) Pearson  =  1.073523

Variance function: V(u) = u*(1-u)               [Bernoulli]
Link function    : g(u) = ln(u/(1-u))           [Logit]

                                                AIC             =  1.103855
Log likelihood   = -32752.32868                 BIC             = -586992.4

------------------------------------------------------------------------------
             |                 OIM
         moy |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
-------------+----------------------------------------------------------------
          d4 |    -.08102   .0084513    -9.59   0.000    -.0975843   -.0644557
       educ1 |   .4072183   .0333354    12.22   0.000      .341882    .4725546
       educ2 |   .5878841    .035669    16.48   0.000     .5179742     .657794
       age_5 |   .0549135   .0283039     1.94   0.052    -.0005612    .1103881
       age_6 |  -.0288489   .0257157    -1.12   0.262    -.0792507    .0215529
       age_7 |   .0723594   .0273218     2.65   0.008     .0188097    .1259091
       age_8 |   .0287296   .0277717     1.03   0.301     -.025702    .0831612
       age_9 |   .0332371   .0288809     1.15   0.250    -.0233684    .0898426
      age_10 |  -.0224951   .0283786    -0.79   0.428    -.0781161     .033126
      age_11 |  -.0680671   .0288181    -2.36   0.018    -.1245495   -.0115848
      age_12 |  -.0698286   .0316282    -2.21   0.027    -.1318188   -.0078383
    period_1 |   .1289731    .020343     6.34   0.000     .0891015    .1688447
    period_2 |   .2315752   .0215316    10.76   0.000      .189374    .2737764
    period_3 |  -.1551509   .0200819    -7.73   0.000    -.1945107   -.1157911
    period_4 |  -.1327952   .0198563    -6.69   0.000     -.171713   -.0938775
    period_5 |  -.0726022   .0223113    -3.25   0.001    -.1163316   -.0288728
  cohort_-11 |  -.2538582   .0574098    -4.42   0.000    -.3663794   -.1413369
  cohort_-10 |   .0714833   .0455096     1.57   0.116    -.0177139    .1606805
   cohort_-9 |   .0740005   .0382053     1.94   0.053    -.0008806    .1488816
   cohort_-8 |     .05448   .0345187     1.58   0.115    -.0131754    .1221354
   cohort_-7 |   .0058596    .032085     0.18   0.855     -.057026    .0687451
   cohort_-6 |   .2083711   .0328693     6.34   0.000     .1439484    .2727938
   cohort_-5 |  -.0217599   .0315359    -0.69   0.490    -.0835691    .0400493
   cohort_-4 |  -.0748433   .0287137    -2.61   0.009    -.1311211   -.0185656
   cohort_-3 |  -.0202232   .0293858    -0.69   0.491    -.0778182    .0373718
   cohort_-2 |   -.063181   .0313406    -2.02   0.044    -.1246074   -.0017545
   cohort_-1 |  -.0807952   .0389934    -2.07   0.038    -.1572208   -.0043695
    cohort_0 |   .1004663   .0745087     1.35   0.178     -.045568    .2465006
       _cons |   1.146796   .0413406    27.74   0.000      1.06577    1.227822
------------------------------------------------------------------------------

. apc_ie roc d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood = -18174.062
Iteration 1:   log likelihood = -17245.764
Iteration 2:   log likelihood = -17240.927
Iteration 3:   log likelihood = -17240.926
Intrinsic estimator of APC effects                 No. of obs      =     59387
Optimization     : ML                              Residual df     =     59362
                                                   Scale parameter =         1
Deviance         =   34481.8515                    (1/df) Deviance =  .5808742
Pearson          =  63250.01402                    (1/df) Pearson  =  1.065497

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .5814716
Log likelihood   = -17240.92575                    BIC             = -618015.2

------------------------------------------------------------------------------
             |                 OIM
         roc |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |  -.1259551   .0130018    -9.69   0.000    -.1514381   -.1004721
       educ1 |  -2.165802   .0420112   -51.55   0.000    -2.248142   -2.083462
       educ2 |  -.9110048   .0389815   -23.37   0.000    -.9874071   -.8346025
       age_5 |  -.0014127   .0436482    -0.03   0.974    -.0869617    .0841362
       age_6 |  -.0682101   .0379949    -1.80   0.073    -.1426787    .0062585
       age_7 |  -.2870282    .043176    -6.65   0.000    -.3716515   -.2024048
       age_8 |  -.2190379   .0419543    -5.22   0.000    -.3012668   -.1368091
       age_9 |   .0445754     .04158     1.07   0.284    -.0369198    .1260707
      age_10 |   .0884679   .0411511     2.15   0.032     .0078132    .1691225
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      age_11 |   .2808861   .0412856     6.80   0.000     .1999679    .3618044
      age_12 |   .1617595   .0468807     3.45   0.001      .069875     .253644
    period_1 |   .2309977   .0297231     7.77   0.000     .1727415    .2892539
    period_2 |  -.2445862   .0323259    -7.57   0.000    -.3079439   -.1812285
    period_3 |    .028654   .0303495     0.94   0.345    -.0308299    .0881379
    period_4 |  -.0186774   .0296713    -0.63   0.529    -.0768319    .0394772
    period_5 |   .0036119   .0327741     0.11   0.912    -.0606241     .067848
  cohort_-11 |  -.2666435   .0887086    -3.01   0.003    -.4405092   -.0927779
  cohort_-10 |   .0341535   .0699352     0.49   0.625     -.102917     .171224
   cohort_-9 |    .148284   .0571169     2.60   0.009     .0363371     .260231
   cohort_-8 |   .3463341   .0503799     6.87   0.000     .2475913    .4450769
   cohort_-7 |    .371704    .045387     8.19   0.000     .2827471    .4606608
   cohort_-6 |   .0815142   .0484488     1.68   0.092    -.0134438    .1764721
   cohort_-5 |   .1712127   .0459274     3.73   0.000     .0811966    .2612288
   cohort_-4 |  -.0023087   .0456555    -0.05   0.960    -.0917918    .0871743
   cohort_-3 |  -.0233393   .0447506    -0.52   0.602    -.1110489    .0643702
   cohort_-2 |  -.0673742   .0475322    -1.42   0.156    -.1605356    .0257872
   cohort_-1 |   -.205892   .0584785    -3.52   0.000    -.3205076   -.0912763
    cohort_0 |  -.5876447   .1134349    -5.18   0.000     -.809973   -.3653165
       _cons |  -.6449842   .0528809   -12.20   0.000    -.7486289   -.5413396
------------------------------------------------------------------------------

