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Inégalités de consommation en France entre 1995 et 2011

Résumé

Comment ont évolué les inégalités de consommation en France durant les deux dernières décennies, et notamment en comparaison des inégalités de revenu ? Pour les États-Unis, alors que les premières mesures de ces inégalités faisaient apparaître une stabilité dans le temps, cette tendance a été remise en question par un indicateur alternatif contrôlant des sous-déclarations des dépenses de consommation et témoignant plutôt d'une hausse du même ordre que celle observée pour les inégalités de revenus (Aguiar et Bils, 2015). Cette étude développe dans un premier temps des indicateurs usuels pour la France, à partir de l'enquête *Budget de famille* entre 1995 et 2011, et les décline selon différents postes de consommation et pour différentes classes d'âge ou compositions de ménage. En prenant un échantillon de ménages et un panier de consommation standards, les inégalités de consommation ne semblent pas avoir accompagné en France la hausse des inégalités de revenu, en particulier durant la crise. Pour les biens inférieurs toutefois, le niveau des inégalités de consommation, certes moins élevé, a augmenté. Dans un second temps, pour corriger de potentiels biais de sous-déclaration, un indicateur alternatif est construit, analogue à celui d'Aguiar et Bils (2015) sur les États-Unis et reposant sur les différences de dépenses en biens de luxe et de première nécessité entre les ménages des bas et hauts revenus. Toutefois, alors que de larges sous-déclarations de la part des ménages de hauts revenus sont observées aux États-Unis, il ne semble pas y avoir d'incidence de tels problèmes de mesure en France. Ainsi, dans l'ensemble, qu'elles soient mesurées à partir d'indicateurs usuels ou de l'indicateur alternatif, les inégalités de consommation n'ont pas crû comme les inégalités de revenu. Ces dernières n'ayant pas elles-mêmes crû fortement, cette légère divergence ne signale pas de recours préoccupant à l'endettement sur cette période comme il a pu en être pour les États-Unis.

Mots-clés : consommation, inégalités, épargne, cycle de vie

Consumption inequality in France between 1995 and 2011

Abstract

How did consumption inequalities evolve in France over the last two decades, and notably compared to disposable income? For the United States in particular, while earliest long run measures of consumption inequalities displayed stability, this pattern has been challenged by a refined indicator mitigating under-reporting and depicting an increase of the same order of magnitude as for disposable income (Aguiar and Bils, 2015). Relying on the survey *Budget de famille* between 1995 and 2011, this work first develops standard inequality measures for France and derives them with respect to consumption categories, ages and household compositions. Under a standard sample and consumption bundle, consumption inequality did not track income inequality in France especially during the crisis. By consumption category, the level of consumption inequality is lower and increased for inferior goods. Second, to correct potential systematic under-reporting errors, an alternative indicator similar to Aguiar and Bils (2015) is built relying on differences in luxuries and necessities expenditures between high- and low-income households. Yet, there seems to be no problem due to mis-measurement related to specific income groups over the whole time period in France. Relatedly, the alternative indicator of consumption inequality depicts no rising pattern, such as the one observed for the United States due to large relative underreporting by high-income respondents. Thus, both the standard and alternative inequality indicators do not illustrate consumption inequalities rising as income inequalities. As the latter did not increase to a large extent, this slight difference does not reflect an alarming surge in household indebtedness such as for the US over the same period.

Keywords: consumption, inequality, savings, life cycle

Classification JEL : D31, E21

Introduction

How did consumption inequality evolve in France over the last two decades, and notably compared to disposable income inequality which increased in the long run (Figure 1)? Indeed, consumption inequality brings a complementary view to the largely debated income and wealth inequalities when it comes to well-being and economic policy redistribution analysis[1]. First, consumption could better reflect long-run resources. Second, if consumption inequality does not increase as income inequality, it might reflect surging indebtedness and financial risk. Consumption and disposable income inequalities do not have to change similarly, depending on the degrees of income uncertainty and households' ability to self-insure.[2] For the United States in particular, while the earliest long run measures of consumption inequalities displayed stability (Heathcote et al., 2010), the pattern has been called into doubt by a refined indicator mitigating under-reporting in the *Consumer Expenditure Survey* (Aguiar and Bils, 2015) and depicting an increase in consumption inequalities of the same order of magnitude as for disposable income (Figure 2).

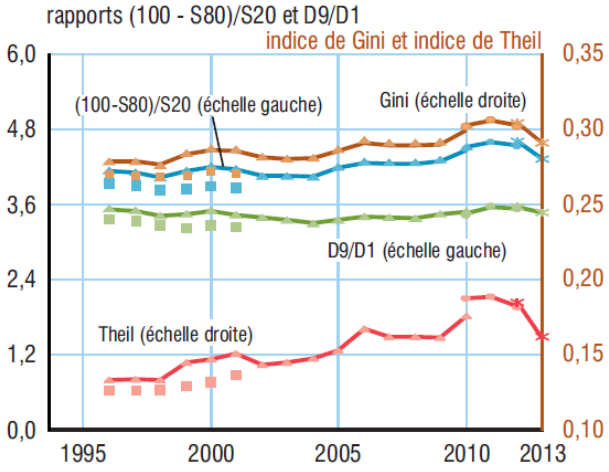
To compare disposable income and consumption inequalities in France, this study first implements standard measures of consumption inequalities (variance of logarithm, Gini coefficient, inter-decile and inter-quantile ratios) between 1995 and 2011 using the survey *Budget de Famille* (BdF). These measures are then derived for different consumption categories, ages and household sizes. Then, the alternative methodology used for the United States by Aguiar and Bils (2015) is adopted. It is based on varying consumption levels by high- and low-income households in terms of luxuries and necessities.[3] This method is likely to bring about adjustments for France also: as in the U.S. case, aggregates from the BdF survey undervalue total consumption by 16.5 percent in 2010 compared to the national accounts (d'Albis and Badji, 2017) and a proportional correction based on national accounts aggregates delivers unsatisfying saving rates for the lowest income quintile (Accardo et al., 2009).

[1] See for instance Coibion et al. (2017) who show that contractionary monetary policy systematically increases inequality in labor earnings, total income, consumption and total expenditures in the U.S. since the 1980s.

[2] Concerning these dimensions in France, for instance, income shocks may have been more transitory than permanent in the 2000s (Ceci-Renaud et al., 2014); the financial saving rate fluctuated between 4 and 7 percent throughout the crisis; and family transfers providing financial help involved 41 percent of French households in 2001 (Garbinti et al., 2012).

[3] From an aggregate point of view, rising standards of living could be seen as a source of changes in households' budget structure since the 1960s from food and clothing towards housing, transports, health, communications and leisures (Consales et al., 2009).

Figure 1 – Disposable income inequality



Source: Boiron (2016), *Enquête Revenus fiscaux et sociaux* (ERFS) between 1996 and 2004, ERFS from 2005 to 2013, Insee-DGFip-Cnaf-Cnav-CCMSA. Field: mainland France, households with positive income and whose reference person is not a student.

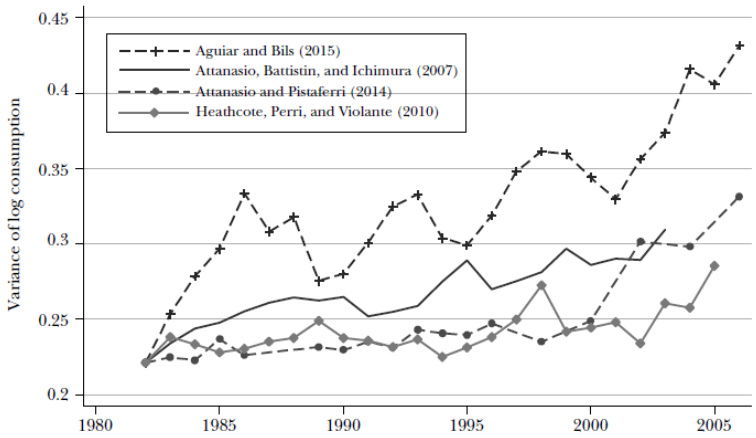
The main results for standard inequality indicators are the following. With the same sample and consumption category selection as the early work by Heathcote et al. (2010), consumption inequality did not track income inequality in France especially during the crisis. Yet, if households in the top and bottom 5 percent of the before-tax income distribution are excluded (to eliminate outliers as in Aguiar and Bils, 2015) and if housing consumption is included, consumption inequality can rise as income inequality by a similar extent (around 4 points of variance of logarithm). Looking at consumption inequality by consumption category, the level of consumption inequality is lower and increased (resp. higher and decreased) for necessities including food, housing and transports (resp. luxuries including clothing, health and leisure).

Moreover, there seems to be demographic effects on consumption inequality: consumption inequality rises with age. This is also the case within cohort over time. Lastly, consumption inequalities are higher (resp. lower) and increased (resp. remained stable) for single persons and one-parent families (resp. couples with less than two children).[4]

Then, the implementation of an alternative consumption inequality indicator provides

[4]Meyer and Sullivan (2017) find that differences between income and consumption inequality in the United States since the 1960s are notably concentrated in single parent families and single individuals.

Figure 2 – Evolution of consumption inequality in the United States



Sources: Attanasio and Pistaferri (2016), *Consumer Expenditure Survey* and *Panel Study of Income Dynamics* with different methodologies. Consumption inequalities are measured by the variance of log consumption, deflated by the Consumer Price Index and expressed in per capita terms.

the following additional insights. There seems to be no problem of mis-measurement related to specific income groups over the whole time period. Relatedly, the alternative indicator of consumption inequality depicts no rising pattern, as observed for the United States due to large relative underreporting by high-income respondents. Thus, both the alternative indicator following Aguiar and Bils (2015) and the standard one relying on Heathcote et al. (2010) do not illustrate consumption inequalities rising between 1995 and 2011 as income inequalities.

