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AU-DELÀ DU REVENU : CONTRIBUTIONS
MÉTHODOLOGIQUES ET EMPIRIQUES À LA MESURE DES
INÉGALITÉS ÉCONOMIQUES

BEYOND INCOME: METHODOLOGICAL AND EMPIRICAL
CONTRIBUTIONS TOWARDS MEASURING ECONOMIC
INEQUALITY

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Résumé

- English version on page vii.

La mesure des revenus a connu d’importants progrès au cours des dernières décennies, grâce à des améliorations méthodologiques et au foisonnement de résultats empiriques sur le sujet. Cependant, l’accent mis sur le revenu en tant qu’outil d’analyse des inégalités sociales s’accompagne de certains renoncements et défis. En effet, la mesure du revenu est souvent incomplète et omet l’existence d’autres ressources économiques. En outre, il existe toujours un décalage non résolu entre le revenu et d’autres mesures de la situation économique, telles que les privations matérielles. Enfin, l’utilisation d’une mesure aussi complexe et abstraite peut faire perdre de vue les groupes sociaux sous-jacents qui stratifient la population.

Ce travail contribue à la littérature sur la mesure des inégalités économiques entre les ménages, en proposant des outils pour étendre, analyser et apporter des compléments aux définitions traditionnelles du revenu. Plusieurs résultats en comparaison internationale et à long terme sont établis.

Le premier chapitre examine une extension de la définition du revenu disponible, qui inclut les taxes à la consommation payées par les ménages. Il mobilise les enquêtes sur le budget et le revenu des ménages, ainsi qu’une méthode innovante d’imputation des dépenses de consommation des ménages pour fournir des estimations cohérentes de l’effet inégalitaire des taxes à la consommation pour un large panel de pays et d’années. Les résultats confirment que dans tous les pays, les taxes à la consommation pèsent de manière disproportionnée sur les ménages à faible revenu. Par conséquent, les inégalités de revenus sont plus élevées lorsqu’elles sont calculées après taxes à la consommation. Les différences entre les pays sont notamment dues à des différences dans les taux d’imposition moyens, ce qui affecte le panorama international des inégalités de revenus et de la redistribution.

Le deuxième chapitre analyse l’évolution des inégalités de revenus en France, à l’aide d’une méthode de décomposition détaillée. L’analyse porte sur les années 1970 à 2019, période pendant laquelle l’économie et la population françaises ont connu des changements majeurs, certains reflétant ce qui s’est passé dans la plupart des pays développés, et d’autres étant spécifiques à la France. Les contributions respectives des changements dans la structure des ménages, des professions, des salaires, des impôts et des presta-

tions sociales sont mesurées. Les distributions des revenus du travail et des pensions sont parmi les principaux déterminants de l'évolution des inégalités, et dominent les effets de l'évolution de la structure socio-démographique. Les variations dans la composition des ménages, bien qu'étant moins déterminantes à court terme, ont contribué à une hausse des inégalités de manière continue sur la période.

Le troisième chapitre étudie la faisabilité de la construction d'un indicateur de grande pauvreté dans les pays développés, pour identifier les plus vulnérables parmi les personnes identifiées comme pauvres par les indicateurs usuels. Ce travail montre qu'il n'est pas possible de cibler la grande pauvreté de manière pertinente en utilisant uniquement le revenu : en dessous d'un certain seuil de revenu, il n'y a plus de corrélation avec d'autres indicateurs de difficultés économiques. En revanche, l'ajout des privations matérielles permet de prendre en compte les composantes non liées au revenu de la situation économique d'un ménage, telles que le patrimoine, la santé ou le statut professionnel, et aide à identifier les individus souffrant d'une situation de pauvreté plus sévère et plus durable.

Mots-clés : Revenus, Pauvreté, Inégalités, Taxes à la consommation, Privations matérielles.

Summary

The measurement of income has experienced tremendous advances in the last decades, through methodological improvements as well as an expansion of the related empirical literature. However, the focus on income as a tool to analyze social inequality comes with some costs and challenges. Indeed, the measure of income is often incomplete and omits the existence of other economic resources. Moreover, there is still an unsolved mismatch between income and other measures of the economic situation, such as material deprivations. Finally, the use of such a complex and abstract measure can make one lose sight of the underlying social groups that stratify the population.

This work contributes to the literature on the measurement of economic inequality between households, by proposing tools to complement, extend and analyze traditional definitions of income. Several cross-country and long-run results are established.

The first chapter considers an extension of the definition of disposable income, that includes consumption taxes paid by households. It uses household budget and income surveys and a new method for imputing household consumption expenditure to provide consistent estimates of the inequality effect of consumption taxes for a large panel of countries and years. It is confirmed that, in all countries, consumption taxes fall disproportionately on low-income households. As a result, income inequality is higher when calculated after consumption taxes. Cross-country differences are notably driven by differences in average tax rates, which affects the international outlook of income inequality and redistribution.

The second chapter analyzes the evolution of income inequality in France, using a detailed decomposition method. The analysis covers the period from 1970 to 2019, during which the French economy and population have undergone major changes, some reflecting what has happened in most developed countries, and others being specific to France. The respective contributions of changes in household structure, occupations, wages, taxes and social benefits are measured. The distributions of labor income and pensions are among the main determinants of inequality trends, and dominate the effects of changes in socio-demographic structure. Changes in household composition, while less important in the short term, have contributed to a steady rise in inequality over the period.

The third chapter examines the feasibility of constructing an indicator of extreme

poverty in developed countries, in order to identify the most vulnerable among those identified as poor by the usual indicators. This work shows that it is not possible to target extreme poverty in a relevant way using income alone: below a certain income threshold, it no longer correlates with other indicators of economic hardship. On the other hand, the addition of material deprivations makes it possible to take into account non-income components of a household's economic situation, such as wealth, health or occupational status, and helps to identify individuals suffering from more severe and persistent poverty.

Keywords: Income, Poverty, Inequality, Consumption taxes, Material deprivation.

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Chapitre 0

Introduction (en français)

- English version on page 25.

Toutes les *mesures* sont fausses, mais certaines sont utiles.

(librement adapté de George Box¹)

En sciences sociales, le revenu des ménages est aujourd’hui la dimension principale de l’analyse des inégalités socio-économiques. Sa mesure a connu d’importants progrès au cours des dernières décennies, grâce à des améliorations méthodologiques et au foisonnement de résultats empiriques sur le sujet. Cependant, l’accent mis sur le revenu en tant qu’outil d’analyse des inégalités sociales s’accompagne de certains renoncements et défis. En effet, la mesure du revenu est souvent incomplète et omet l’existence d’autres ressources économiques. En outre, il existe toujours un décalage non résolu entre le revenu et d’autres mesures de la situation économique, telles que les privations matérielles. Enfin, l’utilisation d’une mesure aussi complexe et abstraite peut faire perdre de vue les groupes sociaux sous-jacents qui stratifient la population.

Que nous apprend l’étude du revenu sur les inégalités économiques et la pauvreté ?

La présente thèse propose trois travaux méthodologiques et empiriques contribuant à répondre à cette question. Le manuscrit est organisé de la manière suivante : une introduction propose une synthèse des avancées historique de la mesure du revenu, et de la manière dont cet indicateur a pris la place centrale qu’il occupe aujourd’hui dans l’analyse des phénomènes économiques et sociaux. Certaines difficultés dans la conception et la mesure de cet indicateur sont rappelées, à la lumière des différentes interprétations

¹Statisticien anglais auteur du célèbre aphorisme « *All models are wrong, but some are useful* » (tous les modèles sont faux, mais certains sont utiles, [Box, 1976](#)).

possibles de ce concept. Enfin, les trois chapitres qui composent le cœur de ce manuscrit sont présentés, en mettant en évidence la manière dont ils s'inscrivent dans la continuité des avancées récentes sur la mesure du revenu, ainsi que les éléments qu'ils apportent à la connaissance des inégalités économiques et de la pauvreté.

* * *

Le revenu peut être vu comme la capacité à consommer et à épargner d'un individu ou d'un ménage. Cette définition est quasiment tautologique puisque l'épargne est généralement définie comme la part du revenu qui n'est pas consommée. Dans une autre définition, celle de [Hicks \(1939\)](#), le revenu est défini de manière explicite : « Le revenu d'une personne est ce qu'elle peut consommer au cours de la semaine tout en s'attendant à être aussi bien lotie à la fin de la semaine qu'elle ne l'était au début. ». Dit autrement, c'est la valeur de ce qui peut être consommé sans diminuer la valeur de son patrimoine. Par extension, c'est donc la somme de ce qui est consommé, et de la variation de la valeur du patrimoine sur la période.

La construction et la mesure de cet indicateur économique ne va cependant pas de soi, et sa mobilisation dans des études nationales ou comparatives a nécessité plus d'un demi-siècle d'innovations conceptuelles et méthodologiques, ainsi que la coopération de chercheurs et d'institutions du monde entier.

Une fois les méthodes de mesure du revenu et de sa distribution établies, celui-ci a pris une place centrale dans la littérature économique. Au-delà de la mesure des inégalités sociales, il est aussi mobilisé comme une dimension majeure d'analyse de la performance économique des États, de l'équité des politiques sociales et fiscales, ainsi que de différents aspects la vie sociale (santé, environnement, démographique).

Bien qu'étant une variable de plus en plus facile à mobiliser, et assez attractive par sa capacité à classer les individus sur une échelle unidimensionnelle, le revenu reste un indicateur polysémique et comportant de multiples difficultés conceptuelles et méthodologiques. Mesure du bien-être économique, de la « part du gâteau » national perçue, de la capacité à consommer et épargner, de la position sociale... Ce concept en apparence simple a diverses interprétations qui sont rarement explicitées, mais qui peuvent révéler des incompatibilités selon les conventions adoptées. Par ailleurs, certains types de revenu continuent à poser des problèmes de mesure, ce qui rend incertaine l'analyse de certains groupes sociaux, notamment du point de vue de la pauvreté.

Un demi-siècle d'avancées méthodologiques

Cette section revient sur les améliorations des sources de données et des méthodes qui ont permis l'état de l'art actuel en matière de mesure des inégalités de revenus. Si les premières

enquêtes sur le budget des ménages pauvres datent de la fin du XIX^e siècle et que les premières données fiscales sur le revenu sont collectées à partir du début du XX^e, c'est surtout à partir de la deuxième moitié du XX^e siècle que les systèmes d'informations sur les revenus se développent. Dans le même temps, un ensemble d'innovations méthodologiques et d'efforts de standardisation ont permis de consolider les études sur les inégalités. Ces avancées dans les sources et les méthodes se sont également traduites par la construction de bases de données destinées aux comparaisons internationales.

Les sources de données

La mesure des revenus a bénéficié au cours du XX^e siècle d'une amélioration continue des sources de données. A la fin du XIX^e siècle, les premières études sur la pauvreté essayant de mesurer les revenus des ménages et de définir un seuil de pauvreté sont d'abord menées dans certaines localités ([Booth \(1889-1897\)](#) à Londres, [Rowntree \(1901\)](#) à York). Aux États-Unis, les études sur la consommation (« *Budget Surveys* ») commencent au début du XX^e et sont aussi généralement menées dans certains territoires seulement ([Johnson and Rogers, 2001](#)). Ces études sur la consommation précèdent celles sur le revenu, mais leur objectif est explicitement de définir un seuil de revenu acceptable pour les populations d'intérêt.

Parallèlement à ces avancées, les systèmes d'information statistique administrative sur les revenus se développent, notamment avec la création des impôts sur le revenu dans la plupart des pays industrialisés. Ce sont les premières bases de données dont l'objectif est de décrire les revenus sur l'ensemble du territoire national, mais initialement pas forcément sur l'ensemble de la distribution des revenus. A la différence des enquêtes sur la consommation et le revenu, plus fréquemment à destination des populations pauvres, les informations administratives se concentrent initialement sur les plus hauts revenus, qui sont la cible de l'impôt ([Hill, 1894](#); [Dunbar, 1894](#); [André and Guillot, 2014](#)). Cela permet notamment les premières analyses statistiques sur l'évolution des hauts revenus par [Kuznets \(1953\)](#). Au fur et à mesure de l'élargissement de ces impôts, la description de l'ensemble de la distribution des revenus par ces bases administratives devient de plus en plus précise. Les systèmes d'informations sur les composantes du revenu deviennent de plus en plus complets et intégrés : ils permettent, comme en France, des appariements individuels décrivant des portions de plus en plus précises du revenu (prestations sociales, pensions de retraite) ([INSEE, 2021](#)).

C'est en 1940 qu'est lancée la première étude statistique nationale sur les revenus aux États-unis, par le biais du recensement décennal ([National Archives, 2022](#)). Cela se fait par le biais d'un questionnaire sur les revenus perçus par le ménage au cours des douze derniers mois. En 1956, en France, l'Insee lance sa première étude statistique sur les revenus des ménages, qui consiste à joindre les déclarations fiscales de l'ensemble des membres d'un même ménage du recensement ([INSEE, 1963](#)). Les études sur les revenus

en France sont encore aujourd’hui menées sur ce modèle². De manière générale, l’ensemble des pays industrialisés a commencé à produire et exploiter des distributions du revenu des ménages à partir de la seconde moitié du XX^e siècle ([United Nations, 1981](#)). Ces enquêtes à visée représentative nationale ont alors une fréquence de plus en plus régulière. Usant de la méthodologie statistique, elles se basent sur des échantillons représentatifs pour décrire l’ensemble de la distribution des revenus de la population.

Les méthodes

L’amélioration de ces sources de données sur les revenus se fait de manière concomitante avec des avancées méthodologiques pour l’analyse des inégalités économiques. D’une part, la littérature économique foisonne d’indicateurs d’inégalité permettant de mesurer précisément certaines propriétés de la distribution des revenus ([Atkinson, 1970; Sen, 1976; Kakwani, 1980](#)). D’autre part, le développement de techniques algorithmiques d’imputation et de microsimulation permet d’élargir le périmètre du revenu ou d’en faire varier certaines composantes selon différentes hypothèses d’évolution³.

De plus, des efforts méthodologiques importants sont menés pour accroître la pertinence et la comparabilité des mesures de revenu. Un des efforts majeurs est le rapport du groupe de Canberra ([Canberra Group, 2001](#)). Ce rapport, rédigé après de multiples rencontres internationales d’experts, érige des lignes directrices pratiques et conceptuelles pour la mesure du revenu des ménages. Cet ensemble de recommandations, également connu sous le nom de « Manuel de Canberra », fait encore aujourd’hui référence parmi les producteurs et utilisateurs de données sur les revenus. Il détermine l’ensemble des composantes à prendre en compte pour définir le revenu disponible et le niveau de vie, élabore des recommandations sur les comparaisons internationales, la présentation des résultats, etc. Toutes ces préconisations ont pour objectif de faire du revenu la meilleure mesure possible du « bien-être économique ». Le rapport de la « Commission sur la mesure des performances économiques et du progrès social » ([Stiglitz, Sen, and Fitoussi, 2009](#)), même si principalement destiné aux dirigeants et concepteurs de politique publique, émet des recommandations sur la mesure des indicateurs économiques. Il appuie cette notion du bien-être, en parlant plus généralement de « *quality of life* », et recommande notamment de porter une attention particulière au patrimoine, aux services non-marchands et au loisir en conjonction avec le revenu.

Une des avancées les plus récentes dans la standardisation des mesures des revenus est la production de comptes nationaux distribués ([Alvaredo et al., 2020; Coli et al., 2022; André, Germain, and Sicsic, 2023](#)). L’objectif est de partir des flux de la comptabilité

²Nous mobilisons cette série d’enquêtes (ERF et ERFS) depuis leur millésime 1970 dans le chapitre 2 « Les déterminants de l’évolution des inégalités de revenu ».

³La forme actuellement la plus aboutie de ces techniques d’élargissement du revenu se retrouve dans des travaux tels que ceux de la redistribution élargie ([André, Germain, and Sicsic, 2023](#)) ou des comptes nationaux distribués ([Piketty, Saez, and Zucman, 2017; Alvaredo et al., 2020](#)), voir *infra*.

bilité nationale et de distribuer l'ensemble du revenu national aux ménages, le long de la distribution des revenus. Cette approche tire parti des dernières avancées techniques en matière de sources de données et de méthodes d'imputation. La promesse de ce rapprochement de la comptabilité nationale avec l'approche distributionnelle est ainsi de produire le « meilleur des deux mondes » : une mesure standardisée, exhaustive, comparable nationalement telle que la comptabilité nationale, d'un indicateur distribué qui permet d'analyser les inégalités.

Les bases de données internationales

Une autre facette importante de l'amélioration des sources de données et des techniques statistiques, qui a été à la fois bénéficiaire et contributrice du consensus international sur les méthodes de mesure du revenu, est la mise en place de bases de données internationales comparatives.

Une des premières études comparatives sur la distribution des revenus des pays de l'Organisation de coopération et de développement économiques (OCDE) est réalisée en retraitant des données agrégées issues de sources nationales ([Sawyer and Wasserman, 1976](#)). Elle souffre cependant d'importants problèmes de comparabilité des concepts de revenu et des populations étudiées, et suscite notamment des critiques de la part de l'Insee en raison du classement de la France comme le pays le plus inégalitaire de l'échantillon ([Bégué, 1976](#)).

En 1983, les chercheurs Lee Rainwater, Gaston Schaber et Tim Smeeding mettent en place le Luxembourg Income Study, qui reste à ce jour la plus importante base internationale de micro-données sur le revenu⁴. L'objectif est de permettre des études internationales sur les inégalités de revenu et la pauvreté en améliorant au maximum la comparabilité des concepts, et en permettant aux chercheurs de manipuler librement des données de niveau individuel. Cette base, centrée au départ sur quelques pays de l'OCDE ([Smeeding, O'Higgins, and Rainwater, 1990](#)), n'a fait que s'étroffer, et rassemble aujourd'hui les données de plus de 50 pays sur une période allant des années 1960 à 2020 ([LIS, 2023](#)).

A partir du début des années 1990, les instituts statistiques nationaux des pays européens adoptent une approche plus intégrée, en mettant en place une enquête harmonisée sur les revenus et les conditions de vie (*European Community Household Panel*, ECHP). La comparabilité est ici assurée par l'établissement de règles guidant l'ensemble du processus, de la conception de l'enquête au calcul des indicateurs statistiques, en passant par le questionnaire et les méthodes de pondération des individus de l'échantillon. Ce dispo-

⁴C'est la base que nous mobilisons dans le chapitre 1 « L'impact sur les inégalités des taxes à la consommation ». Elle est particulièrement intéressante pour cet exercice car elle comporte des données de pays ayant des niveaux d'inégalités de revenus et des structures de systèmes de redistribution socio-fiscale très différents. Une base de données européenne, par exemple, donnerait à voir moins de diversité sur ces dimensions.

sitif est remplacé en 2003 par l'enquête *EU Statistics on Income and Living Conditions* (EU-SILC). La base de données porte aujourd'hui sur l'ensemble des 27 pays de l'Union européenne ainsi que sur quelques pays partenaires de la région⁵.

En dehors de ces bases de niveau individuel sur les revenus et la pauvreté, un ensemble d'institutions ont contribué à la mise en place de séries historiques et internationales. Ces bases sont généralement des sources de données « secondaires », c'est-à-dire qui agrègent des informations produites par d'autres enquêtes ou systèmes d'information, et présentent des difficultés de cohérence plus ou moins importantes ([Ferreira and Lustig, 2014](#)). L'OCDE, en collaboration avec les instituts statistiques nationaux, construit à partir de la fin des années 1990 son *Income Distribution Database*, une base de données centrée sur les pays de l'OCDE et quelques pays partenaires, agrégeant des données sur les revenus et la pauvreté par groupes sociaux et types de revenu. La Banque mondiale maintient également des tableaux de bords comparatifs sur les inégalités pour l'ensemble des pays du monde, principalement avec des indicateurs d'inégalités nationaux. Une base de données plus récente est constituée par le *World Inequality Lab* depuis 2011, centrée initialement sur les hauts revenus puis élargie à l'ensemble de la distribution. Son objectif est de construire les séries les plus exhaustives possibles en termes de champ historique et international, en décomposant l'ensemble du revenu national selon la méthode des comptes nationaux distribués.

Une place de plus en plus centrale dans l'analyse économique

Les avancées en matière d'innovation et de standardisation des concepts et méthodes de mesure du revenu ont ouvert la voie à de nouveaux champs de recherche en sciences économiques. D'une part, la recherche sur les inégalités et la pauvreté a été fortement stimulée par cet outil d'objectivation des situations économiques. D'autre part, le revenu a pris une place centrale dans l'analyse de la stratification de la société.

Comme objet d'étude à part entière

D'abord exprimées sous la forme de classes sociales, les inégalités économiques se sont progressivement exprimées sous l'angle des inégalités de revenu. La figure 1 illustre la place croissante qu'ont prise les inégalités de revenu dans le débat public, au cours des 150 dernières années. Elle montre la fréquence relative des expressions « classes sociales », « produit intérieur brut » et « inégalités de revenu » dans le corpus littéraire en langue

⁵Ces données sont mobilisées dans le chapitre 3 « Mesurer la grande pauvreté dans les pays développés ». Le haut niveau de comparabilité internationale et la richesse des questionnaires en font un matériau idéal pour une analyse fondée sur les conditions de vie des ménages pauvres.

anglaise telle que rassemblé et indexé par le projet Google Books Ngram Viewer (Michel et al., 2011). L'expression « classes sociales » est la seule des trois à avoir un usage significatif avant le milieu du XX^e siècle. L'usage de cette expression, bien que rare y compris dans les premières années suivant la publication du « Manifeste du parti communiste » par K. Marx et F. Engels, augmente graduellement, notamment à la suite de la Commune de Paris (1871), de la révolution russe de 1917, et du début de la guerre froide. Cette expression reste très dynamique jusque dans les années 1970, à partir desquelles son usage diminue relativement. Pendant cette période, les classes sociales sont ainsi le principal concept utilisé pour parler de la stratification sociale et des inégalités dans la société. Le terme de « produit intérieur brut » fait son apparition après-guerre, à la suite des avancées dans les méthodes de comptabilité nationale. Cet indicateur est longtemps l'indicateur hégémonique de la performance économique des États. Le terme d'« inégalités de revenu », de son côté, ne devient significatif qu'à partir des années 1960, et son usage n'a fait que croître, particulièrement à partir du milieu des années 1990. Ce n'est que dans les années récentes (depuis la fin des années 2010) que son usage supplante celui de « produit intérieur brut ».

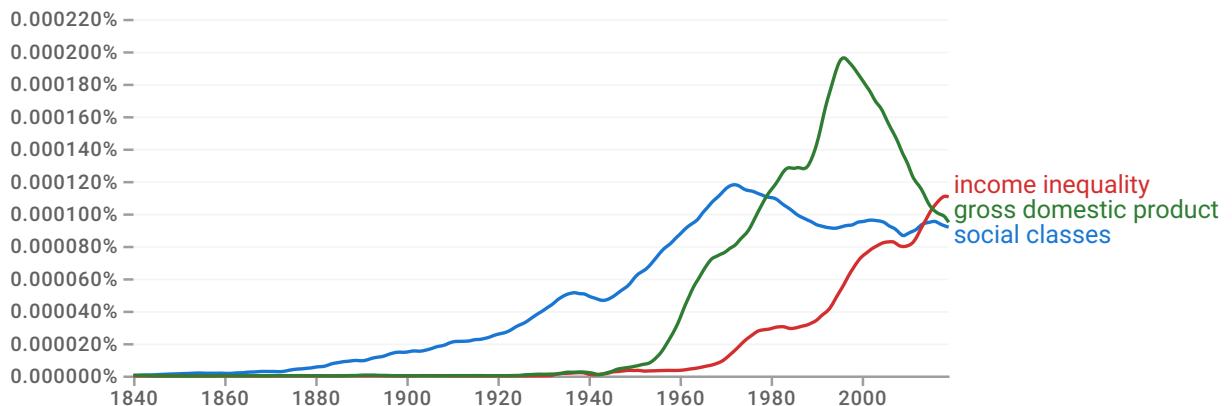


FIGURE 1 : Fréquence des expressions « classes sociales », « produit intérieur brut » et « inégalités de revenu » dans la littérature en langue anglaise

Source : Google Books Ngram Viewer, <http://books.google.com/ngrams>.

A partir du début des années 2000, un pan entier de la recherche en économie empirique se concentre sur l'étude de l'évolution des revenus sur longue période. Ces efforts ont notamment été initiés par Thomas Piketty et coauteurs, avec des études d'abord centrées sur les hauts revenus (Piketty, 2001), et concernant en premier lieu la France (Piketty, 2003) et les États-Unis (Piketty and Saez, 2003). Initialement centrés sur les revenus déclarés, c'est-à-dire avant impôts, ils ont été élargis à l'étude du revenu après redistribution (Bozio et al., 2022). Ces travaux ont montré que le revenu était un des outils les plus aboutis pour analyser de manière cohérente et en termes quantitatifs l'évolution dans le temps de la stratification de la société, et ont ouvert la voie à un ensemble de travaux de production et d'analyse de séries longues nationales sur les revenus.

Une autre facette de l'expansion continue du champ couvert par l'étude des revenus est l'étude d'une distribution mondiale des revenus, principalement popularisée par

[Milanovic \(2012\)](#). Cette approche rassemble dans une même distribution de revenus les populations des différents pays, et met donc sur la même échelle d'analyse, par exemple, les classes populaires occidentales et les classes aisées chinoises. Elle a donné naissance à la fameuse « courbe de l'éléphant », qui montre qu'entre 1998 et 2008, le 80^e percentile de la distribution des revenus mondiale est celui qui a le moins augmenté. Cela a mené à une lecture de la mondialisation comme ayant engendré le déclassement au niveau mondial des classes moyennes occidentales, relativement aux classes moyennes supérieures chinoises, brésiliennes et indiennes.

Comme dimension d'analyse des autres phénomènes

Si les inégalités de revenus se sont développées en tant que champ de recherche académique à part entière, elles se sont également immiscées dans de nombreux autres champs académiques et politiques. La place centrale de la mesure du revenu et des inégalités a notamment été renforcée dans le rapport de la commission [Stiglitz, Sen, and Fitoussi \(2009\)](#). Il promeut l'utilisation d'indicateurs alternatifs au produit intérieur brut, pour mieux prendre en compte les différentes dimensions de la qualité de vie. Le bien-être économique des ménages et son inégale répartition deviennent ainsi un indicateur de la performance économique des États, une prérogative jusqu'alors réservée au produit intérieur brut, c'est-à-dire à la mesure de l'appareil productif national.

De nombreux champs de recherche en sciences sociales font maintenant appel au revenu en tant que facteur explicatif ou dimension d'analyse. Ces travaux mettent en évidence les corrélations entre le revenu et d'autres caractéristiques du monde social, y compris pour des éléments qui n'étaient pas forcément abordés avec un angle monétaire. On a montré que le nombre de morts du COVID-19 dans un pays était lié à son niveau d'inégalités de revenus ([Wildman, 2021](#)) ; on a calculé les inégalités d'émission de CO₂ le long de la distribution de niveau de vie ([Chancel, 2022](#)) ; on a exposé des différences d'espérance de vie selon le niveau de vie ([Blanpain, 2018](#)), etc.

C'est surtout en évaluation des politiques publiques, et en particulier des politiques socio-fiscales, que le revenu est devenu un critère déterminant. Cela s'est fait principalement avec le développement des techniques de microsimulation, au départ développées par les administrations publiques, puis progressivement prises en main par les laboratoires de recherche académiques ([Bessis and Cotton, 2021](#)). Ces techniques permettent ainsi de mesurer l'équité d'une politique publique de manière instantanée, en vérifiant la manière dont son application déformerait la distribution des revenus. Les mesures du gouvernement français, en particulier, sont régulièrement analysées sous ce prisme-là, afin d'en faire le « bilan redistributif » ([Dutronc-Postel et al., 2022; Buresi et al., 2022; Madec, Plane, and Sampognaro, 2023](#)).

Au-delà de leur évaluation, la mesure statistique du revenu peut même servir à la

conception des politiques publiques. Si les prestations sociales sous condition de revenus en sont l'application la plus directe, il peut aussi servir à des politiques publiques plus globales. Les quartiers prioritaires de la politique de la ville en sont un exemple. Ce sont des territoires de niveau infra-communal déterminés administrativement sur la base d'un unique critère statistique : le revenu moyen par habitant. Ces territoires de bas revenu sont ensuite la cible d'un ensemble de politiques publiques visant à réduire les inégalités, centrées non pas sur les revenus mais sur l'emploi, l'éducation, la culture, etc. ([Chaline, 2014](#)).

Le revenu, et en particulier les inégalités de revenu, sont devenus des éléments centraux dans l'analyse économique de la société et la conception de politiques publiques. L'importance de bien le mesurer s'en retrouve accrue, ce qui nécessite de se poser la question de la réalité que l'on cherche à saisir à travers cette définition : difficultés de vie, pauvreté, répartition équitable des ressources nationales, insertion économique dans la société, etc.

Des difficultés persistantes dans sa mesure

Plusieurs obstacles subsistent pour obtenir une mesure pertinente du revenu. D'une part, il s'agit de bien choisir et bien mesurer ses différentes composantes (revenus d'activité, revenus du patrimoine, prestations sociales, etc.). Dans l'étude des inégalités, le fait que certains revenus soient mal mesurés ou omis est en effet problématique dans la mesure où ces revenus catégoriels ne représentent pas la même proportion du revenu pour l'ensemble des ménages.

D'autre part, il s'agit de définir les bonnes échelles auxquelles agréger ces revenus. Il faut donc définir la bonne unité d'intérêt (l'individu ou le ménage), la bonne règle pour comparer le revenu de ces unités (échelles d'équivalence), et la bonne période de référence pour compter le revenu.

Nous verrons que ces choix ne sont pas seulement d'ordre méthodologique, mais également d'ordre conceptuel : il ne s'agit pas seulement de trouver la meilleure manière de mesurer une chose, mais également de trouver la meilleure "chose" à mesurer selon le problème que l'on se pose.

Quels flux agréger ?

Le revenu étant une agrégation de flux de différentes catégories, une des premières difficultés qui se présente est la bonne mesure de l'ensemble des flux, qui sont d'origine et de nature différentes. Il est important de mesurer de manière précise l'ensemble de ces flux afin de rendre comparable les niveaux de vie de ménages dont les sources de revenu varient. Le manuel de Canberra donne une liste des catégories de revenu qui posent régulièrement des problèmes de mesure ([Canberra Group, 2011](#)) :

- Les rémunérations en nature
- Les revenus du travail indépendant
- Les revenus de la propriété (capital mobilier ou immobilier)
- L’auto-consommation
- Les transferts entre ménages
- Les prestations sociales en nature

Ces types de revenus ont en commun qu’ils peuvent être difficiles à valoriser car leur perception et leur consommation ne font pas intervenir de transaction monétaire (rémunération en nature, auto-consommation, prestations sociales en nature), ou qu’ils sont difficiles à mesurer car les sources de données les concernant sont rarement disponibles de manière exhaustive à un niveau individuel (transferts entre ménages, revenus de la propriété), ou encore parce qu’il est parfois difficile de déterminer qui sont les bénéficiaires de ces revenus (transferts entre ménages, revenus du travail indépendant, revenus de la propriété).

Certains de ces flux sont problématiques car ils représentent une part importante du revenu de certaines catégories de la population. En particulier, la mauvaise mesure des revenus du travail indépendant peut conduire à sous-estimer de manière importante le niveau de vie des travailleurs concernés, surestimant leur niveau de pauvreté pour une partie d’entre eux. De même, les étudiants, quand ils sont décohabitants, reposent en grande partie sur une aide de leurs parents pour vivre, que celle-ci soit monétaire ou non-monétaire via le paiement d’un loyer, de vêtements, etc. ([Castell et al., 2016](#)). Ne pas prendre en compte ces revenus donnerait une idée faussée de leur niveau de vie relativement au reste de la population.

La non-prise en compte des prestations sociales en nature, en particulier, peut impacter la vision des inégalités, potentiellement de manière importante : [André, Germain, and Sicsic \(2023\)](#) estiment qu’en France en 2019, la moitié de la redistribution est issue de transferts en nature, principalement l’éducation, la santé et le logement social. La mesure de ces différents éléments est cependant difficile, car souvent indisponible dans les enquêtes ou données administratives. Par ailleurs, la question de leur valorisation n’est pas triviale : la valeur d’un service d’éducation fourni par un professeur fonctionnaire est-elle ce qu’il coûte à la collectivité (c’est-à-dire son salaire), ce qu’il coûterait aux parents d’élève dans un système privé, ou encore autre chose ?

Au-delà de la difficulté de les valoriser ou de les attribuer, d’autres flux font débat quant à la nécessité de les inclure ou non dans la définition du revenu. C’est le cas des revenus non distribués des entreprises, qui font l’objet de conventions diverses ([André and Blanchet, 2021](#)). Si ces revenus ne sont pas (par définition) perçus par les ménages et ne peuvent pas être consommés, ces flux semblent bien contrôlés par les propriétaires des entreprises, et peuvent être remplacés par de véritables revenus au gré des évolutions fiscales. De plus, ces revenus étant très concentrés, leur inclusion ou leur omission ne sera

pas neutre sur la mesure des inégalités. Les services domestiques produits et consommés au sein du ménage, par ailleurs, ne sont pas inclus dans le cadre central de la comptabilité nationale, alors qu'ils représentent une part non négligeable de la consommation et que ce type de services peut être marchandisé à des niveaux variables selon le pays ou la période (Poissonnier and Roy, 2017). Les loyers imputés, s'ils sont inclus dans la comptabilité nationale, sont pourtant rarement inclus dans les mesures du niveau de vie, alors que leurs effets sur les inégalités peuvent être significatifs et varier grandement entre les pays, selon les taux de propriétaires et l'importance du logement social (Figari and Paulus, 2015).

Comment les agréger ?

Une fois que les types de flux à inclure dans le revenu ont été identifiés et sont mesurés de manière satisfaisante, reste à déterminer comment les agréger pour avoir une définition du revenu pertinente. Ces revenus doivent-ils être agrégés au niveau de l'individu ou de son ménage ? Dans le second cas, comment comparer le revenu de ménages de tailles et de compositions différentes ? Enfin, quelle période de référence se donner pour agréger ces revenus ?

L'unité d'agrégation utilisée dans les études sur les inégalités est généralement celle du ménage. Par hypothèse, on considère que les membres d'un même ménage mettent en commun leurs ressources et participent de manière égale à la consommation. En France, cette convention est également mobilisée dans la construction des barèmes des prestations sociales, qui prennent en compte les revenus de l'ensemble des membres du ménage. Cette mise en commun n'est cependant pas toujours complète, comme des résultats économiques et ethnographiques le montrent⁶. Dans la statistique publique, la nécessité de mieux comprendre le partage intra-familial des ressources a été récemment prise en compte dans les enquêtes sur les conditions de vie d'Eurostat, notamment via l'individualisation de certains indicateurs de privations matérielles et sociales, qui font apparaître des différences genrées (Guio et al., 2016). Par ailleurs, les contours des ménages peuvent être flous, avec des situations de semi-cohabitation (gardes alternées, étudiants semi-décohabitants, couples avec deux résidences, etc.). Ces situations peuvent se gérer de diverses manières, avec une mise en commun partielle des ressources et des dépenses, des transferts entre ménages, etc.