. apc_ie pov d4 educ1 educ2  [iw = weight  ] ,  age(ag1) period(y1) family(bin)
> link(logit)  scale (x2) ;

Iteration 0:   log likelihood = -23191.957
Iteration 1:   log likelihood = -22714.045
Iteration 2:   log likelihood = -22705.394
Iteration 3:   log likelihood = -22705.384
Iteration 4:   log likelihood = -22705.384
Intrinsic estimator of APC effects                 No. of obs      =     59387
Optimization     : ML                              Residual df     =     59362
                                                   Scale parameter =         1
Deviance         =  45410.76774                    (1/df) Deviance =  .7649804
Pearson          =  64022.68012                    (1/df) Pearson  =  1.078513

Variance function: V(u) = u*(1-u)                  [Bernoulli]
Link function    : g(u) = ln(u/(1-u))              [Logit]

                                                   AIC             =  .7655003
Log likelihood   = -22705.38387                    BIC             = -607086.3

------------------------------------------------------------------------------
             |                 OIM
         pov |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          d4 |   .1922114   .0104234    18.44   0.000     .1717819     .212641
       educ1 |   1.886154   .0771361    24.45   0.000      1.73497    2.037338
       educ2 |   .7023965   .0809463     8.68   0.000     .5437446    .8610484
       age_5 |  -.0538598   .0349155    -1.54   0.123    -.1222929    .0145734
       age_6 |   .0812588   .0325404     2.50   0.013     .0174807    .1450368
       age_7 |   .0566658   .0334879     1.69   0.091    -.0089692    .1223008
       age_8 |   .0758772   .0349955     2.17   0.030     .0072873    .1444672
       age_9 |  -.0714359   .0373434    -1.91   0.056    -.1446277    .0017559
      age_10 |  -.0207104   .0365549    -0.57   0.571    -.0923566    .0509358
      age_11 |  -.0737698   .0372549    -1.98   0.048     -.146788   -.0007516
      age_12 |    .005974   .0397568     0.15   0.881    -.0719479    .0838959
    period_1 |  -.3568913   .0264116   -13.51   0.000    -.4086571   -.3051256
    period_2 |  -.1914675   .0273393    -7.00   0.000    -.2450515   -.1378836
    period_3 |   .2323782   .0249412     9.32   0.000     .1834943     .281262
    period_4 |   .2218272   .0248428     8.93   0.000     .1731361    .2705183
    period_5 |   .0941535   .0284158     3.31   0.001     .0384596    .1498474
  cohort_-11 |   .5475042   .0702065     7.80   0.000      .409902    .6851064
  cohort_-10 |   -.080432   .0562855    -1.43   0.153    -.1907496    .0298856
```

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   cohort_-9 |  -.2195972   .0481886    -4.56   0.000    -.3140452   -.1251492
   cohort_-8 |  -.3080413   .0439513    -7.01   0.000    -.3941842   -.2218983
   cohort_-7 |  -.3044486   .0422276    -7.21   0.000    -.3872131   -.2216841
   cohort_-6 |  -.4030089   .0421729    -9.56   0.000    -.4856663   -.3203514
   cohort_-5 |  -.1253384   .0405207    -3.09   0.002    -.2047574   -.0459193
   cohort_-4 |   .0967581   .0349662     2.77   0.006     .0282256    .1652907
   cohort_-3 |   .0305768   .0365564     0.84   0.403    -.0410724    .1022259
   cohort_-2 |   .1411285   .0387774     3.64   0.000     .0651261    .2171308
   cohort_-1 |   .2923243   .0486444     6.01   0.000      .196983    .3876656
    cohort_0 |   .3325744     .09311     3.57   0.000     .1500821    .5150667
       _cons |  -4.037131   .0838053   -48.17   0.000    -4.201387   -3.872876
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