The alternative indicator is notably robust to additional socio-demographic controls (PCS, education, employment status), changes in sample selection and restrictions by age categories, and alternative consumption spendings categories. Lastly, the methodology is very sensitive to housing expenditures: its high share in household budgets is likely to bias estimates substantially.

This work is first related to the broad set of inequality analyses with a long run perspective for France. Many studies addressed income inequalities (see for instance Ceci-Renaud et al., 2014; Charnoz et al., 2011; Fraisse et al., 2012; Marc et al., 2011; Bozio et al., 2015; Boiron, 2016) or wealth disparities (among many others Cordier et al., 2006; Lamarche and Salembier, 2012; Piketty and Zucman, 2014), but no inequality analysis of this kind exists

for consumption in France over the long-run. Looking at demographic and generational patterns, life-cycle consumption and saving have yet been addressed by Antonin (2014), Boissinot (2007) or d'Albis and Badji (2017) using the same *Budget de famille* data. Here, similar estimates are carried out for consumption inequalities. More specifically, this paper provides a complementary view on long run disposable income inequalities (Boiron, 2016) and to the breakdown of consumption by household categories in the national accounts for 2003 and 2011 (Accardo et al., 2009; Accardo et al., 2017).

This work is also related to consumption inequality analysis whose measure remains a largely open debate. Initially, direct inequality measures from standard indicators were broadly used (Krueger and Perri, 2006; Heathcote et al., 2010; Krueger et al., 2010), notably for international comparisons: long-run changes in disposable income inequality were found to be larger than in consumption inequality in the United States, but also the United Kingdom, Germany, Italy and Spain notably (Blundell and Ethridge, 2010; Fuchs-Schuendeln et al., 2010; Jappelli and Pistaferri, 2010; Pijoan-Mas and Sanchez-Marcos, 2010). Then, mis-reporting of consumption categories lead to prefer econometric corrections (Aguiar and Bils, 2015) or more recently to rely just on well-measured consumption categories (Meyer and Sullivan, 2017).[5] This paper embraces both simple and sophisticated approaches by Heathcote et al. (2010) and Aguiar and Bils (2015), and provides additional socio-demographic insights.

The rest of the paper is organized as follows. Section 1 describes data and their treatment. Section 2 develops standard inequality indicators for consumption. Finally, Section 3 applies the alternative methodology.

1 Data

1.1 Treatments

The BdF survey is made up by cross-section databases available since 1972 and generally collected every six years generally. Household members complete questionnaires for their durable expenditures over the year and two booklets for their non durable consumptions

[5]The consumption categories depicted as well-measured by Meyer and Sullivan (2017) are food at home, rent plus utilities, gasoline and motor oil, the rental value of owner-occupied housing, and the rental value of owned vehicles. They concentrates thus on necessities.

during two weeks.[6] Income analysis became an additional objective of the survey in 1995. Since then, evolutions of income and consumption inequalities can be compared over a sufficiently long time span. In 1995, the product nomenclature also changed and was adapted to Eurostat norms (*Classification of Individual Consumption by Purpose* or COICOP).

In this study, consumption data are treated to distinguish between main consumption categories (food, clothing, housing,...) and to replicate the alternative methodology by Aguiar and Bils (2015), which requires more precision (for instance to distinguish between "food at home" and "food away from home" which varies with standards of living). In doing so, 27 consumption categories are distinguished, closely following Aguiar and Bils (2015) (Table A1).[7] These categories are then related to a group encompassing durable goods or to one of seven groups of non durable goods[8] and services: "food", "clothing and shoes", "housing", "health", "leisure" and "others".

In general, the BdF nomenclature allows to fit these categories by grouping 2-digit codes, even if some reallocations are necessary: for instance, in the 2-digit code "other goods and services" (91 in 1995), "vehicle insurance" is associated to the category including vehicle expenses; the corresponding insurances are also associated to housing and health. Lastly, adjustments have to be carried out for different BdF editions but are minor, as precisely reported in Table A1.

Income variables, from labor earnings to disposable income, are also computed in order to compare consumption to disposable income inequalities. In addition, disposable income is necessary for the computation of the alternative inequality indicator (see Section 3). Before-tax incomes correspond to labor incomes (for employees and independent workers) plus unemployment benefits, old-age pensions, some health benefits (benefits for dependent elderly persons and disabled adult allowances), financial and housing incomes (in particular, imputed rents for homeowners), family and housing allowances, and minimum social benefits (Table A2). Taxes used to derive disposable income are taken from the BdF spendings

[6]This time window is the same as for the Diary Survey of the U.S. *Consumer Expenditure Survey*. Coibion et al. (2017) document a decline in the frequency of shopping trips likely to affect expenditures and consumption inequality measures. For France, this area of research is let for further work.

[7]The same categories are used apart from "shoes and other apparel" and "children's clothing". An additional category "personal belongings" is considered, as related expenditures are likely to strongly depend on incomes. "Personal belongings" are combined with "apparel" in the group "clothing and shoes" (see Tables 3 and A1 and Aguiar and Bils (2015) Table 2).

[8]Durable goods include "home appliances", "vehicle purchasing", "telecommunication equipment", "entertainment equipment", "debt reimbursement" and "renovation work".

tables, notably the income tax, the property tax and the housing tax. There is no major change in nomenclature.[9]

In order to compare standards of living derived from housing services between renters and homeowners, we impute for homeowners rents they would pay to live in a similar accommodation. Imputed rents have been available in BdF tables for homeowners since 2001. These imputed rents are used for the 2001, 2006 and 2011 editions. For 1995, they are computed as d'Albis and Badji (2017) or Antonin (2014) by the Hot Deck method: rents are first estimated for renters depending on the surface, the number of rooms, the accommodation type (apartment or house) and the construction year. Separate estimations are carried out for different urban area sizes. Imputed rents are then imputed to homeowners using the same characteristics and attributing a residual randomly taken among those for renters. The distribution of imputed rents covers the one for initial real rents to a large extent (Figure A1). The slight difference for higher values may be due to the generally better financial situations of homeowners. In the end, the new distribution for 1995 is very close to those for the following editions. Imputed rents are added to the consumption and income of homeowners.

1.2 Descriptive statistics

Table A3 presents the breakdown of total spendings by consumption categories and disposable income quintile. The statistics are close to the breakdowns computed for 2003 in national accounts by Accardo et al. (2009). "Food, beverages and tobacco" expenditures amount to around 25 percent of non durable spendings. For the category "Housing, utilities and furnishing" this share is at around 35 percent for the first quintile and nearly 25 percent for the last one.[10] "Clothing" corresponds to 6 to 8 percent of households budget. This share grows as income rises, which is also the case for "Leisure" (15-20 percent) and to a lesser extent "Health" and "Transports". In general, there is no substantial change in these proportions through time.[11]

For incomes, shares in disposable incomes are similarly computed for labor incomes, so-

[9] Households in overseas departments appear in 2011 and have been removed.

[10] Imputed rents are considered as housing consumption as in Accardo et al. (2009).

[11] The mean of non durable spendings increases between 1995 and 2006 but diminishes between 2006 and 2011 for each quintile (not reported). The gap between the values for 2006 here and those for 2003 by Accardo et al. (2009) may reflect quintile level discrepancies between national accounts and the BdF survey (see Section 3).

cial security benefits, wealth incomes and social benefits (Table A4). For the first quintile, labor incomes (net wages and self-employment incomes) amount to around 30 percent of disposable incomes, and unemployment pensions and social benefits (including family, housing and minimum benefits) to around 7 and 25 percent. Old-age pensions are slightly above 20 percent and wealth incomes (including financial and housing incomes) are at around 7 percent.[12] Taxes stand at 3 percent. The income profile of the fifth quintile is quite symmetric: the share of labor incomes is twice higher at around 65 percent; social and unemployment benefits are very small; income taxes represent 12 percent of disposable incomes; and wealth incomes reach 20 percent. Here, financial incomes are particularly underestimated (4 percent, compared to 15 percent for Accardo et al., 2009). Disposable income inequalities as derived below can thus fall short of those obtained by Boiron (2016). Mean disposable income rose between 1995 and 2006 as mean consumption, but this rise persisted between 2006 and 2011, excepting for the first quintile. There could have been specific underlying saving behaviors over this crisis period, likely to affect various inequality measures in the end.

2 Standard measures of consumption inequality

2.1 A relative stability for the whole population

Several studies find that long run evolutions of inequality for consumption are more moderate than for income, in particular in the United States but also for other developed countries.[13] Table 1 Panel A displays this disjunction for the United States between 1990 and 2005 with data and methodology used by Heathcote et al. (2010). Annual data from the *Consumer Expenditure Survey* (CEX) are used here to concentrate on five-year intervals and diverse inequality measures to grasp changes at the global level (Gini coefficient, variance of logarithm) or focus on the top or the bottom of the distribution (D9/D5 and D9/D1). Generally, consumption inequality variations between 1990 and 2005 were twice lower than for incomes.

Figures for the United States provide here a benchmark for France with identical fields and methodologies (Table 1 Panel B). Consumption inequalities in France according to all indicators are weaker than in the United States. Levels and variations are much smaller than for incomes. The evolution of income inequality is also slighlty upward in France for most

[12] Imputed rents are considered as housing incomes as in Accardo et al. (2009).

[13] See the special issue of the *Review of Economic Dynamics* in January 2010 and Krueger et al. (2010).

indicators, as identified by Boiron (2016), but to a much lower extent than for the United States. Changes are three times lower for all indicators (+1 point for the Gini coefficient).[14] Consumption inequality does not display any clear-cut trend over the period. Evolutions are positive for all indicators but are twice or three times lower than for incomes in France. The Gini coefficient indicates a relative stability around 0.28 across all BdF editions.[15]

Thus, standard indicators suggest that a disjunction between income and consumption inequalities occurred also in France, even if orders of magnitude are much lower than in the United States. Yet, these evolutions appear to be open to interpretation because of the sensitivity of indicators to the chosen field and methodology. In order to illustrate what underlies these statistics, derivations are next carried out with respect to different fields envisaged in the literature, and diverse age and household composition categories.