Ces éléments sont d'autant plus importants que les formes de ménages évoluent : le modèle du couple hétérosexuel où l'homme est apporteur de ressources principal pour l'ensemble du ménage n'est plus omniprésent (Daguet, 2017). Par ailleurs, les ménages qui fonctionnent sur le modèle de la spécialisation conjugale le font souvent au détriment

⁶Roy (2006) montre par exemple que les dépenses des ménages hétérosexuels sont genrées, c'est-à-dire que certains achats augmentent plus quand le salaire de l'homme augmente, tandis que d'autres augmentent plus quand le salaire de la femme augmente.

des perspectives salariales des femmes ([Meurs, Pailhé, and Ponthieux, 2010](#)), ce qui entraîne des inégalités de niveau de vie importantes en cas de séparation ([Bonnet, Garbinti, and Solaz, 2021](#)). Ce modèle continue pourtant d'influencer fortement les conventions de mesure des statistiques sociales, et le débat public récent a montré que ces conventions nécessitent d'être actualisées dans le champ des politiques publiques : en France, l'allocation aux adultes handicapés (AAH) a été déconjugalisée en 2023 à la suite d'un débat public animé, portant justement sur le sujet de la mise en commun des ressources du ménage, et l'autonomie financière de ses membres⁷.

En admettant l'hypothèse de mise en commun des ressources du ménage, se pose la question de comment comparer le revenu de ménages de tailles et de compositions différentes. Les besoins d'un couple ou d'une famille de quatre sont en effet supérieurs à ceux d'une personne seule, mais ne sont pas forcément proportionnels au nombre de personnes dans le ménage, en raison d'économies d'échelles. Différentes conventions existent pour répondre à ce problème : quand les enfants ne sont pas écartés de l'équation (via ce qu'on appelle une division égale entre les adultes), on recourt généralement à des échelles d'équivalence, ce qui est recommandé dans [Canberra Group \(2011\)](#). Cela peut se faire via l'application d'une fonction concave au nombre de personnes dans le ménage (telle que la racine carrée), ou le calcul d'unités de consommation qui attribuent un poids moins important aux adultes supplémentaires ainsi qu'aux enfants. Le bon niveau des unités de consommation est cependant difficile à estimer, et il peut varier dans le temps ou selon les configurations familiales. Certains travaux fondés sur des appréciations subjectives de leur budget par les ménages mettent ainsi en évidence que les unités de consommation de l'OCDE modifiée sous-estiment actuellement les besoins des familles monoparentales ([Martin and Périvier, 2018](#)).

Une autre problématique plus rarement discutée de la mesure du revenu est celle de la période de référence. La référence communément admise est celle de l'année en cours : on y agrège tous les revenus et tous les prélèvements qui concernent le ménage à ce moment-là. Ce faisant, on gomme des singularités qui peuvent exister à l'intérieur de cette période. Cela est d'autant plus problématique dans la mesure des inégalités que les ménages les plus pauvres ont un rapport à l'avenir plus incertain et doivent plus souvent gérer des problèmes de trésorerie ([Morduch and Schneider, 2017](#)). En effet, les mécanismes permettant de lisser sa consommation relativement aux chocs de revenu, tels que l'épargne et l'accès aux crédits, sont inégalement répartis le long de la distribution. [Papuchon and Duvoux \(2019\)](#) affirment ainsi, en s'appuyant sur le sentiment subjectif de pauvreté, que le revenu annuel masque une dimension fondamentale de la pauvreté, qui est celle du rapport au temps et à l'avenir. A l'inverse, une littérature plus économique met l'accent sur la nécessité de mesurer le revenu sur une période de temps beaucoup plus longue, de manière à capter un

⁷L'AAH est une prestation sociale sous conditions de revenu pour les personnes reconnues handicapées. Jusqu'en 2023, le revenu de référence pour évaluer l'éligibilité à l'allocation était celui du ménage entier, rendant de nombreuses personnes inéligibles car vivant avec un partenaire percevant des revenus.

sous-jacent, le revenu permanent, qui serait plus représentatif du niveau de vie du ménage que son revenu annuel « instantané ». Ces approches seraient notamment justifiées par la grande mobilité des ménages à un horizon d'un an dans la distribution des niveaux de vie. Ainsi, une part importante des personnes mesurées comme pauvres au sens monétaire une année donnée ne le sont plus l'année d'après (Blavier, 2023). Le revenu annuel reste très majoritairement utilisé, principalement pour des raisons pratiques, les informations de revenu infra-annuelles et celles de plus long terme étant rarement disponibles pour un même ménage.

De multiples interprétations en tension

Le revenu et le niveau de vie posent plusieurs problèmes de mesure, et des réponses méthodologiques conceptuellement différentes peuvent y être apportées. Cela est lié au fait que le revenu est par nature polysémique, et qu'il peut être utilisé pour répondre à des questions différentes, donnant lieu à des interprétations parfois incompatibles de la nature du revenu.

Cette section montre qu'on peut distinguer au moins deux acceptations assez différentes du revenu : une de nature plus sociologique liée au bien-être économique du ménage, et l'autre de nature plus macroéconomique liée à la répartition des revenus au sein de l'économie. De plus, même défini de manière à répondre à ces deux problèmes distincts, la mesure des inégalités de revenu manque une partie de la réalité qu'elle prétend éclairer, faisant apparaître le besoin d'outils complémentaires à cette mesure.

Considérer le revenu comme une mesure du bien-être économique du ménage amène à rompre avec une acceptation plus macroéconomique du revenu. Dans l'approche bien-être, l'utilisation d'échelles d'équivalence pour passer au « niveau de vie » est fondamentale, car elle tient compte des besoins du ménage, qui varient selon sa composition. Ces échelles d'équivalence introduisent cependant une rupture avec d'autres concepts de revenu : la somme des niveaux de vie des ménages n'est pas égale au revenu perçu par l'ensemble des ménages, tel qu'on pourrait le mesurer par exemple dans la comptabilité nationale. La diminution moyenne de la taille des ménages (les gens vivent plus souvent seuls ou avec moins d'enfants) engendre même, en raison des échelles d'équivalence, une baisse du niveau de vie moyen, à revenu par tête constant⁸. Si le concept de niveau de vie est nécessaire pour se rapprocher de la notion de bien-être économique et est particulièrement important pour les questions de mesure de la pauvreté, cela se fait au prix d'une incompatibilité avec la notion comptable du revenu, qui vise à mesurer les flux perçus par les différents acteurs

⁸Cela se comprend facilement en imaginant le cas d'une séparation : deux adultes, en vivant dans le même ménage et en mettant en commun leurs revenus, ont un niveau de vie égal à la somme de leurs revenus divisée par 1,5 (le nombre d'unités de consommation pour deux adultes selon l'échelle d'équivalence de l'OCDE modifiée). En se séparant, chacun dispose de son revenu et la moyenne de leurs niveaux de vie est donc égale à la somme de leurs revenus divisée par 2.

de l'économie.

En outre, même adapté par des échelles d'équivalence, le revenu reste une mesure incomplète du bien-être économique. D'une part, par des effets d'habituation ou de cliquet, les seuils de revenu nécessaires pour « joindre les deux bouts » ou « être riche » déclarés dans les enquêtes augmentent significativement à mesure que le revenu de l'enquêté augmente. Cela complexifie la relation entre revenu et bien-être. D'autre part, des éléments hors du champ du revenu vont moduler cette relation. C'est le cas du patrimoine et de l'accès au crédit, dont l'accès est inégalitaire et qui permettent de compléter le revenu. Mais les besoins et coûts peuvent aussi varier en fonction des ménages, selon l'âge, l'état de santé, la localisation et le mode de vie. Il semble ainsi nécessaire de compléter la vision donnée par le niveau de vie par des variables complémentaires : c'est une des fonctions des privations matérielles et sociales qui, bien que très liées au revenu, peuvent affecter très différemment des ménages de revenu équivalent.

Les approches fondées sur la distribution du revenu national (CND ou DINA⁹), en conservant leur compatibilité avec la comptabilité nationale, permettent de leur côté de répondre à une question plus comptable : quelle est la « part du gâteau national » perçue par les différents ménages ? Répondre à cette question permet de mesurer des éléments structurants de nos sociétés, notamment la part socialisée du revenu national et la manière dont celle-ci est distribuée. Cette approche permet ainsi de comparer les différents groupes de la société à l'aune de leur « surface économique » dans la distribution des revenus, c'est-à-dire leurs pouvoirs relatifs sur les flux économiques, ce qui est particulièrement éclairant dans une vision dynamique pour analyser l'évolution des rapports de force dans la société.

En tant qu'outil d'analyse de la structure de la société, s'il permet de faire une synthèse des dynamiques économiques et sociales par une mesure quantitative, le revenu reste un concept complexe, qui ajoute une couche d'abstraction à l'étude des inégalités. Le niveau et l'évolution de ces indicateurs résultent ainsi de phénomènes aussi différents que la situation sur le marché du travail, la composition du ménage, les prestations sociales, les prélèvements, etc. Il ne faut donc pas perdre de vue ces phénomènes sous-jacents : une stagnation du niveau de vie peut cacher par exemple une montée massive du chômage, mais un fonctionnement à plein régime des amortisseurs sociaux. Cette stagnation apparente cachera alors des phénomènes sociaux très marquants et aux effets potentiellement inégalitaires. L'étude de la distribution des revenus, même si instructive en soi, nécessite des outils d'analyse qui permettent de comprendre les dynamiques sociales, économiques, politiques.

Comment penser le revenu en termes de bien-être si on ne prend pas en compte les éléments non-monétaires ? Comment traduire le revenu par une capacité à consommer si on ne prend pas en compte l'accès différencié à certains biens et services et les différences de prix locales ? Comment le traduire par une « part du gâteau » si on inclut des échelles

⁹Respectivement « comptes nationaux distribués » et « *distributional national accounts* ».

d'équivalence ? Dans toute étude mobilisant le revenu, il convient donc de s'assurer de ce que l'on cherche à capter via cet indicateur. Cela peut être une mesure de l'aisance financière, du bien-être économique, de la capacité à satisfaire ses besoins et ses désirs, selon une approche plus « sociologique ». Mais cela peut également être une mesure du pouvoir économique des différents acteurs, ou de la répartition des flux du revenu national, selon une approche plus « économique ». Les efforts méthodologiques visant à réconcilier et expliquer les écarts entre ces approches sont précieux, mais celles-ci persistent à avoir une certaine autonomie l'une vis-à-vis de l'autre.

Présentation des chapitres

Les trois chapitres présentés dans ce manuscrit contribuent à la connaissance dans le domaine des inégalités de revenus, en apportant des éléments de réponse sur les sujets qui ont été soulevés dans cette introduction. Ils sont indépendants les uns des autres.

Dans la suite, nous reprenons à notre compte le principe de « toutes les mesures sont fausses, mais certaines sont utiles », en conservant le niveau de vie comme principale mesure, mais en allant au-delà : nous étendons sa définition, décomposons sa distribution, et y apportons une mesure complémentaire.

Dans le chapitre 1 « l'impact sur les inégalités des taxes à la consommation », le niveau de vie est augmenté par une estimation des taxes à la consommation payées par les ménages. Cela donne à voir des inégalités de revenu plus élevées, et un pouvoir redistributif des systèmes socio-fiscaux amoindri. Cela précise également les comparaisons internationales sur ces deux dimensions, car l'impact des taxes à la consommation varie significativement entre les pays, bien qu'il ne remette pas en cause les classements déjà connus en matière d'inégalité.

Le chapitre 2 « les déterminants de l'évolution des inégalités de revenu » ouvre la boîte noire du niveau de vie pour mettre en lumière les phénomènes sociaux et économiques qui contribuent à l'évolution des inégalités de niveaux de vie monétaires. Il permet de mieux comprendre les évolutions de la distribution des revenus en mesurant les contributions relatives de l'évolution de la structure de la société, d'une part, et de la composition des revenus des ménages, d'autre part. Les variations des revenus du travail et des pensions sont les principaux déterminants des inégalités sur la période, tandis que les évolutions des configurations familiales induisent moins fortement, mais continûment, une hausse des inégalités sur la période.

Le chapitre 3 « mesurer la grande pauvreté dans les pays développés » propose de compléter le revenu par une autre mesure du bien-être économique : les privations matérielles et sociales. Il montre que l'usage d'une telle mesure alternative est nécessaire pour identifier les situations de grande pauvreté, là où le revenu seul ne suffit pas. Plus

précisément, les personnes qui cumulent le fait d'avoir un faible revenu et de nombreuses privations matérielles sont celles qui subissent les plus grandes difficultés économiques et qui restent le plus longtemps dans cette situation.

Chapitre 1 : l'impact sur les inégalités des taxes à la consommation¹⁰

Le Chapitre 1 développe une méthodologie originale pour intégrer les taxes à la consommation, telles que la taxe sur la valeur ajoutée (TVA), aux comparaisons internationales sur les inégalités de revenu et la redistribution. Ce faisant, il présente un panorama inédit de la variation de l'effet de ces taxes sur les inégalités dans le temps et entre les pays, par une analyse couvrant 26 pays et une période de plus de 40 ans.

Les taxes à la consommation représentent une part importante des revenus des états (en moyenne un tiers des recettes des pays de l'OCDE). Payées par les ménages lors de leur consommation, leur impact est pourtant rarement intégré à la mesure des inégalités et de la redistribution. C'est encore moins le cas dans les comparaisons internationales, alors que le montant et la structure de ces taxes peuvent varier de manière importante entre les pays.

Il est connu que la propension à consommer des ménages diminue à mesure que l'on monte dans la distribution des revenus. Les taxes à la consommation représentent donc une part du revenu plus importante pour les ménages les plus pauvres que les plus aisés. Pour cette raison, on peut dire que les taxes à la consommation sont distribuées de manière régressive par rapport au revenu¹¹.

Dans ce travail, nous mobilisons la base de données du LIS (Luxembourg Income Survey) sur les revenus et la consommation des ménages pour calculer la variation de la propension à consommer selon la distribution des revenus pour 26 pays. Pour palier les cas où la consommation n'est pas disponible dans les enquêtes, nous développons un modèle d'imputation à partir de l'échantillon d'enquêtes pour lesquelles la consommation est connue. Ce modèle permet d'imputer des distributions de consommation en fonction du revenu et d'autres caractéristiques du ménage.

Nous utilisons ensuite les données de comptabilité nationale de l'OCDE sur la consommation, les revenus et les recettes fiscales des taxes à la consommation. Ces données permettent, d'une part, de compléter les enquêtes pour les rendre comparables en niveau entre elles, et d'autre part, de calculer des taux implicites de taxe à la consommation.

¹⁰Ce chapitre est basé sur un article co-écrit avec Elvire Guillaud et Michaël Zemmour, publié dans le *Journal of Public Economics* ([Blasco, Guillaud, and Zemmour, 2023](#)).

¹¹Il faut toutefois garder en mémoire que ces taxes sont dans de nombreux pays distribuées de manière progressive par rapport à la consommation, car les taux peuvent être modérés de manière à ce que le panier de consommation moyen des ménages pauvres soit en moyenne taxé moins fortement que celui des ménages les plus aisés.

Ces taux sont calculés de manière à être le taux moyen de taxe à la consommation dans le pays et l'année considérée.

En combinant les informations microéconomiques de revenu et de consommation issues des enquêtes, et les informations macroéconomique de revenu, de consommation et de recettes de taxes issues des données de comptabilité nationale, nous obtenons une distribution des taxes à la consommation payées par les ménages. Cela permet de construire une définition du revenu « post-taxes à la consommation », en retranchant du revenu disponible du ménage les taxes à la consommation payées par celui-ci.

Nous montrons d'une part, que les taxes à la consommation représentent effectivement une part de moins en moins importante du revenu, à mesure que l'on monte dans la distribution : en moyenne, elles représentent une part du revenu près de deux fois plus importante pour les ménages en dessous de la médiane des revenus que pour les ménages dans les 10 % les plus aisés.

D'autre part, en mesurant le niveau d'inégalité dans la distribution des revenus post-taxes à la consommation, nous montrons que ces taxes augmentent significativement les inégalités. En moyenne, en comparant cet effet à l'effet redistributif des impôts directs et des prestations sociales, les taxes à la consommation compensent un tiers de la redistribution socio-fiscale.

Enfin, cet effet des taxes à la consommation sur les inégalités varie grandement entre les pays. Cela est principalement dû aux différences de taux de taxes à la consommation appliqués dans les différents pays : dans notre échantillon, le taux moyen de taxe varie de 7 à 30 %.

L'intérêt de ce travail est de mettre en lumière le coût distributif des taxes à la consommation. Il est d'autant plus important de les prendre en compte que les pays qui redistribuent le plus via leurs prestations sociales sont généralement aussi ceux qui ont les taxes à la consommation les plus importantes. Cet effet n'est toutefois pas de nature à changer le classement en matière d'inégalités entre des pays traditionnellement très inégalitaires et avec de faibles taxes à la consommation comme les Etats-Unis, et des pays moins inégalitaires et avec des fortes taxes à la consommation comme le Danemark.

Ce chapitre s'inscrit dans l'ambition d'exhaustivité de la mesure du revenu, qui consiste à y adjoindre le plus de composantes possibles, ceci afin d'avoir une vision plus complète des flux de revenus dans la société, et afin d'améliorer la comparabilité des mesures entre les pays. Le modèle d'imputation pourrait aussi tout à fait être utilisé dans la construction de comptes nationaux distributionnels, en particulier dans les cas où le manque de données rend difficile l'attribution des taxes à la consommation aux ménages.

Chapitre 2 : les déterminants de l'évolution des inégalités de revenu¹²

Le Chapitre 2 présente une analyse de l'évolution des inégalités de niveau de vie en France entre 1970 et 2019, qui évalue la contribution des différents phénomènes démographiques, sociaux et économiques ayant transformé la distribution des niveaux de vie sur cette période. En mesurant l'impact de l'évolution de la structure de la population, d'une part, et de la composition des revenus, d'autre part, sur l'évolution des inégalités, cette analyse fait le lien entre les études sur la composition socio-économique de la population et les études sur la distribution du revenu.

Pendant les cinquante dernières années, la société et l'économie françaises ont connu de nombreux changements structurels majeurs. Une partie de ces changements est commune à l'ensemble des pays développés : vieillissement de la population, participation croissante des femmes au marché du travail, augmentation du chômage, diminution de la taille des ménages, polarisation du marché du travail... Tandis que d'autres ont été plus spécifiques à la France, comme la sortie massive de la pauvreté des retraités grâce à la montée en charge du système de retraites.

Il existe une grande littérature économique et sociologique qui rend compte de ces différents phénomènes. De même, l'évolution de la distribution des revenus en France et dans les autres pays développés durant cette période commence à être de mieux en mieux connue. A cet égard, la France a connu une baisse importante des inégalités jusque dans les années 1990 comme la plupart des pays développés, puis une remontée des inégalités, même si moins forte qu'ailleurs.

Peu de travaux permettent cependant de faire le lien entre les changements dans la structure de la population du point de vue des types de famille, de l'âge et des métiers et ceux des inégalités de revenu. Parmi tous ces phénomènes, tous ont-ils joué dans le même sens et quels ont été les plus importants sur l'évolution des indicateurs d'inégalité ?

Pour répondre à cette question, ce travail mobilise les enquêtes Revenus fiscaux et Revenus fiscaux et sociaux de l'INSEE, de 1970 à 2019. Ces données consistent en un appariement de données d'enquête (d'abord enquête du Recensement, puis enquête Emploi) et de données administratives sur les revenus, issues de sources fiscales puis également des données des caisses d'allocations. La période 1970-2019 est découpée en plusieurs sous-périodes successives au sein desquelles nous mesurons l'effet des différents déterminants de l'évolution des revenus.

La méthode utilisée pour analyser l'évolution des revenus entre une date 1 et une date 2 tire parti de l'important échantillon de ces enquêtes et des informations précises qu'elles comprennent sur la composition des ménages et leurs revenus. Elle consiste à modifier l'échantillon représentatif de la période 1 pour que sa structure en termes de compositions

¹²Ce chapitre est basé sur un article co-écrit avec Clément Carbonnier.

familiales, de métiers, de salaires, de pensions, etc. soit la même qu'en période 2. Cette modification se fait par étapes : nous modifions d'abord la structure des types de ménage, puis celle des métiers, etc. A chaque étape, les indicateurs d'inégalités des revenus sont recalculés, de manière à isoler l'effet d'une variable sur la distribution des revenus.

L'ensemble des déterminants pris en compte sont les compositions familiales, la part de retraités, les catégories socio-professionnelles, les revenus du travail, les pensions de retraite, les autres revenus primaires, les impôts directs et les prestations sociales.

Un des premiers résultats est que, à court et moyen terme, les évolutions des montants et de la distribution des salaires et des pensions ont un effet bien plus important sur les inégalités que les changements structurels de vieillissement de la population, de changement des métiers et de compositions familiales. Ces facteurs ont cependant un effet non négligeable sur l'évolution de long terme des inégalités. L'évolution des compositions familiales, avec notamment l'augmentation des familles monoparentales, contribue ainsi à une augmentation des inégalités et de la pauvreté sur la période.

De manière notable, nous montrons également que les facteurs qui ont mené à la baisse des inégalités durant la première partie de la période ne sont pas tous les mêmes que ceux qui ont mené à leur remontée par la suite. Dans la première partie de la période les facteurs qui ont contribué à la baisse des inégalités sont la hausse des revenus du travail pour les salariés les moins payés, ainsi que le niveau croissant des pensions de retraites, qui ont sorti une grande partie des retraités de la pauvreté. Les revenus ont ensuite plutôt contribué à une hausse des inégalités, par l'écartement de la distribution des salaires mais aussi par la baisse du revenu salarial des personnes subissant des épisodes de chômage. Les pensions de retraite, en revanche, ont plutôt un effet neutre sur les inégalités à partir des années 1990.

La redistribution socio-fiscale a aussi beaucoup évolué durant cette période. Du point de vue des transferts, cela a principalement joué en faveur d'une réduction des inégalités, notamment au moment de la création de nouveaux dispositifs en faveur des bas revenus, tels que les allocations logement, le revenu minimum d'insertion (RMI) ou la prime d'activité. En revanche, dans les périodes de croissance économique et quand les barèmes ne sont pas revalorisés, un phénomène d'érosion de ces prestations sociales contribue toutes choses égales par ailleurs à une augmentation des inégalités. Les impôts directs, eux, ont également contribué à une baisse des inégalités sur la période, en jouant principalement sur le niveau de vie des plus aisés, au bénéfice relatif de la première moitié de la distribution.

Ce travail, même s'il ne remet pas en cause la construction classique du niveau de vie, permet d'entrer à l'intérieur de cette boîte noire. D'une part, il permet d'isoler l'effet de ses différentes composantes : revenus du travail, pensions, taxes, prestations sociales. Mais surtout, et c'est la sa principale innovation, il fait le lien entre les études sur la distribution du revenu et les études sur la composition sociale et économique de la population. Il permet ainsi de replacer tous ces phénomènes dans un même cadre d'analyse, afin de comparer

leurs contributions au phénomène global de mesure des inégalités. Il permet notamment de distinguer des mouvements contraires qui se jouent à l'intérieur du calcul de l'indicateur d'inégalités.

Cette contribution est complémentaire aux analyses issues des comptes nationaux distribués réalisées sur des périodes de temps similaire. Elle adopte une approche plus microéconomique en gardant le ménage et son niveau de vie comme unité d'analyse plutôt que le revenu national distribué par adulte, et en mesurant l'effet des changements de la structure des ménages en plus des changements sur la structure des revenus.

Chapitre 3 : mesurer la grande pauvreté dans les pays développés

Le chapitre 3 est une exploration de la question de la mesure de la grande pauvreté dans les pays développés. Il propose un indicateur fondé non seulement sur les revenus mais également sur les privations matérielles et sociales, et en montre une application sur données européennes.

La question de la pauvreté a une place à part dans la mesure des inégalités économiques. Mesurer la pauvreté dans une économie nécessite en effet de s'intéresser à une fraction de la population, plutôt qu'à l'économie dans son ensemble. Les définitions de la pauvreté sont donc de nature sociologique ou microéconomique plutôt que macroéconomique. Le niveau de pauvreté d'une économie est ainsi généralement défini comme la proportion de personnes qui sont en situation de pauvreté¹³.

C'est le besoin de mesurer la pauvreté qui a motivé les premières enquêtes sur le budget et le revenu des ménages. Assez vite, il a été question de comparer le revenu des ménages à un seuil de pauvreté, de manière à identifier et comptabiliser ceux en situation de vulnérabilité économique. S'il y a de nombreuses manières de définir un seuil de pauvreté, un certain consensus existe sur ce qu'il est censé représenter : c'est le niveau de revenu en dessous duquel l'individu n'est pas capable de bénéficier des conditions de vie que l'on pourrait considérer comme le minimum décent dans la société dans laquelle il vit.

Parallèlement, certaines enquêtes auprès des ménages ont été conçues pour mesurer directement les situations de pauvreté, sous la forme des privations matérielles et sociales. Il s'agit de recenser un ensemble de biens et services censés être caractéristiques d'un niveau de vie ordinaire. Le ménage est réputé en privation de cet élément s'il déclare ne pas pouvoir y accéder pour des raisons financières. Dans ce cadre, la pauvreté signifie subir un certain nombres de privations matérielles et sociales.

Dans les conventions des instituts statistiques des pays développés, les populations identifiées comme pauvres représentent une part importante de la population, générale-

¹³Il existe aussi d'autres indicateurs qui ne sont pas des proportions de la population, comme l'intensité de la pauvreté, qui est l'éloignement moyen des personnes pauvres par rapport au seuil de pauvreté.

ment entre 10 et 20 %¹⁴. Bien que partageant le fait d'être assez éloignées du niveau de vie standard de leur pays, ces populations sont très hétérogènes en matière de revenus, de conditions de vie, de situation d'emploi, de satisfaction dans la vie, de persistance de leur situation.

Ces conventions peuvent donc apparaître comme insuffisantes, car identifiant des populations qui ne subissent pas le même degré de difficulté. Par ailleurs, plusieurs institutions mettent en évidence la nécessité d'identifier les situations de grande pauvreté, définies comme celles où les difficultés se cumulent et où les chances de sortir de la pauvreté sont les plus faibles.

Ce chapitre étudie la faisabilité d'un indicateur de grande pauvreté à partir des définitions connues de la pauvreté. Pour cela, nous mobilisons l'enquête européenne sur les ressources et les conditions de vie (EU-SILC), qui comporte des informations sur les revenus, les privations matérielles, l'emploi, etc. des ménages de l'ensemble des pays de l'Union européenne.

Dans un premier temps, nous montrons que les mesures mobilisant uniquement les revenus ou uniquement les privations matérielles ne permettent pas de cibler de manière satisfaisante les situations de plus grande pauvreté. Dans le cas du revenu, nous montrons qu'il existe un plancher dans la plupart des pays de l'Union européenne, en dessous duquel le revenu n'est plus un déterminant significatif de situations de pauvreté plus difficiles. En particulier, la corrélation entre revenus et privations matérielles n'est plus aussi robuste. Cela est dû notamment aux problèmes de mesure du revenu, mais aussi au fait que les ressources annexes et les autres facteurs des difficultés économiques deviennent prépondérants. De même, le critère des privations matérielles et sociales ne permet pas d'écartier une partie de la population qui comporte des revenus relativement élevés, parfois proches de la médiane, ce qui semble incompatible avec une mesure de grande pauvreté.

Dans un deuxième temps, nous montrons que la combinaison des critères de revenu et de privations matérielles permet, elle, de cibler effectivement des populations qui subissent des difficultés plus importantes, que ce soit du point de vue de la situation d'emploi, de la satisfaction dans la vie, du revenu ou des privations matérielles. De plus, le fait de subir des privations matérielles renforce la persistance des situations de pauvreté monétaire.

La population de grande pauvreté ainsi définie est environ six fois moins nombreuse que la pauvreté monétaire ou la privation matérielle et sociale classique. Elle est plus souvent composée de chômeurs, de familles monoparentales et de personnes en mauvaise santé. Par ailleurs, la part de personnes possédant une épargne financière significative ou étant propriétaire de son logement est beaucoup plus réduite.

Ce travail montre l'important écart qui existe entre les mesures monétaires de la pauvreté et les mesures fondées sur les privations matérielles et sociales. Ces conclusions

¹⁴En Europe en 2022, Eurostat estime le taux de pauvreté dans l'Union européenne à 16,5 % de la population, avec un seuil de pauvreté à 60 % du niveau de vie national.

sont robustes à l'utilisation de définitions alternatives du revenu, qui peuvent prendre en compte des éléments non monétaires comme les rémunérations en nature, l'auto-consommation, le loyer fictif perçu par les propriétaires. De plus, certains éléments comme l'état de santé et la situation d'activité expliquent en partie l'écart entre mesures monétaires et matérielles, mais sont loin de les réconcilier totalement : ces situations de pauvreté ne sont pas réductibles à des situations de faibles revenus.

Introduction (in English)

All **measures** are wrong, but some are useful.

(freely adapted from George Box¹)

In the social sciences, household income has become the key dimension in the analysis of socio-economic inequalities. Significant progress has been made in measuring it in recent decades, thanks to methodological improvements and a wealth of empirical evidence on the subject. However, the focus on income as a tool for analyzing social inequalities comes with certain limitations and challenges. The measurement of income is often incomplete because it ignores the existence of other economic resources. Moreover, there remains an unresolved gap between income and other measures of economic status, such as material deprivation. Finally, the use of such a complex and abstract measure can mask the underlying social groups that stratify the population.

What does the study of income tell us about economic inequality and poverty?

This thesis presents three methodological and empirical studies that help to answer this question. The manuscript is organized as follows: an introduction summarizes the historical advances in the measurement of income and how this indicator has come to occupy the central place it occupies today in the analysis of economic and social phenomena. Some of the difficulties in conceiving and measuring this indicator are recalled in the light of the various possible interpretations of this concept. Finally, the three chapters that make up the core of this manuscript are presented, highlighting the ways in which they follow recent advances in income measurement, as well as the elements that they contribute to our understanding of economic inequality and poverty.

* * *

Income can be thought of as the ability of an individual or household to consume and save. This definition is almost tautological, since saving is generally defined as the portion

¹English statistician, author of the famous aphorism “All models are wrong, but some are useful” (Box, 1976).

of income that is not consumed. Another definition, that of [Hicks \(1939\)](#), defines income explicitly: “A person’s income is what he or she can consume during the week and expect to be as well off at the end of the week as he or she was at the beginning.”. Put another way, it’s the value of what can be consumed without reducing the value of one’s wealth. More broadly, it is the sum of what is consumed and the change in the value of assets over time.

However, the construction and measurement of this economic indicator is not trivial, and its use in national or comparative studies has required more than half a century of conceptual and methodological innovation, as well as the cooperation of researchers and institutions from all over the world.

Once the methods for measuring income and its distribution had been established, it took on a central role in economic literature. In addition to measuring social inequalities, it is also mobilized as a major dimension for analyzing the economic performance of states, the fairness of social and fiscal policies, and various aspects of social life (health, environment, demography).

Although increasingly easy to mobilize and attractive in its ability to classify individuals on a unidimensional scale, income remains a polysemic indicator fraught with conceptual and methodological difficulties. It is a measure of economic well-being, of one’s perceived national “piece of the pie”, of one’s ability to consume and save, of one’s social position... This apparently simple concept is subject to a variety of interpretations, which are rarely made explicit, but which may reveal incompatibilities depending on the conventions adopted. In addition, certain types of income continue to pose measurement problems, making the analysis of certain social groups uncertain, particularly from the point of view of poverty.

Half a century of methodological advances

This section reviews the improvements in data sources and methods that have led to the current state of the art in measuring income inequality. While the first budget surveys of poor households date back to the end of the 19th century, and the first income tax data were collected in the early 20th century, it was mainly in the second half of the 20th century that income databases were developed. At the same time, a series of methodological innovations and standardization efforts consolidated the study of inequality. These advances in sources and methods have also led to the construction of databases for international comparisons.

Data sources

Over the course of the twentieth century, the measurement of income has benefited from a continuous improvement in data sources. At the end of the 19th century, the first poverty studies attempting to measure household income and define a poverty line were first carried out in certain localities ([Booth \(1889-1897\)](#) in London, [Rowntree \(1901\)](#) in York). In the United States, Budget Surveys began in the early 20th century and were also generally conducted only in certain areas [Johnson and Rogers \(2001\)](#). These surveys on consumption preceded those on income, but their purpose was explicitly to define an acceptable income threshold for the populations of interest.

At the same time as these advances, administrative statistical information systems on income were developing, especially with the creation of income taxes in most industrialized countries. These were the first databases aimed at describing income over the entire national territory, but initially not necessarily over the entire income distribution. Unlike consumption and income surveys, which tended to focus on the poor, administrative information on income initially focused on the highest incomes, which were the target of the tax ([Hill, 1894](#); [Dunbar, 1894](#); [André and Guillot, 2014](#)). This led to the first statistical analyses of changes in top incomes by [Kuznets \(1953\)](#). As these taxes expanded, the description of the entire income distribution by these administrative bases became increasingly precise. Information systems on income components became more complete and integrated: they allowed, as in France, individual matches describing increasingly precise portions of income (social benefits, retirement pensions) ([INSEE, 2021](#)).

The first national statistical survey on income in the United States was launched in 1940 through the decennial census ([National Archives, 2022](#)). This involved the completion of a questionnaire on household income over the previous twelve months. In 1956, the French National Statistical Institute (INSEE) launched its first statistical survey of household income, which consisted of combining the income tax returns of all members of a sample of households taken from the population census ([INSEE, 1963](#)). Income surveys in France today are still based on this model². In general, all industrialized countries began to produce and use household income distributions in the second half of the twentieth century ([United Nations, 1981](#)). These nationally representative surveys became increasingly regular. Using statistical methodology, they are based on representative samples to describe the overall income distribution of the population.

Methods

The improvement of these sources of income data has gone hand in hand with methodological advances in the analysis of economic inequality. On the one hand, the economic

²We use this series of surveys (ERF and ERFS) since their 1970 vintage in chapter 2 “The determinants of the evolution of income inequality”

literature abounds with inequality indicators that allow precise measurement of certain properties of income distribution : ([Atkinson, 1970](#); [Sen, 1976](#); [Kakwani, 1980](#)). On the other hand, the development of algorithmic imputation and microsimulation techniques makes it possible to broaden the perimeter of income, or to vary certain components of it according to different evolutionary hypotheses³. In addition, major methodological efforts are being made to increase the relevance and comparability of income measures. One of the major efforts is the Canberra Group report ([Canberra Group, 2001](#)). This report, drafted after numerous international meetings of experts, sets out practical and conceptual guidelines for household income measurement. This set of recommendations, also known as the Canberra Manual, is still the benchmark for producers and users of income data. It sets out all the components to be taken into account when defining disposable income and standard of living, and includes recommendations on international comparisons, presentation of results, etc. The aim of all these recommendations is to make income the best possible measure of economic well-being. The report of the “Commission on the Measurement of Economic Performance and Social Progress ([Stiglitz, Sen, and Fitoussi, 2009](#)), although primarily aimed at leaders and designers of public policy, makes recommendations on the measurement of economic indicators. It supports this notion of well-being, speaking more generally of “*quality of life*”, and recommends in particular paying particular attention to wealth, non-market services and leisure in conjunction with income.

One of the most recent advances in the standardization of income measures is the production of distributed national accounts ([Alvaredo et al., 2020](#); [Coli et al., 2022](#); [André, Germain, and Sicsic, 2023](#)). The aim is to start from national accounts flows and distribute all national income to households, along the income distribution. This approach takes advantage of the latest technical advances in data sources and imputation methods. The promise of this rapprochement between national accounting and the distributional approach is thus to produce the best of both worlds: a standardized, exhaustive, nationally comparable measure such as national accounting, of a distributed indicator that enables inequalities to be analyzed.

International databases

Another important facet of the improvement in data sources and statistical techniques, which both benefited from and contributed to the international consensus on income measurement methods, was the establishment of comparative international databases.

One of the first comparative studies of income distribution in the countries of the Organisation for Economic Co-operation and Development (OECD) was carried out by

³The currently most accomplished form of these income broadening techniques can be found in works such as those on extended redistribution ([André, Germain, and Sicsic, 2023](#)) or distributed national accounts ([Piketty, Saez, and Zucman, 2017](#); [Alvaredo et al., 2020](#)), see *infra*.

reprocessing aggregate data from national sources ([Sawyer and Wasserman, 1976](#)). It suffered from major problems of comparability of income concepts and populations studied, and in particular drew criticism from INSEE for ranking France as the most unequal country in the sample ([Bégué, 1976](#)).

In 1983, researchers Lee Rainwater, Gaston Schaber and Tim Smeeding set up the Luxembourg Income Study, which to this day remains the largest international database of micro-data on income⁴. The aim is to enable international studies of income inequality and poverty by maximizing the comparability of concepts, and allowing researchers to freely manipulate individual-level data. Initially focusing on just a few OECD countries ([Smeeding, O'Higgins, and Rainwater, 1990](#)), the database has grown steadily, and now includes data from over 50 countries, covering the period from the 1960s to 2020 ([LIS, 2023](#)).

From the early 1990s, the national statistical institutes of European countries adopted a more integrated approach, setting up a harmonized survey on income and living conditions (European Community Household Panel, ECHP). Comparability is ensured here by a set of rules guiding the entire process, from survey design to the calculation of statistical indicators, including the questionnaire and weighting methods. This survey was replaced in 2003 by the EU Statistics on Income and Living Conditions (EU-SILC) survey. Today, the database covers all 27 countries of the European Union, as well as a number of partner countries in the region⁵.

In addition to these individual-level databases on income and poverty, a number of institutions have contributed to the development of historical and international series. These databases are generally secondary data sources, i.e. they aggregate information produced by other surveys or information systems, and present varying degrees of consistency difficulties ([Ferreira and Lustig, 2014](#)). Since the late 1990s, the OECD, in collaboration with national statistical institutes, has been building its *Income Distribution Database*, a database focused on OECD countries and a few partner countries, aggregating data on income and poverty by social group and type of income. The World Bank also maintains comparative inequality dashboards for all countries in the world, mainly with national inequality indicators. A more recent database has been built up by the *World Inequality Lab* since 2011, initially focusing on high incomes and then extended to the entire distribution. Its aim is to build the most exhaustive series possible in terms of historical and international scope, by breaking down all national income using the distributed national accounts method.

⁴This is the database we mobilize in chapter 1 “The impact of consumption taxes on inequality”. It is particularly interesting for this exercise, as it includes data from countries with very different levels of income inequality and structures of socio-fiscal redistribution systems. A European database, for example, would show less diversity on these dimensions

⁵These data are used in chapter 3 “Measuring extreme poverty in developed countries”. The high level of international comparability and the richness of the questionnaires make them ideal material for an analysis based on the living conditions of poor households

An increasingly central role in economic analysis

Advances in innovation and standardization of income measurement concepts and methods have opened the way to new fields of research in economics. On the one hand, research into inequality and poverty has been strongly stimulated by this tool for objectifying economic situations. Secondly, income has taken on a central role to the analysis of social stratification.

As an object of study in its own right

Initially expressed in terms of social classes, economic inequalities have progressively been expressed in terms of income inequalities. Figure 1 illustrates the growing importance of income inequality in public debate over the last 150 years. It shows the relative frequencies of the expressions “social classes”, “gross domestic product” and “income inequality” in the English-language literary corpus as collected and indexed by the Google Books Ngram Viewer project (Michel et al., 2011). The expression “social classes” is the only one of the three to have a significant use before the middle of the 20th century. The use of this expression, although rare even in the early years following the publication of the Communist Manifesto by K. Marx and F. Engels, gradually increased, notably following the Paris Commune (1871), the Russian Revolution of 1917, and the start of the Cold War. The term remained dynamic until the 1970s, when its use declined. During this period, social classes became the main concept used to talk about social stratification and inequalities in society. The term gross domestic product emerged after the war, following advances in national accounting methods. For a long time, this was the hegemonic indicator of a country’s economic performance. The term “income inequality”, on the other hand, did not become significant until the 1960s, and its use has grown steadily, particularly since the mid-1990s. It is only in recent years (since the late 2010s) that its use has supplanted that of gross domestic product.

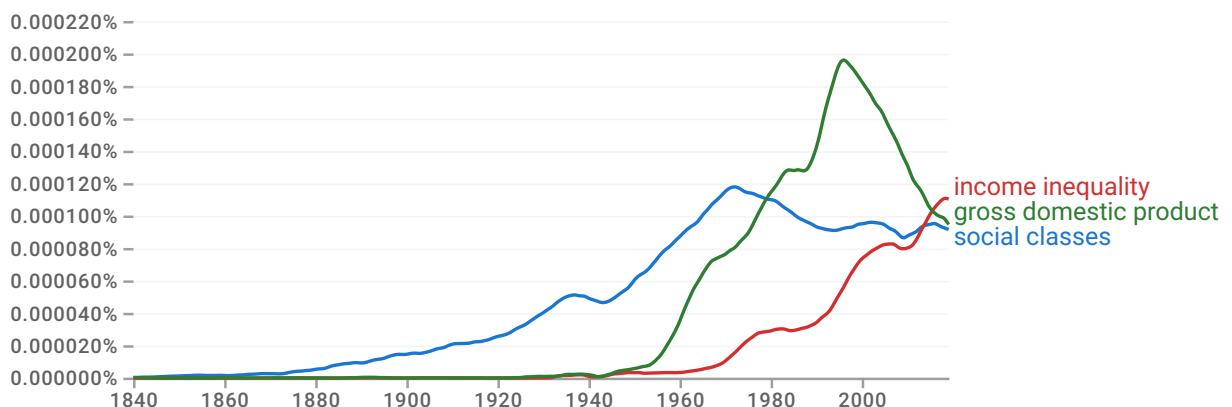


Figure 1: Frequency of expressions “social classes”, “gross domestic product” and “income inequality” in English-language literature

Source : Google Books Ngram Viewer, <http://books.google.com/ngrams>.

Since the early 2000s, a whole strand of empirical economics research has focused on the study of long-term income trends. These efforts were notably initiated by Thomas Piketty and co-authors, with studies initially focused on high incomes ([Piketty, 2001](#)), and primarily concerning France ([Piketty, 2003](#)) and the United States ([Piketty and Saez, 2003](#)). Initially focused on declared income, i.e. before tax, they were extended to include income after redistribution ([Bozio et al., 2022](#)). This work showed that income was one of the most advanced tools for analyzing the stratification of society over time in a coherent and quantitative way, and paved the way for a body of work producing and analyzing national long series on income.

Another facet of the continuing expansion of the scope of income studies is the study of a global distribution of incomes, mainly popularized by [Milanovic \(2012\)](#). This approach brings together the populations of different countries in the same income distribution, and thus puts the Western working classes and the Chinese wealthy classes on the same scale of analysis, for example. This gave rise to the famous “elephant curve”, which shows that between 1998 and 2008, the 80th percentile of global income distribution grew the least. This has led to an interpretation of globalization as having led to the worldwide downgrading of the Western middle classes, relative to the Chinese, Brazilian and Indian upper middle classes.

As a dimension for analyzing other phenomena

While income inequality has developed as a field of academic research in its own right, it has also intruded into many other academic and political fields. The centrality of income and inequality measurement was notably reinforced in the report of the [Stiglitz, Sen, and Fitoussi \(2009\)](#) commission. It promotes the use of alternative indicators to gross domestic product, to take better account of the various dimensions of quality of life. The economic well-being of households and its unequal distribution thus become an indicator of the economic performance of states, which until now has been limited to measuring the national productive apparatus.

Many fields of social science research now use income as an explanatory factor or analytical dimension. These studies highlight the correlations between income and other characteristics of the social world, including elements that were not necessarily approached from a monetary angle. A link between the number of COVID-19 deaths in a country and its level of income inequality was shown ([Wildman, 2021](#)); inequalities in CO2 emissions along the income distribution were calculated ([Chancel, 2022](#)); differences in life expectancy according to income were exposed ([Blanpain, 2018](#)), and so on.

It is above all in the evaluation of public policies, and in particular social and fiscal policies, that income has become a decisive criterion. This was mainly due to the development of microsimulation techniques, initially developed by public administrations,

then gradually taken over by academic research laboratories ([Bessis and Cotton, 2021](#)). These techniques make it possible to measure the equity of a public policy instantaneously, by verifying how its application would distort income distribution. French government measures, in particular, are regularly analyzed through this prism, in order to draw up a redistributive balance sheet. ([Dutronc-Postel et al., 2022](#); [Buresi et al., 2022](#); [Madec, Plane, and Sampognaro, 2023](#)).

Beyond their evaluation, statistical measurement of income can even be used to design public policies. While income-tested social benefits are its most direct application, it can also be used for more global public policies. French “quartiers prioritaires de la politique de la ville” (priority urban districts) are a case in point. These are sub-municipal areas determined administratively on the basis of a single statistical criterion: average per capita income. These low-income areas are then the target of a range of public policies aimed at reducing inequalities, focusing not on income but on employment, education, culture and so on. ([Chaline, 2014](#)).

Income, and in particular income inequalities, have become central elements in the economic analysis of society, and in the design of public policies. This makes it all the more important to measure it properly, which requires us to ask ourselves what reality we are trying to capture through this definition: living difficulties, poverty, equitable distribution of national resources, economic integration into society, etc.

Persistent difficulties in measuring it

There are a number of obstacles to obtaining a relevant measure of income. On the one hand, its various components (earned income, capital income, social benefits, etc.) need to be carefully selected and measured. In the study of inequalities, the fact that certain incomes are poorly measured or omitted is indeed problematic insofar as these categorical incomes do not represent the same proportion of income for all households.

Secondly, we need to define the right scales on which to aggregate these incomes. We therefore need to define the right unit of interest (the individual or the household), the right rule for comparing the income of these units (equivalence scales), and the right reference period for counting income.

We will see that these choices are not just methodological, but also conceptual: it is not just a question of finding the best way to measure something, but also of finding the best “thing” to measure, depending on the problem we are addressing.

Which flows to aggregate?

Since income is an aggregation of flows from different categories, one of the first difficulties we face is how to measure all these flows, which are of different origins and nature. It is important to measure all these flows accurately, in order to compare the living standards of households with different sources of income. The Canberra manual provides a list of income categories that regularly pose measurement problems ([Canberra Group, 2011](#)):

- Remuneration in kind
- Income from self-employment
- Income from property (real estate or financial capital)
- Self-consumption
- Transfers between households
- Social benefits in kind

What these types of income have in common is that they can be difficult to value because their collection and consumption do not involve a monetary transaction (remuneration in kind, self-consumption, social benefits in kind), or that they are difficult to measure because data sources concerning them are rarely exhaustively available at an individual level (inter-household transfers, property income), or because it is sometimes difficult to determine who the beneficiaries of these incomes are (inter-household transfers, self-employment income, property income).

Some of these flows are problematic because they represent a significant proportion of the income of certain categories of the population. In particular, the insufficient measurement of self-employment income can lead to a significant underestimation of the standard of living of the workers concerned, overestimating the poverty level for some of them. Similarly, students, when they are not living with their parents, rely to a large extent on their parents for support, whether monetary or non-monetary, in the form of rent, clothing, etc. ([Castell et al., 2016](#)). Not taking these incomes into account would give a distorted idea of their standard of living relative to the rest of the population.

Failure to take account of in-kind social benefits, in particular, can impact the vision of inequalities, potentially significantly: [André, Germain, and Sicsic \(2023\)](#) estimate that in France in 2019, half of redistribution comes from in-kind transfers, mainly education, health and social housing. Measuring these different elements is difficult, however, as they are often unavailable in surveys or administrative data. Moreover, the question of their valuation is not trivial: is the value of an education service provided by a civil servant teacher what it costs the community (i.e. their salary), what it would cost parents in a private system, or something else?

Beyond the difficulty of valuing or attributing them, other flows are under discussion regarding their inclusion in the definition of income. Such is the case of undistributed corporate income, which is addressed by various conventions ([André and Blanchet, 2021](#)).

While this income is not (by definition) received by households and cannot be consumed, this flow appears to be well controlled by company owners, and can be replaced by real income when tax schedules change. Moreover, as this income is highly concentrated, its inclusion or omission will not be neutral in the measurement of inequalities. Domestic services produced and consumed within the household, on the other hand, are not included in the main national accounting concept, even though they represent a non-negligible share of consumption and this type of service can be commoditized to varying degrees depending on the country or the period ([Poissonnier and Roy, 2017](#)). Imputed rents, while included in national accounts, are rarely included in measures of income, even though their effects on inequality can be significant and vary widely between countries, depending on homeownership rates and the importance of social housing ([Figari and Paulus, 2015](#)).

How to aggregate them?

Once the types of flows to be included in income have been identified and are satisfactorily measured, the next step is to determine the method for aggregating them to obtain a relevant definition of income. Should income be aggregated at individual or household level? If the latter, how can we compare the income of households of different sizes and compositions? Finally, what reference period should be used to aggregate these incomes?

The unit of aggregation used in inequality studies is generally the household. The assumption is that members of the same household pool their resources and contribute equally to consumption. In France, this convention is also used in the construction of social benefit scales, which take into account the income of all household members. This pooling is not always complete, however, as economic and ethnographic findings show⁶. In official statistics, the need to better understand the intra-family sharing of resources has recently been taken into account in Eurostat's living conditions surveys, notably through the individualization of certain indicators of material and social deprivation, which reveal gendered differences ([Guio et al., 2016](#)). Furthermore, the boundaries of households can be blurred, with situations of semi-cohabitation (shared custody, semi-decohabiting students, couples with two residences, etc.). These situations can be managed in a variety of ways, with partial pooling of resources and expenses, transfers between households, and so on.

These elements are all the more important as household forms evolve: the model of the heterosexual couple where the man is the main breadwinner is no longer ubiquitous ([Daguet, 2017](#)). Moreover, households that follow a pattern of conjugal specialization often do so to the detriment of women's wage prospects ([Meurs, Pailhé, and Ponthieux, 2010](#)), leading to significant inequalities in living standards in the event of separation ([Bonnet, Garbinti, and Solaz, 2021](#)). This model continues to strongly influence the

⁶[Roy \(2006\)](#) shows, for example, that heterosexual household spending is gendered, meaning that some purchases increase more when the man's salary rises, while others increase more when the woman's salary rises

measurement conventions of social statistics, and recent public debate has shown that these conventions need to be updated in the field of public policy: in France, the schedule of the disabled adults' allowance (AAH) was deconjugualized in 2023 following a lively public debate, precisely on the subject of the pooling of household resources, and the financial autonomy of its members⁷.

Assuming that household resources are pooled, the question arises of how to compare the income of households of different size and composition. The needs of a couple or a family of four are indeed greater than those of a single person, but are not necessarily proportional to the number of people in the household, due to economies of scale. Various conventions exist to deal with this problem: when children are not excluded from the equation (via what is known as "equal-split" adults), equivalence scales are generally used, as recommended in [Canberra Group \(2011\)](#). This process, called equivalization, can be done by applying a concave function to the number of people in the household (such as the square root), or by calculating consumption units that assign less weight to additional adults as well as children. The resulting measure is called equivalized income, or standard of living. The right level of consumption units is, however, difficult to estimate, and may vary over time or according to family configurations. Some studies based on subjective assessments of household budgets show that modified OECD consumption units currently underestimate the needs of single-parent families ([Martin and Périvier, 2018](#)).

Another rarely discussed issue in income measurement is that of the reference period. The commonly accepted reference is that of the current year, which is used to aggregate all income and taxes concerning the household at that time. In so doing, the singularities that may exist within this period are erased. This is all the more problematic when it comes to measuring inequalities, as the poorest households have a more uncertain relationship with the future, and are more often faced with cash-flow problems ([Morduch and Schneider, 2017](#)). This is because the mechanisms for smoothing consumption in relation to income shocks, such as savings and access to credit, are unevenly distributed along the distribution. [Papuchon and Duvoux \(2019\)](#) thus assert, based on the subjective feeling of poverty, that annual income masks a fundamental dimension of poverty, which is that of the relationship with time and the future. Conversely, a more economic literature emphasizes the need to measure income over a much longer period of time, so as to capture an underlying, permanent income, which would be far more representative of a household's standard of living than its instantaneous annual income. These approaches would be justified in particular by the high mobility of households over a one-year horizon in the distribution of living standards. For example, a significant proportion of people measured as poor in the monetary sense in a given year are no longer poor the following year ([Blavier, 2023](#)). Annual income is still overwhelmingly used, mainly for practical

⁷The AAH is a means-tested benefit for disabled people in France. Until 2023, the income base that determined eligibility was that of the whole household, making people in couples with a working partner ineligible.

reasons, as infra-annual and longer-term income information is rarely available for the same household.

Multiple interpretations in tension

Income and standard of living pose a number of measurement problems, to which conceptually different methodological responses may be applied. This is because income inherently possesses multiple meanings, and can be used to answer different questions, giving rise to sometimes incompatible interpretations of the nature of income.

This section shows that we can distinguish at least two quite different meanings of income: one of a more sociological nature linked to the economic well-being of the household, and the other of a more macroeconomic nature linked to the distribution of income within the economy. Moreover, even when defined in such a way as to address these two distinct issues, the measurement of income inequality misses part of the reality it claims to illuminate, highlighting the need for complementary tools.

Considering income as a measure of household economic well-being leads us to break with a more macroeconomic understanding of income. In the well-being approach, the use of equivalence scales to move to a standard of living is fundamental, as it takes into account the needs of the household, which vary according to its composition. However, these equivalence scales introduce a break with other income concepts: the sum of household equivalized incomes is not equal to the income received by all households, as might be measured in national accounts, for example. Due to equivalence scales, the average reduction in household size (people are more likely to live alone, or with fewer children) even results in a drop in the average standard of living, at constant per capita income⁸. While the concept of standard of living is necessary to get closer to the notion of economic well-being, and is particularly important for questions of poverty measurement, this comes at the price of incompatibility with the accounting notion of income, which aims to measure the flows received by the various players in the economy.

Moreover, even when adapted by equivalence scales, income remains an incomplete measure of economic well-being. On the one hand, through habituation or ratchet effects, the income thresholds needed to “make ends meet” or be “rich” reported in surveys increase significantly as the respondent’s income rises. This complicates the relationship between income and well-being. On the other hand, elements outside the scope of income will influence this relationship. This is the case for assets and access to credit, access to which is unequal and which can supplement income. But needs and costs can also vary from

⁸This is easily understood by imagining the case of a separation: two adults, living in the same household and pooling their incomes, have a standard of living equal to the sum of their incomes divided by 1.5 (the number of consumption units for two adults according to the modified OECD equivalence scale). When they separate, each has their own income, and the average of their living standards is therefore equal to the sum of their incomes divided by 2.

household to household, depending on age, state of health, location and lifestyle. This is one of the functions of material and social deprivation, which, although closely linked to income, can affect households with equivalent incomes very differently.

Approaches based on the distribution of national income (DINA⁹), while remaining compatible with national accounting, enable us to answer a more accounting-related question: what is the share of the national pie received by different households? Answering this question enables us to measure the structuring elements of our societies, in particular the socialized share of national income and the way it is distributed. This approach makes it possible to compare different groups in society in terms of their relative power over economic flows, which is particularly enlightening in a dynamic vision for analyzing the evolution of power relationships in society.

As a tool for analyzing the structure of society, while it enables us to synthesize economic and social dynamics through quantitative measurement, income remains a complex concept, adding a layer of abstraction to the study of inequalities. The level and evolution of these indicators are the result of phenomena as diverse as the situation on the job market, household composition, social benefits, taxes and so on. We must therefore not lose sight of these underlying phenomena: a stagnation in living standards, for example, may conceal a massive rise in unemployment, but a large reaction of social welfare systems. This apparent stagnation will then conceal very striking social phenomena with potentially unequal effects. The study of income distribution, while instructive in itself, requires analytical tools that enable us to understand social, economic and political dynamics.

How can we think of income in terms of well-being if we don't take non-monetary elements into account? How can we translate income into a capacity to consume if we don't take into account differentiated access to certain goods and services and local price differences? How can we translate it into a "share of the pie" if we include equivalence scales? In any study based on income, we need to be sure of what we're trying to capture with this indicator. It may be a measure of financial affluence, economic well-being, or the ability to satisfy needs and desires, according to a more sociological approach. But it can also be a measure of the economic power of different players, or of the distribution of national income flows, according to a more economic approach. Methodological efforts to reconcile and explain the differences between these approaches are valuable, but these approaches continue to maintain a certain independence from each other.

Chapter introductions

The three chapters presented in this manuscript contribute to knowledge in the field of income inequality, providing elements of response on the topics that have been raised in this introduction. They are independent of each other.

⁹For "DIistributional National Accounts".

In what follows, we take up the principle of “all measures are wrong, but some are useful”, retaining equivalized income (or “standard of living”) as the main measure, but going beyond it: we extend its definition, decompose its distribution, and bring in a complementary measure.

In [Chapter 1](#) “The inequality impact of consumption taxes”, the standard of living is augmented by an estimate of the consumption taxes paid by households. This reveals higher income inequalities, and a reduced redistributive power of socio-fiscal systems. It enhances international comparisons on these two dimensions, as the impact of consumption taxes varies significantly between countries, although it does not call into question already known national inequality rankings.

[Chapter 2](#) “Determinants of the evolution of income inequality” opens the black box of income to shed light on the social and economic phenomena that contribute to the evolution of income inequality. It provides a better understanding of changes in income distribution by measuring the relative contributions of changes in the structure of society, on the one hand, and in the composition of household incomes, on the other. Changes in labor income and pensions are the main determinants of inequality over the period, while changes in family configurations are less strongly, but continuously, responsible for an increase in inequality over the period.

[Chapter 3](#) “Measuring extreme poverty in developed countries” proposes to complement income with another measure of economic well-being: material and social deprivation. It shows that the use of such an alternative measure is necessary to identify situations of extreme poverty, since income alone is insufficient. In particular, those who combine low income with numerous material deprivations are those who suffer the greatest economic hardship, and who remain in this situation the longest.

Chapter 1: The impact of consumption taxes on inequality¹⁰

Chapter 1 develops an original methodology for integrating consumption taxes, such as the value-added tax (VAT), into international comparisons of income inequality and redistribution. In so doing, it presents an unprecedented panorama of the variation in the effect of these taxes on inequalities over time and between countries, through an analysis covering 26 countries and a period of over 40 years.

Consumption taxes account for a significant share of government revenues (on average a third of revenues in OECD countries). Although they are paid by households at the point of consumption, their impact is rarely taken into account when measuring inequality and redistribution. This is even less the case in international comparisons, even though the amount and structure of these taxes can vary significantly between countries.

¹⁰This chapter is based on an article co-authored with Elvire Guillaud and Michaël Zemmour, published in the *Journal of Public Economics* ([Blasco, Guillaud, and Zemmour, 2023](#)).

It is well known that the propensity to consume decreases as one moves up the income distribution ladder. Consumption taxes therefore represent a larger share of income for poorer households than for better-off ones. For this reason, it can be said that consumption taxes are distributed regressively in relation to income¹¹.

In this work, we mobilize the LIS (Luxembourg Income Survey) database on household income and consumption to calculate the variation in the propensity to consume according to income distribution for 26 countries. To handle cases where consumption is not available in the surveys, we develop an imputation model based on the sample of surveys for which consumption is known. This model allows us to impute consumption distributions as a function of income and other household characteristics.

We then use OECD national accounts data on consumption, income and consumption tax revenues. These data are used to complete the surveys, making them comparable in terms of level, and to calculate implicit consumption tax rates. These rates are calculated as the average consumption tax rate in the country and year under consideration.

By combining microeconomic information on income and consumption from surveys, and macroeconomic information on income, consumption and tax revenue from national accounts data, we obtain a distribution of consumption taxes paid by households. This makes it possible to construct a definition of post-consumption-tax income, by subtracting the consumption taxes paid by the household from its disposable income.

First, we show that consumption taxes do indeed represent a smaller and smaller share of income, the higher up the distribution you go: on average, they represent almost twice as large a share of income for households below the income median than for households in the richest 10%.

Secondly, by measuring the level of inequality in the post-consumption tax income distribution, we show that these taxes significantly increase inequality. On average, by comparing this effect with the redistributive effect of direct taxes and social benefits, consumption taxes offset one-third of socio-fiscal redistribution.

Finally, the effect of consumption taxes on inequality varies widely between countries. This is mainly due to differences in the consumption tax rates applied in different countries: in our sample, the average tax rate varies from 7 to 30%.

The contribution of this work is to shed light on the distributional cost of consumption taxes. It is all the more important to take them into account as the countries that redistribute the most via their social benefits are generally also those with the highest consumption taxes. However, this effect is unlikely to change the inequality ranking between traditionally highly unequal countries with low consumption taxes, such as the USA, and less unequal countries with high consumption taxes, such as Denmark.

¹¹However, it should be remembered that in many countries, these taxes are distributed progressively in relation to consumption, as rates can be moderated so that the average consumption basket of poor households is taxed less heavily than that of better-off households.

This chapter is in line with the ambition of exhaustiveness in income measurement, which consists in adding as many components as possible, in order to have a more complete view of income flows in society, and to improve the comparability of measurements between countries. The imputation model could be used in the construction of distributional national accounts, particularly in cases where lack of data makes it difficult to attribute consumption taxes to households.

Chapter 2: the determinants of changes in income inequality¹²

Chapter 2 presents an analysis of the evolution of living standards inequalities in France between 1970 and 2019, assessing the contribution of the various demographic, social and economic phenomena that have transformed the distribution of living standards over this period. By measuring the impact of changes in population structure, on the one hand, and income composition, on the other, on the evolution of inequalities, this analysis bridges the gap between studies on the socio-economic composition of the population and studies on income distribution.

Over the past fifty years, French society and economy have undergone a number of major structural changes. Some of these changes are common to all developed countries: aging of the population, increasing participation of women in the labor market, rising unemployment, shrinking household size, polarization of the labor market... Others, however, have been more specific to France, such as the significant reduction in the poverty rate among pensioners due to the expansion of the pension system.

There is a vast body of economic and sociological literature on these various phenomena. Similarly, the evolution of income distribution in France and other developed countries during this period is becoming increasingly well known. In this respect, France, like most developed countries, experienced a sharp fall in inequality until the 1990s, followed by a rise in inequality, albeit less marked than elsewhere.

Few studies, however, make the link between changes in population structure in terms of family type, age and occupation, and changes in income inequality. Among all these phenomena, have they all played out in the same direction, and which have been the most significant in terms of changes in inequality indicators?

To answer this question, this work draws on INSEE's "Fiscal income" surveys, from 1970 to 2019. These data consist of a matching of survey data (first the census survey, then the labor force survey) and administrative data on income, derived from tax sources and then also from benefit fund data. The period 1970-2019 is divided into several successive sub-periods, within which we measure the effect of the various determinants of income trends.

¹²This chapter is based on an article co-authored with Clément Carbonnier.

The method used to analyze income trends between date 1 and date 2 takes advantage of the large sample of these surveys and the precise information they contain on household composition and income. The representative sample of period 1 is reweighted so that its structure in terms of family composition, occupations, salaries, pensions, etc. is the same as in period 2. This modification is carried out in stages: first we modify the structure of household types, then that of occupations, etc. At each stage, income inequality indicators are recalculated, so as to isolate the effect of one variable on income distribution.

The determinants taken into account are family composition, the proportion of pensioners, socio-professional categories, earned income, retirement pensions, other primary income, direct taxes and social benefits.

One of the first results is that, in the short and medium term, changes in the amounts and distribution of wages and pensions have a far greater effect on inequality than structural changes in population ageing, occupational change and family composition. These factors do, however, have a non-negligible effect on long-term trends in inequality. Changes in family composition, notably the rise in single-parent families, contribute to an increase in inequality and poverty over the period.

Significantly, we also show that the factors that led to a fall in inequality during the first part of the period are not all the same as those that led to its subsequent rise. In the first part of the period, the factors that contributed to the fall in inequality were the rise in earned income for the lowest-paid employees, and the growing level of retirement pensions, which lifted a large proportion of pensioners out of poverty. Earnings then contributed to a rise in inequality, through the widening of the wage distribution, but also through the fall in wage income for people experiencing periods of unemployment. Retirement pensions, on the other hand, have had a neutral effect on inequality since the 1990s.

Socio-fiscal redistribution also evolved considerably during this period. Regarding transfers, this mainly played a role in reducing inequalities, particularly when new schemes were created to benefit low-income earners, such as housing allowances, the minimal-income benefit (“revenu minimum d’insertion”, RMI) and the activity bonus (“prime d’activité”, another means-tested benefit). On the other hand, in periods of economic growth, and when benefit scales are not adjusted, the erosion of these social benefits contributes, all other things being equal, to an increase in inequality. Direct taxes, on the other hand, have also contributed to a fall in inequality over the period, mainly by affecting the standard of living of the richest, to the relative benefit of the first half of the distribution.

Although this work does not call into question the classic construction of income, it does allow us to get inside this black box. On the one hand, it allows us to isolate the effect of its various components: earned income, pensions, taxes and social benefits. But above all, and this is its main innovation, it links studies on income distribution with studies on

the social and economic composition of the population. It enables all these phenomena to be placed within the same analytical framework, in order to compare their contributions to the overall phenomenon of inequality measurement. In particular, it makes it possible to distinguish contrary movements within the calculation of the inequality indicator.

This contribution complements analyses based on distributed national accounts over similar time periods. It adopts a more microeconomic approach, retaining the household and its standard of living as the unit of analysis rather than distributed national income per adult, and measuring the effect of changes in household structure in addition to changes in income structure.

Chapter 3: measuring extreme poverty in developed countries

Chapter 3 explores the issue of measuring extreme poverty in developed countries. It proposes an indicator based not only on income, but also on material and social deprivation, and shows its application to European data.

The question of poverty has a special place in the measurement of economic inequality. Measuring poverty in an economy means focusing on a fraction of the population, rather than the economy as a whole. Definitions of poverty are therefore sociological or microeconomic in nature, rather than macroeconomic. The poverty level of an economy is thus generally defined as the proportion of people living in poverty¹³.

It was the need to measure poverty that motivated the first household budget and income surveys. The idea was already to compare household income with a poverty line, in order to identify and count those in a situation of economic vulnerability. While there are many ways of defining a poverty line, there is a certain consensus on what it is supposed to represent: it is the level of income below which the individual is unable to enjoy the living conditions that might be considered the decent minimum in the society in which they live.

At the same time, certain household surveys have been designed to measure poverty directly, in the form of material and social deprivation. The aim is to identify a set of goods and services deemed to be characteristic of an ordinary standard of living. Households are deemed to be deprived of this element if they declare that they are unable to access it for financial reasons. In this context, poverty means suffering a certain number of material and social deprivations.

In the conventions of the statistical institutes of developed countries, the populations identified as poor represent a significant proportion of the population, generally between 10 and 20%¹⁴. Although these populations share the fact of being quite far from the

¹³There are also other indicators that are not proportions of the population, such as poverty intensity, which is the average distance of poor people from the poverty line.

¹⁴In Europe in 2022, Eurostat estimates the poverty rate in the European Union at 16.5% of the

standard standard of living in their country, they are very heterogeneous in terms of income, living conditions, employment situation, life satisfaction and the persistence of their situation.

These conventions may therefore appear insufficient, as they identify populations who do not suffer the same degree of hardship. In addition, several institutions highlight the need to identify situations of extreme poverty, defined as those where difficulties accumulate and where the chances of escaping from poverty are lowest.

This chapter examines the feasibility of developing an indicator of extreme poverty based on known definitions of poverty. To this end, we mobilize the European Survey on Income and Living Conditions (EU-SILC), which includes information on household income, material deprivation, employment, etc. in all European Union countries.

Firstly, we show that measures based on only income or only material deprivation do not satisfactorily target the situations of extreme poverty. In the case of income, we show that there is a floor in most European Union countries, below which income is no longer a significant determinant of more difficult poverty situations. In particular, the correlation between income and material deprivation is no longer significant. This is due in particular to problems in measuring income, but also to the fact that auxiliary resources and other factors of economic difficulties are becoming predominant. Similarly, the criterion of material and social deprivation does not allow us to exclude a part of the population with relatively high incomes, sometimes close to the median, which seems incompatible with a measure of extreme poverty.

Secondly, we show that the combination of income and material deprivation criteria effectively targets populations experiencing greater difficulties, whether in terms of employment status, life satisfaction, income or material deprivation. Moreover, material deprivation reinforces the persistence of income poverty.

The population of extreme poverty defined in this way is around six times smaller than that of monetary poverty or classic material and social deprivation. It is more often made up of unemployed people, single-parent families and people in poor health. Moreover, the proportion of people with significant financial savings or who own their own home is much smaller.

This work shows the significant gap that remains between income-based measures of poverty and measures based on material and social deprivations. These conclusions are robust to the use of alternative definitions of income, which can take into account non-monetary elements such as remuneration in kind, self-consumption and imputed rent received by homeowners. Moreover, factors such as health and employment status partly explain the mismatch between monetary and material measures, but are far from fully reconciling them: these situations of poverty are not reducible to low-income situations.

population, with a poverty threshold of 60% of the national standard of living.

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Chapter 1

The inequality impact of consumption taxes: an international comparison

With Elvire Guillaud and Michaël Zemmour.

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Abstract

Consumption taxes are often considered as the most regressive component of the tax system. However, there are only few estimates, and even fewer international comparisons, of the redistributive impact of consumption taxes in the literature, due to scarce data on household expenditures. We use household budget and income surveys and microsimulation to provide consistent estimates of the regressivity of consumption taxes for a large panel of countries and years. We propose a new method for imputing household consumption expenditure across countries: this can be applied to any dataset that contains income information and potentially other socio-demographic variables. We stress that using housing rents, when available, to impute household consumption and calculate consumption taxes significantly improves the accuracy of the model. We have three results. First, in almost all countries, consumption taxes fall disproportionately on low-income households: the top income decile pays a share of its income in consumption taxes that is only 60 percent of what the bottom half pays. Second, income inequality is higher when calculated after consumption taxes, and this rise in inequality offsets one-third of the redistributive effect of tax-benefit systems. Last, cross-country differences in the inequality effect of consumption taxes are mainly explained by different implicit tax rates (from 7 to 30 percent in our sample), rather than variations in the distribution of household consumption patterns. Consumption taxes should therefore be taken into account when comparing income inequality and tax-benefit systems across countries, as the most-redistributive systems generally come with high consumption taxes.

Keywords: Consumption taxes; Distributional effects; Income inequality; Microsimulation; Tax-benefit model.

1 Introduction

The distributive effect of consumption taxes is the blind spot in the comparative analysis of redistribution systems. Consumption taxes globally account for 30% of government revenue in developed economies, and there is a positive cross-country correlation between the level of consumption taxes and the size of the welfare state (Lindert, 2004; Kato, 2003). However, consumption taxes are also considered to be unfair, as they are a flat tax on consumption expenditure, and the share of income spent on consumption falls with income (Warren, 2008). How large is this effect? Should this change the way we view cross-country variation in terms of inequality and redistribution? It could indeed be the case that consumption taxes substantially narrow the gap between the countries perceived to have low redistribution and those perceived to have high redistribution. The standard view that the United States is more unequal than the Scandinavian countries, either in terms of market income or disposable income, may no longer hold when indirect taxes are taken into account.