2.2 A high sensitivity with respect to fields and consumption categories

Studies devoted to consumption inequality rely on different samples for households. In particular, outliers and tail thresholds can lead to eliminate a varying proportion of poor quality observations at the top and/or bottom of the distribution: 0.5 percent for Heathcote et al. (2010), 2 percent for Blundell and Preston (1998) or even 5 percent for Aguiar and Bils (2015). Yet, inequality indicators can be driven by the top of the distribution, through financial incomes, or by its bottom, especially during the crisis with higher unemployment. From the raw sample of BdF observations, without income outliers, or without the left tail of the income distribution, the Gini coefficient regularly stands at around 0.29 (Table 2, variant 1 to 3).

Samples can also be restricted to households with active status or up to 60 or 64. Such choices may ease economic interpretation abstracting from old-age saving behaviors. But they can also rule out demographic effects arising from population ageing, or simply ignore inequalities related to the elderly. Indeed, this is a substantial choice, as omitting households whose reference person is above 60 reduces the number of observations from 9 552 to 6 442 in

[14] Levels and variations are likely to be under-estimated in view of the BdF incomplete coverage of financial incomes, while they contributed to rising income inequality to a large extent in the 2000s (Boiron, 2016).

[15] Less obviously, levels of consumption inequality are similar to those for income, around 0.30 for the Gini coefficient. This is notably due to the absence of imputed and real rents in consumption in this methodology. As described below, their inclusion largely diminishes consumption inequalities. In addition, higher fiscal redistribution can also participate in narrowing the gap between income and consumption inequalities in France compared to the United States.

Table 1 – Consumption inequality in France and in the United states

Panel A - United States, 1990-2005

year	Income				Consumption			
	varlog	Gini	D9/D5	D9/D1	varlog	Gini	D9/D5	D9/D1
1990	0.45	0.35	2.19	5.50	0.28	0.30	1.97	3.71
1995	0.50	0.36	2.17	5.74	0.29	0.30	1.98	3.84
2000	0.51	0.37	2.21	5.92	0.31	0.31	2.01	4.02
2005	0.55	0.40	2.42	6.46	0.34	0.32	2.02	4.25
2005/1990	+0.10	+0.04	+0.23	+0.96	+0.06	+0.02	+0.06	+0.54

Panel B - France, 1995-2011

year	Income				Consumption			
	varlog	Gini	D9/D5	D9/D1	varlog	Gini	D9/D5	D9/D1
1995	0.24	0.27	1.80	3.38	0.27	0.28	1.84	3.58
2001	0.22	0.27	1.82	3.31	0.28	0.28	1.87	3.69
2006	0.24	0.27	1.77	3.43	0.28	0.28	1.85	3.66
2011	0.28	0.29	1.79	3.68	0.28	0.28	1.87	3.75
2011/1995	+0.04	+0.01	-0.01	+0.30	+0.01	+0.00	+0.04	+0.17

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: For the United States, data are those used by Heathcote et al. (2010). Observations with negative income are deleted. 0.5 percent of values at the bottom of the income distribution are removed, and households headed by an individual aged 25-60 are selected as in Heathcote et al. (2010). Consumption includes all non durable consumption categories excepting imputed or real rents. Income here is disposable income. Note that inequality ratios do not use thresholds but means within deciles.

1995 for instance. This affects inequality indicators downwards slightly, by around 1 point for the Gini coefficient, and with few differences for the top and the bottom of the distribution through the D9/D5 and Q5/Q1 ratios (Table 2).[16] There are also outliers whose consumption profile is inconsistent with reported income. For 0.02 percent of the sample, spendings for a single consumption category (except housing, food or vehicle purchase) represent more than half of disposable income. The impact of these observations is small, at around 1 point for the Gini coefficient (variant 5). Enlarging tail trimming to 5 percent consistently reduces all inequality indicators (variant 6), and using survey weight does not change them substantially (variant 7). Actually, the major change in inequality indicators arises from the additions of housing expenditures in total consumption, as in Aguiar and Bils (2015) but contrary to Heathcote et al. (2010). Specifically, this treatment results in an upward profile over the whole period of analysis, from 2.02 in 1995 to 2.15 in 2011 for Q5/Q1 ratio (variant 8).[17]

[16]Here, the Q5/Q1 ratio is not a ratio between quintile thresholds but between quintile means. It corresponds exactly to the other denomination "(100-S80)/S20". Q5/Q1 ratios are not displayed by Heathcote et al. (2010) on U.S. data. They are yet introduced here as the alternative indicator by Aguiar and Bils (2015) replicated for France next will be related to this measure.

[17]See also Table A6 for the corresponding estimate in the context of the alternative indicator computation.

Table 2 – Effect of sample selection on consumption inequality measures

			varlog	Gini	D9/D5	Q5/Q1	obs.
(1)	Raw measure...	*1995*	0.30	0.29	1.89	2.46	9 605
		2011	0.31	0.29	1.93	2.31	9 386
(2)	... without negative income	*1995*	0.30	0.29	1.89	2.46	9 600
		2011	0.31	0.29	1.93	2.31	9 381
(3)	... without the bottom 0.5%	*1995*	0.30	0.29	1.89	2.47	9 552
	of the after-tax income dist.	*2011*	0.31	0.29	1.93	2.31	9 335
(4)	... without ages above 60 (base)	*1995*	0.27	0.28	1.84	2.46	6 442
	as in Heathcote et al. (2010)	*2011*	0.28	0.28	1.87	2.21	5 875
(5)	... without obs. where one consumption	*1995*	0.26	0.27	1.81	2.52	6 259
	category is 50% of after-tax income	*2011*	0.28	0.28	1.85	2.33	5 753
(6)	... without the bottom and top 5%	*1995*	0.21	0.24	1.71	2.16	5 665
	of the before-tax income dist.	*2011*	0.24	0.26	1.78	2.09	5 229
(7)	... with survey weights	*1995*	0.22	0.25	1.71	2.14	6 186
		2011	0.25	0.27	1.80	2.12	5 901
(8)	... with housing consumption	*1995*	0.15	0.22	1.63	2.02	6 186
	as in Aguiar and Bils (2015)	*2011*	0.20	0.23	1.66	2.15	5 901

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Variants are cumulative in the sense that the sample from the previous variant is used with the additional change from the current variant. The sample used for estimates in Table 1 following Heathcote et al. (2010) corresponds to the one in variants 4. The sample used for estimates in Section 3 following Aguiar and Bils (2015) corresponds to the one in variant 8. Note that inequality ratios do not use thresholds but means within deciles or quintiles.

Thus, beyond sample selection issues, the relative stability of consumption inequality observed previously can encompass diverse evolutions with respect to consumption subcategories. Table 3 displays the same set of standard inequality indicators for major consumption categories and with the sample following Heathcote et al. (2010). Levels for categories corresponding to necessities are lower: this is the case for "Food" (below 0.30 in 1995 for the Gini coefficient) and "Housing", which lowers total consumption inequality substantially (see variants "Total without housing" and "Total"). On the contrary, indicators are higher for categories related to less frequent spendings, booklets being filled by surveyed households during two weeks only: "Clothing" and "Health" reflect it especially. In addition, these categories, and also "Leisure", can be affected by heterogeneities with respect to income: the D9/D5 ratio is higher. "Transports" is in an intermediary situation.

As for variations, there are discrepancies between categories which are not reflected by aggregate consumption. For "Food", "Transports" and, to some extent, "Housing", inequality rises over the period. On the contrary, inequality falls for "Clothing", "Health" and "Leisure" spendings. Necessities tend to have lower inequality levels but they evolve upwards, while luxuries have higher inequality levels which evolve downwards. This symmetry should not be over-interpreted. These evolutions might also be the outcome of varying category specific

Table 3 – Inequality measures by consumption category

		varlog	Gini	D9/D5	Q5/Q1
Food, beverages and tobacco	*1995*	0.35	0.27	1.71	1.45
	2011	0.80	0.37	2.11	1.65
Clothing, shoes and personal belongings	*1995*	1.65	0.56	3.61	3.38
	2011	1.35	0.53	3.35	2.26
Housing, utilities, furnishing	*1995*	0.27	0.29	1.99	2.10
	2011	0.30	0.28	1.82	2.32
Health and personal care	*1995*	1.11	0.51	3.04	3.07
	2011	0.69	0.37	2.11	2.20
Transports	*1995*	0.78	0.44	2.60	2.27
	2011	1.00	0.47	2.69	2.16
Leisure, communication, culture, education, hotels, restaurants	*1995*	0.96	0.47	2.93	3.51
	2011	0.67	0.42	2.65	2.80
Total without housing, utilities, furnishing	*1995*	0.27	0.28	1.84	2.46
	2011	0.28	0.28	1.87	2.21
Total	*1995*	0.20	0.25	1.74	2.30
	2011	0.23	0.25	1.73	2.25

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. The sample corresponds to the one used by Heathcote et al. (2010) such as in variant 4 of Table 2. Consumption categories are the same as in Table A3 (see Table A1 for their construction). Note that inequality ratios do not use thresholds but means within deciles or quintiles.

mis-measurement (Section 7).

2.3 Discrepancies with respect to age and household composition

In order to discern demographic effects, consumption inequality is derived for different age categories.[18] Consumption inequality seems to rise with age at first glance, but this profile is not robust (Table 4). In 1995, the D9/D5 ratio for instance ranges from 1.66 for those below 30 to 1.89 for those above 70, with 1.79 for those between 50 and 59. Yet, in 2011, there is no linear relation between age and inequality for any indicator.

In terms of variations between 1995 and 2011, consumption inequalities increase for the three youngest categories (below 30, 30-39, 40-49) while they decline for most of the oldest ones (50-59 and above 70). In the end, indicators are very likely to be subject to noise from year and cohort effects.