The analysis of consumption taxes and inequality requires a considerable amount of data: detailed data on household expenditures and income, as well as precise data on the statutory tax rates applied to different types of goods (excise taxes, sales taxes, and various VAT rates). Most work on the redistributive effect of tax-benefit systems therefore actually leaves consumption taxes out of the equation (see, for instance, Guillaud, Olckers, and Zemmour, 2020; Causa and Hermansen, 2017; Piketty and Saez, 2007). When consumption taxes do appear, the research that focuses on international comparisons typically relies on the Euromod microsimulation tool (for example, Figari and Paulus, 2015), with the resulting limitation of the analysis to European countries. A second option is to use aggregate imputations of consumption taxes, as recently adopted in the work carried out by the Distributional National Accounts (DINA) project. This approach, however, estimates consumption by income group, by applying synthetic saving rates to disposable income. All of this estimated consumption is then assumed to be taxed (see Piketty, Saez, and Zucman, 2018 for the United States, and Bozio et al., 2018 for France). We here take a step forward in this research area by producing reliable estimates of the consumption taxes paid at the more fine-grained household level. We propose a straightforward method for the imputation of missing consumption data in survey datasets on household living standards. Applying implicit consumption-tax rates to this consumption data produces an accurate international comparison of the impact of consumption taxes on inequality in 27 countries over 36 years going from 1978 to 2013, yielding a total of 132 datasets. This allows us to evaluate the extent to which consumption taxes counteract the redistribution resulting from other tax-benefit policies.

Our method is as follows. Starting from micro-data on expenditure and income in household budget surveys, harmonized by the Luxembourg Income Study ([LIS](#)), we construct a simulation model of household consumption that allows us to obtain predictions

of the distribution of the household-level propensity to consume for all country-years. Once we have this distribution, we apply a homothetic transformation of the data to match macroeconomic aggregates. We then apply a country-year-specific consumption tax rate on household-level consumption. This allows us to compare the distributions of consumption taxes and income, and evaluate the effect of the former on disposable-income inequality. In particular, we compare the consumption tax-to-income ratios across households, and analyze the distribution of post-consumption-tax income.

After testing the robustness of our model, we show that taking the composition of the household consumption basket into account does not significantly change the estimates of the distributional effect of consumption taxes. On the other hand, we do require data on household income and composition, which systematically appear in cross-country micro-datasets. Moreover, while consumption data are rather scarce in international datasets, household income data often include specific information on housing costs (including imputed rents). We show that, where such data are available, this information can be exploited and clearly increases the predictive power of the model.

We show that (1) the consumption tax-to-income ratio for households in the top decile of equivalized income is 60% that of the bottom half; (2) consumption taxes undo one third of the impact of direct taxes and transfers on the Gini coefficient of household income; and (3) the average consumption tax rate, rather than the distribution of propensities to consume, drives the cross-country variation in the anti-redistributive effect of consumption taxes.

2 Literature

While there is significant redistribution using the revenue from consumption taxes, the direct anti-redistributive effect of their imposition has rarely been assessed. This latter effect is determined by the tax-rate structure, and household consumption patterns and average propensity to consume. This likely differs significantly from one country to another, as there is considerable cross-country variation in both the level of consumption taxes and the distribution of households' propensities to consume.

2.1 The determinants of regressivity in consumption taxes

The amount of consumption tax paid by each household depends on both the overall level of their consumption and the type of goods and services consumed. The distribution of tax rates across the population therefore reflects both the household propensity to consume and the basket of goods consumed, with the latter influencing the average effective rate applied to total household expenditure.

Regarding the first factor, it is widely thought that the propensity to consume falls

with household income. If this is so, then for a given tax rate the relative amount of consumption tax paid by the household also falls with income. This is the main reason why consumption taxes are considered to be regressive. Second, for a given propensity to consume, each household's effective tax rate will depend on the bundle of goods and services it chooses to purchase. Country-specific analyses are required in order to assess how this 'bundle effect' affects the distribution of tax rates across income levels.

There has been a series of empirical analyses of this question, making use of detailed household budget surveys and using statutory tax-rate information for different types of goods and services.¹ Some of these analyses are at the country level, for instance [Savage \(2017\)](#) for Ireland, and [Bozio et al. \(2012\)](#); [Ruiz and Trannoy \(2008\)](#) for France. Others use Eurostat data and Euromod microsimulation tools to compare different countries ([Figari and Paulus, 2015](#); [Decoster et al., 2010](#); [O'Donoghue, Baldini, and Mantovani, 2004](#)). Recently, [Thomas \(2022\)](#) applied VAT statutory rates on household consumption from surveys in 27 OECD countries, mostly covering the 2008-2012 period, to compare the distributional effect of VAT. This literature concludes that the bundle effect on the effective tax rate on household consumption is only limited, as compared to the other effects from the falling propensity to consume and the share of rents.

In France, VAT is slightly progressive (being one point higher for the top decile than for the bottom: see [Boutchenik, 2015](#)), but this is offset by regressive excise taxes so that the total tax rate on consumption is almost flat ([Bozio et al., 2012](#); [Ruiz and Trannoy, 2008](#)). In Ireland, [Savage \(2017\)](#) finds that the profile of all consumption taxes is slightly regressive (two points higher for the bottom than for the top decile, and three points higher for deciles 2 to 4).

Using a larger sample of countries, [O'Donoghue, Baldini, and Mantovani \(2004\)](#) conclude that VAT rates on consumption are slightly progressive (zero to two points higher for consumption in the top decile) in each of the 12 European countries they consider; on the contrary, excise taxes are regressive everywhere (with a zero to three points difference). They overall find that consumption tax rates fall with consumption (and are thus regressive), but that the difference between the top and bottom deciles is rather limited: under one point in 8 out of the 12 countries, and between one and two points in France, Italy, Portugal and the United Kingdom. Applying the same method to more-recent data, [Decoster et al. \(2010\)](#) and [Figari and Paulus \(2015\)](#) find the opposite result: a slightly-increasing tax rate on consumption. In the former, the top decile pays between 0.5 (UK) and 2.6 points (Belgium) more than the bottom decile; in the latter this range is between 0.4 (UK) and 1.6 points (Belgium).

¹As the national legislation on consumption taxes is sometimes very complex, the imputation of the tax rate for different goods is generally simplified: the analyses distinguish between a few dozen groups of goods and services and apply a tax rate to each, even if in practice the legislation can be much more detailed. However, this type of approach is by far the most-precise evaluation we have of the bundle effect.

In [Thomas \(2022\)](#), VAT is generally either proportional or slightly progressive when measured as a percentage of consumption, while saving rates rise with income, thereby driving the regressivity of tax-to-income ratios in all 27 OECD countries analysed. The importance of taking housing rents into account is also underlined: the share of housing rents in household budgets affects the scope of taxable consumption. Thus, even though reduced tax rates on certain goods usually benefit the poor, resulting in (slightly) progressive effective tax rates on consumption, the decreasing propensity to consume has a much more important impact, driving the decreasing tax-to-income ratios in all countries.

We will here neglect the bundle effect by considering that this does not vary by income group, but do address housing rents, which are not subject to consumption tax: we apply a constant tax rate to non-rent consumption. We then test the sensitivity of our results to this assumption in [Section 5.1](#), which considers a consumption tax rate that varies by income group. Last, we carry out a robustness check of our results by comparing implicit and statutory consumption tax rates in [Section 5.2](#).

2.2 Issues in measuring consumption taxes

Unlike payroll or income taxes, which can be measured at the individual level using administrative data, consumption taxes such as sales taxes or value-added taxes are not registered at the individual level. It is therefore not straightforward to establish the consumption taxes that a household pays. The most-common way of measuring this amount is based on consumption data and microsimulation techniques: with information on household consumption and the country's tax system, the consumption taxes paid by the household can be derived.

There are three main issues with this technique. The first is the lack of time series on household consumption. Second, the definition of the tax rate on consumption that is to be applied to consumption expenditures. Last, it is useful to ask, in the context of comparing the redistribution of fiscal systems in a cross-country fashion, whether micro-data from different national surveys can be compared directly or if they should be harmonized via National Accounts. We consider these three in turn below.

Measuring consumption. Extensive empirical research has been carried out to estimate consumption data at the household level, starting with the use of traditional detailed budget surveys that ask respondents to report their disaggregated consumption expenditure (whether through diary or recall procedures). More recently, administrative tax data have been widely exploited to impute consumption expenditure based on the accounting identity that total household expenditure equals income plus capital gains minus the change in wealth over the period (see [Browning, Crossley, and Winter, 2014](#) and [Eika, Mogstad, and Vestad, 2020](#), for critical reviews of these different methods).

While all of these consumption data face measurement problems, researchers tend to believe that household income is easier to measure than household consumption. With regard to income, however, it is well known that the resources of low-income households are difficult to measure using tax data, while the resources of households at the top of the distribution are relatively poorly captured in surveys (see [Yonzan et al., 2022](#), and the references therein). Moreover, as shown by [Meyer and Sullivan \(2003, 2011\)](#), consumption expenditure in surveys is actually better measured than income at the bottom of the living-standards distribution. Another lesson from this literature is that consumption from survey data is systematically underestimated as compared to the aggregate figures in National Accounts ([Krueger et al., 2010](#)), while administrative tax data needs to be coupled with fine-grained household financial data to be exploitable (see, for instance, [Kolsrud, Landais, and Spinnewijn, 2020](#)). As a result, research questions that would require the use of micro consumption data to be addressed are severely hampered by the lack of good and accessible time series on household consumption, be it from surveys or registry-based measures.

In this paper, we contribute to the literature by proposing a simple way of deriving household consumption from current income, housing costs and standard demographics. We test the sensitivity of our imputations to the method used, by comparing the outcome of different regression models. We also check their robustness by comparing our results to those in the literature (see [Section 5.1](#)), and by taking advantage of the fact that for some datasets we do observe household consumption expenditures. Although our data are likewise subject to some measurement errors, which are identified and listed, they have the great advantage of using only standard easily-accessible data that are already well-known by researchers.

Measuring the tax rate. The most direct way of calculating the effective tax rates on consumption consists in using legal statutory tax rates (e.g. [Thomas, 2022](#); [Figari and Paulus, 2015](#); [Decoster et al., 2010](#); [O'Donoghue, Baldini, and Mantovani, 2004](#)). This has the advantage of being an exact method, provided that we can decompose the household's consumption bundle in order to apply the corresponding tax to each good. However, the application of the correct tax rates according to the nature of the good or service purchased requires consumption data to be broken down into very fine categories. Existing consumption databases rarely exhibit this level of precision.² We discuss the limitations of this bottom-up approach in [Section 5.2](#).

As proposed by [Mendoza, Razin, and Tesar \(1994\)](#), the most-workable solution to comparing the effect of taxation in multiple countries characterized by different and changing tax structures is to construct synthetic tax indicators. The effective tax rate is defined as the ratio of particular tax revenues to the corresponding tax bases obtained from the

²See [De Agostini et al. \(2017\)](#); [Akoğuz et al. \(2020\)](#) for a discussion of the issues raised by using detailed consumption data such as Household Budget Survey data with statutory rates.

National Accounts. The effective tax rate on consumption is therefore the ratio of tax revenues from consumption taxes to the pre-tax value of consumption.³

Equivalently, we can define an *implicit* tax rate on consumption as a percentage of the post-tax value of consumption.⁴ Implicit and effective tax rates on consumption embed the same information and their correlation coefficients are equal to 1, as clearly shown in [Martinez-Mongay \(2000\)](#) and [Carey and Tchilinguirian \(2000\)](#). Changing the tax base (pre-tax versus post-tax) only changes the level of the calculated tax rate, which is lower if expressed as a percentage of the post-tax value of consumption.

In this paper, as observed consumption is expressed in consumer prices in the micro-data, we adopt a tax base reflecting the post-tax value of consumption and therefore calculate implicit tax rates on consumption at the macro-level.⁵ In addition, since we remove rents (actual and imputed) in the micro-data on consumption, we also remove them in the macro-computation of the tax base. While this is a sensible thing to do with micro-simulation tools (e.g. [IFS, 2011](#)), no analysis using implicit tax rates has actually consistently removed rents from the tax base.⁶

International comparisons. There is always a gap between micro-data from surveys and aggregate National Accounts data. In this case, as we use individual income and consumption data in order to estimate the impact of consumption taxes, we want to make sure that the amounts can be compared across countries. National Accounts, as they are standardized, are more fit for international comparisons. The propensities to consume calculated at the national level do indeed vary significantly between countries, as measured in National Accounts. These differences, however, do not always appear in micro data (see [Pistaferri, 2015](#); [Sabelhaus et al., 2015](#), and the references therein).

We therefore combine micro- and macro-level data in order to produce information on the distribution of income and consumption for each country-year that is comparable at the international level. Many other researchers have noted this discrepancy between micro and macro data, and have dealt with it in a similar manner (e.g. [Piketty, Saez, and Zucman, 2018](#)). We discuss the implications of our scaling method extensively in the next section, and present sensitivity tests of this assumption in [Section 5.3](#).

³At the micro level, it is thus the difference between the consumer price (post-tax) and the producer price (pre-tax), expressed as a percentage of the producer price (i.e. the wedge between consumer and producer prices).

⁴At the micro level, the difference between the consumer price (post-tax) and the producer price (pre-tax) is in this case expressed as a percentage of the consumer (post-tax) price.

⁵See [Eurostat \(2016\)](#) and [Carey and Tchilinguirian \(2000\)](#) for a similar computational choice.

⁶[Mahler, Jesuit et al. \(2018\)](#) opt for an intermediate method: they apply the “standard” statutory tax rate to household consumption, adjusted by the actual tax revenue calculated from OECD data. This approach is close to that described here, except that the adjustment does not take into account that a considerable portion of the final consumption recorded in OECD data is not subject to taxation (e.g. rents and some parts of public consumption such as health and education).

3 Method and data

Over a lifetime, the distributional impact of consumption taxes does not depend on the current propensity to consume; it instead depends on the difference between lifetime expenditure and lifetime income, which might vary across households.⁷ We here seek to assess the distributional impact of consumption taxes at a given point in time (and compare this figure across countries): as such, our analysis does not provide any information on the distributional impact of consumption taxes over the life course, as households have the possibility to borrow and save.

We consider this methodological choice to be informative, as the households currently labeled as poor are affected by consumption tax-rates differently from those currently labeled as rich: this cross-section distributional impact, which we observe over a wide range of countries and years, is important. Our approach also has the advantage of allowing us to make straightforward comparisons with direct taxes and benefits, whose impact is usually measured on the current distribution of income.

Starting from cross-country micro-level databases on income and consumption, we estimate the consumption-tax amount each household pays. This allows us to define the household tax-to-income ratio as the ratio of consumption taxes paid to household income. This section presents the method and the data used in order to produce consistent estimates of the distribution of tax-to-income ratios over different country-years.⁸

3.1 Data

We use micro-level data from surveys on income and consumption in order to calculate households' propensities to consume. Implicit tax rates on consumption are calculated via National Accounts data on consumption-tax revenue and household consumption. National Accounts data on household consumption and income are also used in order to scale the micro data.

The Luxembourg Income Study ([LIS](#)) is a cross-national data center that collects survey and administrative data on household income, wealth, consumption, and other socio-economic characteristics. In most countries, the micro data comes from national household budget surveys carried out by National Statistical Institutes. This data is then harmonized by the Luxembourg Income Study.⁹

The initial dataset includes over 200 country-years, with over 30 different countries

⁷In economic theory, lifetime income and lifetime expenditure are generally considered to be equal, omitting gifts and bequests. Including gifts and bequests, economic theory would consider that net gifts are not part of the lifetime income of the giver but part of the lifetime income of the receiver, to avoid double counting (see [Capéau, Decoster, and Phillips, 2014](#) for a discussion).

⁸The code that was used to build our cross-country dataset, as well as the main indicators and percentile data presented in this paper are available online at <https://doi.org/10.5281/zenodo.4291984>.

⁹For more information, see <http://www.lisdatacenter.org/about-lis/>.

over the 1967 to 2016 period. Household consumption data is only available in about one quarter of those datasets. When consumption is not available, we impute it, as described in Section 3.2.

From consumption data, whether observed or imputed, we then require additional macro-data in order to calculate consumption taxes at the household level. This macro data, taken from National Accounts data in each country-year, is used for two reasons. The first is to scale the micro data on consumption and expenditure so that it is consistent with National Accounts, and thus comparable across countries. The second is to calculate consumption-tax rates, based on tax revenues and total consumption. These data, available from OECD Statistics, are produced by National Statistical Institutes, and cover not only OECD member countries but also a number of other cooperating countries.¹⁰ This National Accounts data is not available for all of our country-years.

At the end of the day, we apply our method to 132 country-years for which we are able to calculate the effect of consumption taxes on inequality, covering 27 countries over 36 years from 1978 to 2013. Of these, 55 country-years fall under the core model, which uses information on rents to produce the most-accurate estimates of the impact of taxes. We also use a lighter version of our simulation model that is slightly less accurate but requires less data (in particular, it does not require rents data), in order to simulate consumption taxes for 77 additional country-years. The complete list of countries and years in our analysis, as well as the estimation method used for each of them, appears in Section H.

3.2 Method

We use microsimulation to produce estimates of the consumption taxes paid by households: this requires information on households' consumption expenditures as well as on the taxes on consumption. Having calculated the consumption taxes paid, we can define the tax-to-income ratio (TIR) for household i in country c at year t :

$$TIR_{i,ct} = \frac{\tau_{ct} \cdot consumption_i}{disposable\ income_i} = \tau_{ct} \cdot prop_i \quad (1.1)$$

where τ_{ct} is the implicit tax rate on consumption in country c at year t , and $prop_i$ is household i 's propensity to consume, i.e. the share of disposable income that is actually spent.

The distribution of this measure by income reveals the regressivity of consumption taxes in the country-year. The more the TIR falls with income, the more regressive are consumption taxes.

We can similarly define post-tax disposable income as the disposable income once

¹⁰See <http://stats.oecd.org>.

consumption taxes have been paid:

$$\text{post-tax income}_i = (1 - TIR_{i,ct}) \cdot \text{disposable income}_i \quad (1.2)$$

We present below the method used to calculate the propensities to consume and render them consistent across country-years; we then define the implicit tax rates on consumption used to simulate consumption taxes. Last, we describe the imputation strategy when consumption data is missing.

Definition of the propensity to consume

Households' propensities to consume, which are the household-level term in [eq. \(1.1\)](#), represent the share of income that is effectively spent on goods and services. This is calculated at the household level using budget survey data, and is defined as the ratio of taxable consumption to disposable income. Thus, for every household i :

$$prop_i = \frac{\text{taxable consumption}_i}{\text{disposable income}_i} = \frac{hmc_i - rents_i}{dhi_i}$$

where hmc is household monetary consumption, $rents$ household expenditure on rents and dhi disposable household income.

Taxable consumption thus includes all monetary expenditure but excludes rents, which are not subject to consumption taxes.¹¹ Rents represent a higher share of income at the lower end of the income distribution. Therefore, including rents in taxable consumption, as most international comparisons do, would produce a slight overestimation of the regressive effect of consumption taxes (see [Section D](#)).¹²

Disposable income is the amount of money that households have available for spending after accounting for direct taxes, social-security contributions and monetary transfers. All monetary variables are equivalized according to the OECD standard: income and consumption are divided by the square root of the number of household members.

As consumer expenditures are systematically under-reported in surveys, particularly 'vices' such as alcohol and tobacco, the effect of taxation on disposable income will be underestimated, especially for excise taxes ([Capéau, Decoster, and Phillips, 2014](#)). In addition, under-reporting is generally higher for taxed expenditures than for untaxed expenditures, hence the need to calibrate the data with National Accounts. We can define the aggregate propensities to consume for country c in year t , based on the aggregate values

¹¹Loan repayments are considered as savings, not consumption.

¹²While our core model sticks to this definition of taxable consumption, we also produce estimates for a larger set of countries where rents are not subtracted from consumption. The results from the lighter model applied to the full sample appear in [Section E](#).

of consumption and income in the National Accounts:

$$P_{c,t} = \frac{C_{c,t}}{I_{c,t}}$$

In order to render the distribution of the propensities to consume consistent with National Accounts data, the micro-data on consumption and income is scaled according to these aggregates. Note that, to be consistent with our micro data, rents are removed from both consumption (for actual and imputed rents) and income (for imputed rents) in the scaling factor. See [Section B](#) for details of the economic aggregates used for this scaling. After this homothetic transformation, we have:

$$\sum_{\text{households } i} \text{taxable consumption}_i = C_{c,t}$$

$$\sum_{\text{households } i} \text{disposable income}_i = I_{c,t}$$

The combination of these two types of data allows us to use micro-data to estimate the distribution of consumption over income, while the relative average levels of income and consumption are scaled to match the National Accounts.

Implicit tax rates

Consumption taxes include value-added taxes (VAT), excise taxes, and other taxes on goods and services. To account for all of these taxes and their average respective weights in consumption, we calculate for each country-year an implicit tax rate based on national consumption-tax revenue and domestic monetary consumption.

There are two main definitions of the implicit effective consumption tax rate in the economic literature, as described in [Eurostat \(2016\)](#) and [Carey and Tchilinguirian \(2000\)](#), both inspired by [Mendoza, Razin, and Tesar \(1994\)](#). We draw on these contributions in order to propose a slightly-improved definition:

$$\tau_{c,t} = \frac{\text{consumption tax revenue}}{C - CGW - R}$$

where *consumption tax revenue* includes all revenue from consumption taxes, including value-added taxes (or sales taxes if applicable), excise taxes, taxes on specific services, etc. $C = CP + CG$ is total final consumption expenditure (private consumption and the consumption of general government). CGW are the wages of employees paid by the general government, and $R = R_{\text{actual}} + R_{\text{imputed}}$ are actual and imputed housing rents.

We take into account the fact that the value of housing (whether paid by tenants or imputed to homeowners) and some part of public consumption do not produce consumption-tax revenue.

We can then calculate the tax-to-income ratio for each household i in country c at year t :

$$TIR_i = \tau_{c,t} \cdot \text{scaled prop}_{c,t,i} = \underbrace{\tau_{c,t} \cdot \frac{C_{c,t}}{I_{c,t}}}_{\text{macro data}} \cdot \underbrace{\frac{\sum_i dhi_i}{\sum_i hmc_i - rents_i}}_{\text{micro data}} \cdot prop_i$$

where $\tau_{c,t}$ is the implicit consumption tax rate of country c at year t , $\frac{C_{c,t}}{I_{c,t}}$ the aggregate propensity to consume (consumption over income) in country c at year t , $\sum_i dhi_i$ the (weighted) sum in micro data of all households' disposable income, $\sum_i hmc_i - rents_i$ the (weighted) sum of all households' non-rent consumption, and $prop_i$ household- i 's propensity to consume.

This implicit tax rate, which is a weighted average of the different rates on specific products, is thus the same for all households in a country-year. Based on the discussion in [Section 2.1](#), we argue that the effect of having varying bundles of goods and rates across households is of only third-order compared to the decreasing propensity to consume and the falling share of rents in income. We run a sensitivity analysis of this assumption, and show that consumption-tax rates that increase with income in proportions consistent with the literature have a smaller effect than decreasing propensities to consume and a falling share of rent in consumption (see [Section 5.1](#)).

The imputation of consumption

We use a regression model to impute consumption from household characteristics when consumption data is not available. The key issue here is that the distribution of consumption has to be imputed in entire country-year datasets in which there are no expenditure observations. We therefore require a model that is generic enough to be calibrated on some countries and then used for others: this, in particular, has to be independent of cross-country differences in median incomes.

We proceed by applying medianization to all of the monetary variables (including income, consumption and the value of housing). As such, all monetary variables are expressed as a proportion of their median values in country c at year t . The **medianized disposable income** of household i is thus:

$$\widehat{\text{income}}_i = \frac{\text{income}_i}{\text{median}_{c,t}(\text{income})}$$

Similarly, we define $\widehat{\text{consumption}}_i$ as medianized consumption and $\widehat{\text{housing}}_i$ as the medianized value of its housing. The value of housing is defined as the total cost of housing, including rents and utilities, as well as imputed rents for occupying owners. This is a very good proxy of the standard of living of the household, and appears much

more often in income databases than does total consumption expenditure.¹³ Moreover, while income can be subject to considerable transitory shocks that do not feed through to consumption, housing expenditure is smoothed, as consumption is expected to be.

We apply a generalized linear model with a logarithmic link function and Gaussian error.¹⁴ In this model, $\widehat{\text{consumption}}$ follows a normal distribution conditional on income, housing and other socio-demographic variables X , with constant variance σ^2 and mean μ defined by:

$$\log(\mu) = \alpha + \beta \log(\widehat{\text{income}}) + \delta \log(\widehat{\text{housing}}) + \Delta^\top X \quad (1.3)$$

Importantly, socio-demographics include the age of the household head to account for the fact that consumption rates vary significantly over the life-cycle (Heathcote, Storesletten, and Violante, 2005). While this is our core model, we also consider a lighter version of the regression model for the country-year datasets where the cost of housing and/or the age of the household head is not available. See Section A for the full specification.

Accuracy of the imputation

We use this model to impute consumption in every dataset where it is missing but where income and other relevant socio-economic determinant variables appear. The relationship between the propensity to consume and income in the imputed consumption data is very similar to that calculated using observed consumption data. *In fine*, the same model seems to be applicable over a wide range of country-years, and the shape and downward slopes of the curves fit the data well. Figure 1 shows the results from nine imputation models using cross-validation: each model excludes the country for which consumption is estimated. For example, imputed consumption in Australia in 2010 comes from a regression model estimated on every country but Australia. Even in countries where imputed consumption appears to overstate observed consumption at the bottom and understate it at the top (such as in the United Kingdom or Poland), the imputation model produces reliable estimates of the post-consumption-tax Gini coefficients (Figure 2).

The estimated coefficients from our model appear in Table A.1, and the estimated implicit tax rates on consumption in Blasco, Guillaud, and Zemmour (2020). However, it should be noted that, while our imputation model produces reliable estimates of the impact of consumption taxes on inequality, it may well be inappropriate for other purposes, such as testing the permanent-income hypothesis, comparing consumption between social groups, or other questions for which researchers often rely on household consumption data.

¹³While consumption expenditure appears in 25% of the datasets, housing costs are listed in 60% of them.

¹⁴See Nelder and Wedderburn (1972) for the original description of these models, and Hardin and Hilbe (2018) for a description of their modern implementation in Stata.

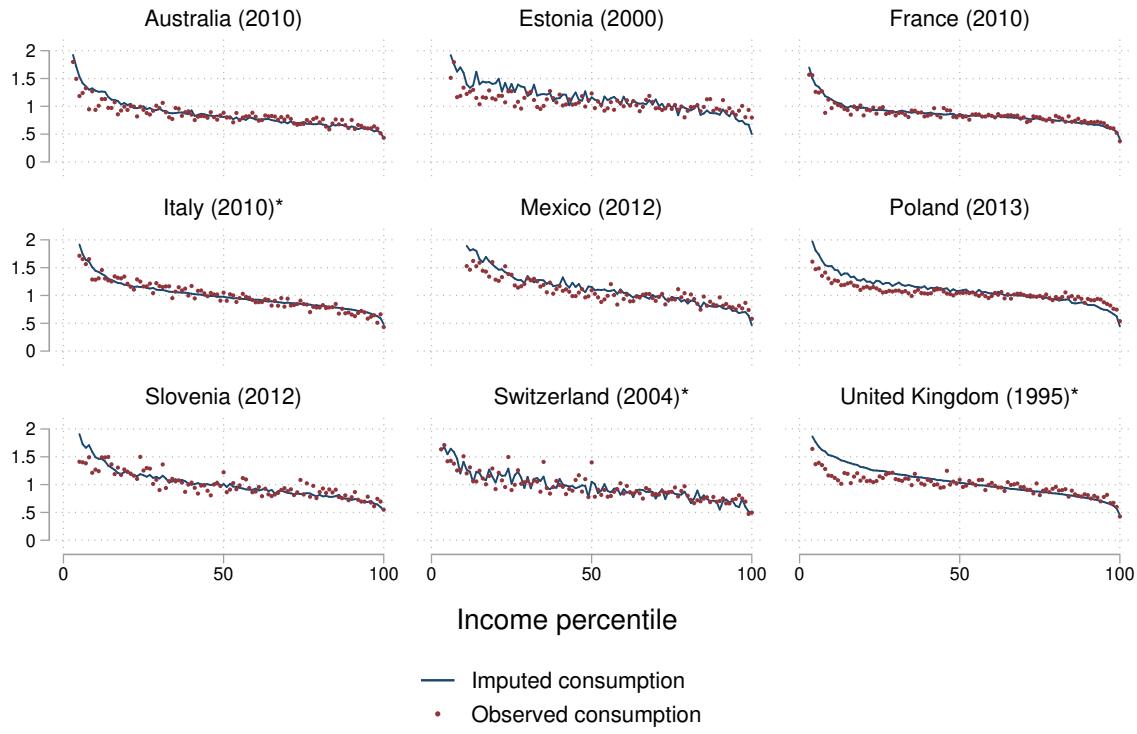


Figure 1: The imputed and observed propensities to consume, using cross-validation.

Notes: Imputation for Italy, Switzerland and the United Kingdom come from the lighter model.

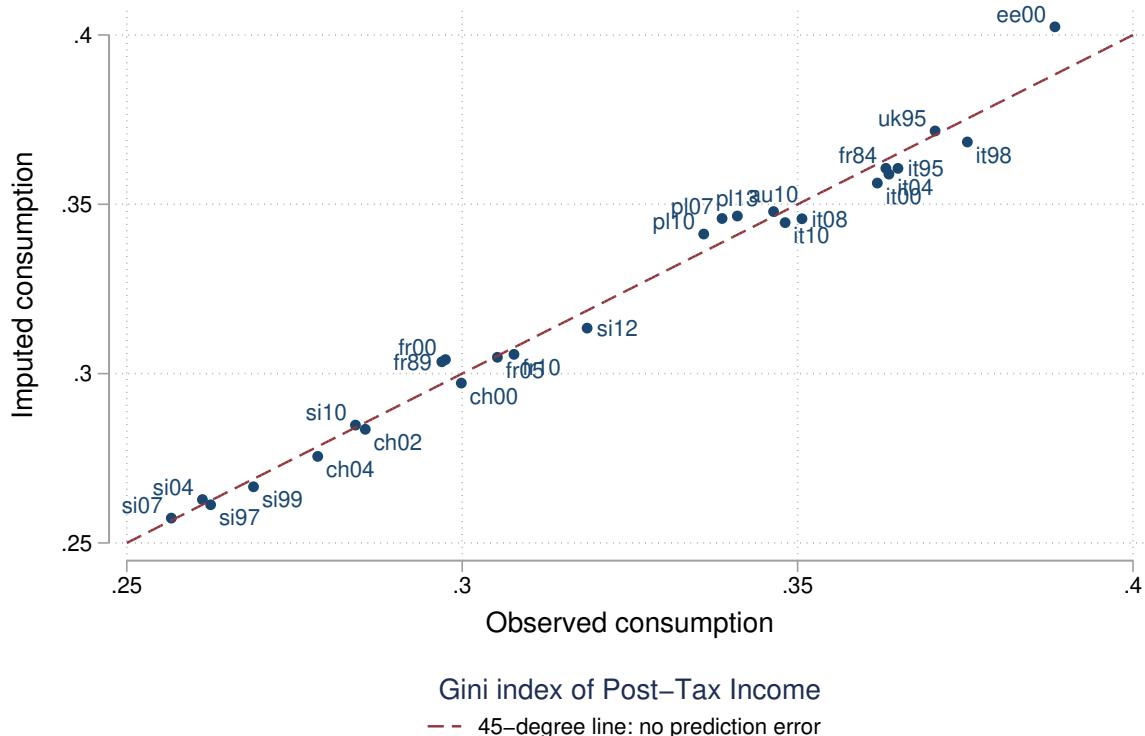


Figure 2: The observed and predicted Gini coefficients of post-tax income.

We show that including the total cost of housing as an independent variable significantly increases imputation quality. This is the approach taken in the core model. However, this housing information is not available for some country-years, as is the age of the household head. In this case, we use imputations from the lighter model to increase the coverage of our international comparisons. We show in [Section A](#) that the lighter model produces fairly satisfactory results as well.¹⁵

4 Results

In the following figures, we present the results from observed consumption data when available, or from the imputations of the core model or the lighter model, depending on the availability of the data needed to run the models. For clarity, the results shown for each country are that from its latest available year (see [Table H.1](#) for a full description of the available data for each country and year).

All of our results, including those from the lighter model and the core model, are available at <https://doi.org/10.5281/zenodo.4291984>.

4.1 The tax-to-income ratio of the richest 10 percent is only 60% that of the poorest 50 percent

The first results that we present here refer to the global tax-to-income ratios for each percentile of income. We find that, in all countries and years, propensities to consume fall with income. In general, consumption exceeds disposable income in the first percentiles, indicating significant dis-saving. On the contrary, households in the highest percentiles of equivalized income consume about 50-60% of their income.

Tax-to-income ratios follow the same downward slope ([Figure 3](#)). Consumption taxes are therefore significantly regressive: in France in 2010, the poorest households paid over 20% of their disposable income in consumption taxes, while this figure was under 10% in the richest households. The curve in Germany is very similar, both in level and slope. The estimated regressivity is slightly lower in France, as the consumption-propensity curves cross at the middle of the income distribution. The slope is also similar in other countries, even though the levels are different: in Denmark, the tax-to-income ratio is over 30% for almost half of households, while it is under 10% for most households in the United States.

For most countries, the tax-to-income ratio of the richest 10 percent is between 50% and 60% of that of the poorest 50 percent ([Table 1](#)). For the countries with the greatest inequality in propensities to consume, the tax-to-income ratio is even under half that of

¹⁵We present there the coefficients of the simpler imputation models, as these can be applied to datasets with little socio-demographic information, such as fiscal data.

the bottom 50 percent: 46% in the United States, 47% in Spain and 49% in Italy. On the other hand, the gap is lower for less-unequal countries: the tax-to-income ratio of the top 10 percent represents 68% of that of the bottom 50 percent in Poland, 62% in Belgium, France and Sweden.

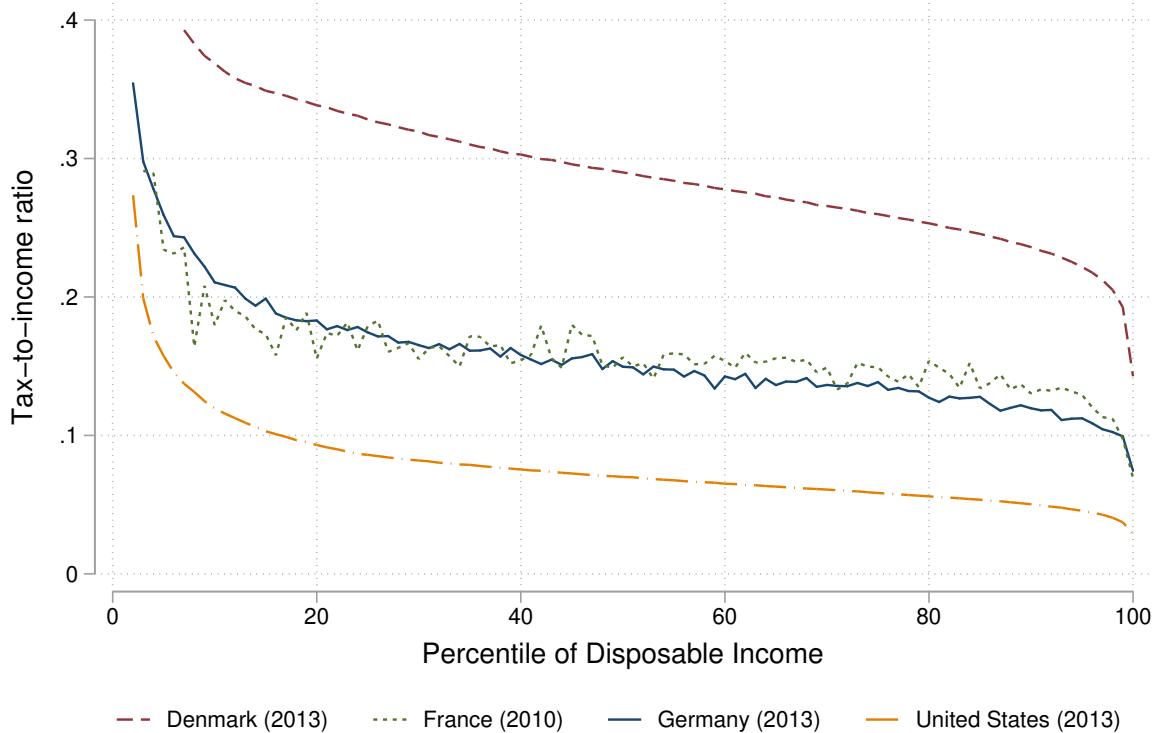


Figure 3: Tax-to-income ratios in Germany, Denmark, France and the United States.