As age, cohort and year effects are intertwined, inequalities per age are here not only illustrated generally but also by controlling for birth cohorts and survey edition years.[19] In two separate estimations, age effects are distinguished from edition year effects on the

[18] In this subsection, the analysis with respect to age relies on the methodology and household selection by Heathcote et al. (2010). In view of the results in the previous subsection, "housing" is included in consumption.

[19] No specific relation between year effects is assumed as in Deaton and Paxson (1994) and d'Albis and Badji (2017) to address collinearity between age, cohort and year. Here, the two estimations below are descriptive and follow Heathcote et al. (2010).

Table 4 – Consumption inequality measures by age categories

		varlog	Gini	D9/D5	Q5/Q1	obs.
Below 30	*1995*	0.17	0.23	1.66	2.04	1 103
	2011	0.27	0.27	1.78	2.28	888
30-39	*1995*	0.18	0.24	1.69	2.32	2 042
	2011	0.22	0.25	1.68	2.22	1 339
40-49	*1995*	0.19	0.24	1.72	2.26	2 151
	2011	0.24	0.26	1.78	2.37	1 827
50-59	*1995*	0.23	0.27	1.79	2.39	1 363
	2011	0.21	0.25	1.71	2.14	1 990
60-69	*1995*	0.21	0.26	1.81	2.28	1 473
	2011	0.23	0.26	1.81	2.39	1 570
Above 70	*1995*	0.24	0.27	1.89	2.56	1 420
	2011	0.20	0.25	1.77	2.37	1 721
25-60	*1995*	0.20	0.25	1.74	2.30	6 442
	2011	0.23	0.24	1.73	2.25	5 875
Whole population	*1995*	0.21	0.25	1.77	2.29	9 552
	2011	0.23	0.26	1.77	2.30	9 335

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. The sample corresponds to the one used by Heathcote et al. (2010), except in the last variant for the whole population. and includes "Housing" such as in variant "Total" of Table 3. Note that inequality ratios do not use thresholds but means within deciles or quintiles.

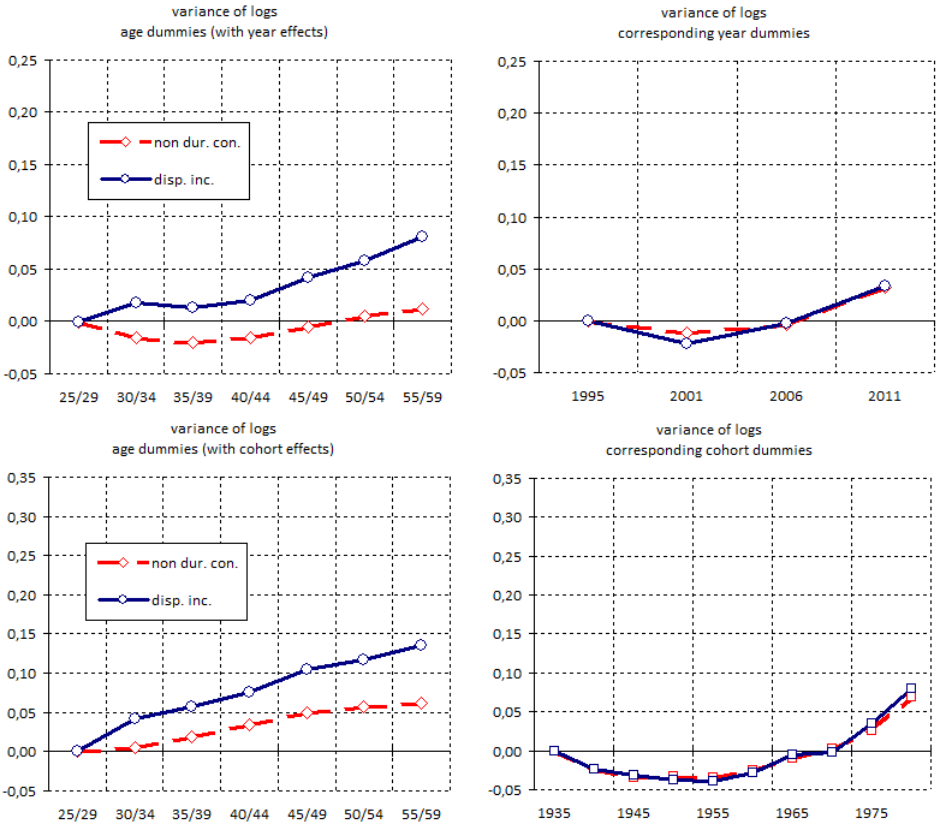
one hand and birth cohort effects on the other hand. In Figure 3, the two upper panels correspond to the first estimation following $m_{a,c,t} = \beta_a D_a + \beta_t D_t + \epsilon_{a,c,t}$, and the two lower panels to the second one with $m_{a,c,t} = \tilde{\beta}_a D_a + \beta_c D_c + \epsilon_{a,c,t}$, where the variable $m_{a,c,t}$ is the chosen inequality indicator (here the variance of logarithm), and D_a, D_t et D_c are vectors for age, year and cohort dummies. Panels report values of estimated coefficients β_a and β_t on the one hand, and $\tilde{\beta}_a$ and β_c on the other hand. These regressions are only illustrative. Further work in that respect should adopt a methodology closer to d'Albis and Badji (2017), with year effects summing to zero following Deaton and Paxson (1994).

The curvature of coefficients is very close to those obtained by Heathcote et al. (2010) for the United States: income and consumption inequalities are rising with age. Moreover, consumption inequality is always lower than income inequality. On the contrary, cohort and year effects are very close for income and consumption. Year effects confirm a relative stability of consumption inequality between 1995 and 2006.[20] As a whole, year and cohort effects are of the same order of magnitude as the maximum values for age effects between specifications, at around 0.05 point of variance of logarithm.

Cohort effects contribute to leveling direct measures of consumption inequality by age for a given year, as they are rising since the 1950s while age effects are lower for the youngest.

[20]They also illustrate a rise between 2006 and 2011 which may have to do with the inclusion of "Housing" in the consumption spendings specifically (cf. Table 3).

Figure 3 – Inequality measures by age category, with controls



Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: The sample corresponds to the one used by Heathcote et al. (2010), except the last variant for the whole population. and includes "Housing" such as in variant "Total" of Table 3. As ages, cohorts are gathered within 5-year classes. Reported values refer to the age class 25-29, the year 1995 and the cohort class 1935-1939.

Beyond, such cohort effects could be interpreted as in d'Albis and Badji (2017) who use cohort effects for consumption means per age category compared to consumption variances here: they state that inter-generational inequality in living standards has not risen over time, contrary to the idea of privileged baby boom generations; here, cohort effects could suggest that consumption inequalities within cohorts increased at the same time.

Lastly, over the long run, demographic effects could also be expected concerning household composition in addition to age, in view of the rise in one-parent families for instance. Table 5 displays the evolution of consumption inequality for seven household categories along this dimension. Single persons have the highest inequality levels (around 0.27 for the Gini coefficient) while couples without children, with one child or with two children stand at

Table 5 – Inequality measures by household composition

		varlog	Gini	D9/D5	Q5/Q1	obs.
Single persons	*1995*	0.23	0.27	1.88	2.38	1 054
	2011	0.28	0.28	1.81	2.38	1 364
Couples, no children	*1995*	0.19	0.25	1.76	2.03	1 106
	2011	0.16	0.22	1.65	1.88	1 233
Couples, 1 child	*1995*	0.17	0.23	1.62	2.22	1 240
	2011	0.19	0.23	1.64	2.29	932
Couples, 2 children	*1995*	0.17	0.23	1.65	2.47	1 394
	2011	0.17	0.23	1.68	2.12	1 048
Couples, more than 3 children	*1995*	0.19	0.25	1.81	2.67	766
	2011	0.27	0.28	1.72	2.82	518
One-parent families	*1995*	0.19	0.24	1.70	2.19	435
	2011	0.31	0.29	1.88	2.45	625
Whole population	*1995*	0.20	0.25	1.74	2.30	6 442
	2011	0.23	0.24	1.73	2.25	5 875

Source: *Budget de famille*. Field: Households in mainland France. Note: The sample corresponds to the one used by Heathcote et al. (2010) adding "Housing" such as in variant "Total" of Table 3. Note that inequality ratios do not use thresholds but means within deciles or quintiles.

around 0.23. In the bottom of the distribution, households with two working age members may be more able to maintain standards of living than single persons. Single-parent families are in an intermediary position.[21] In terms of variations between 1995 and 2011, consumption inequality increased for single persons and one-parent family and remained relatively stable among couples without children, with one child or with two children. Finally, the share of single persons household has risen since the mid-1990s but may not affect aggregate consumption inequality changes as the gap with other categories is rather limited.

3 Alternative measure

Standard measures of consumption inequality have to be considered with caution, because of the sensitivity with respect to sample selection previously highlighted, but also in view of the gaps between aggregates from the BdF survey and those from the National Income and Product Accounts (NIPA). For the United States, the CEX aggregate consumptions undervalue NIPA figures by 14 percent in the early 1980s and by 34 percent in 2009 (Aguiar and Bils, 2015). In France, this differential is also sizable at 16.5 percent in 2011 (d'Albis and Badji, 2017): this can be explained by measurement errors for some consumption categories in the BdF survey and by differences in scope between BdF and the national accounts (d'Albis

[21] Furthermore, couples with more than 3 children have higher inequality levels than other household types. Yet, the number of consumption units may affect inequality measures in this group where the number of children is not constant.

and Badji, 2017).[22] The gap seems even wider when focusing on necessities compared to luxuries (Table A5).

This does not automatically imply that the BdF survey is not suitable to compute reliable inequality indicators, as Aguiar and Bils (2015) put it for the CEX survey. If reporting problems are uniform across income levels, inequality measures by ratios (such as the D9/D5 ratio) should not be biased. However, adjusting individual observations proportionally to conform to national accounts remains unsatisfying on French data also. With such a treatment, the saving rate of households in the first quintile markedly diverges from the one directly obtained with raw data. This problem motivates the alternative methodology by Aguiar and Bils (2015) and also prevails in France: with proportionally adjusted data, the saving rate of the first decile is inconsistent, as highlighted between 1984 and 1995 by Loisy (1999) or for 2003 by Accardo et al. (2009), reaching -11 percent in this case.[23] So, the problem is also relevant in the French situation.

3.1 Methodology

Misreporting is supposed to take two forms: either all households wrongly report a specific consumption category similarly, or a specific type of households, for instance with different income levels, wrongly reports all consumption categories. These two misreporting behaviors are sufficient to generate biases for each consumption category and are likely to accumulate at the total consumption level. Here, the aim is to deal with both bias sources.

Households with different standards of living also have different consumption profiles with respect to consumption categories. Specifically, luxuries consumption prevails for rich households while the consumption of necessities is more homogeneously distributed. In spite of the presence of the two kinds of reporting biases, consumption profiles are still noticeable and exploitable. The relative proportions of typical consumption profiles can be followed and indicate evolutions in consumption inequality.

In the following, the main features and intuitions of the methodology are summarized (see Aguiar and Bils, 2015, for a detailed description). It is made up by two steps. First, for

[22] In particular, national accounts include tourist consumption in France, as well as all households, while the BdF survey concentrates an ordinary households, who do not live in mobile or communal dwellings.

[23] To address this problem, Accardo et al. (2009) and Accardo et al. (2017) correct incomes when they are low compared to spendings and when households declare having financial difficulties. In comparison, Aguiar and Bils (2015) remove observations when spendings for a specific category exceed half of disposable income.

a particular BdF edition, a preliminary estimation derives elasticities for each consumption category with respect to total expenditures which are instrumented to correct for cumulated mis-measurements. Second, for the other BdF editions, and the other way round, a main estimation uses these elasticities and dummies for mis-measurement by consumption quintile to obtain corrected mean consumption levels by quintile from detailed household expenditures. This step is presented first to directly focus on the alternative consumption inequality indicator.

Main estimation

More precisely, assume that the consumption profiles are known and can be summarized through a set of total spendings elasticities for each type of consumption category $\hat{\beta}_1, ..., \hat{\beta}_J$, where the number of categories here is $J = 20$. Thus, if standards of living increase, the relative share of each consumption category is distorted in favor of those with the highest elasticities. Then, consider all observations of spendings per category and per household. Once they are controlled for category-year and quintile-year fixed effects, and for demographic factors such as age and household composition, there remains adjusted spendings likely to have variability with respect to standards of living.

As previously mentioned, total consumption is affected by mis-measurements at the category level. Ideally, it would be desirable to extract from adjusted spendings the implicit total consumption of the household and then to form a new indicator of consumption inequality. Yet, such an approach would imply estimating too many variables. Falling that, total consumption at the individual level is approached by mean total consumption of the corresponding consumption quintile. Such an approximation also allows to directly compute inequality ratios.[24] In the end, the main estimation has the following form:

$$\ln x_{hjt} - \ln \bar{x}_{jt} - \hat{\Gamma}_j Z_h = \alpha_{jt} + \phi_t^i + \ln X_{it}^* \hat{\beta}_j + \epsilon_{hjt} \tag{1}$$

where h is the household index, j is the good index between 1 and 20, i is the quintile index between 1 and 5, t corresponds to the BdF edition year, x_{hjt} is the reported expenditure on good j at time t by household h, $\bar{x}_{jt}$ is the mean of households spendings for a given

[24] In doing so, this measure has advantages and drawbacks, and cannot be absolutely considered as an indicator with higher relevance than standard ones: on the one hand, it is intended to filter reporting biases, but on the other hand, it relies on a strong approximation and on the elasticities β whose accurate estimation is thus crucial.

category and a given year, $\hat{\Gamma}_j$ (assumed to be known for the time being, as the elasticities $\hat{\beta}$) includes the sensitivities of spendings to socio-demographic characteristics Z_h[25], α_{jt} is a category-year fixed effect, ϕ_t^i is a quintile-year fixed effect, and ϵ_{hjt} is a residual. Lastly, $\ln X_{it}^*$ corresponds to the five levels of mean total consumption by quintile. Note here that these values are estimated coefficients in Equation (1) for given $\hat{\beta}_j$. *In fine*, the alternative indicator of consumption inequality is a synthetic Q5/Q1 ratio:

$$\Delta_t = \ln X_{5t}^* - \ln X_{1t}^*. \tag{2}$$

Preliminary estimation

Yet, this estimation requires the prior knowledge of elasticities $\hat{\Gamma}_j$ and $\hat{\beta}_j$. Their estimation is subject to an initial econometric step, which includes two precautions. First, it has to be carried out on a BdF edition that is not used next for the "second step" corresponding to Equation (1) to avoid any correlation between first-step regressors and second-step residuals. Here, the 2001 BdF edition is chosen to extract elasticities $\hat{\Gamma}_j$ and $\hat{\beta}_j$ from a preliminary estimation (Equation (3) below) in order to use them as inputs in three main estimations (following Equation (1) above) for 1995, 2006 and 2011. This choice allows to illustrate long run evolutions between 1995 and 2006 as well as through the crisis between 2006 and 2011.[26] Second, this estimation can not be based directly on total consumption by household, which could cumulate mis-measurement errors, and which is instrumented by an income quintile dummy and disposable income.[27] So, the first-step estimation follows:

$$\ln x_{hj\tau} - \ln \bar{x}_{j\tau} = \alpha_{j\tau} + \Gamma_j Z_h + \beta_j \ln \tilde{X}_{h\tau} + \epsilon_{hj\tau}, \tag{3}$$

where τ indicates the specific estimation year, and $\tilde{X}_{i\tau}$ is the instrumented household total consumption.[28]

The methodology works under two major underlying assumptions. First, an identifying assumption: first-step and second-step residuals are not correlated with quintiles of

[25] These characteristics include an age interval (25-37, 38-50 and 51-64), the number of active persons (strictly below or higher than 2) and the household size (below 2, equal to 3 or 4, or above 5).

[26] Aguiar and Bils (2015) proceeds with a subsample in the middle of their full dataset.

[27] Aguiar and Bils (2015) also use information on household spendings over several periods available in the CEX and reach similar conclusions. Yet, the fact remains that these first-step instruments are linked to incomes, while the second-step quintile means obtained with the corresponding elasticities are interpreted as related to consumption.

[28] Alternative inequality levels are sensitive to the year used for the first-step. The analysis on variations is demonstrated to be robust by Aguiar and Bils (2015).

spendings. Such a correlation could for instance correspond to the a case of systematic under-reporting of luxuries by richer households. In this case, which is not unlikely as put by Meyer and Sullivan (2017), the alternative indicator would have to be seen as underestimating consumption inequality. Second, the quality of the estimation of the coefficients β_j depends to a large extent to the capacity to rule out misreporting cumulated into total consumption. So, the methodology is largely sensitive to the income instruments used in that purpose.

3.2 Results

The sample selection used by Aguiar and Bils (2015) differs from previous standard inequality measures (Table 1). Thus, Table A6 provides income and consumption indicators in this context for the United States by Aguiar and Bils (2015) (Panel A) and for France (Panel B). For the United States, consumption inequality rises between 1982 and 2007, but this increase is about twice lower than the one for disposable income. For France, disposable income inequality slightly rises between 2006 and 2011 (5 percent, compared to 1 percent between 1995 and 2006), as a result of increasing pre-tax income inequality (1 percent then 5 percent) coming from labor income disparities (7 percent between 1995 and 2006, and 14 percent between 2006 and 2011). Consumption inequality is relatively stable between 1995 and 2006, with a surge in 2011 due to housing as already noticed (see variant 8 of Table 2).

As a preliminary step, elasticities of category spendings with respect to instrumented total consumption are estimated with the BdF 2001 data (Table 6). By and large, the weights of each category in total consumption correspond to those for American households in the CEX. "Housing", "Food at home" and "Vehicle purchase, leasing, insurance" represent the most sizeable groups and can be opposed to "Domestic services and childcare", "Personal care", "Alcoholic beverages" or "Tobacco, other smoking".[29] The elasticities reflect the differentiated nature of consumption categories in relation to income: they are lower for "Housing"[30], "Food at home", "Vehicle purchase, leasing, insurance" and "Utilities" especially (and even negative for "Tobacco, other smoking"), and are higher for "Cash contributions", "Entertainment fees,

[29] Yet, the share of "Apparel" is higher here, because of the inclusion of personal belongings. The ones for "All other transportation" and "Appliance, phones, computers" are oddly weak.

[30] This confirms that "Housing" should be considered as a necessity as discussed by Accardo and Bujega (2009). For low-income households, the housing budget share by m^2 is always higher compared to high-income households and it rose since 1985.