Notes: The results for the US and Denmark come from the lighter model.

The changes in the propensities to consume along the income distribution are captured by the β coefficient of the consumption-imputation model, as shown in eq. (1.3). This coefficient being less than 1 means that consumption grows less quickly than income, and the propensity to consume falls with income. In the lighter specification, i.e. that where income is the only continuous independent variable, the β coefficient is 0.57 over most of the income distribution (Table A.1). As such, a 1 percent rise in income leads to 0.57 percent higher consumption.¹⁶

In our core model (in column (3) of Table A.1), housing costs are strongly correlated with total consumption. The β coefficient for income when these costs are included is smaller, as part of the income effect passes via housing costs. For most of the income distribution, a 1 percent increase in income yields a 0.45 percent increase in consumption (as opposed to a figure of 0.57 when housing costs are not included), while a 1 percent increase in housing costs yields 0.33 percent higher consumption.

¹⁶We introduced a different slope at the bottom of the income distribution, i.e. where income is below 60 percent of the median (see Section A). For these poorest households, the β coefficient is 0.27 in the lighter model.

	TIR of T10	TIR of B50	Ratio
United States (2013)	0.04	0.09	0.46
Spain (2013)	0.10	0.22	0.47
Italy (2010)	0.10	0.20	0.49
Estonia (2013)	0.17	0.34	0.50
Greece (2013)	0.15	0.30	0.50
United Kingdom (2013)	0.11	0.21	0.51
Austria (2013)	0.12	0.23	0.54
Switzerland (2013)	0.07	0.12	0.54
Hungary (2012)	0.20	0.36	0.56
Netherlands (2013)	0.12	0.21	0.56
Ireland (2010)	0.13	0.23	0.57
Germany (2013)	0.10	0.18	0.57
Czech Republic (2013)	0.14	0.25	0.57
Mexico (2012)	0.06	0.10	0.58
Slovenia (2012)	0.17	0.29	0.59
Finland (2013)	0.17	0.28	0.59
Australia (2010)	0.08	0.13	0.59
Denmark (2013)	0.20	0.33	0.61
Iceland (2010)	0.18	0.30	0.61
Norway (2013)	0.16	0.26	0.61
Belgium (1997)	0.12	0.19	0.62
France (2010)	0.11	0.18	0.62
Sweden (2005)	0.17	0.27	0.62
Poland (2013)	0.14	0.21	0.68

Table 1: Tax-to-income ratios of the top decile and the bottom half of equivalized income, and the ratio between them

4.2 The anti-redistributive effect of consumption taxes is on average 1/3 of the size of direct redistribution

We measure the distributive effect of consumption taxes using synthetic measures of income inequality and progressivity. We first show that the effect of consumption taxes on income inequality is significant, but much smaller in magnitude than that of direct tax-benefit redistribution. We then decompose this distributive effect into its horizontal and vertical components, and show that the largest part of the between-country differences come from the differences in consumption-tax rates.

We measure the distributive impact of consumption taxes by defining post-tax disposable income:

$$\begin{aligned}\text{post-tax income} &= \text{disposable income} - \text{consumption taxes} \\ &= \text{market income} + \text{transfers} - \text{direct taxes} - \text{consumption taxes}\end{aligned}$$

We define the redistributive effect of consumption taxes as the difference in income inequality between disposable and post-tax disposable income, using the following index of effective redistribution:

$$\Delta G = G_{dhi} - G_{dhi-tax}$$

where G_{dhi} ($G_{dhi-tax}$) is the Gini coefficient on pre-tax (post-tax) disposable income. This measure is positive for a progressive tax and negative for a regressive tax. We expect a negative value for consumption taxes, corresponding to greater income inequality.

Not surprisingly, this is the case for all countries, as the propensity to consume falls with income. [Figure 4](#) shows that the anti-redistributive effect of consumption taxes is between 0.010 and 0.056 Gini points, with the figure for most countries being in the 0.015-0.035 range. We can also consider alternative measures of inequality, such as the ratio of the top 10 to the bottom 50 percent of the income distribution. The same story emerges in this case (see [Figure 5](#)): the United States, Belgium and France are among the countries where the inequality impact of consumption taxes is the smallest, while this impact is the largest in Estonia, Greece and Denmark.

We next compare in [Figure 6](#) the Gini coefficients for four concepts of income: market income (income from labour, capital and pensions); gross income (market income after transfers); disposable income (gross income after direct taxes); and post-tax income (disposable income minus consumption taxes). These income concepts, similar to those in [Guillaud, Olckers, and Zemmour \(2020\)](#), allow for a sequential analysis of redistribution, and enable consistent comparisons of redistribution over the whole population between countries with different social security and pension regimes.^{[17](#)}. In this graph, post-tax

¹⁷These income concepts are defined to avoid common biases in cross-country comparisons: i) Market income includes all types of pensions, so that that pensioners in public-pension countries do not appear

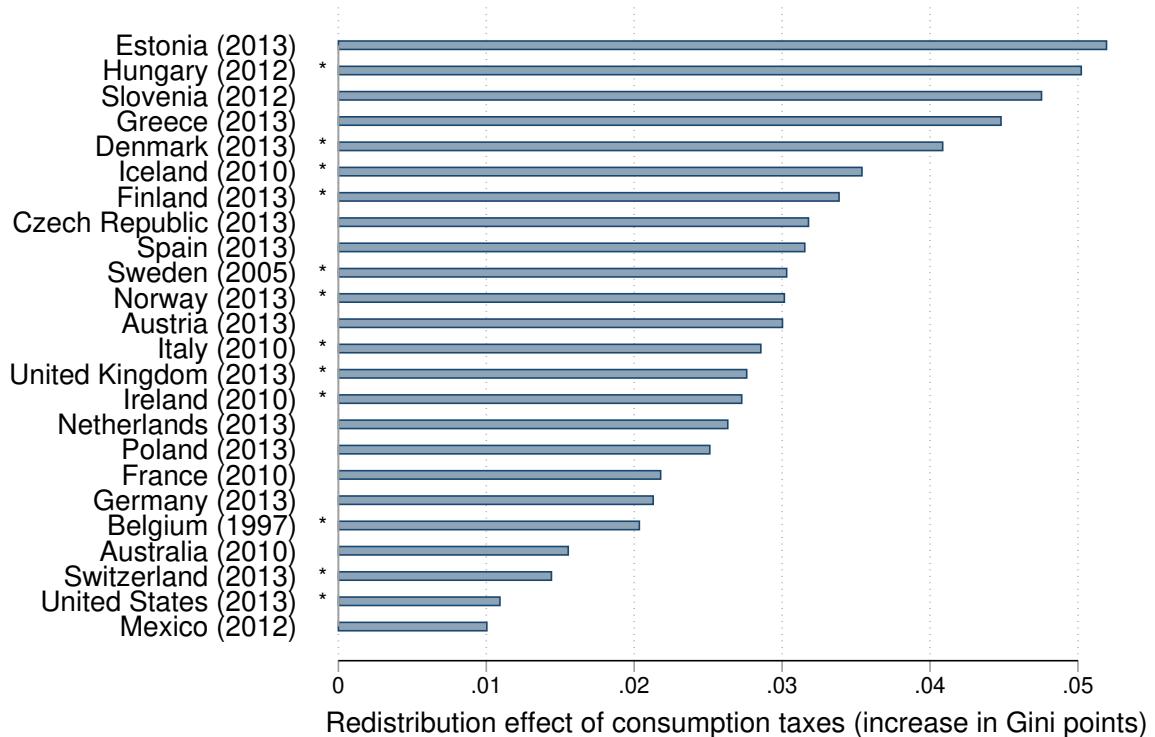


Figure 4: The estimated rise in the Gini coefficient due to consumption taxes.

Notes: Results for countries with a '*' come from the lighter model.

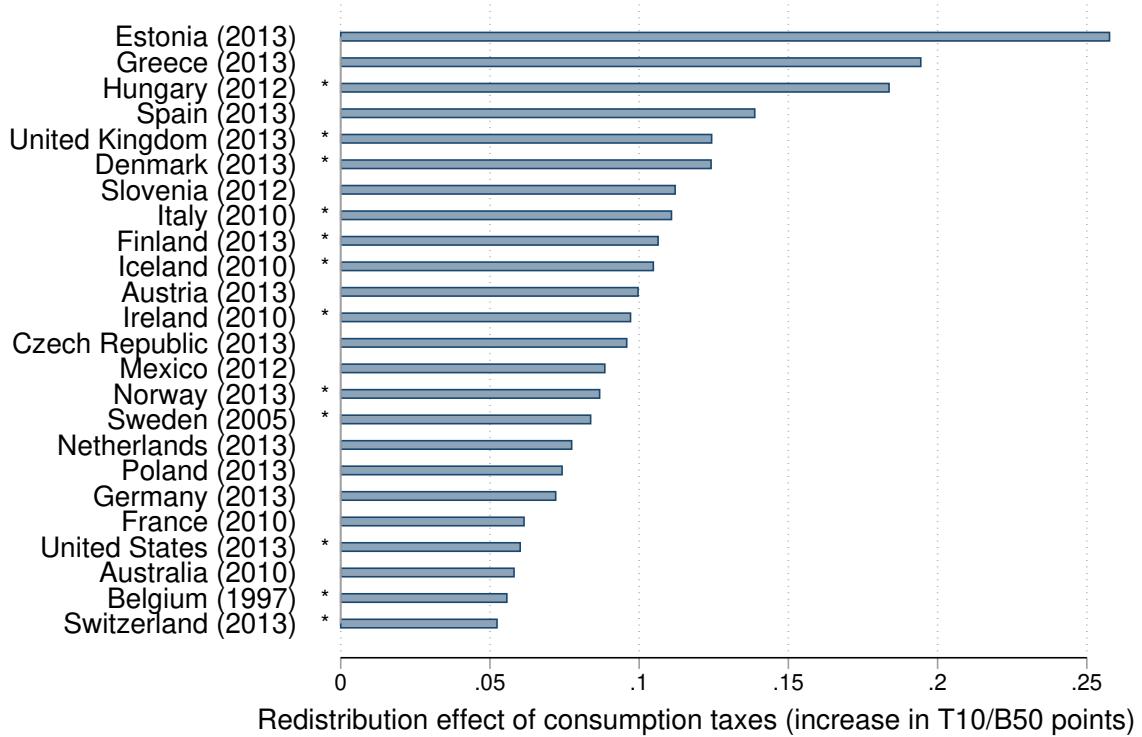


Figure 5: The estimated rise in the T10/B50 ratio due to consumption taxes.

Notes: Results for countries with a '*' come from the lighter model.

income is derived from the present article, while market, gross and disposable income¹⁸ are taken from [Guillaud, Olckers, and Zemmour \(2020\)](#). Our sample and the one they use do not always overlap: for example, they do not provide all income concepts for Mexico, Poland or Switzerland.

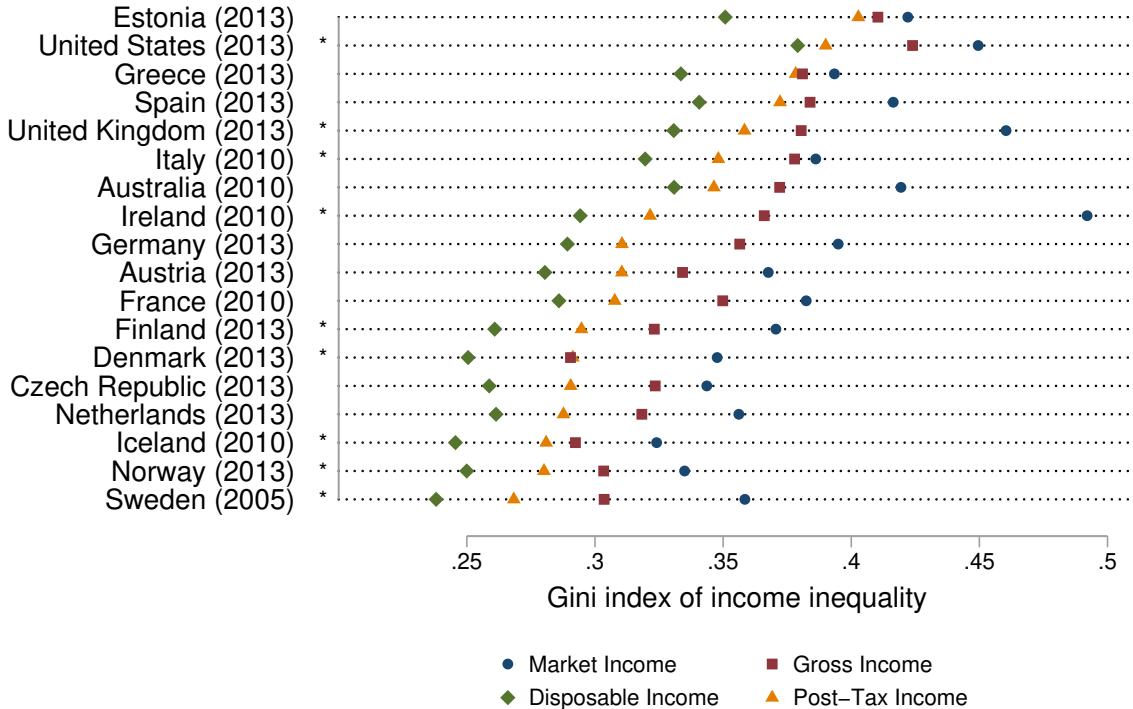


Figure 6: The Gini coefficients for market, gross, disposable and post-tax income.

Reading note: In Estonia 2013, the Gini index of income inequality is 0.351 for disposable income, 0.403 for post-tax income, 0.410 for gross income and 0.422 for market income. Countries are ranked in descending order of post-tax income inequality. Results for countries with a '*' come from the lighter model.

The classical way in which countries are compared in terms of income inequality is disposable income inequality¹⁹. Market income inequality and gross income inequality are represented here in order to give a sense of the redistribution that is operated by direct taxes and social transfers. Market income presents the highest dispersion, as it is before any redistribution.

The countries presented in [Figure 6](#) are an interesting sample because they present large variations in their inequality levels and the structure of their tax systems. Northern European nations like Sweden, Norway, and Iceland have low disposable income inequality and high levels of direct and indirect taxation. The United Kingdom and Ireland,

artificially poor at the market-income stage, and ii) Pre-tax labour income includes imputed employer contributions (as the divide between employer and employee contributions is largely artificial, and varies greatly across countries, so that including only employee contributions in labour income significantly biases the measure).

¹⁸Disposable income inequality is actually the same in our sample as in theirs.

¹⁹All measures of income here are equivalized in order to take household composition into account.

in contrast, present high levels of market income inequality and high levels of direct redistribution. The United States also has high market income inequality, but less direct redistribution. The two groups also differ in their level of indirect taxation: the average implicit tax rate is around 7% for the USA and over 15% for the UK and Ireland, as shown in [Figure C.1](#). In general, European countries have high levels of consumption tax rates, notably because the European Union mandates that the standard rate should not be less than 15% and reduced rates should not be less than 5%.

For all countries, inequality is higher for post-tax income than for disposable income, and lower than for market income. Consumption taxes produce greater inequality, but of smaller size than the reduced inequality due to the remainder of the tax-benefit system. In almost all countries, the Gini coefficient of post-tax income is closer to that of disposable income than to that of market income.²⁰

The anti-redistributive effect is thus significant, and large enough to change the income-inequality ranking between countries with similar levels of disposable-income inequality but different distributions of the propensities to consume and consumption-tax rates. For example, the Netherlands has similar disposable-income inequality to Finland (with Gini figures of 0.261), but lower post-tax income inequality (0.288 versus 0.295: see [Figure 6](#)). This is mainly due to the high VAT rate in Finland (24%, with two reduced rates of 10% and 14%), while that in the Netherlands is lower (21%, with a 9% reduced rate applied to many common products).

In general, the variation of the inequality effect of consumption taxes tends to reduce the gap between countries with high and low disposable-income inequality. For example, while the Gini index of disposable income is 0.251 for Denmark and 0.379 for the United States, the post-tax indices of inequality are respectively 0.291 and 0.390. The gap between the two countries is reduced by 23%, from +0.128 to +0.099.

On average in our sample, the increase in income inequality due to consumption taxes is equal to one third of the total redistribution from taxes and transfers. In a few countries such as Estonia and Greece, where redistribution is quite low, the increase in inequality represents three quarter of the total direct redistribution effect. In others, such as Australia, France, Germany, Ireland, the United Kingdom and the United States, it is under one quarter of total direct redistribution. Consumption taxes exceed half of the redistribution from direct taxes, and sometimes even all of the redistribution from these taxes in countries with low direct taxes (such as the United Kingdom) or high consumption taxes (such as Denmark or Norway).

²⁰The sole exceptions are countries that have high initial income inequality (and thus very-regressive consumption taxes) combined with either little redistribution via direct taxes and transfers or high consumption tax rates, such as Estonia or Greece.

4.3 The redistribution effect is mainly driven by the tax rate

We here investigate the drivers of the different redistributive effects of consumption taxes across countries: Are these completely explained by the average tax rate, as in the example of Finland and the Netherlands above? Or do they also reflect more- or less-unequal distributions of the propensities to consume? To answer these questions, we decompose the indicator of the redistributive effect.

Effective redistribution can be decomposed into vertical redistribution, measured by the Reynolds-Smolensky index RS , and horizontal redistribution, measured by the re-ranking index Re (see [Section F.1](#) for details):²¹

$$\Delta G = RS - Re$$

While the former measures the redistribution due to the regressivity of taxes, the latter is orthogonal to the income distribution: it represents the redistribution effected between households with the same disposable income. In practice, vertical redistribution constitutes most of the redistributive effect of consumption taxes (see [Figure F.1](#)).

As shown in [Kakwani \(1977\)](#), the RS index is itself the product of two terms, respectively linked to the regressive nature of the tax and its average rate:

$$RS = K \cdot \frac{TIR}{1 - TIR} \quad (1.4)$$

Here TIR is the global tax-to-income ratio, defined as average consumption taxes paid over average disposable income, and K is the Kakwani index, a measure of the regressivity of consumption taxes (see [Section F.2](#)). Vertical redistribution can then be decomposed into one distributional parameter and one macro-level parameter. The Kakwani index is determined by the population pattern of consumption and income, and is not a policy parameter. On the other hand, the tax rate can be tuned by the policy-maker.

A first intuition can be grasped with [Figure 7](#) which shows a positive correlation between the implicit tax rate on consumption and the anti-redistributive effect of consumption taxes across countries. Comparing Denmark to the USA, for instance, the sharp increase in inequality in Denmark (+0.04 Gini points) is four times that in the USA (+0.01 Gini points): this difference is driven by a high implicit tax rate on consumption in Denmark (28%), which is four times the tax rate in the USA (7%).

²¹Under these definitions, the Reynolds-Smolensky and Kakwani indices are negative if there is an increase in income inequality (the redistributive effect is negative). We will however present the absolute values of these coefficients in the following figures.

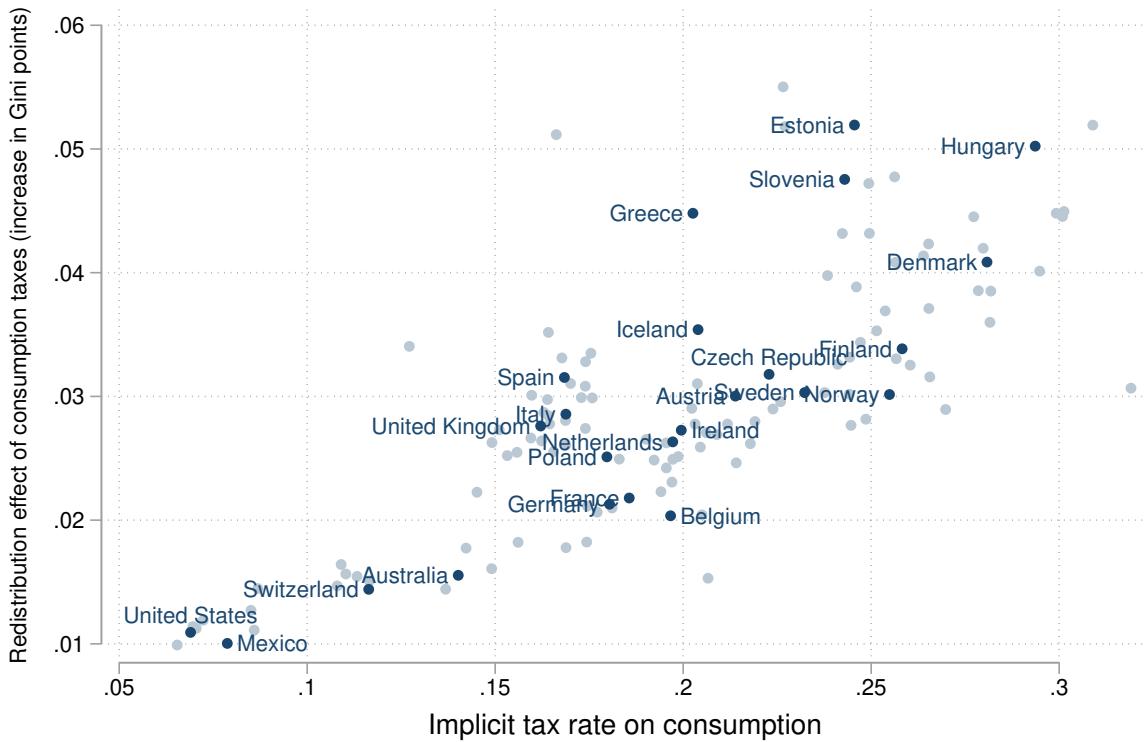


Figure 7: The redistributive impact is mainly driven by the tax rate.

Notes: The last year for each country is shown in bold and the other years appear in greyscale. These last years are 2013 for Austria, the Czech Republic, Denmark*, Estonia, Finland*, Germany, Greece, the Netherlands, Norway*, Poland, Spain, Switzerland*, the United Kingdom* and the United States*, 2012 for Hungary*, Mexico and Slovenia, 2010 for Australia, France, Iceland*, Ireland* and Italy*, 2005 for Sweden*, and 1997 for Belgium*. Results for countries marked with a '*' in this list come from the lighter model.

The analytical decomposition of this anti-redistributive impact of consumption taxes, exposed in eq. (1.4), is applied to our sample in Figure 8. Two insights can be gained from reading this graph. On the one hand, differences in redistribution between countries with similar tax-to-income ratios can be explained by different levels of tax regressivity. Comparing Greece with Norway, for example, the significant anti-redistributive impact of consumption taxes in Greece reflects the regressive nature of the tax. While both countries have the same tax-to-income ratio, the substantial income inequality in Greece produces considerable inequality in consumption and saving rates, as witnessed by the higher Kakwani index.

The comparison between Greece and the United States, on the other hand, reveals the role of the tax-to-income ratio in the redistributive effect of consumption taxes. While the two countries have similar levels of tax regressivity, they face different increases in after-tax inequality (+0.01 Gini points for the United States, versus +0.045 Gini points for Greece). This is due to a much lower tax-to-income ratio in the United States than in Greece, because of a lower average tax rate.

In practice, the Kakwani index of regressivity varies only little, as compared to the

variation in global TIRs. We calculate the Kakwani indices in all of the datasets with consumption information, whether or not consumption taxes can be calculated (77 country-years). Approximately half of the Kakwani indices lie between -0.10 and -0.15, and almost all lie between -0.05 and -0.20 (see Figure F.2). Vertical redistribution is then mainly driven by the tax rate, as the Kakwani indices are fairly similar to each other.²²

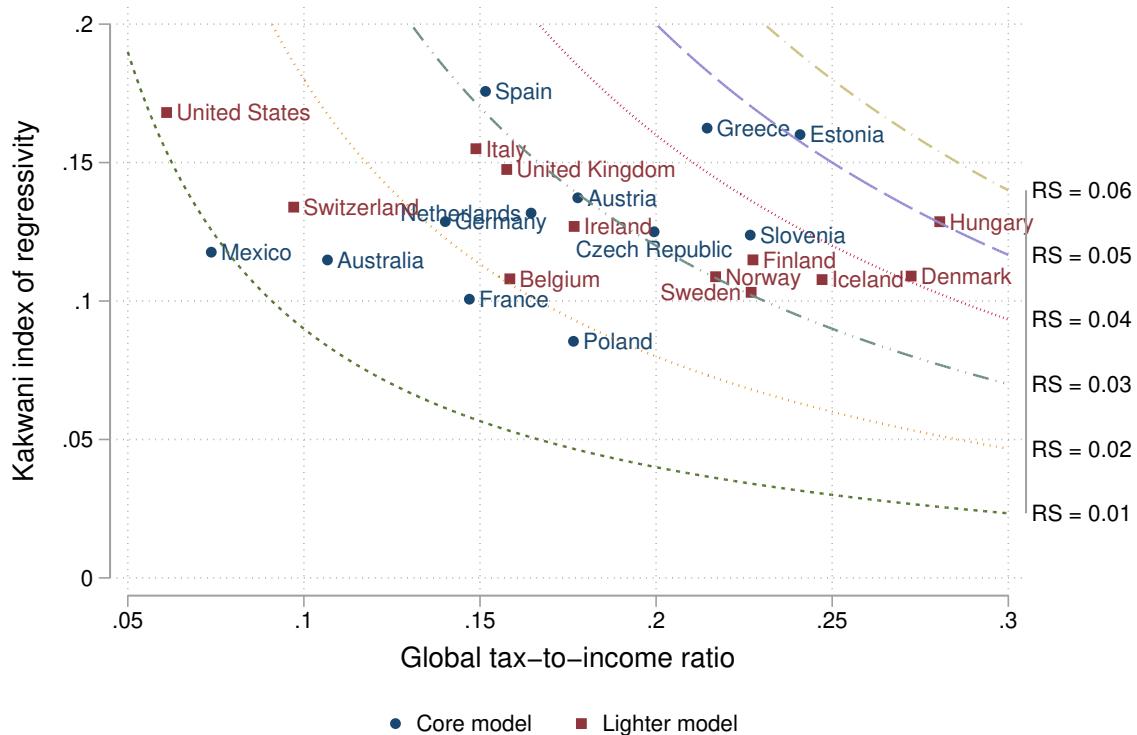


Figure 8: Kakwani index of regressivity, tax-to-income ratio and resulting Reynolds-Smolensky index of vertical redistribution

Reading note: In the United States, the Kakwani index of consumption taxes is 0.168, the global tax-to-income ratio is 6.1%, and the resulting Reynolds-Smolensky index is 0.011. The curves are isolines of Reynolds-Smolensky index: the further to the North-East of the graph, the greater the effect of the consumption tax on inequality.

Last years available: 2013 for Austria, the Czech Republic, Denmark*, Estonia, Finland*, Germany, Greece, the Netherlands, Norway*, Poland, Spain, Switzerland*, the United Kingdom* and the United States*, 2012 for Hungary*, Mexico and Slovenia, 2010 for Australia, France, Iceland*, Ireland* and Italy*, 2005 for Sweden*, and 1997 for Belgium*. Results for countries marked with a '*' in this list come from the lighter model.

²²Imputation produces a similar range of Kakwani indices in the datasets without consumption information: most lie between -0.10 and -0.15. The absolute difference between the Kakwani index calculated from imputed data and that from observed data is under 0.055 in 90% of country-years, and larger errors are found only in high income-inequality countries such as South Africa, India and Mexico.

4.4 Changes over time in the impact of consumption taxes

As the incidence of consumption taxes is determined by the average tax rate and inequality in consumption across households, our multi-year dataset allows us to analyze the change in the impact of taxes on consumption over time. Figure G.1 in the Appendix plots the evolution of the impact of consumption taxes on inequality over time in the countries that have at least three data points over the 2000-2010 period. We generally find some re-ranking over time for countries with similar consumption-tax impacts, while the countries at the extremes (with the highest or lowest impacts of consumption taxes on inequality), maintain their ranks over the entire period.

We here demonstrate how our method can be used to assess the impact of changes in consumption-tax legislation on inequality, via the case of the United Kingdom over the 1995-2013 period. The UK adopted a lower VAT rate in the wake of the 2008 economic crisis: between December 1st 2008 and December 31st 2009 the standard VAT rate in the UK dropped from 17.5 percent to 15 percent.²³ It then reverted to 17.5 percent in 2010, and increased to 20 percent one year later, as part of an “emergency budget” presented by the coalition government. Our approach allows us to measure the inequality effect of these measures.

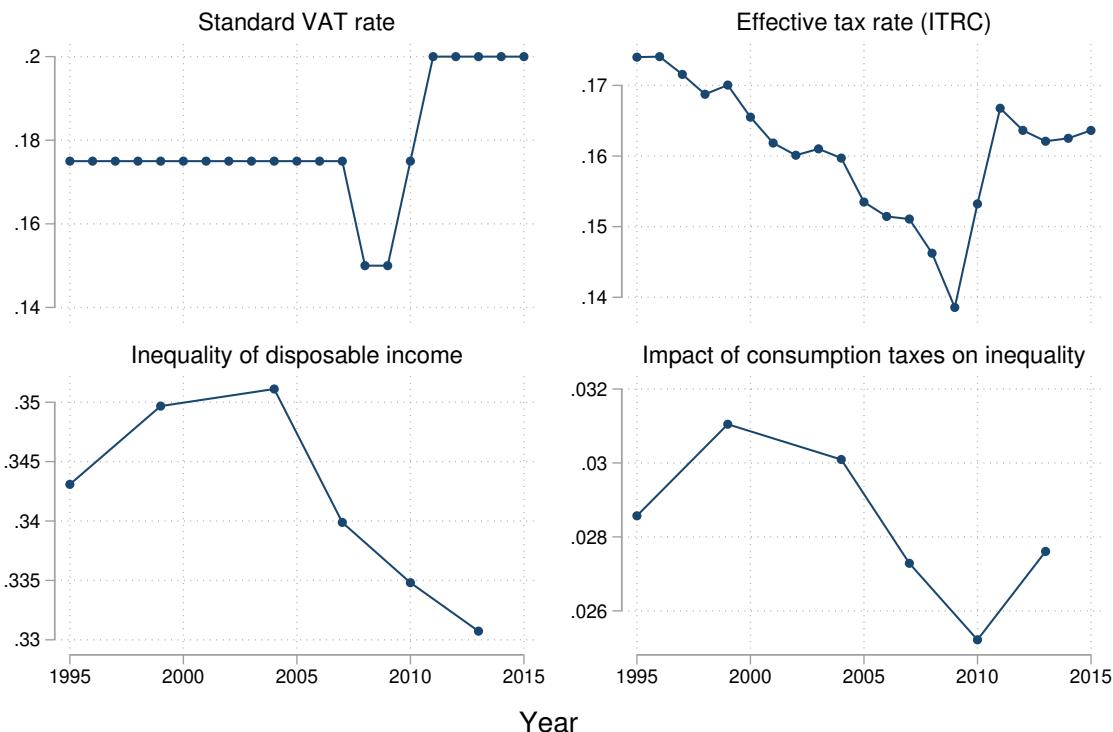


Figure 9: The effect of the VAT cut on some indicators in the United Kingdom

Figure 9 shows the impact of these policies on the standard VAT rate, the implicit tax rate on consumption, and the estimated inequality effect of consumption taxes. The lower-

²³See Chirakijja et al. (2009) for a more in-depth analysis of this policy.

left panel shows, for context, the evolution of disposable income inequality. In general, the higher is income inequality, the higher is the inequality in propensities to consume. Therefore, as income inequality increases, all things remaining equal, the inequality impact of consumption taxes goes up.

The effect of consumption taxes on disposable-income inequality (in the South-East panel), as we explained in [Section 4.3](#), depends on two factors, namely the tax rate (the ITRC, in the North-East panel) and the distribution of propensities to consume, which in turn is affected by changes in the income distribution (in the South-West panel).

Over the 1995-2013 period, the UK experienced significant changes in the distribution of income: inequality increased during the growth period between 1995 and 2005, and then fell afterwards, especially during the 2008 economic crisis, due to a greater drop in income at the top of the income distribution than at the bottom ([ONS, 2016](#)). The effect of these fluctuations, coupled with a fall in the aggregate propensity to consume in 2009 (-6%, according to National Accounts), can be seen in the evolution of the inequality effect of consumption taxes between 1995 and 2010 (in the South-East panel).

Second, the consequences of discretionary VAT shocks are also visible: the drop in the VAT rate in 2008 and its rise in 2010-2011 affected the implicit tax rate, and explain the movements in the inequality effect of consumption taxes between 2010 and 2013.

Other fluctuations in the ITRC do not reflect discretionary VAT shocks but rather the relative decline of excise taxes in the total share of consumption. For example, between 1995 and 2007, the fall in the ITRC was primarily due to the drop in the share of excise taxes. The main excise taxes on oil, tobacco and alcohol did not rise over this period, so that as prices rose the share of the tax as a proportion of the volume sold was a declining share of the value consumed. While excise duties accounted for 11.3 per cent of total tax revenues in the UK in 1995, this figure was only 8.0 per cent in 2007, while the share of VAT remained stable ([IFS, 2016](#)).

5 Robustness checks

We consider three critical methodological choices that have been made in our analysis: ignoring the bundle effect, calculating the average tax rate via National Accounts (a top-down approach) instead of via statutory rates (a bottom-up approach), and grossing up our micro data using a homothetic transformation (i.e. distributing missing consumption proportionally to income). In this section, we perform a series of robustness checks to assess the extent to which these assumptions may affect our results.

First, the structure of consumption in terms of the goods that are subject to reduced or additional taxes may change along the income distribution. Using detailed household consumption data and statutory rates is one way of taking this bundle effect into account.

This is the approach taken in the work by O'Donoghue, Baldini, and Mantovani (2004); Decoster et al. (2010); Figari and Paulus (2015), which applies the microsimulation model from Euromod to detailed consumption data in Household Budget Surveys. We apply our constant consumption-tax rate to their consumption data, and compare the resulting consumption tax-to-income ratios to their results: the measured bundle effect is relatively small ([Section 5.1](#)).

Second, the calculation of implicit tax rates on consumption with National Accounts data (ITRC, top-down approach) used here, and the calculation of average tax rates derived from detailed bundles and statutory rates (bottom-up approach), as in the work cited above, are different methods that may yield different results. We compare below the outputs from these two methods and establish the impact of their use on post-tax income inequality. We show that the main differences in the results reflect differences in the calculation of the tax rate, which in our approach is closer to what households actually pay ([Section 5.2](#)).

Third, the consumption data in the microdata sets are generally not consistent in volume with that in National Accounts data ([Capéau, Decoster, and Phillips, 2014](#)), producing an underestimation of the overall propensity to consume calculated using microdata. We therefore have to gross up the micro data, by adding household expenditure data from the National Accounts, which we do in a distribution-neutral way. However, some research has suggested that expenditures may be differentially underreported along the income distribution ([Aguiar and Bils, 2015](#); [Meyer and Sullivan, 2023](#); [Sabelhaus et al., 2015](#)). In this case, our imputation of missing expenditure in proportion to existing consumption will yield biased estimates: the regressivity of consumption taxes will be overestimated, as we underestimate the consumption taxes paid by the top decile. This also affects our imputation model, which is estimated on micro data, and in particular the β coefficient (the income elasticity of consumption). We test the robustness of our results to this assumption by using an alternative method to gross up micro-data to National Accounts data ([Section 5.3](#)).