Table 6 – First-step: total spendings elasticities for each consumption category

	France			United-States		
Good category	share	elas.	s.e.	share	elast.	s.e.
Housing	21.9	0.70	(0.03)	27.3	0.92	(0.02)
Food at home	14.5	0.52	(0.03)	11.7	0.37	(0.02)
Vehicle purchase, leasing, insurance	16.3	1.03	(0.07)	13.2	1.02	(0.08)
All other transportation	1.3	1.87	(0.22)	7.4	0.89	(0.03)
Utilities	5.7	0.79	(0.04)	5.2	0.47	(0.02)
Health expenditures inc. insurance	5.6	0.98	(0.07)	5.0	0.91	(0.06)
Appliances, phones, computers	0.8	1.13	(0.15)	4.9	0.87	(0.04)
Food away from home	6.2	1.74	(0.07)	4.6	1.33	(0.06)
Entertainment equipment	4.1	0.97	(0.06)	4.1	1.26	(0.07)
Apparel	6.0	1.23	(0.06)	2.6	1.35	(0.05)
Entertainment fees, admissions	5.9	1.36	(0.07)	2.2	1.74	(0.06)
Cash contributions	2.5	2.54	(0.17)	2.2	1.81	(0.18)
Furnitures and fixtures	2.5	1.89	(0.13)	1.5	1.39	(0.10)
Education	0.4	1.34	(0.22)	1.3	1.63	(0.18)
Domestic services and childcare	1.3	1.34	(0.11)	1.5	1.60	(0.13)
Alcoholic beverages	1.4	0.98	(0.11)	1.0	1.14	(0.09)
Personal care	2.3	1.13	(0.09)	1.0	0.96	(0.05)
Tobacco, other smoking	1.4	-0.12	(0.10)	1.0	-0.26	(0.09)

Source: *Budget de famille*, Aguiar and Bils (2015) and *Consumer Expenditure Survey*. Field: Households in mainland France. Note: The sample corresponds to the one used by Aguiar and Bils (2015) as in variant 8 of Table 2. The standard errors are calculated using a bootstrap with 100 replications. "Entertainment fees, admissions" includes "reading".

admissions", "Education", "Domestic services and childcare" and "Food away from home".[31] Relatedly, elasticities are somehow negatively correlated with budget shares, which suggests that regressions should be also weighted for comparison purposes at least.

In second-step estimations, synthetic inter-quintile Q5/Q1 ratios are computed for the years 1995, 2006 and 2011 (Table 7). Results by Aguiar and Bils (2015) for the United States[32] are also reported in Panel A. For the United States, the evolution of the inter-quintile ratio completely changes with the alternative indicator, with a rise from 0.27 to 0.48 between 1991-1993 and 2006-2008[33], compared to only 6 percent with the standard direct ratio (Column (1) versus Column (0)). This gap is robust when observations are weighted by the share of the corresponding category in total consumption (Column (2)), or when tobacco spendings or durables are also removed (Columns (3) and (4)). For the crisis period, the standard and alternative indicators are aligned, with a decrease by around 5 percent.

In the French case (Panel B), the standard indicator is stable between 1995 and 2006 (Column (0)). The alternative indicator evolves moderately downwards, between 3 and 7

[31] Only the elasticity for "All other transportation" appears high compared to the United States.

[32] That is part of Table 3 by Aguiar and Bils (2015) adapted in levels.

[33] In Aguiar and Bils (2015), data are averaged over three years to moderate substantial year-to-year movements

Table 7 – Second step: alternative inequality measure

(a) United States, 1980-2010 (Aguiar and Bils, 2015)

	log inequality					relative mis-measurement			
	(0)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(6)**	**(8)**
level, 1980-82	0.90	0.85	0.90	0.91	0.71	0.09	0.04	0.02	0.16
		(0.07)	(0.06)	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)
change, 1980-82/1991-93	0.12	0.27	0.17	0.15	0.27	-0.13	-0.04	-0.02	-0.16
		(0.08)	(0.06)	(0.07)	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)
change, 1980-82/2005-07	0.18	0.48	0.35	0.30	0.46	-0.30	-0.16	-0.10	-0.28
		(0.08)	(0.07)	(0.07)	(0.06)	(0.07)	(0.05)	(0.05)	(0.06)
change, 2005-07/2008-10	-0.06	-0.06	-0.04	-0.04	-0.05	0.04	0.02	0.01	0.02
		(0.08)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.04)
categories included	all	all	all	w/ tob.	w/ dur.	all	all	w/ tob.	w/ dur.
specification		OLS	WLS	WLS	WLS	OLS	WLS	OLS	WLS

(b) France, 1995-2011

	log inequality					relative mis-measurement			
	(0)	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
level, 1995	0.70	0.73	0.74	0.72	0.74	0.05	0.03	0.05	0.02
		(0.06)	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.04)
change, 1995/2006	0.00	-0.03	-0.05	-0.07	-0.05	-0.02	0.03	0.05	0.04
		(0.06)	(0.05)	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)	(0.05)
change, 2006/2011	0.07	-0.05	-0.15	-0.17	-0.16	0.01	0.19	0.20	0.21
		(0.06)	(0.05)	(0.06)	(0.06)	(0.07)	(0.05)	(0.06)	(0.05)
categories included	all	all	all	w/ tob.	w/ dur.	all	all	w/ tob.	w/ dur.
specification		OLS	WLS	WLS	WLS	OLS	WLS	WLS	WLS

Source: Aguiar and Bils (2015) and *Consumer Expenditure Survey* for Panel A, *Budget de famille* 1995-2011 for Panel B. Field: Households in mainland France. Note: The sample corresponds to the one used by Aguiar and Bils (2015) as in variant 8 of Table 2. The standard errors are calculated using a bootstrap with 100 replications. Log inequality corresponds to the logarithm of $\Delta_t = \ln X^*_{5t} - \ln X^*_{1t}$. as in Equation (2). Relative mis-measurement corresponds to difference between income-specific measurement error for highest-income respondents relative to lowest-income respondents: $\phi^5 - \phi^1$ from Equation (1).

percent depending on specifications (Columns (1) to (4)). This is considerably lower than the 20 point upward correction for the United States. In addition, this correction is statistically weak and does not favor any interpretation of a substantial drop. So, between 1995 and 2006, all indicators underline the stability of consumption inequality and no growing under-reporting concentrated among the rich affects inequality measures as in the United States.

Between 2006 and 2011, the alternative indicator declines by 5 to 17 percent. This post-crisis pattern is comparable to the one observed for the United States. A potential explanation could be the sizable and temporary rise in financial savings by households in view of the economic uncertainty which arose with the crisis: indeed, the financial saving rate of French households grew from 4 percent in 2006 to 4.2 percent in 2008, 7.1 percent in 2009

and fell back to 6.1 percent in 2011 (French national accounts, 2010 basis). However, this alternative indicator has to be viewed against the standard one, which increases by around 7 percent between 2006 and 2007. As all measures depend on housing to a large extent, any interpretation for the period 2006 and 2011 is difficult but stable consumption inequality seems more likely.

3.3 Robustness

First, the alternative methodology is carried out using the 2006 *BdF* edition rather than the 2011 one to derive first-step estimates. Generally, the elasticities and the related order of goods are relatively stable (Columns (2) in Table 8). The biggest changes can be noticed for elasticities associated to "Utilities" (from 0.79 to 0.42), to "All other transportation" (from 1.87 to 1.23), for "Cash contributions" (from 2.54 to 1.97), for "Education" (from 1.34 to 2.01), and for "Tobacco, other smoking" (-0.12 to -0.52). Yet, these categories sum up to less than 15 percent of total consumption in 2001 (Table 7) and can be expected to weigh on the final inequality indicator to a low extent. Indeed, inequality alternative indicators in levels or variations do not vary much in terms of intensity and significance for both unweighted and weighted specifications (2) and (2') in Table 9 Panel A.

Second, additional socio-demographic controls are added in the first- and second-step estimations on top of age and household size and the number of earners: in particular, the socio-professional category, the education level and the size of the urban area. Regarding first-step elasticities relying on 2006 data (Table 8, Column (2)), there is no substantial qualitative change except two cases. The income elasticity for "Education" is divided by two from 1.34 to 0.74, and the one for "Tobacco, other smoking" becomes slightly positive but is not significant anymore. In the second-step (Table 9, Panel A, specifications (3) and (3')), there is no major difference in the OLS nor the WLS estimations. The alternative indicator of consumption inequality thus seems robust to refined controls. As results are unchanged here, these additional controls are kept for other robustness tests.

Third, the analysis of standard inequality measures previously underlined their sensitivity to the sample selection (see Table 2). Here, the alternative indicators for consumption inequality are computed on a sample where this selection criteria is omitted, and where additional socio-demographic controls are also included. In first-step estimations (Table 8, Panel A, Column (4)), there is almost no major change except "Alcoholic beverages" whose

Table 8 – First-step: elasticities - robustness

	(1)		(2)		(3)		(4)	
Good category	elas.	s.e.	elas.	s.e.	elas.	s.e.	elas.	s.e.
Housing	0.70	(0.03)	0.59	(0.02)	0.65	(0.03)	0.65	(0.03)
Food at home	0.52	(0.03)	0.61	(0.03)	0.56	(0.03)	0.57	(0.04)
Vehicle purchase, leasing, insurance	1.03	(0.07)	1.16	(0.07)	1.13	(0.08)	1.14	(0.09)
All other transportation	1.87	(0.22)	1.23	(0.18)	1.55	(0.27)	1.52	(0.30)
Utilities	0.79	(0.04)	0.42	(0.04)	0.95	(0.05)	0.97	(0.05)
Health expenditures inc. insurance	0.98	(0.07)	0.93	(0.06)	1.00	(0.09)	0.90	(0.10)
Appliances, phones, computers	1.13	(0.15)	1.10	(0.10)	1.12	(0.15)	1.10	(0.15)
Food away from home	1.74	(0.07)	1.77	(0.06)	1.45	(0.09)	1.43	(0.12)
Entertainment equipment	0.97	(0.06)	0.89	(0.05)	0.79	(0.09)	0.87	(0.10)
Apparel	1.23	(0.06)	1.35	(0.06)	1.13	(0.07)	1.14	(0.08)
Entertainment fees, admissions	1.36	(0.07)	1.35	(0.05)	1.28	(0.07)	1.26	(0.09)
Cash contributions	2.54	(0.17)	1.97	(0.14)	2.70	(0.20)	2.52	(0.27)
Furnitures and fixtures	1.89	(0.13)	1.86	(0.12)	2.00	(0.15)	1.75	(0.19)
Education	1.34	(0.22)	2.01	(0.25)	0.74	(0.26)	0.56	(0.30)
Domestic services and childcare	1.34	(0.11)	1.56	(0.14)	1.39	(0.12)	1.30	(0.13)
Alcoholic beverages	0.98	(0.11)	1.06	(0.11)	1.18	(0.13)	1.50	(0.31)
Personal care	1.13	(0.09)	1.17	(0.08)	1.12	(0.10)	1.11	(0.10)
Tobacco, other smoking	-0.12	(0.10)	-0.52	(0.12)	0.06	(0.12)	-0.01	(0.13)
Specification	baseline		year 2006		add. controls		w/ 50% trunc.	