5.1 The implications of not taking the bundle effect into account

We recalculate the tax-to-income ratios for a reduced sample of country-years by applying our implicit consumption-tax rate (which is, by construction, the same for all income deciles) to detailed household consumption and income data from O'Donoghue, Baldini, and Mantovani (2004); Decoster et al. (2010); Figari and Paulus (2015); ITEP (2018). We then compare these ratios, calculated with a constant tax rate that ignores the bundle effect, to those in these contributions that apply effective consumption-tax rates that vary by decile, and thus fully account for the bundle effect. As shown in [Figure 10](#), the absolute differences in tax-to-income ratios along the income distribution are quite small when adjusting for differences in the average level of tax rates.

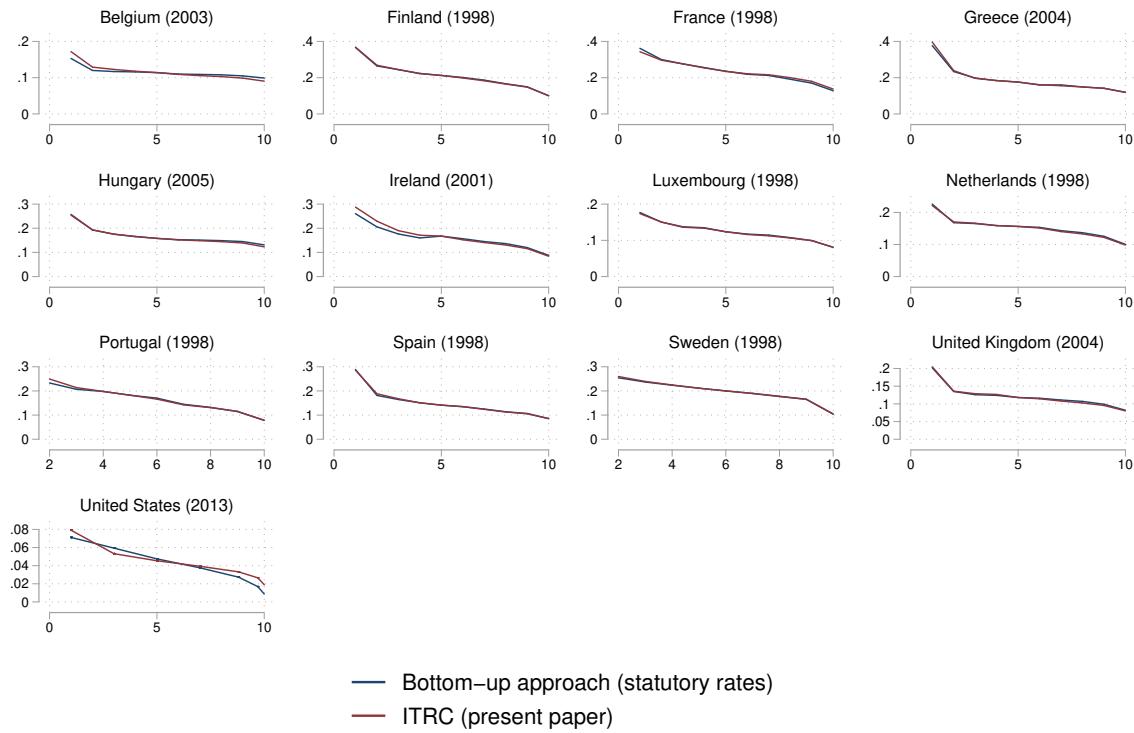


Figure 10: Tax-to-income ratios calculated from detailed consumption data, with uniform implicit tax rates (our method) and decile-varying effective tax rates (Euromod method) adjusted for differences in the average tax rate.

Notes: Data for Belgium, Greece and the UK come from [Figari and Paulus \(2015\)](#), Hungary and Ireland from [Decoster et al. \(2010\)](#), Finland, France, Luxembourg, the Netherlands, Portugal, Spain and Sweden from [O'Donoghue, Baldini, and Mantovani \(2004\)](#), and the United States from [ITEP \(2018\)](#). As the [ITEP \(2018\)](#) data does not include income, we take income from our datasets for the United States.

In the countries where the bundle effect is the most important, the gradient of tax-to-income ratios by income is significantly different when the bundle effect is taken into account. This is the case for Belgium, the country where the effective tax rate on consumption varies the most between high and low incomes, as shown in the literature (see [Section 2.1](#)). When the bundle effect is taken into account, we find that the tax-to-income ratio of the top income decile is 0.87 that in the fifth decile, and 0.65 that in the first decile. With a constant tax rate, the analogous figures are 0.79 (-0.08 points difference) and 0.53 (-0.12 points difference). In this specific case, ignoring the bundle effect then leads us to overestimate the regressivity of consumption taxes.

For most countries, however, the gradients of the tax-to-income ratios by income from the Euromod bundles are more similar to ours: the two methods lead to differences in the tax-to-income ratios in the top deciles (expressed as a proportion of that in the fifth and the first deciles) of no more than 0.05 points. Moreover, they do not materially affect the cross-country picture of the regressivity of consumption taxes.

5.2 The implications of not using the statutory rates

The standard method of applying statutory rates to detailed consumption bundles, to simulate consumption taxes paid at the micro level, allows us to calculate aggregate effective tax rates. This is effected by taking the weighted sum of all the taxes paid by a representative sample of households and dividing it by the weighted sum of their incomes. Figure 11 compares the aggregate effective tax rates obtained with the data in O'Donoghue, Baldini, and Mantovani (2004), Decoster et al. (2010) and Figari and Paulus (2015) using this method (the bottom-up approach), and the implicit tax rates (ITRC) in our (top-down) National Accounts approach.²⁴ There are a number of explanations for the observed gap in the resulting average tax rates:²⁵

- Fraud in consumption taxes, which biases upward the rates calculated with the bottom-up approach;
- Missing rules for excise duties and ad-valorem taxes (downward bias with the bottom-up approach);
- The under-reporting of consumption subject to excise duties (downward bias with the bottom-up approach);
- The non-reporting of excise duties paid on intermediate goods in household surveys (downward bias with the bottom-up approach, or upward bias with ITRCs).

Last, although the fact that households consume different baskets of goods is not supposed to lead to a gap between the *aggregate* measures of consumption taxes, whether using the bottom-up or National Accounts approaches, it can actually produce gaps in both directions (downward or upward biases) if some goods are coded inaccurately and are assigned the wrong tax rate in the bottom-up approach.

We argue that the top-down approach provides a more-complete and accurate measure of consumption taxes as it uses actual tax revenues to measure the taxes paid by households. In contrast, the bottom-up approach is confined to the strict application of statutory rules, potentially incompletely collected, to a surveyed basket of goods where the required degree of precision is substantial and therefore likely to be subject to error.

We measure the consequences of the different methods in terms of post-tax income inequality. Figure 12 decomposes the gap between our method and that in the literature using detailed household consumption and statutory rates into the two sources of differences: the bundle effect and the method of calculating the tax rate. The differences in some countries are notable, such as Luxembourg 1998 and Portugal 1998. Applying different rates along the income distribution, instead of a constant tax rate, has a very small

²⁴The data from ITEP (2018) does not allow us to compare the average effective tax rates for the United States.

²⁵See European Commission (2020) for an evaluation of the VAT gap in EU-28 Member States.

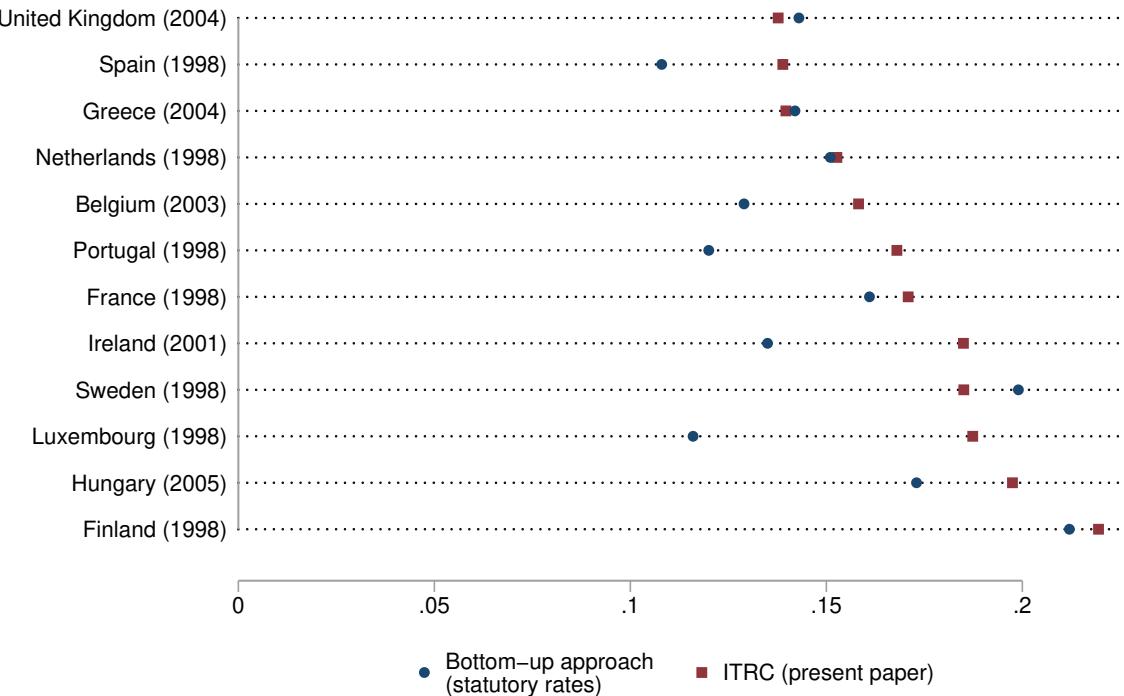


Figure 11: Effective tax rates on consumption, computed with the ITRC method (present paper) and with the bottom-up approach (statutory rates)

Reading: In the United Kingdom, the effective tax rate on consumption is 14.3% when computed with our method using ITRC, and 13.8% when computed with the bottom-up approach using statutory rates.

Notes: The following sources for statutory rates are used: [O'Donoghue, Baldini, and Mantovani \(2004\)](#) for Spain, the Netherlands, Portugal, France, Sweden, Luxembourg, Finland; [Decoster et al. \(2010\)](#) for Ireland, Hungary; [Figari and Paulus \(2015\)](#) for the United Kingdom, Greece and Belgium.

distributive impact overall and does not affect the findings in terms of the cross-national variation in the impact of consumption taxes on inequality. Ignoring the bundle effect does not then seem to produce major problems. The observed gaps mainly reflect differences in the *level* of effective consumption-tax rates, driven by the discrepancies discussed above between the micro and National Accounts approaches. Without ignoring these differences, we consider our estimates to be more reliable for our research purpose, which is to assess the distributive impact of the taxes that are effectively paid by households.

5.3 The implications of grossing up with homothetic scaling

The question of how consumption misreporting varies with income is still a matter of debate in the literature (see, for instance, [Aguiar and Bils, 2015](#) and [Meyer and Sullivan, 2023](#), for the United States). The homothetic scaling method we use in this study assumes that the amount of unreported consumption expenditures is proportional to the amount

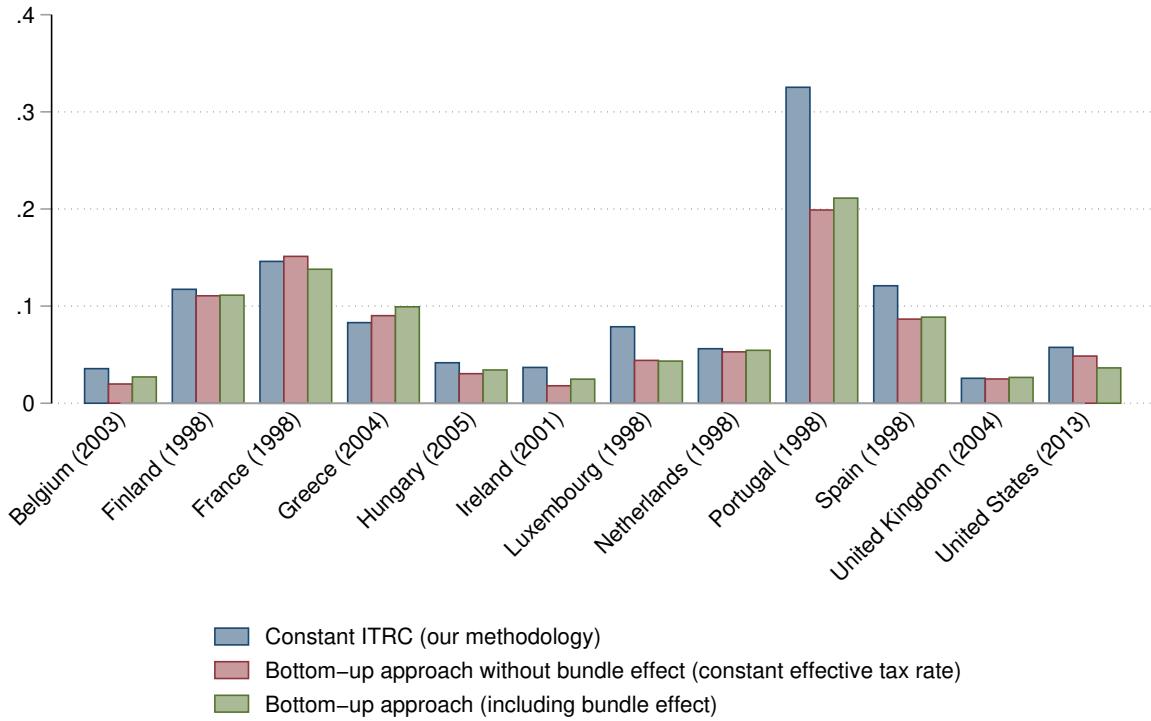


Figure 12: The effect of consumption taxes on income inequality in the bottom-up, constant effective tax rate and ITRC approaches (in T10/B50 points)

reported, which is the best approximation in the absence of additional data. There is evidence that consumption in surveys is in fact relatively well estimated at the bottom of the income distribution, while it is underestimated at the top ([Sabelhaus and Groen, 2000](#); [Sabelhaus et al., 2015](#)). In this context, a homothetic transformation implies an over-concentration of consumption at the bottom of the income distribution, and therefore an overestimation of the regressivity of consumption taxes.

As a sensitivity analysis, we consider a non-linear distribution of missing consumption, which assigns more missing consumption to the top of the income distribution than does the proportional assumption in the main paper (see [Section B](#)). This changes the estimates of post-tax income inequality only for a few countries, mostly high-tax Nordic countries, by less than 2%. Estimates for the United States are not significantly affected, and this certainly does not change the cross-country outlook.

6 Discussion

The aims of this article were to establish the distributional effects of consumption taxes, and in a way that makes it possible to compare these effects to those from direct taxes and transfers, and to identify the variables that lie behind this distributional effect of consumption taxes.

The comparison to the distributional effect of direct taxes and transfers implies the analysis of current income, as no empirical work has produced a meaningful measure of the impact of direct taxes and transfers on permanent income. We identify the key drivers of the distributional effect of consumption taxes via the analysis of an extensive and comprehensive database covering a maximum number of country-years.

We contribute to the international distributional accounting literature by developing a simple way of using household survey data on income and consumption, which are readily available to researchers, and matching this household-level information to macroeconomic data on consumption-tax revenues and final consumption expenditure. We carry out this matching, as there are arguably no internationally-comparable datasets at the micro level covering all of income, consumption and consumption taxes.

As we carry out imputation analyses for consumption, an advantage of our approach is that it can be applied to micro-level datasets that do not contain consumption information, as long as they include income, or income and standard socio-economic variables. We consider this to be a major contribution to the field, as it solves the issue of including consumption taxes in the international or intertemporal comparisons of monetary redistribution.

We also contribute to the literature by measuring the distributional effect of consumption taxes for a wide range of country-years, and comparing this to the effect of direct taxes and transfers. We have shown that the anti-redistributive impact of consumption taxes (including value-added-taxes, sales taxes, excise taxes, and taxes on specific goods and services) is fairly large, but far from offsets the positive effect of direct taxes and transfers on inequality-reduction. While the gap in disposable-income inequality between the United States and Denmark is substantially narrowed after consumption taxes are accounted for, the former remains more unequal than the latter.

Taking advantage of our large sample of country-years, we identify the key determinants of the cross-country variation in the anti-redistributive effect of consumption taxes. This depends on two variables of different natures: a behavioral variable, the propensity to consume (which falls with income in all countries), and a more political one, the average consumption-tax rate (varying up to four times across countries). We show that the distributional effect of consumption taxes varies greatly from one country to another, due to the political parameter of the average rate. As such, countries with significant anti-redistributive effects of consumption taxes are generally those that have chosen to implement high tax rates. Denmark is a sound example of this kind of choice, which allows it to fund a large welfare state.

As has already been noted in the literature, countries with high levels of tax revenue and redistribution (in cash and in kind) do not put all of the tax burden on the upper end of the income distribution, and tend to have moderate tax progressivity. The analysis of taxes on consumption reinforces this diagnosis. Even so, consumption taxes can be

part of redistributive policies at the national level: under loose assumptions regarding the distribution of public goods, greater public good or service provision financed by an increase in consumption taxes will in fact increase equality among households (as the lower inequality due to public goods will offset the regressivity of the consumption tax that helps finance them).

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Appendix

The code used to construct our cross-country dataset, as well as the main indicators and percentile data presented in this paper is at <https://doi.org/10.5281/zenodo.4291984>. If reused, the data should be cited as Blasco, Guillaud, and Zemmour (2020).

A The consumption-imputation model

We construct three nested models, depending on the information available in the dataset.²⁶ The first of these, [Model 0](#), is a generalized linear model where the only explanatory variables are household medianized disposable income and a dummy variable $\mathbb{1}_{nonpov}$ for the household being above the monetary-poverty threshold. This latter is defined as 60% of median equivalized income. Given our medianization, a household is poor if its medianized disposable income is below 0.6. We add this variable to reflect that, at the lowest income levels, consumption tends to be less correlated (or even uncorrelated) with income. In order to ensure the continuity of the consumption function with income, this dummy variable is multiplied by $\log(\widehat{dhi}) - \log(0.6)$, which equals zero when the income of the household is exactly equal to the monetary-poverty threshold. The estimated equation of \widehat{hmc} conditional on \widehat{dhi} is thus:

$$\begin{aligned} \log \left(\mathbb{E} \left[\widehat{hmc} \mid \widehat{dhi} \right] \right) &= \alpha_0 + \beta_0 \log(\widehat{dhi}) + \beta_1 \mathbb{1}_{nonpov} \left(\log(\widehat{dhi}) - \log(0.6) \right), \\ \widehat{hmc} &\sim \text{Normal} \end{aligned} \quad (\text{Model 0})$$

We do not use this first model ([Model 0](#)), but make the resulting coefficients available, as it can be used to produce a satisfactory distribution of consumption on any other national dataset that contains few socio-demographic variables other than income, such as fiscal data for example.

The next model, called the lighter model or [Model 1](#), contains the same explanatory variables, as well as a small number of socio-demographic determinants X_1 (the number of household members and the marital status of the household head). We estimate the following equation.

$$\begin{aligned} \log \left(\mathbb{E} \left[\widehat{hmc} \mid \widehat{dhi}, X_1 \right] \right) &= \alpha_0 + \beta_0 \log(\widehat{dhi}) + \beta_1 \mathbb{1}_{nonpov} \left(\log(\widehat{dhi}) - \log(0.6) \right) + \Gamma^\top X_1, \\ \widehat{hmc} &\sim \text{Normal} \end{aligned} \quad (\text{Model 1})$$

Last, in the core model, [Model 2](#), we add the ownership status of the household,

²⁶To reduce heterogeneity between countries, several countries with the most-extreme income distributions were removed from the training sample. These are countries with high income inequality or very low median income, as compared to the rest of the sample. The countries that are used in the regression are listed in [Section H](#).

and information on the household head's age, as consumption changes over the life-cycle. We also add another important monetary variable, the total imputed or effective cost of housing. This can be the actual housing cost for the household or the non-monetary consumption of housing services (e.g. imputed rents for occupying owners). This variable is much more widely-available in household surveys than total consumption, and is a good proxy for the household's standard of living. The model is then:

$$\begin{aligned} \log \left(\mathbb{E} \left[\widehat{hmc} \mid \widehat{dhi}, X_2 \right] \right) &= \alpha_0 + \beta_0 \log(\widehat{dhi}) + \beta_1 \mathbb{1}_{nonpov} \left(\log(\widehat{dhi}) - \log(0.6) \right) \\ &\quad + \delta \log(\widehat{housing}) + \Theta^\top X_2, \\ \widehat{hmc} &\sim \text{Normal} \end{aligned} \tag{Model 2}$$

The results of these three models appear in [Table A.1](#).

We use the regression results to impute medianized values of household monetary consumption. These are then scaled using National Accounts data in order to be comparable with the observed values, as in [Section 3.2](#).

[Figure 2](#) presents the levels of post-consumption-tax inequality in the observed and imputed consumption data. Much of the country ranking is preserved. However, as shown in [Figure A.1](#), there can be considerable error in the estimation of the effect of consumption taxes on inequality, as is the case for Estonia, one of the most unequal countries of our sample. In general, however, the two estimates are fairly similar to each other and provide accurate information for the comparison of post-consumption-tax levels of inequality.

Comparing the predictive power of Models 1 and 2

The initial LIS dataset contains 77 country-years where consumption data is available, of which 47 where we can apply our imputation model in order to compare the results to the observed data.

The imputation from [Model 1](#), the lighter model, also yields satisfactory Gini coefficients, as can be seen in [Figure A.2](#).

Table A.1: Coefficients and standard errors of the regression models of consumption[†]

Variable	Model 0	Model 1 “Lighter model”	Model 2 “Core model”
Intercept α_0	-7.7 (0.4)	-2 (0.5)	-3.8 (0.8)
Logarithm of medianized income (households below poverty threshold) β_0	27.9 (0.7)	26.6 (0.7)	7.2 (0.8)
Logarithm of medianized income (households above poverty threshold) $\beta_0 + \beta_1$	57.8 (0.7)	57.4 (0.7)	44.8 (0.8)
Logarithm of housing costs (incl. imputed rents) δ			32.8 (0.2)
Number of household members ϑ (Ref. = 1 member)		-5.2 (0.3)	-5.5 (0.6)
3		-4.6 (0.3)	-5.5 (0.6)
4		-3.7 (0.3)	-4.1 (0.6)
5		-6.6 (0.4)	-5.5 (0.6)
6 or more		-9.6 (0.4)	-5.6 (0.6)
Head of household living with a partner (Ref. = <i>Single</i>)		-6.6 (0.2)	-9.4 (0.3)
Ownership status of household (Ref. = <i>Resident owner</i>)			
<i>Rented housing</i>			3.8 (0.3)
<i>Free housing</i>			-1.1 (0.7)
Age of household head (Ref. = <i>Below 30</i>)			
<i>Between 30 and 49</i>			0.8 (0.4)
<i>Between 50 and 64</i>			-2.8 (0.4)
<i>65 or more</i>			-13.8 (0.5)
Dummy “single and over 65”			-6.7 (0.9)
No. of datasets included	47	47	23
Individual-level observations	626,258	626,258	256,934

[†] All coefficients and standard errors are multiplied by 100 for ease of reading.

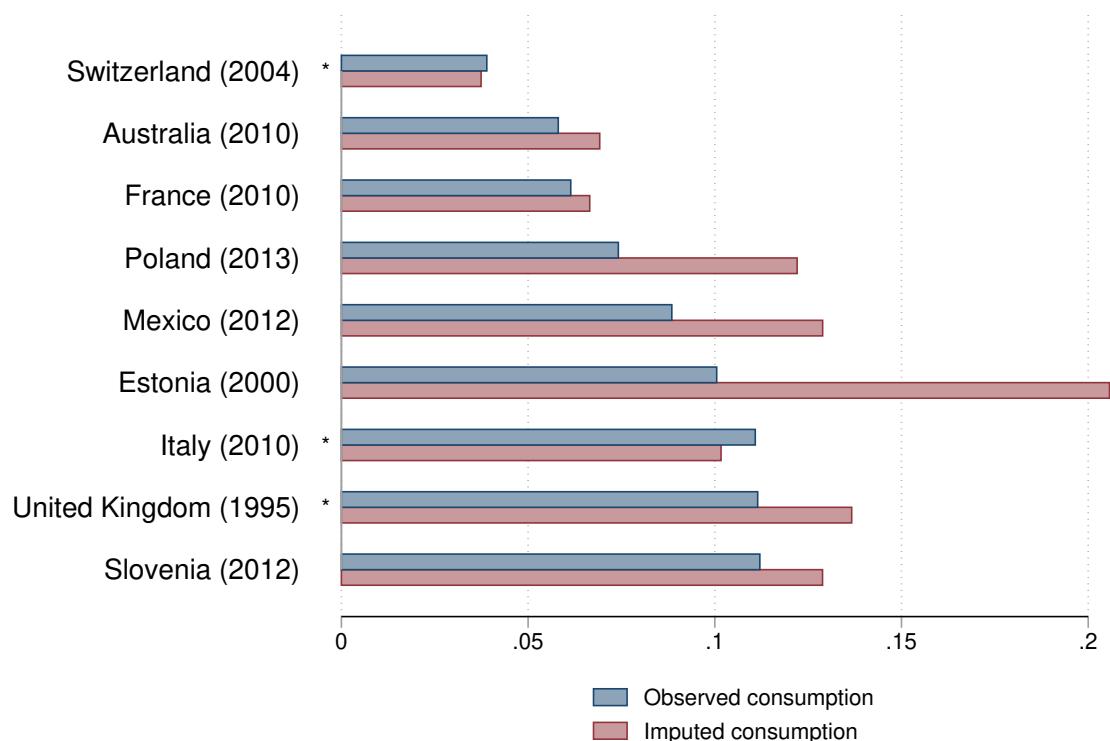


Figure A.1: Absolute error in the estimated effect of consumption taxes (in points of T10/B50)

Notes: The income data for Estonia (2000) comes from a household budget survey that is known for displaying unusually large income inequality. The model therefore overestimates consumption inequality. Results for Italy and the UK come from the lighter model.

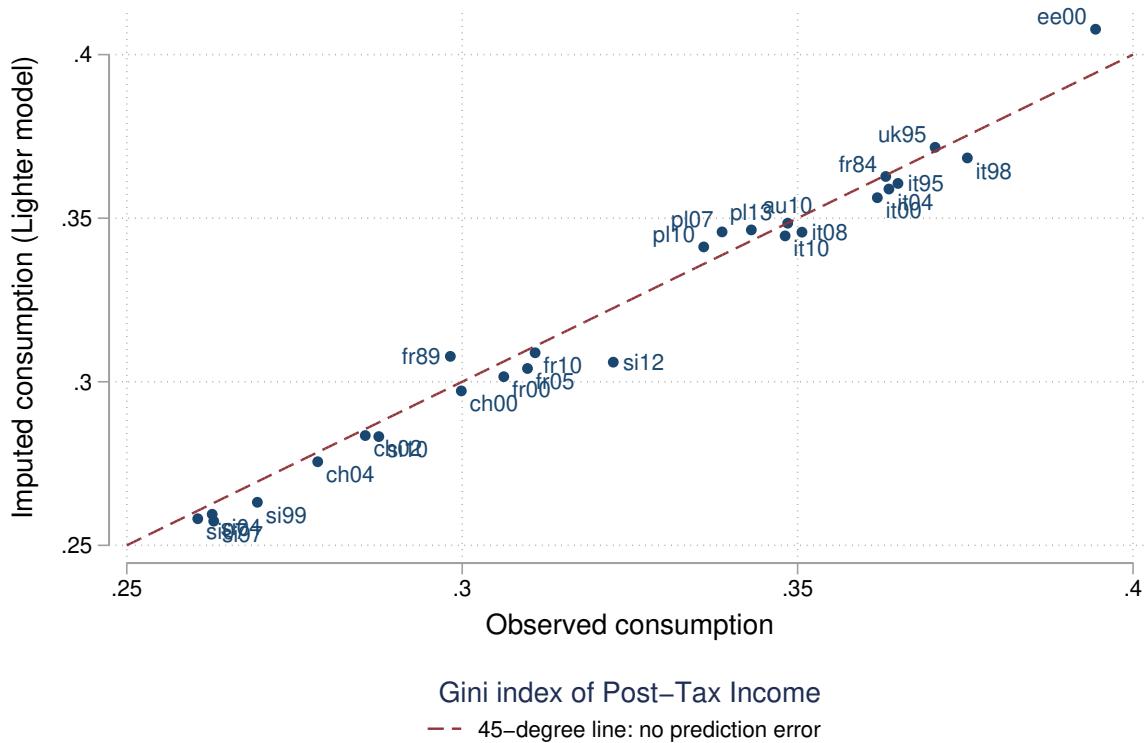


Figure A.2: The observed and predicted Gini coefficients of post-tax income, for the lighter model

B Scaling with National Accounts

After some pre-processing of the data (equivalization, bottom-coding), the propensities to consume are scaled according to National Accounts data. In order to carry out international comparisons, the micro-data is transformed to reflect national-level consumption and income. Conceptually, this means that micro-data are used to obtain the shape of consumption (its distribution as a function of income), while the total levels of income and consumption are matched to National Accounts.

$$\text{scaled } \textit{prop}_{c,t,i} = \textit{scaling}_{c,t} \cdot \textit{prop}_{c,t,i}$$

$$\textit{scaling}_{c,t} = \frac{CH - R}{I - R_{\textit{imputed}}} \cdot \frac{\sum_i dhi_i}{\sum_i hmc_i - rents_i}$$

where:

- CH is household final consumption expenditure²⁷
- $R = R_{\textit{actual}} + R_{\textit{imputed}}$ are the actual and imputed housing rents

²⁷When this figure was not available, we used household expenditure and income including those of non-profit institutions serving households.

- I is household gross disposable income
- $R_{imputed}$ are imputed rents for occupying owners

In National Accounts, the housing services that owners produce for themselves are included in both consumption expenditure and household income. We thus remove these terms from the scaling factor of the propensities to consume. Where rents are not separable between actual and imputed rents, an average correction coefficient is applied.

In the main paper, we assumed that missing consumption was proportional to existing consumption before estimating the consumption regressions; we now consider instead a non-linear distribution, with the missing consumption being proportional to the square of existing consumption (so that the scaling coefficient rises linearly with income, and thus assigns more missing consumption to the top of the income distribution than does the proportional assumption in the main paper).

[Figure B.1](#) shows the impact of these different scaling methods on calculated consumption by income decile: uniform scaling (our main hypothesis) versus heterogeneous scaling. The left side of the figure plots the unscaled consumption from the microdata for France in 2010 and the scaled consumption under the two hypotheses. Missing consumption data is mostly attributed to the top decile under both of these, but more so with the heterogeneous scaling. The right side of the figure (for the USA in 2010) plots the distributions of imputed consumption (no consumption data is observed for the USA in our initial sample) for the two scaling methods. Heterogeneous scaling again assigns relatively more consumption to the top of the income distribution. With homothetic scaling, 17% of the missing consumption in France 2010 was attributed to the top decile and 39% to the bottom 50 percent; under the alternative hypothesis this figure rises to 26% for the top decile and falls to 28% for the bottom 50 percent.

The scaling choice also affects the income elasticity of consumption calculated in our imputation models. β rises by about 10 percent with heterogeneous scaling, so that a 1% increase in income has a greater impact on consumption expenditures: 0.64% as opposed to 0.57% with homothetic scaling (see [Table A.1](#)).

We last compare the distribution of post-tax income from the two scaling methods. [Figure B.2](#) shows that the results are largely unchanged, except in Italy and in the high-tax Nordic countries (Denmark, Finland, Norway and Sweden), where post-tax income inequality is lower (by less than 2%) under the alternative assumption assigning more missing consumption to the top decile. For the remaining countries, including the United States, inequality is unaffected by the scaling choice. Our result that the income inequality gap between the Nordic countries and the United States is greatly reduced when consumption taxes are taken into account is hence robust to the scaling method.

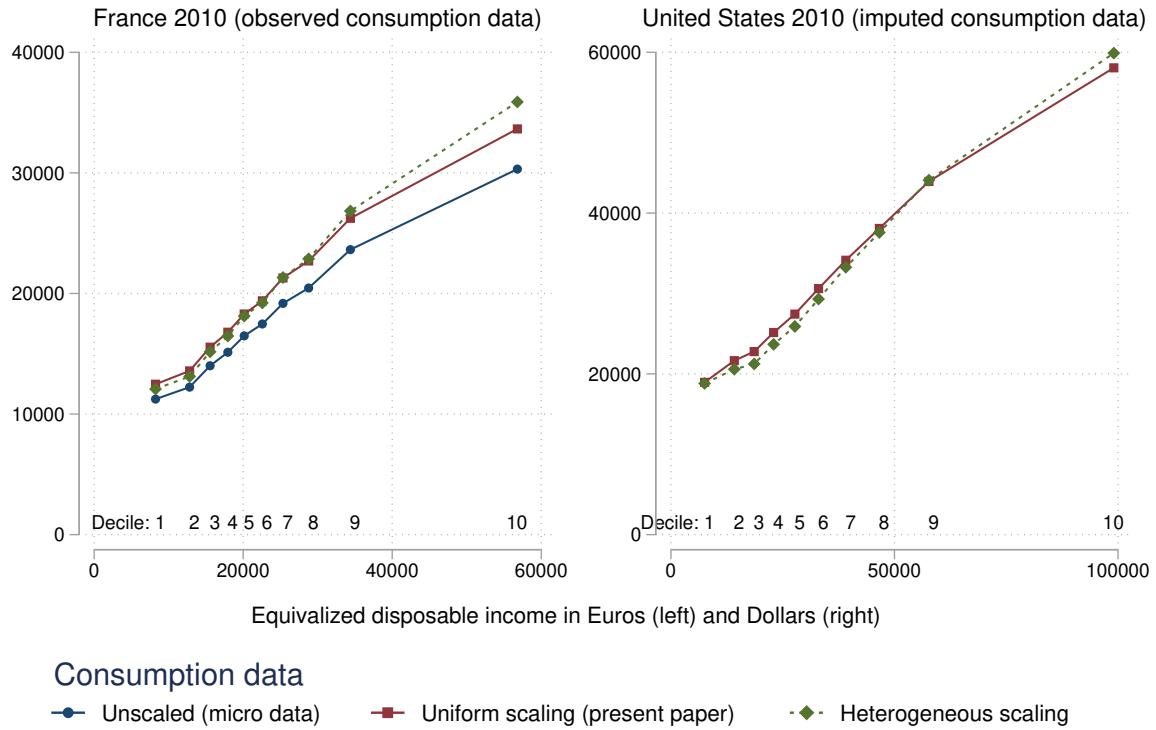


Figure B.1: Mean consumption by income decile with two scaling methods.

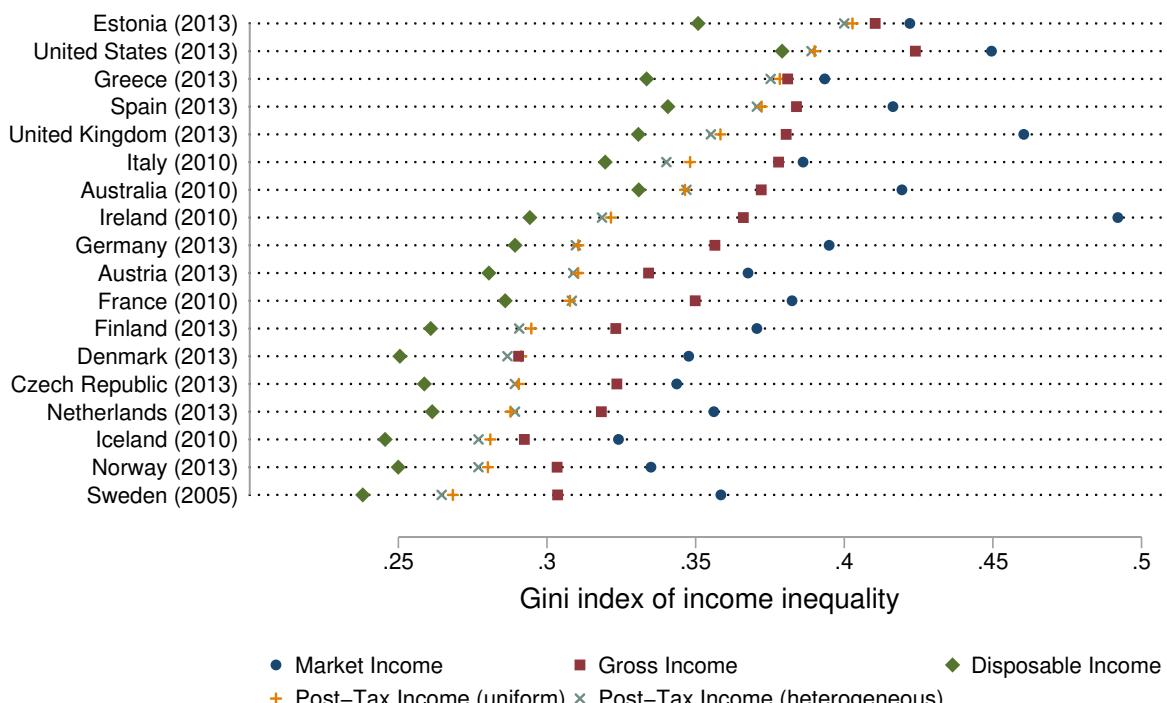


Figure B.2: The Gini coefficients on market, gross, disposable and post-tax income with two scaling methods.

C The definition of the implicit tax rate

The different definitions of the implicit tax rates are based on different definitions of taxable consumption.

In the paper, we define the implicit tax rate as follows:

$$\tau_{c,t} = \frac{\text{consumption tax revenue}}{C - CGW - R}$$

where *consumption tax revenue* includes all revenue from consumption taxes, including value-added-taxes (or sales taxes, if applicable), excise taxes, taxes on specific services, etc. According to the nomenclature in stats.oecd.org, this includes:

- General taxes on goods and services (including VAT)
- Taxes on specific goods and services
 - Excise taxes
 - Profits of fiscal monopolies
 - Customs and import duties
 - Taxes on specific services
 - Other taxes on specific goods and services
- Taxes on the use of goods and performances

C is the total final consumption expenditure (private consumption and the consumption of general government). The CGW figure corresponds to the wages of the employees paid by the general government, and $R = R_{\text{actual}} + R_{\text{imputed}}$ are the actual and imputed housing rents.

The definition in [Eurostat \(2016\)](#) relies on a narrower taxable base, covering only private consumption

$$\tau_{c,t} = \frac{\text{consumption tax revenue}}{CP} \tag{5}$$

while the definition in [Carey and Tchilinguirian \(2000\)](#) considers a broader definition, over all consumption

$$\tau_{c,t} = \frac{\text{consumption tax revenue}}{C} \tag{6}$$

The choice of whether to remove rents from the denominator depends on the definition of taxable consumption in the micro-data. As we account for rents not being subject to consumption taxes by removing them from the micro-data on consumption, we subtract rents from the denominator of the implicit tax rate.

If we do the same for the two alternative definitions described above, our implicit consumption tax rate is thus structurally bounded above by the tax rate defined in [eq. \(5\)](#) and below by that defined in [eq. \(6\)](#), as shown in [Figure C.1](#). These alternative definitions can be used for robustness checks. When the tax rate cannot be calculated according to our definition due to missing values, we impute the rates using a regression model based

on the other two rates.

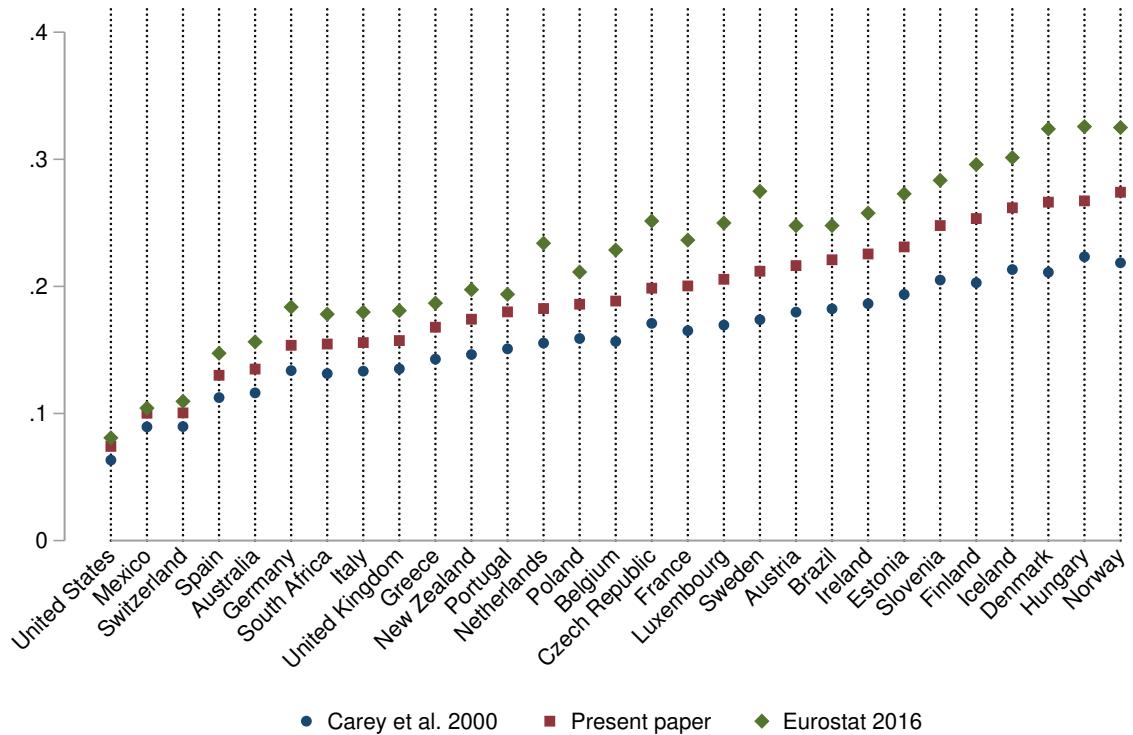


Figure C.1: Average implicit tax rates on consumption in each country.

D The importance of excluding rents from consumption

Our method allows us to account for housing rents not being subject to consumption taxes. Housing rents are an important part of household consumption, and represent a higher share of consumption for poorer households (Figure D.1). As a result, the downward slope in the propensities to consume becomes less pronounced when rents are removed from total consumption. We can therefore conclude that micro-simulation methods that apply tax rates to total consumption (including housing rents) somewhat overestimate the regressivity of consumption taxes.

In order to maximize our country-year coverage, we define another version of the effective tax rate, where actual housing rents are not deducted from private consumption in the denominator. This definition is used in our lighter model, where micro-data on consumption is not separable between housing rents and other consumption. This lower rate will be applied to a higher consumption figure.

$$\tau_{wr} = \frac{\text{consumption tax revenue}}{CP - R_{imputed} + CG - CGW}$$

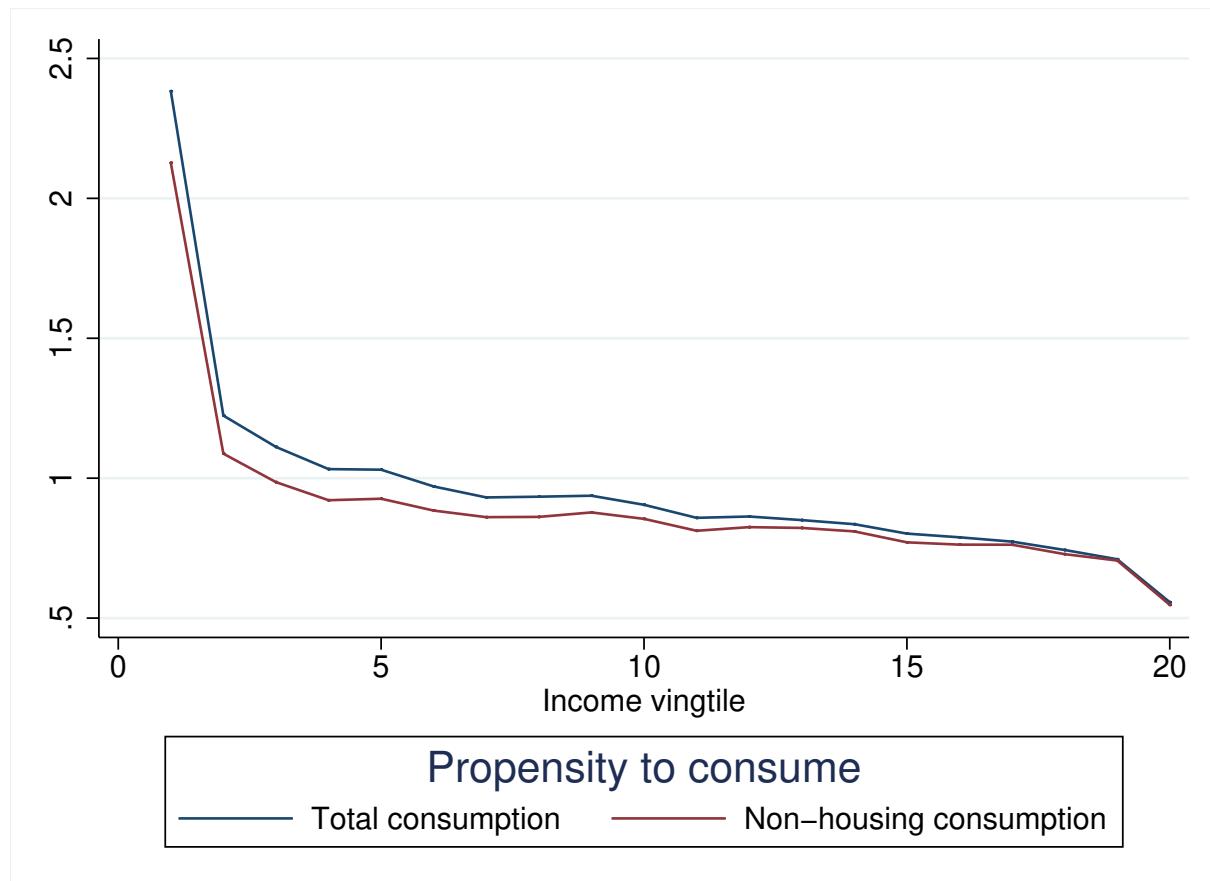


Figure D.1: Housing rents represent a higher share of consumption at the bottom of the income distribution (e.g. France in 2010, as shown here)

As shown in [Figure D.2](#), the estimated regressivity is lower when housing rents are taken into account and removed from consumption: the absolute value of the Kakwani index of regressivity, and thus the anti-redistributive effect, is reduced by up to 20% in some countries.

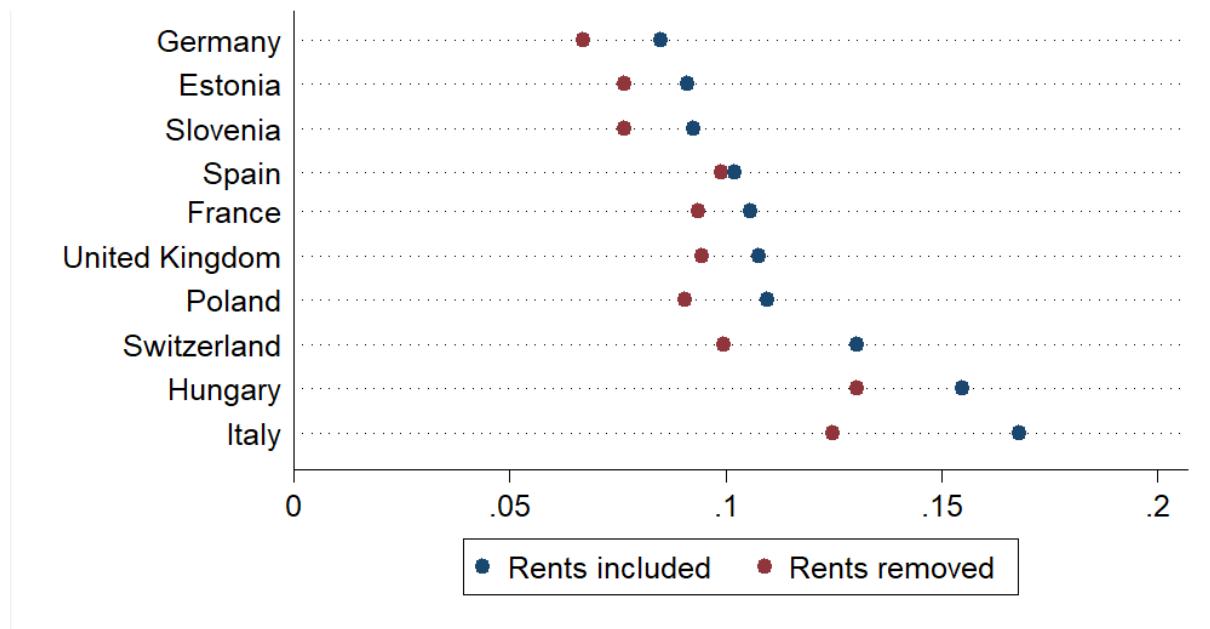


Figure D.2: The mean value (all years country-average) of the Kakwani index according to whether taxable consumption includes housing rents

E Results from the lighter model

We presented in this article the results for the core model of propensities to consume, when this more-precise version is available. We here present the results only from the lighter model, which requires fewer independent variables. We can see in [Figure E.1](#) that the range of the effect of consumption taxes is similar to that in the core model.

Moreover, the lighter model shows even more clearly that the anti-redistributive impact of consumption taxes is mainly driven by the tax rate, as shown in [Figure E.2](#).

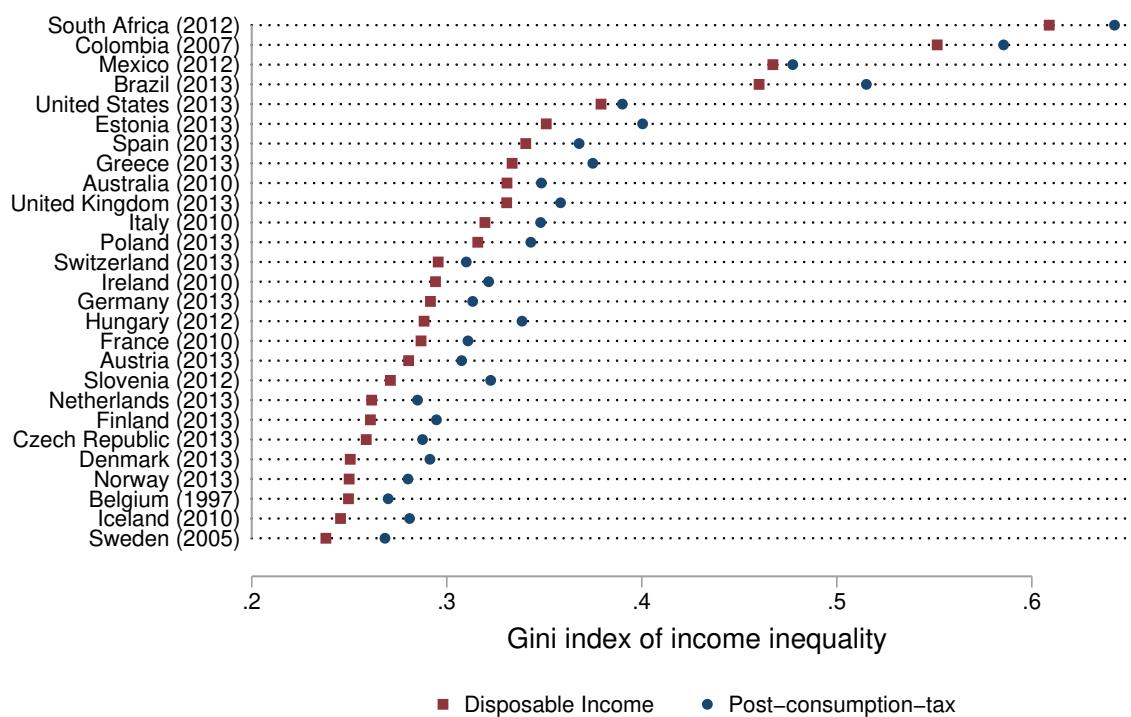


Figure E.1: Gini coefficients of income inequality for disposable income and post-consumption-tax income, with the lighter model

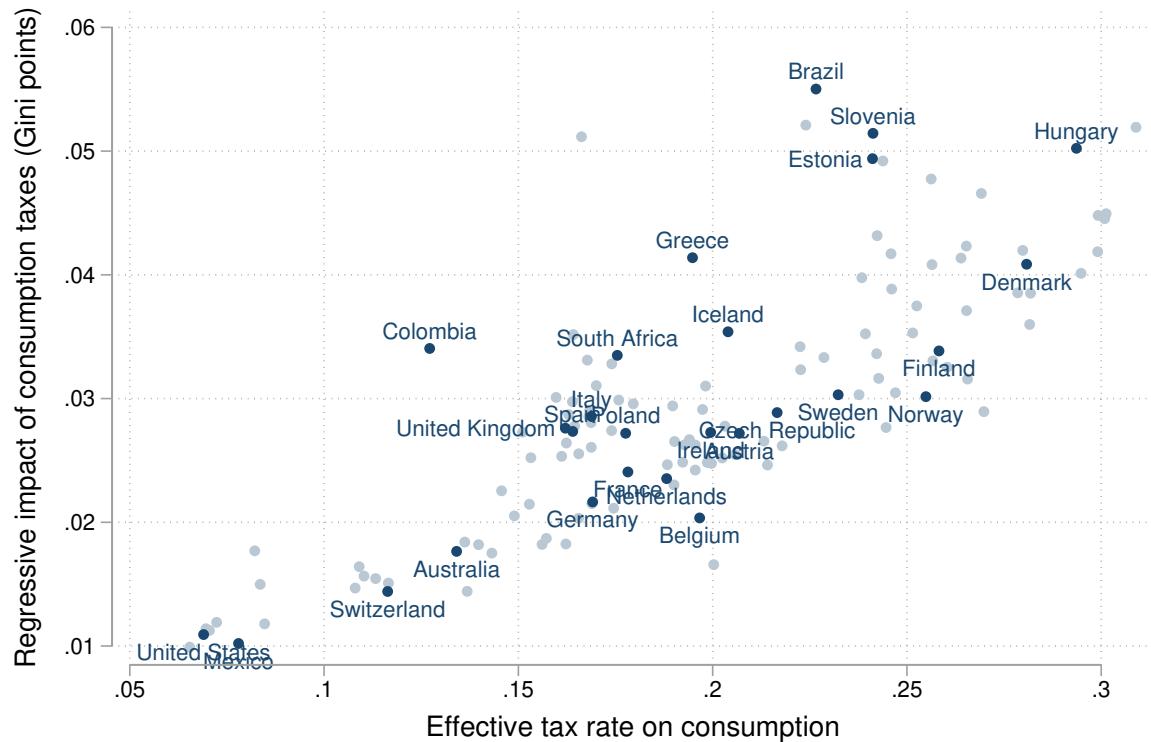


Figure E.2: The link between the effective consumption tax rate and the impact of consumption tax on inequality continues to hold

Notes: All available years in our datasets are displayed on the graph. The most recent year for each country is labelled and highlighted. The corresponding years are listed in [Figure E.1](#).

F The decomposition of the redistributive effect

F.1 Vertical and horizontal redistribution

The effective redistribution of a tax or a transfer can be decomposed into vertical redistribution, as measured by the Reynolds-Smolensky index (RS), and horizontal redistribution, given by the re-ranking index (Re):

$$\Delta G = G_{dhi} - G_{dhi-tax} = RS - Re \quad (7)$$

Vertical redistribution refers to the amount of tax that is distributed in a progressive or regressive way as a function of income. One measure of vertical redistribution, the Reynolds-Smolensky index, is defined as follows (Kakwani, 1977):

$$RS = G_{dhi} - C(dhi - tax, dhi)$$

where G_{dhi} is the Gini index of pre-tax income and $C(dhi - tax, dhi)$ the concentration index of post-tax income ranked by pre-tax income. This term is thus relatively close to the Gini coefficient for post-tax income.

Horizontal redistribution is the amount of redistribution that is orthogonal to the distribution of income. The re-ranking index of horizontal redistribution is a measure of the amount of redistribution that is not due to tax regressivity, but rather inequality that is created between individuals in the same income range. This is defined as follows:

$$Re = G_{dhi-tax} - C(dhi - tax, dhi)$$

By definition, the re-ranking Re is non-negative, so by eq. (7) the Reynolds-Smolensky index is an upper bound for effective redistribution (when effective redistribution is positive) and is a measure of the maximum feasible redistribution if no re-ranking resulted from the tax or the transfer. In our case, if redistribution is negative, then the RS index is a lower bound for the anti-redistributive effect (in absolute value). The rise in income inequality due to taxes is thus the sum of the vertical anti-redistribution and the re-ranking due to the variation in propensities to consume between households at the same levels of income. In practice, the Reynolds-Smolensky index is close to the difference in the Gini coefficients (see Figure F.1): re-ranking generally accounts for less than 20% of the impact on inequality.

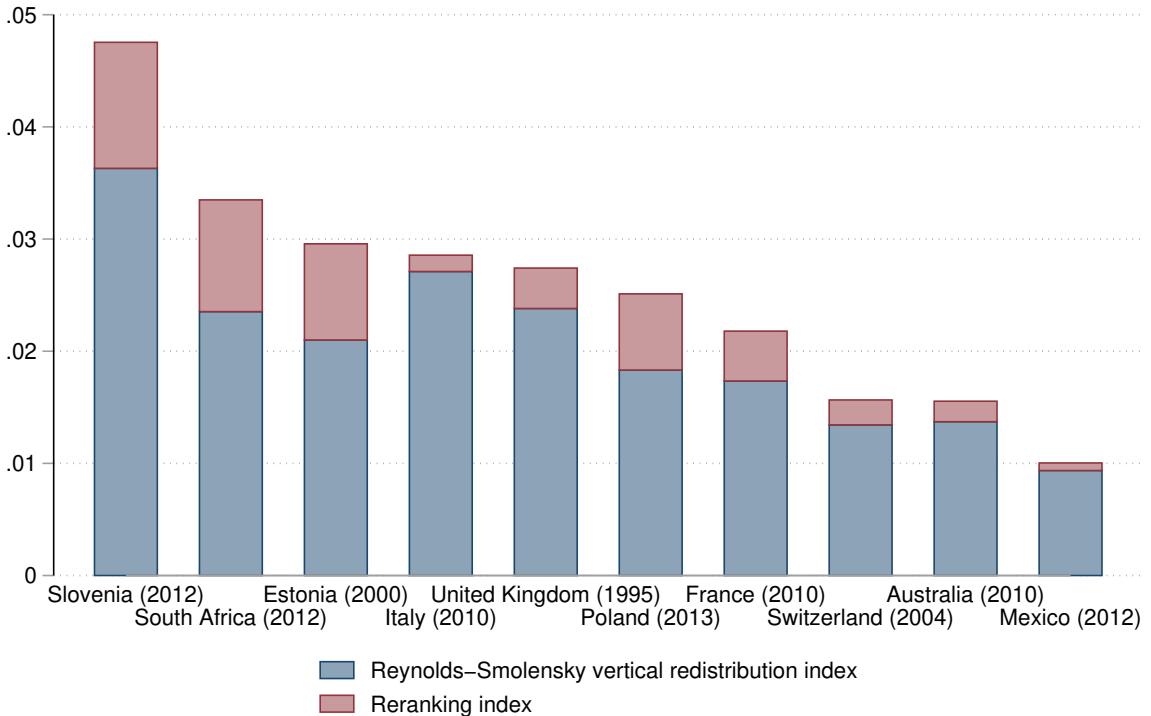


Figure F.1: The decomposition of the redistributive effect

F.2 The Kakwani indices of regressivity

We have seen in eq. (1.4) that the vertical redistribution from consumption taxes can be viewed as the product of two independent terms: regressivity, a micro-level term linked to propensities to consume that fall with income, and the consumption-tax rate, a macro-level term:

$$RS = K \cdot \frac{TIR}{1 - TIR} \quad (1.4)$$

We measure the regressivity of consumption taxes by the Kakwani index. This reflects how concentrated taxes are at one or the other end of the income distribution. It is equal to the difference between the concentration index of the tax relative to (pre-tax) disposable income and the Gini coefficient of disposable income (Kakwani, 1977). Namely:

$$Kakwani(tax, dhi) = C(tax, dhi) - Gini(dhi)$$

The concentration index $C(tax, dhi)$ is a measure of the extent to which the distribution of the tax payments is skewed towards the highest incomes. It takes on values [-1;1], with -1 indicating that all the tax payments are concentrated on the poorest individual, and 1 that these are concentrated on the richest individual. By subtracting the Gini index of income, the sign of the Kakwani index provides a simple piece of information: a positive Kakwani value means that the tax payments are more heavily concentrated towards the highest percentiles of income than is income itself, so that the tax is progressive. On the

contrary, a negative Kakwani index reveals that the distribution of tax payments is less skewed to the right than is the distribution of income, so that the tax is regressive. For consumption taxes, we expect negative Kakwani indices.²⁸

For one fixed tax rate, we can make assumptions on the Kakwani index and thus have a range of possible RS index values, based on [eq. \(1.4\)](#). When the Kakwani indices are derived from imputed consumption values, this will be useful to provide upper and lower bounds on the possible RS values.

We calculate the Kakwani index for all the datasets where consumption data is available (i.e. 77 country-years): the results are summarized in [Figure F.2](#). Approximately half of Kakwani indices lie between -0.10 and -0.15, and almost all between -0.05 and -0.20.

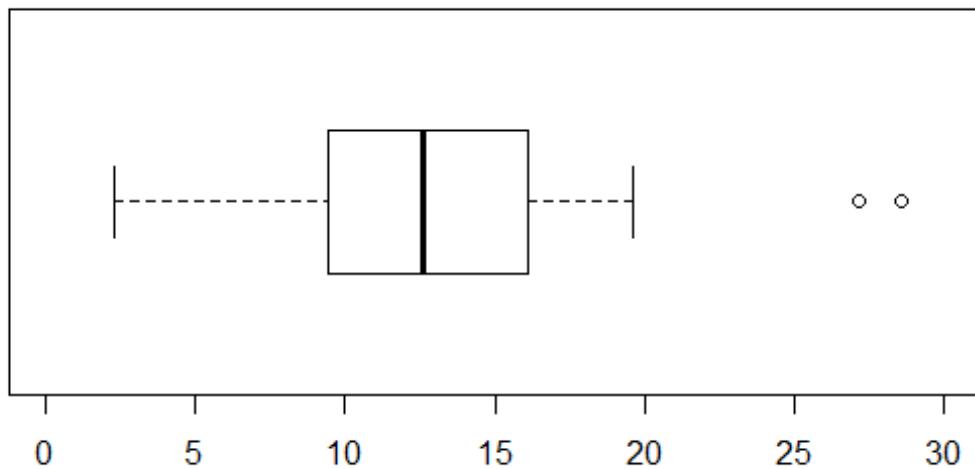


Figure F.2: The distribution of the Kakwani index on 77 datasets (x100)

Based on the different tax rates that we calculated earlier, we can now provide bounds for the possible values of the RS index. As summarized in [Figure F.3](#), most values for the Reynolds-Smolensky index will lie between -0.02 and -0.08.

²⁸In the subsequent figures, we plot the absolute values of the RS and Kakwani coefficients.

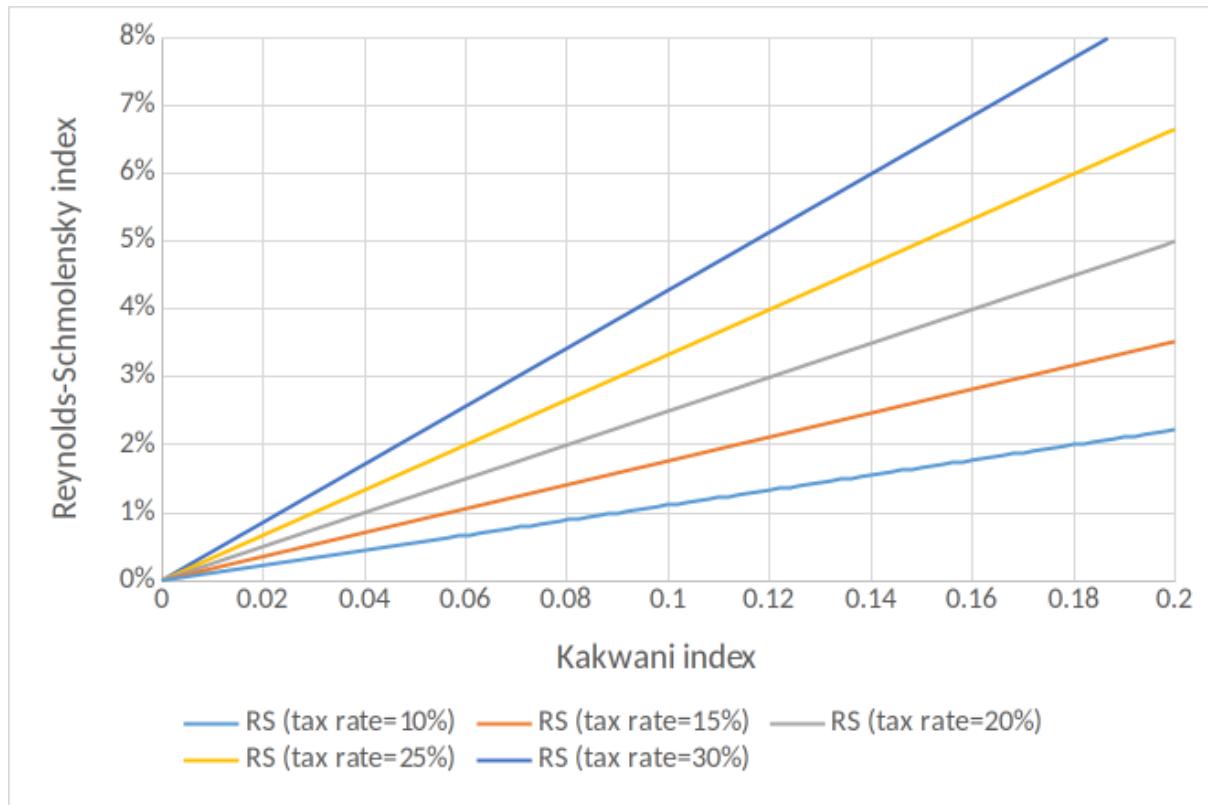


Figure F.3: The value of the Reynolds-Schmolensky index depending on the tax rate and the Kakwani index

G Changes over time in the impact of consumption taxes in several countries

Figure G.1 depicts the evolution over time of the inequality impact of consumption taxes for countries in our dataset with at least three data points over the 2000-2010 period.

Countries at the extremes of the estimated consumption-tax impact maintain their ranks throughout the period under study: the United States, Switzerland, and Mexico remain countries with a low consumption-tax impact, while Denmark remains the country with the highest consumption-tax impact. There is, however, some re-ranking among countries that have similar inequality effects of consumption taxes.

Last, some countries show large variations in the estimated impact of consumption taxes: for example, Greece joins Denmark at the end of the period as one of the countries with the highest inequality impact of consumption taxes. This may be related to the dramatic changes in the Greek economy after the 2008 economic crisis, where income inequality rose sharply while VAT rates were increased in an attempt to raise more revenue.

G. CHANGES OVER TIME IN THE IMPACT OF CONSUMPTION TAXES IN SEVERAL COUNTRIES

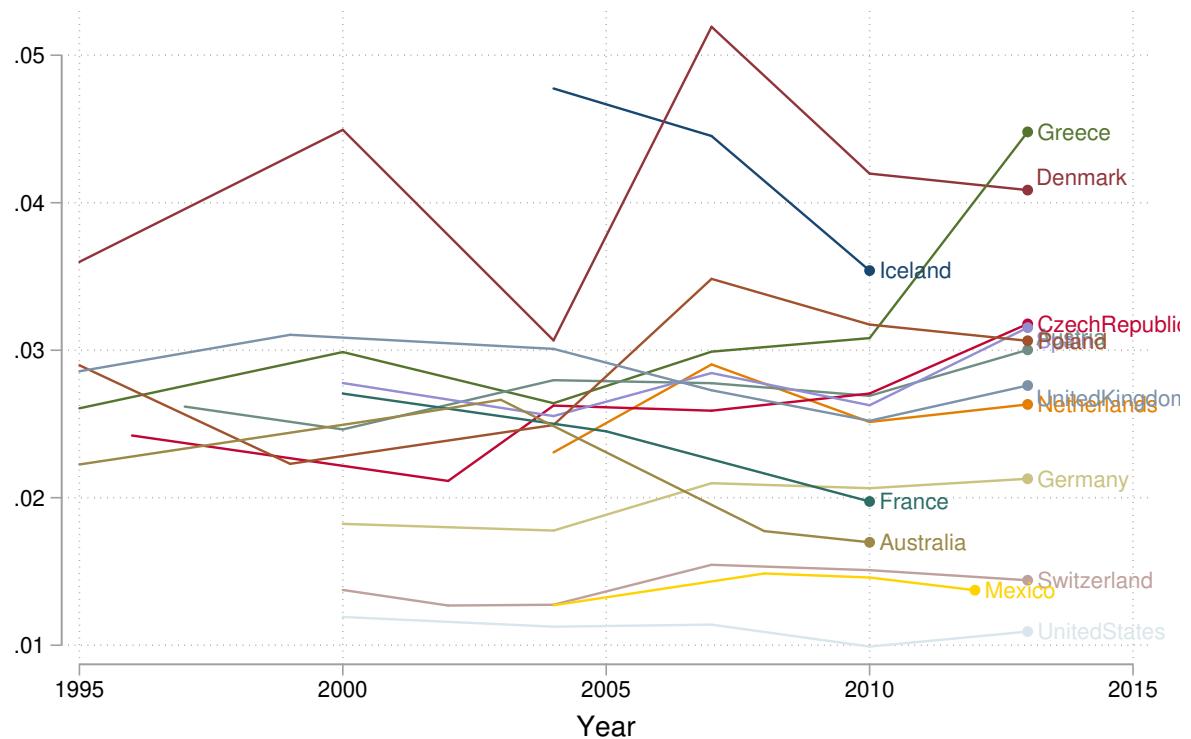


Figure G.1: Evolution over time of the inequality impact of consumption taxes in a number of countries

H Country and year coverage

To carry out the calibration of our imputation models of consumption data, 47 datasets from the following 12 countries are used: Estonia (2000), France (1978, 1984, 1989, 2000, 2005, 2010), Germany (1973, 1978, 1983), Hungary (1991, 1994), Italy (1995, 1998, 2000, 2004, 2008, 2010, 2014), Poland (2007, 2010, 2013), Slovenia (1997, 1999, 2004, 2007, 2010, 2012), South Korea (2006, 2008, 2010, 2012), Spain (1980, 1985, 1990), Switzerland (2000, 2002, 2004), Taiwan (1981, 1986, 1991, 2007, 2010, 2013) and the United Kingdom (1986, 1991, 1995).²⁹

As described in [Table H.1](#), we estimate the regressivity of consumption taxes for 132 LIS datasets, spanning 27 countries over 36 years from 1978 to 2013. Among those, 55 country-years are part of the core model, that is the model which provides the most-accurate estimates of the effect of consumption taxes on inequality. For the years with a * in the table, information on rents is missing, so the lighter model is used: for those 77 additional country-years, the regressivity of consumption taxes is slightly overestimated. Among those 132 country-years, 33 estimates come from observed data on consumption, and 99 come from imputed consumption data.