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: The sample corresponds to the one used by Aguiar and Bils (2015) as in variant 8 of Table 2. The standard errors are calculated using a bootstrap with 100 replications. "Entertainment fees, admissions" includes "reading". Additional controls include socio-professional categories, education and size of urban area.

elasticity increases from 1.18 in Column (3) to 1.50. In the second-stage, the evolutions of consumption inequality are also not affected: between 1995 and 2006, the coefficient sign changes but remains insignificant, confirming stability over this period; between 2006 and 2011, the same pattern occurs as for main specifications, that is a significant moderate decline with OLS, and an accentuated one with WLS.

Fourth, alternative indicators are derived for different age categories by conditioning the sample of the second-stage while keeping the first-stage elasticities from the whole population. As indicated in specifications 2, 3 and 4 for heads of households with age in the ranges 30-39, 40-49 and 50-59 (Table 10, Panel B), the level of consumption inequality is rising with age in 1995 from 0.56 to 0.97. This controlled profile with respect to age is consistent with estimates using cohort or year controls in Figure 3. For OLS estimates, inequality changes for both 2006 and 2011 are insignificant for each age category, as for the whole population. For WLS estimates, a significant drop occurs among households whose head is between 50 and 59 contrary to the outcome for the whole population. This is still the case in 2011 for the 50-59 category but also for the 40-49 one such that the significant drop for the whole population is largely shared among the population.

Table 9 – Second step: alternative inequality measure - robustness (I)

Panel A - Year, controls, truncation

	(1)	**(1')**	**(2)**	**(2')**	**(3)**	**(3')**	**(4)**	**(4')**
log inequality, 1995	0.73	0.74	0.70	0.71	0.71	0.71	0.68	0.69
	(0.06)	(0.05)	(0.07)	(0.04)	(0.06)	(0.05)	(0.08)	(0.06)
log change, 1995/2001			-0.06	0.02				
			(0.07)	(0.04)				
log change, 1995/2006	-0.03	-0.05			-0.04	-0.03	0.08	0.08
	(0.06)	(0.05)			(0.08)	(0.06)	(0.12)	(0.11)
log change, 2001/2011			-0.02	-0.14				
			(0.07)	(0.05)				
log change, 2006/2011	-0.05	-0.15			-0.05	-0.14	-0.09	-0.17
	(0.06)	(0.05)			(0.07)	(0.06)	(0.08)	(0.07)
categories included	all	all	all	all	all	all	all	all
specification	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
first-step basis year	2001	2001	2006	2006	2001	2001	2001	2001
additional controls	no	no	no	no	yes	yes	yes	yes
without "50%" trunc.	no	no	no	no	no	no	yes	yes

Panel B - Age

	(1)	**(1')**	**(2)**	**(2')**	**(3)**	**(3')**	**(4)**	**(4')**
log inequality, 1995	0.68	0.69	0.56	0.49	0.68	0.71	0.97	0.95
	(0.08)	(0.05)	(0.09)	(0.06)	(0.08)	(0.05)	(0.15)	(0.12)
log change, 1995/2006	0.08	0.08	0.06	0.09	-0.03	-0.05	-0.24	-0.21
	(0.12)	(0.11)	(0.13)	(0.09)	(0.06)	(0.10)	(0.15)	(0.12)
log change, 2006/2011	-0.09	-0.17	0.23	-0.02	-0.11	-0.24	-0.28	-0.29
	(0.08)	(0.07)	(0.13)	(0.12)	(0.12)	(0.08)	(0.17)	(0.12)
categories included	all	all	all	all	all	all	all	all
specification	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
first-step basis year	2001	2001	2001	2001	2001	2001	2001	2001
additional controls	yes	yes	yes	yes	yes	yes	yes	yes
without "50%" trunc.	no	no	no	no	no	no	no	no
age	25-64	25-64	30-39	30-39	40-49	40-49	50-59	50-59

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. The standard errors are calculated using a bootstrap with 100 replications. Additional controls include socio-professional categories, education and size of urban area. Log inequality corresponds to the logarithm of $\Delta_t = \ln X^*_{5t} - \ln X^*_{1t}$. as in Equation (2).

Fifth, "housing" amounts to more than one fifth of household budget so that differences between OLS and WLS results in the second-step could be affected by this category specifically. Indeed, in Table 10 Panel A, the weighted specification 2' displays a strong correction for the change between 2006 and 2011: while all previous estimates indicated a strong decline, the evolution here is also negative, but to a lower extent and insignificantly. So, the decline of the alternative consumption inequality indicator suggested by all specifications except this one is driven mainly by outcomes for the "housing" category specifically. Specification 3 is run without using imputed rents directly available in the sample but with those obtained by using the Hot Deck method for every edition and not only the 1995 one. In this

Table 10 – Second step: alternative inequality measure - robustness (II)

Panel A - Housing

	(1)	**(1')**	**(2)**	**(2')**	**(3)**	**(3')**
log inequality, 1995	0.68	0.74	0.71	0.75	0.71	0.71
	(0.08)	(0.05)	(0.06)	(0.06)	(0.06)	(0.05)
log change, 1995/2006	0.08	0.08	-0.04	-0.09	-0.04	-0.03
	(0.12)	(0.11)	(0.08)	(0.07)	(0.08)	(0.06)
log change, 2006/2011	-0.09	-0.17	-0.04	-0.05	-0.05	-0.14
	(0.08)	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)
categories included	all	all	w/hou.	w/hou.	w.alt.	w.alt.
specification	OLS	WLS	OLS	WLS	OLS	WLS
first-step basis year	2001	2001	2001	2001	2001	2001
additional controls	yes	yes	yes	yes	yes	yes
without "50%" trunc.	no	no	no	no	no	no

Panel B - Consumption bundles

	(1)	**(2)**
log inequality, 1995	0.78	0.91
	(0.07)	(0.10)
log change, 1995/2006	-0.05	-0.11
	(0.07)	(0.10)
log change, 2006/2011	-0.12	-0.16
	(0.07)	(0.10)
categories included	necessities vs. luxuries	food at home vs. entertainment
specification	OLS	OLS
first-step basis year	2001	2001
additional controls	yes	yes
without "50%" trunc.	no	no

Source: *Budget de famille*. Field: Households in mainland France. The standard errors are calculated using a bootstrap with 100 replications. Additional controls include socio-professional categories, education and size of urban area. In specifications 2 and 2' of Panel A, all consumption category are considered except housing. "Necessities" includes consumption categories "Housing", "Food at home", "Vehicle purchase, leasing, insurance", "All other transportation", "Utilities", "Health expenditures inc. insurance", "Apparel" and "Appliances, phones and computers". "Luxuries" includes "Entertainment fees, admissions", "Education", "Personal care", "Domestic services and childcare", "Entertainment equipment", "Food away from home", "Furnitures and fixtures" and "Cash contributions".

case, there is no specific change. Lastly, the same methodology is carried with consumption bundles rather than a full set of consumption with on the one hand necessities vs. luxuries and on the other hand single representative categories for necessities and luxuries, that is "food at home" and "entertainment fees, admissions". In the former, housing is gathered with necessities and in the later housing is excluded. In both, the decline between 2006 and 2011 is not significant.

To sum up, the sharp outcomes for housing consumption suggest preferring OLS estimates to avoid deriving conclusions largely driven by a single consumption category. Clearly, the alternative method here does not suggest radical changes in the interpretation of standard

inequality indicator, and, contrary to the United States, there seems to be no obvious mis-measurement differential between low- and high income households (Table 7) likely to cast doubts on direct inequality measures. All in all, our preferred measure of consumption inequality remains the one from Table 1 Panel B, as housing is excluded, as sample trimming is more conservative (0.5 percent compared to 5 percent for alternative indicators), and as consumption relative measurement seems less an issue for France.

Conclusion

This study produces a large set of inequality indicators for consumption inequality. Standard indicators are derived for different socio-demographic characteristics, and an alternative indicators is computed to deal with potential mis-reporting of spendings. As for the United States, the measures display a strong sensitivity to the selected field and consumption categories contribute differently to aggregate outcomes. There seems to be no demographic effect of age on consumption inequality in a context of population ageing, maybe due to a simultaneous rise in within cohort consumption inequality over time. On the whole, consumption inequality seems stable between 1995 and 2006. Between 2006 and 2011, distinguishing between stability and decline remains difficult even with the alternative indicator.

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Table A1 – Main consumption categories

Category	Group	1995	2001	2006	2011
Food at home	FOO	11-12-15	11-12-13	11-12	11-12-13
Alcoholic beverages	FOO	13	21	21	21
Tobacco	FOO	14	22	22	22-23
Apparel	CLO	21-22-23	31-32-33-34	31-32	31-32-33
Housing (rents, maintenance)	HOU	31*-91.1/91.3	41-124.2	41-124.2**	41-125.2
Utilities (water, gaz, electricity)	HOU	32*	44-45	44-45	44-45-46
Furnitures and housing repair	HOU	41	43-51	43-51	43-51
Home appliances	DUR	43	53	53	53
Home furnishing and maintenance products	LOG	42-44-45	52-54-55	52-54-55	52-54-55
Domestic services and childcare	HOU	46	56	56	56
Health expenditures	SAN	51-53-54-91.5	62-63-64-124.3	62-124.3	62-63-125.3
Health appliances	HEA	52	61	61	61
Vehicle purchasing	DUR	61	71	71	71
Vehicle expenses	TRA	62-91.4	72-124.4	72-124.4	72-125.4
Public transportation	TRA	63-65	73-74	73	73
Telecommunication equipment	DUR	64.11	81.2	81.2	81.2
Telecommunication services	LEI	64.12-64.2	81.1-81.3	81.1-81.3	81.1-81.3
Entertainment equipment	DUR	71	91-92	91-92	91-92
Entertainment spendings, leisure objects	LEI	72-73	93-94-95-96-97	93-94-95	93-94-95-96
Education	LEI	74	101	101	101
Personal care	HEA	81	121	121	121
Personal belongings	CLO	82	122	122	123
Food away from home & lodging expenses	LOI	83	111-112	111	111
Exceptional service expenditures	OTH	86	123-126-127	123-126	127-128
Financial services	OTH	85-91.6-97	125	125	126
Debt reimbursement	DUR	94	133	133	132
Renovation work	DUR	93	132	132	134

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: These categories are built using the BdF spending tables. "Food at home" includes food, non-alcoholic beverages and exceptional expenditures; "home furnishing" corresponding textiles, dishes and tools; "health expenditures" drugs consultations and hospitals; "public transportations" exceptional expenditures; "entertainment spendings" fees, admissions and reading; "exceptional service expenditures" funerals, layers and house moving for instance.

Table A2 – Main income and tax categories

Incomes

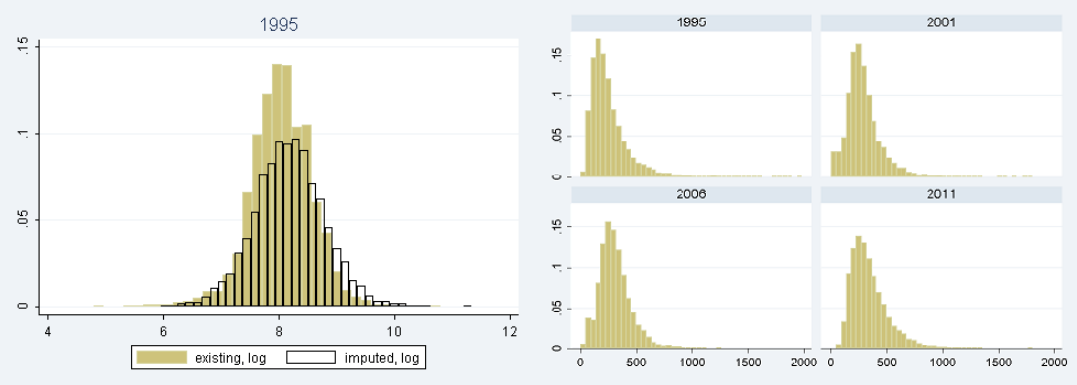
Category	1995	2001	2006	2011
net wages	11-20-21-33-36	11-20-21-33	101-200-201	salaires-rev_etranger
self-employment income	10	10	100	revindep
old-age pension	23/25-30	23/25-30	203-213-204-205-300	retraites-rev507-rev508
unemployment pension	22-64	22-64	202-604	chomage-rev604
health benefits	27/29-31-48	27/29-31-48	207/209-301-408	prest_precarite_hand rev500-rev520-
financial assets income	50/53	50/53	500-520-501/503-519	rev501/rev503-rev509-rev519
housing assets income	54/58	54/58	504-508	rev504/rev508
imputed rents			801	
transfers - received	70/73	70/73	700-703	rev850/rev852-rev700/rev702
transfers - provided	96	135	135	133
family benefits	32-40/47	32-40/47	302-400/407-409/414	prest_fam_petite_enfance-prest_fam_autres-rev302
housing benefits	01-02	01	010	prest_logement
minimum benefits	26-34-35	26-34-35	206-304-305-306-307	prest_precarite_rsa-rsa_act-prest_precarite_viel-rev414

Taxes

	1995	2001	2006	2011
taxes on estate	921/923	1311/1313	1311-1312	1311-1312
income tax	924	1314	1314	1314
other taxes (automobile)	925-926	1315-1316	1315-1316	1315-1316

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: These categories are built relying on the BdF income tables. "Net wages" include secondary incomes and daily allowances, "transfers" alimonies and gifts, and "old age pensions" annuities. Provided transfers and taxes are taken from the BdF spending tables. Transfers correspond to amounts regularly provided by another household.

Figure A1 – Imputed rents



Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: Values are in 2006 euros on the right side, and in logarithms on the left side. Imputed rents are computed in 1995 by the Hot Deck method using surface, number of rooms, accomodation type, construction year and urban area size.

Table A3 – Shares of consumption categories in households budget, in percent by income quintile

		Q1	Q2	Q3	Q4	Q5	mean
Food, beverages and tobacco	*1995*	26	26	26	23	20	24
	2011	23	23	25	23	22	23
Clothing, shoes and personal belongings	*1995*	6	6	6	7	8	7
	2011	6	5	6	6	7	6
Housing, utilities, furnishing	*1995*	34	30	27	25	24	28
	2011	33	33	28	24	23	28
Health and personal care	*1995*	10	13	13	14	14	13
	2011	9	11	11	11	10	10
Transports	*1995*	10	11	12	13	13	12
	2011	11	11	12	14	13	12
Leisure, communication, culture, education, hotels, restaurants	*1995*	12	13	15	17	19	15
	2011	17	14	16	19	22	18
Total spendings (2006 euros per cons. unit)	*1995*	10 698	13 186	15 880	19 658	27 774	17 439
	2011	12 066	13 585	15 950	19 813	28 466	17 976
Non durable goods (2006 euros per cons. unit)	*1995*	9 513	11 002	12 389	14 918	20 235	13 611
	2011	10 106	11 931	13 140	15 318	20 332	14 165
Durable goods (2006 euros per cons. unit)	*1995*	1 185	2 185	3 490	4 740	7 539	3 827
	2011	1 959	1 665	2 810	4 495	8 134	3 812

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: Consumption groups are built as indicated in Table A1.

Table A4 – Shares of income components, in percent by income quintile

		Q1	Q2	Q3	Q4	Q5	mean
Net wages	*1995*	30	44	50	59	60	49
	2011	27	42	48	57	59	46
Self employment incomes	*1995*	4	4	3	4	8	5
	2011	1	2	2	2	7	3
Old-age pensions	*1995*	25	30	29	25	23	27
	2011	20	38	26	29	25	28
Unemployment pensions	*1995*	7	4	2	2	2	3
	2011	7	5	3	2	2	4
Health benefits	*1995*	3	3	2	1	1	2
	2011	3	1	1	0	0	1
Financial assets incomes	*1995*	2	2	2	3	4	3
	2011	2	1	1	2	3	2
Housing assets incomes	*1995*	12	12	14	13	14	13
	2011	9	9	12	14	15	12
Family benefits	*1995*	8	4	3	2	1	3
	2011	6	2	1	1	1	2
Housing benefits	*1995*	10	2	1	0	0	3
	2011	19	2	0	0	0	4
Minimum benefits	*1995*	3	1	0	0	0	1
	2011	8	1	0	0	0	2
Property and housing taxes	*1995*	-2	-2	-2	-2	-3	-2
	2011	-2	-2	-3	-3	-3	-2
Income tax	*1995*	-1	-2	-3	-6	-10	-4
	2011	-1	-1	-3	-4	-8	-3
Disposable income	*1995*	8 231	12 906	16 673	21 379	35 325	18 902
	2011	8 701	14 905	19 511	25 209	42 360	22 137

Source: *Budget de famille*, 1995-2011. Field: Households in mainland France. Note: "Net wages" includes secondary incomes and daily allowances. Income groups are built as indicated in Table A2. Disposable income is in 2006 euros per consumption unit.

Table A5 – Measurement discrepancy between consumption surveys and national accounts

	National accounts		*Budget de famille*		ratio	
	1995	2011	1995	2011	1995	2011
Necessities	512.5	686.1	461.9	553.2	0.90	0.81
Luxuries	255.6	342.9	227.3	279.1	0.89	0.88
Total	762.1	1022.5	689.3	856.7	0.90	0.84

Note: Figures are in billions of 2006 euros. "Necessities" includes food, beverages and tobacco, housing and utilities, clothing and shoes, health and transports. "Luxuries" consists in leisure, communications, culture, education, restaurants and hotels and other goods and services. National accounts data are taken from Table 2.201 for effective final consumption by households for major consumption categories (base 2010).

Table A6 – Inequality trends: ratio of high-income to low-income respondents

Panel A - United States, 1990-2005

	1981	1992	2006	2009	1982-2007 log change	2007-2010 log change
labor earnings	6.41	8.47	7.88	8.59	0.21	0.09
pre-tax income	4.75	5.80	6.40	6.50	0.30	0.02
disposable income	4.21	5.12	5.87	5.92	0.33	0.01
consumption	2.31	2.58	2.76	2.62	0.18	-0.05

Panel B - France, 1995-2011

	1995	2001	2006	2011	1995-2006 log change	2006-2011 log change
labor earnings	4.96	5.23	5.33	6.14	0.07	0.14
pre-tax income	3.31	3.27	3.35	3.54	0.01	0.06
disposable income	3.14	3.06	3.17	3.34	0.01	0.05
consumption	2.02	2.07	2.01	2.15	0.00	0.07

Source: Aguiar and Bils (2015) and *Consumer Expenditure Survey* for Panel A, *Budget de famille* between 1995 and 2011 for Panel B. Field: Households in mainland France. Note: As in Aguiar and Bils (2015), high income refers to respondents who report pre-tax household income in the eightieth through ninety-fifth percentiles (pre-tax incomes correspond to labor earnings plus government transfers). Low income refers to those in the fifth through twentieth percentiles. The elements of the first four columns are the ratio of the average of high-income respondents to the average for low-income respondent.

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