For each country in this paper, we use the latest year available in the core model, except for Belgium, Brazil, Denmark, Finland, Hungary, Iceland, Ireland, Italy, Norway, Sweden, the United Kingdom and the United States, where we use the lighter model. When observed consumption data is available, these are the figures that we use.

²⁹For some of those datasets, tax data or other necessary National Accounts data is not available (South Korea and Taiwan, for instance). They therefore do not appear in the remainder of the analysis and are not listed in [Table H.1](#).

Table H.1: Country and years used in the study

Country	Years with observed data	Years with imputed data
Australia	2010	1981*, 1985*, 1989, 1995, 2001, 2003, 2008
Austria		1997*, 2000*, 2004, 2007, 2010, 2013
Belgium		1997*
Brazil		2011*, 2013*
Colombia		2007*
Czech Republic		1996*, 2002*, 2004*, 2007, 2010, 2013
Denmark		1995*, 2000*, 2004, 2007*, 2010*, 2013*
Estonia	2000	2004, 2007, 2010, 2013
Finland		1995*, 2000*, 2004*, 2007*, 2010*, 2013*
France	1978*, 1984, 1989, 2000, 2005, 2010	1994*
Germany		2000, 2004, 2007, 2010, 2013
Greece		1995*, 2000*, 2004*, 2007, 2010, 2013
Hungary		2005*, 2007*, 2009*, 2012*
Iceland		2004*, 2007, 2010*
Ireland		2004*, 2007*, 2010*
Italy	1995*, 1998*, 2000*, 2004*, 2008*, 2010*	
Mexico	2008, 2010, 2012	2004
Netherlands		2004, 2007, 2010, 2013
Norway		1979*, 1986*, 1991*, 1995*, 2000*, 2004*, 2007*, 2010*, 2013*
Poland	2007*, 2010*, 2013	1995, 1999, 2004
Slovenia	1997, 1999, 2004, 2007, 2010, 2012	
South Africa	2008*, 2010*, 2012*	
Spain		2000*, 2004*, 2007, 2010, 2013
Sweden		1995*, 2000, 2005*
Switzerland	2000*, 2002*, 2004*	2007*, 2010*, 2013*
United Kingdom	1995*	1999*, 2004*, 2007*, 2010*, 2013*
United States		2000*, 2004*, 2007*, 2010*, 2013*

Notes: For the years with a * in the table, information on rents is missing so that the lighter model is used to estimate the regressivity of consumption taxes.

Chapter 2

Determinants of the evolution of income inequality: semi-parametric decomposition in France, 1970-2019

With Clément Carbonnier.

Abstract

Over the past 50 years, the French economy and population have undergone major changes. Some of these changes reflect what has happened in most developed countries: population aging, increasing participation of women in the labor market, rising unemployment, skill-based technological change, declining household size... Another part is specific to France: a sharp reduction in income inequality until the 1990s and then a moderate increase in inequality, a massive exit from poverty of retired households thanks to rising pensions. We analyze the evolution of income inequality in France between 1970 and 2019, in sub-periods according to economic cycles. We measure the respective contributions of changes in household structure, occupations, wages, taxes and transfers to the evolution of income inequality using a semi-parametric decomposition approach. We show that the determinants that caused the decrease in income inequality in the first part of the period are not those that caused the return of inequality in the second period. We highlight the strong contribution of the pension system to the decline in inequality at the beginning of the studied period, before a neutralization and even a recent reversal of its impact. Changes in family types led to a moderate, but continuous rise in inequality. The strong increase in female employment did not lead to a uniform fall in inequality of household income, partly because of homogamy. Direct taxes contributed to a fall in inequality over the period, while changes in social benefits led to a fall in inequality only when new schemes were implemented or when benefits scales were updated, i.e. especially in the 1970-1996 period.

Keywords: Long-term inequality; Redistribution; Demographic trends.

1 Introduction

The analysis of long-term changes in inequality occupies an important place in the economic literature, especially because of the recent construction of long-term databases that are comparable across countries, thanks to improved access to administrative data and new methodologies (Piketty, 2003; Piketty and Saez, 2003; Atkinson, Piketty, and Saez, 2011; Piketty and Zucman, 2014). Overall, intra-country inequality in developed countries has been on the rise since the turn of the 1970s and 1980s, after a long post-World War II period of relatively low inequality by historical standards. The evolution of inequality between countries is less monotonous when we look at inequality at the level of the world population (Lakner and Milanovic, 2016).

Several phenomena have been highlighted in the academic literature to explain these changes. The polarization of the labor market, initially highlighted in the United Kingdom (Goos and Manning, 2007) and the United States (Autor and Dorn, 2013), is caused by the evolution of the skills demanded by employers in a period of high task automation. In parallel, a race between education (the supply of skilled labor) and technology (the demand for skilled labor) has led to a decrease or increase in inequality, depending on the relative growth of the two determinants (Goldin and Katz, 2009).

At the same time, the labor market has been characterized by a steady increase in the participation rate of women (Mosisa and Hippel, 2006). While this appears to be a factor in improving living standards, it may not be enough to reduce inequalities between households, given phenomena such as homogamy and the increase in the number of single-parent families (Bouchet-Valat, 2017). These social and demographic changes are accompanied by a shift in public policies that affect not only the labor force participation rate and the distribution of households' labor income, but also their disposable income through socio-fiscal redistribution.

Empirical evidence shows that policies that increase access to childcare do indeed lead to higher female labor force participation (Baker, Gruber, and Milligan, 2008; Lefebvre and Merrigan, 2008). However, the structuring of public policies can lead to strong inequalities in access to childcare and consequently in labor market participation opportunities between mothers of different socioeconomic status (Carboneir and Morel, 2018; Ferragina, 2020; Carboneir and Palier, 2022). Moreover, transfer policies can also affect participation, even if they are not formally gendered (Périvier and Verdugo, 2019; Carboneir, 2021). In particular, parental leave increases periods of inactivity in the years following childbirth (Piketty, 1998), which can affect women's careers in the long run (Lequien, 2012). Moreover, these gender differences can vary greatly between women of different socioeconomic categories, and even more so when public policies design access or incentives that differ by socio-professional category.

The purpose of this paper is to assess the contribution of these determinants to the

evolution of income inequalities in France. In particular, we aim to document how tax and family policies interact with socioeconomic inequalities to shape inequalities that cross socioeconomic and gender dimensions. Thus, we analyze the evolution of income inequality in France between 1970 and 2019, separating the respective contributions of changes in household structure, occupations, wages, taxes and transfers to the evolution of income inequality.

Over the past fifty years, the French economy and population have undergone major changes. Many of these changes reflect what has happened in most developed countries over the same period: population aging, increasing participation of women in the labor market, rising unemployment, skill-biased technological change, declining average household size, etc. But in some respects France's trajectory is unique: a sharp reduction in income inequality until the 1990s, followed by a more moderate rise in inequality than in some other countries, and a massive escape from poverty among retired households thanks to rising pensions.

We decompose this French trajectory of inequality change by analyzing representative data on French households from 1970 to 2019. These data, newly available following a harmonization exercise ([Blasco and Picard, 2019](#)), are derived from matching survey data on the sociodemographic profile of households (family composition, occupation, activity status) and administrative data on income, taxes and benefits (earned income, pensions, taxes, social benefits). The analysis allows not only a precise measurement of changes in income distributions over time (as well as inequality indicators), but also a decomposition of these changes according to several parameters, in particular changes in redistributive policies, family composition, labor force participation and the interaction of these different parameters with changes in occupational structures and skills.

A critique from the sociological literature insists on the importance of not considering inequalities solely through uniform and continuous differences in income or wealth, and on the need for an analytical grid linked to socio-professional categories ([Pierru and Spire, 2008](#); [Duvoux and Papuchon, 2022](#)) . Similarly, economic critics have challenged the way in which different forms of wealth are considered homogeneous ([Bonnet et al., 2015](#)), opening up a debate on the valuation of real estate wealth and its consequences in terms of socio-economic inequalities ([Carbonnier, 2015, 2018](#)). Thus, this paper analyzes the evolution of income inequality in the light of the evolution of household categories and, in particular, the socio-professional category. In fact, the decomposition attempts to distinguish the changes in income inequality that are due to changes in the composition of the global labor force from those that are due to changes in the relative earnings of different occupations or to earnings dispersion within occupations.

The results show a strong contribution of the pension system to the reduction of inequality and even more to the reduction of poverty at the beginning of the period (between 1970 and 1990), before a neutralization and even a slight opposite effect from the 2010s

onwards. The strong increase in female employment, although an important structural change, did not lead to a uniform decline in income inequality between households, and even led to an increase in some subperiods (mainly 1975-1990) due to the dispersion of income within the lower half of the income distribution. This is an indication that the effect of homogamy was greater than the pure effect of reducing inequality by increasing the labor income of non-working women. Overall, taxes and benefits reduced inequalities, but the impact of benefits at the beginning of the period (1970-1996) is partially reversed afterwards.

The remainder of this article is organized as follows: the second section presents the database in detail in a first subsection, followed by the decomposition method in a second subsection. The third section presents the results by temporal sub-periods for a general perspective, and then by determinants for a more in-depth analysis of the impact of the factors driving inequality over time. Finally, the fourth section concludes and comments on the lessons and limitations of this decomposition.

2 Material and method

2.1 Data

This decomposition is based on the analysis of representative annual data of French households from 1970 to 2019. These data, which have recently been made available following a consistency study ([Blasco and Picard, 2019](#)), are derived from matching survey data on the socio-demographic profile of households (family composition, occupation, employment status) with tax and social security data on income (earned income, pensions, taxes, social benefits). These are the data from the tax income surveys (ERF) and the tax and social income surveys (ERFS). Initially, the surveys, based on the population census, were conducted approximately every five years: in 1970, 1975, 1979, 1984 and 1990. Two major changes occurred from 1996 onwards: first, the survey became annual; second, it was linked to the labor force survey and was thus enriched with data on employment.

Survey and tax data are matched in the following way: a representative sample of households is drawn from respondents of the population census (or from the labor force survey from 1996 onwards). The actual income tax returns of all individuals living in this household are then matched. This provides detailed information on the different types of income received and taxes paid by the household as a whole. Social transfers are imputed according to existing rules and scales for the years 1970 to 2004, using information available from the tax administration as well as information from the population census. From 2005 onwards, social transfers are matched using individual data from benefit funds.

These databases are representative samples of the population (ranging from 25,000 households for the first vintages to 50,000 households for the most recent vintages) and

contain detailed information on households that allows us to go beyond income. Unlike tax data, which can at best group individuals by tax units, households can be defined as people living under the same roof and can be disaggregated by age and socio-professional categories of household members. For some household categories, such as joint custody of children, it may be difficult to define membership. In our method, we use the household members as reported in the survey.

It is thus possible to create categories that cross household composition (single man or woman, couple, with or without dependent children) and socio-professional categories (crossed for the man and woman in the case of a heterosexual couple). Therefore, in the rest of the study, we consider as different household categories a low-skill employed woman in a couple with an executive man and an executive woman in a couple with a low-skill employed man, even if they have the same number of children. Same-sex couple households, because of their small numbers and the fact that they were not reported as couples in early versions of the survey, are grouped together with other types of households made up of several cohabiting adults.

Regarding income, it is possible to break down pre-tax income into wages and salaries, self-employment income, unemployment benefits from 1996 onwards, retirement pensions, and other income.

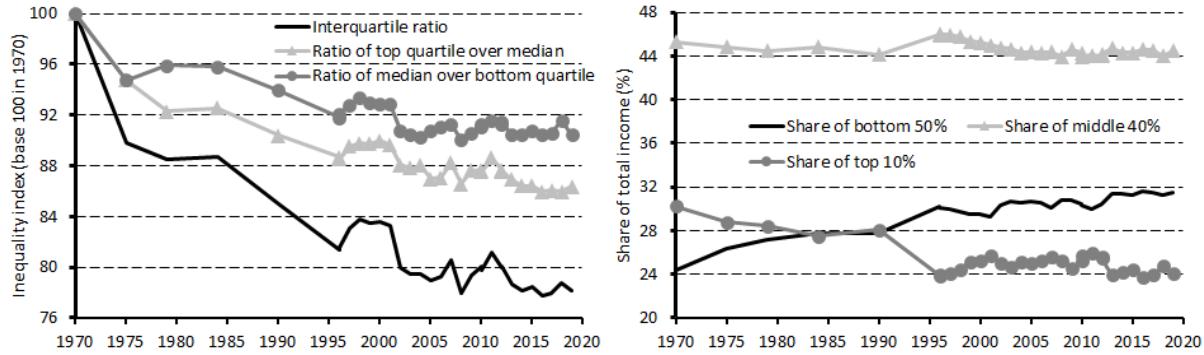
On the other hand, due to the structure of the survey, the available samples are not representative of incomes at the top of the income distribution. Thus, the goal is to analyze the evolution of inequality among households in the bottom 99 percent of the income distribution, which may lead to significant differences with inequality measures that focus on the highest incomes, including income not distributed by firms ([Yonzan et al., 2022; Garbinti, Goupille-Lebret, and Piketty, 2018, 2021](#)).

Another weakness of these data is the variable coverage of capital income. Indeed, the obligation to report it has varied over time and only a small fraction of it may be available in tax sources. However, this problem is corrected by imputation in the ERFS from 1996 onwards, using models of asset holdings based on household surveys and a simulation of financial income based on bank sources. Therefore, changes in capital income cannot be interpreted for the period 1990 to 1996, as the differences reflect the introduction of new measures rather than actual changes in household income. However, the decomposition step associated with these incomes is retained, not for direct interpretation, but as a control for this effect vis-à-vis the other determinants of inequality trends.

Since different inequality indicators measure different phenomena, we use several of them to understand the evolution of inequality in its entirety and complexity. As our study focuses the changes in the middle class (and not at the upper tail of the income distribution) we focus on inequality indexes at the middle of the distribution, preferably the interquartile ratio. To distinguish between changes in inequality in the upper and lower middle classes, sub-indexes are also used: the ratio of the upper quartile over median and

the ratio of median over the lower quartile. Furthermore, the shares of the overall income accruing to the different parts of the income distribution are also measured: the share of the bottom 50%, the share of the middle 40% and the share of the top 10%. [Figure 1](#) shows the evolution of these indexes over the period studied.

Figure 1: Evolution of income inequalities in France, 1970 – 2019

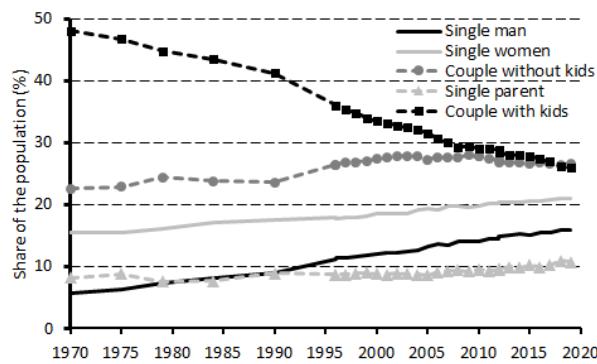


Scope: Metropolitan France, households excluding collective housing, 1970-2019.

Source: ERF-ERFS, Insee.

Thus, it appears that inequality has declined overall for all indicators, with a rapid decline in the 1970s, 1980s, and first half of the 1990s, followed by a halt in the decline or even an increase in inequality in the second half of the 1990s, 2000s, and 2010s. Compared to other works (especially those that distribute total national income), the increase in inequality since the beginning of the 21st century is much less pronounced here. This is due to the limitations mentioned above. [Yonzan et al. \(2022\)](#) show that survey and tax data are very comparable for all but the top 1% of the population. Yet this top 1% of income has made a significant contribution to the recent rise in inequality, as measured in particular by [Chancel et al. \(2022\)](#).

Figure 2: Evolution of family composition in France, 1970 – 2019



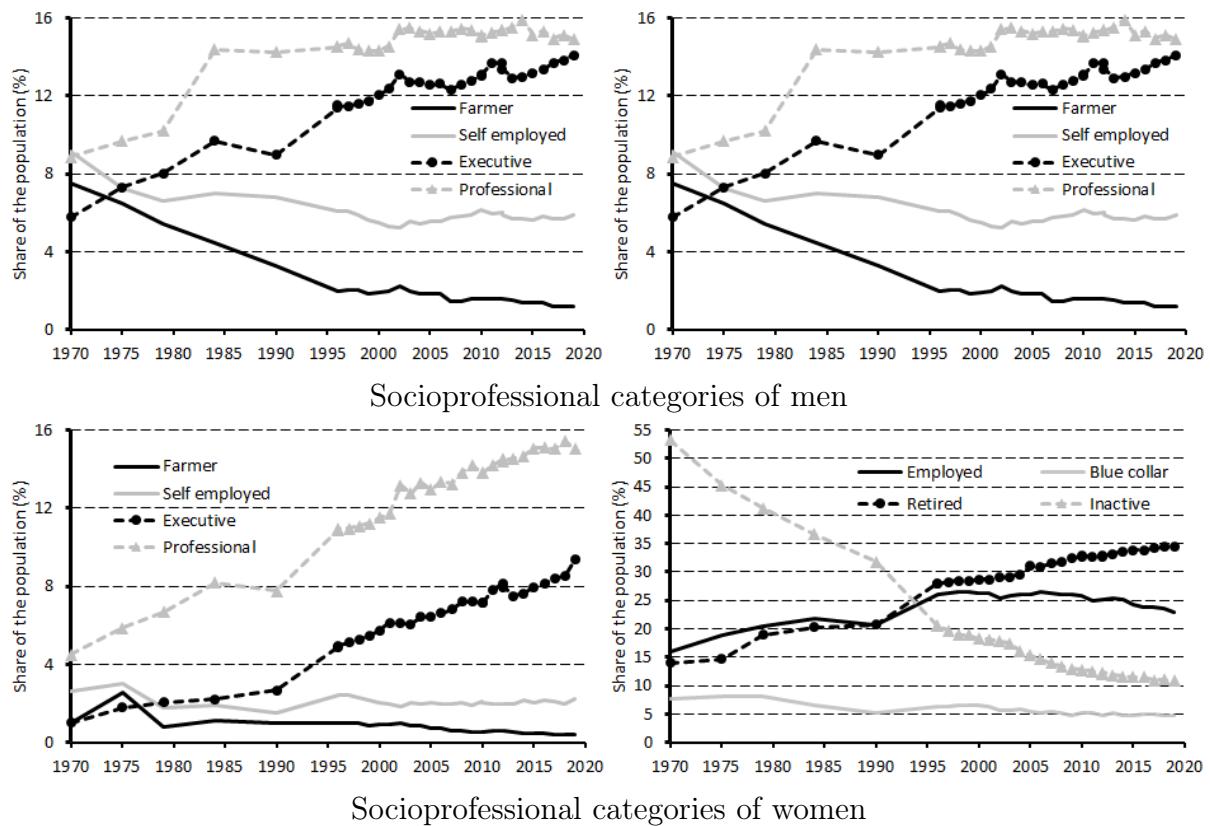
Scope: Metropolitan France, households excluding collective housing, 1970-2019.

Source: ERF-ERFS, Insee.

Among the variations in family composition ([Figure 2](#)), the general picture is one of a sharp decline in couples with children, absorbed by all the other categories. However,

the growth rates of these other categories differ. The category of single men has grown strongly, from the rarest composition in 1970 to approaching single women at the end of the period. The other categories have grown much more slowly on average, with steady, low growth for single women and couples without children, and concentrated growth at the end of the period for single-parent families. The growth of single persons and couples without children is partly due to the aging of the population, as the share of retired households increased steadily over the period. The increase in the number of single persons with children - mainly single mothers - does not appear very large in the figures, but should not be neglected for at least two reasons: first, the absolute change may be small, although the relative change is larger; second, second, the increase in the number single mothers is much larger as a proportion to non-retired households.

Figure 3: Evolution of socioprofessional categories in France, 1970 – 2019



Scope: Metropolitan France, households excluding collective housing, 1970-2019.
Source: ERF-ERFS, Insee.

Regarding the labor force ([Figure 3](#)), the first thing to note is the large increase in the share of retired people. As a result of the ageing of the population, their share in the adult population has almost doubled over the whole period. The main trends concerning socioprofessional categories are the general rise in qualifications - for both men and women - and the very sharp decline in the number of non-retired inactive women. This decline is steady in relative terms over the whole period, but seems to be slowing down in absolute terms as the stock becomes smaller.

Women farmers and craftswomen & entrepreneurs, who were very few in number at the beginning of the period, have seen their share decline further, as have blue-collar women, although the latter were less rare in 1970. The strongest growth rates are observed among the most highly qualified women - executives and professionals - although they are still in the minority compared to female low-skill employees. For the latter, three periods can be distinguished, with growth from 1970 to 1999, stabilization from 1999 to 2007 and then a decline from 2007 onwards, which continued after the economic crisis, even during the period of clear recovery from 2016 to 2019.

Among men, the largest decline in relative terms is among farmers and the largest decline in absolute terms is among blue-collar workers. Craftsmen & entrepreneurs and low-skill employees experienced a steady decline, similar to that of blue-collar in relative terms, but starting from a much lower base. The growth of executives and professionals is very similar over the early part of the period, but that of professionals seems to have stopped since 2002, or even reversed since 2014, while that of executives continues. The rate of non-retired inactive men has risen sharply, but still remains the rarest category apart from farmers.

2.2 Method

To decompose the evolution of income inequality due to changes in the structure of the population, the labor market and socio-fiscal policies, we follow the method used by [Biewen and Juhasz \(2012\)](#) to analyze wage inequality in Germany from 1999/2000 to 2005/2006. They adapted a semi-parametric decomposition method developed by [Di-Nardo, Fortin, and Lemieux \(1996\)](#) to decompose the increase in inequality in the U.S. labor market between 1973 and 1992 into three factors. Our adaptation of the method allows us to account for a larger number of factors, including differential changes in types of income that not all households earn, by separating between developments in the extensive and intensive margins.

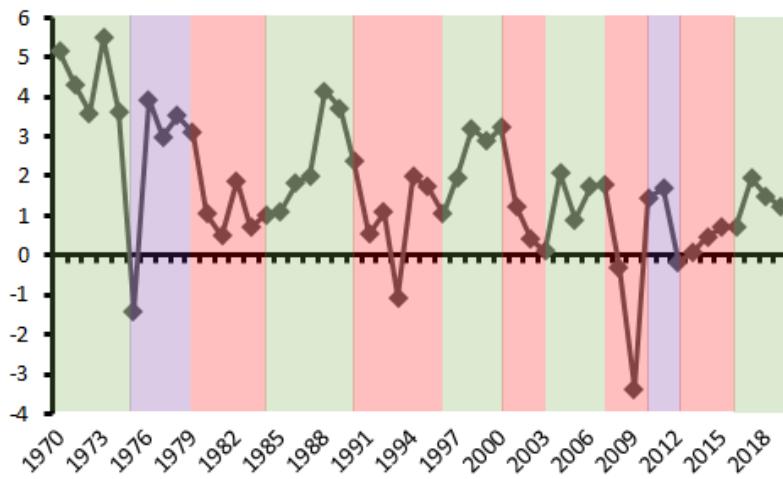
Determination of the sub-periods

In addition, the available data allow us to analyze a much greater depth of time. However, this long period is analyzed by sub-periods because the different determinants have had variable or even opposite contributions over the long time scale considered: from 1970 to 2019. The choice of sub-periods for the end of the twentieth century is limited by the fact that the survey data from 1970 to 1996 were not annual, but about every five years. Therefore, we analyze the period from 1970 to 1975 with the end of the post-war boom, then from 1975 to 1984 with the decade of recession following the energy crisis. The recovery from 1984 to 1990 is followed by a new recession from 1990 to 1996.

For the beginning of the 21st century, another constraint is imposed due to breaks

in the data series in 2010 and 2012 (but with two databases in each of the statistical conventions for these key years): we therefore have a study period from 2010 to 2012. After 2012, we choose to divide the period according to the economic cycles (see Figure 4) and therefore divide between 2012 and 2016 and between 2016 and 2019. An alternative breakdown based on the electoral cycle takes 2017 as a transition year. Before 2010, and still based on the business cycle, the periods are 1996 to 2000, before the bursting of the Internet bubble from 2000 to 2003, a new growth phase from 2003 to 2007, before the subprime crisis from 2007 to 2010. An alternative based on the electoral cycle considers the periods from 1997 to 2002, from 2002 to 2007, and from 2007 to 2012.

Figure 4: GDP growth in France, 1970 – 2019 and chosen decomposition periods



Scope: France, 1970-2019.

Source: Annual national account, Insee.

Evolution of the distribution of households' characteristics

For each sub-period, we start from the income distribution of the initial year (noted with index 0) and build a counterfactual income distribution by modifying each determinant of income, so that the underlying structure corresponds to the characteristics of the final period (with index 1). First, we modify the weights of the observations so that the frequencies of the family compositions of the modified period 0 correspond exactly to those of period 1. Then, we operate sequentially on the other characteristics (the share of retired men, the distributions of men's socio-professional categories, the share of retired women, the distributions of women's socio-professional categories) also correspond.

For example, to obtain the corrected weights $w_{\Delta\Theta\Lambda}^0$ so that the weighted frequencies of categories D in the feature set Δ , categories T in the feature set Θ , and categories L in the feature set Λ correspond to the frequencies of period 1, the weight w_i^0 of household i

(belonging to categories D_i , T_i , and L_i) in period 0 is modified according to formula (2.1):

$$w_{i,\Delta\Theta\Lambda}^0 = w_i^0 \left(\frac{\sum_{j \in D_i T_i L_i} w_j^1}{\sum_{k \in \text{period}_1} w_k^1} \right) / \left(\frac{\sum_{j \in D_i T_i L_i} w_j^0}{\sum_{k \in \text{period}_0} w_k^0} \right) \quad (2.1)$$

That is to say, households who belong in categories that are relatively more frequent in period 1 than in period 0 will see their weights increased, while households who belong in categories that are less frequent in period 1 than in period 0 will see their weights decreased. Each step of such reweighting is done sequentially and conditionally of previous decompositions.

Evolution of the income per type

The following steps modify the distributions of categorical incomes. For each type of income other than taxes and social benefits (labor income, unemployment benefits, retirement pensions, capital income), a first step modifies the weights of the observations to correct for the extensive part of the rates of beneficiaries of these incomes, in the same way as is done in previous steps. For taxes and benefits, we do not correct for extensive margins via reweighting, as changes in the share of households affected by taxes or benefits conditionally on the changes in the structure of the population should be interpreted as changes in the taxes and benefits designs, not changes in the structure of the population (see following subsection).

In a second step, the amounts themselves are modified to take into account the evolution of the intensive margin. The incomes of the last period are normalized so that the average equivalized disposable income is the same in the two periods, in order to measure the evolution of the shape of the income distributions and not their level, and to neutralize the effect of the order of the incomes taken into account in the decomposition.

The intensive step corresponds to taking into account changes in the conditional distributions of income, which can be parameterized in different ways. The categories are cross-tabulated indicators that take into account the family composition of the household (couple or single, with or without dependents) and the socio-professional category of the man and woman in the household (if any).

This involves regressing the amount of categorical income considered on all household characteristics (for those households that benefit from it), according to equation (2.2).

$$Y_{it} = \alpha_t + \sum_j \beta_{jt} \mathbf{1}_{[i=j]} + \sum_k \gamma_{kt} X_{ikt} + \epsilon_{it} \quad (2.2)$$

Where Y_{it} is the considered income of individual i in period t , $\mathbf{1}_{[i=j]}$ the indicator equal to 1 if household i belongs to category j and 0 otherwise, X_{ikt} the values of the other

characteristics k of household i in period t ; α_t , β_{jt} and γ_{kt} are the coefficients of the regression and ϵ_{it} the residual. Other k-controls include age, age squared, and pre-tax & transfers income and its square for the tax and benefit regressions.

From these regressions, it is possible to calculate for each household $i0$ in period 0 the value of income predicted by the period 0 regression (\hat{Y}_{i0}^0) and the value predicted by the period 1 regression (\hat{Y}_{i0}^1). Then, the true value Y_{i0} of household i_0 's income is corrected homothetically to Y_{i0}^{cor} :

$$Y_{i0}^{cor} = Y_{i0} \frac{\hat{Y}_{i0}^1}{\hat{Y}_{i0}^0} \quad (2.3)$$

We also compute an alternative methodology with an additive correction:

$$Y_{i0}^{cor} = Y_{i0} + (\hat{Y}_{i0}^1 - \hat{Y}_{i0}^0) \quad (2.4)$$

An alternative methodology for taking into account changes in categorical incomes is also considered. It corresponds to taking into account both inter-category and intra-category changes in income through changes in the intra-category standard deviation of each type of income. To compute this, the averages m_{jt}^Y and standard deviations σ_{jt}^Y of the income considered Y for each category j at each period t are calculated. The disposable income DY_{i0} of household i in period 0 is corrected (in DY_{i0}^{cor}) for the evolution of income types Y of her category j according to equation (2.5).

$$DY_{i0}^{cor} = DY_{i0} + (1 - \tau_{i0}) \left[m_{j1}^Y - m_{j0}^Y + (\sigma_{j1}^Y - \sigma_{j0}^Y) \frac{Y_{i0} - m_{j0}^Y}{\sigma_{j0}^Y} \right] \quad (2.5)$$

Where τ_{i0} is the average tax rate of household i in period 0.

Only the results of the central methodology are presented and discussed in the body of this article, the results of the alternative methodologies are presented in the appendix (coming soon) and are essentially similar to those of the central methodology.

The extensive margin due to tax and allocation schedules

For taxes and benefits, the step at the extensive margins concerns change in the schedules and not only demographic change of potential beneficiaries or taxpayers. Therefore, a specific methodology at the extensive margins is implemented. We compute a binomial logistic regression that models the probability of being affected by positive taxes or positive benefits in period 1. We then consider as being affected by taxes and benefits in the modified period 0 the X% of households with the highest predicted probability in period 0, X% being the prevalence in period 1. Actually, we limit the number of households for which we change the status (from zero to positive or from positive to zero): we complete up to X% (mainly) or subtract down to X% (rarely) with the marginal households according

to the probability of being affected by positive taxes or benefits computed thanks to the binomial logistic regression model.

For those who were actually affected at period 0 but are predicted not to be at period 1 by the previous methodology, the corrected tax or benefit becomes zero. For those who were not affected at period 0 and are predicted to be so in the modified distribution, we attribute the average of corrected tax or benefit among i_0 's 4-nearest neighbors in terms of predicted probability (a technique generally used for imputing missing values in administrative or survey data, see [Little and Rubin, 2019](#)).

Thus, for each stage of the transformation from period 0 to period 1, we have a database for which some determinants have been modified to correspond to those of period 1 and some other determinants still corresponding to period 0. For each database, it is possible to calculate the usual indicators for measuring inequality (the interquartile ratio, the Gini coefficient for average inequality over the whole distribution, the poverty rate for inequality at the bottom of the distribution and the share of the richest 10% for inequality at the top of the distribution). The pattern of variation of these indicators over time allows us to observe the contribution of the different determinants to the evolution of inequality between periods 0 and 1.

3 Results

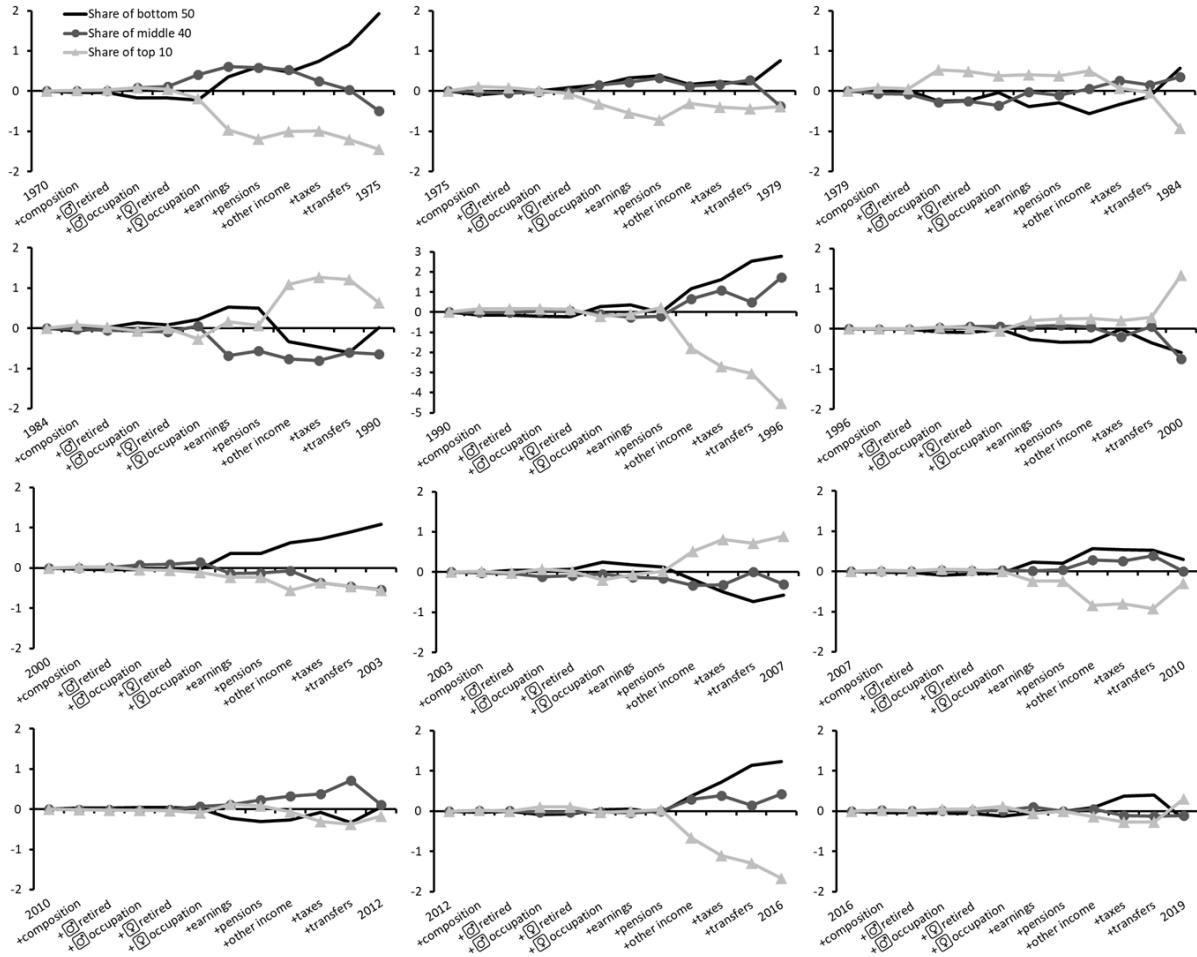
In this section, we present the results of our decompositions on the subperiods defined in [Section 2.2](#): the pivot years are 1970, 1975, 1979, 1984, 1990, 1996, 2000, 2003, 2007, 2010, 2012, 2016, 2019. We also introduce aggregate subperiods 1970-1990, 1990-2003, 2003-2012 and 2012-2019.

First, we present the general outlook of period-by-period decompositions. This allows to compare the impact of different determinants between them, and thus to identify the main drivers of inequality during specific periods. In particular, we show that the determinants of the decrease in inequality in the first part of the period were not the same than the determinants of the increase in inequality in the later part. We then present, for each major determinant, the evolution in time of their impact on the evolution of income inequality.

3.1 Decomposition of the evolution of inequality by sub-periods

The results concerning the global decomposition of inequalities are presented in [Figure 5](#) for the share of the bottom 50%, middle 40% and top 10% and [Figure 6](#) for the interquartile ratios. Contributions are scaled in proportion of the value of each inequality indicator at the beginning of the subperiod.

Figure 5: Decomposition of inequality evolution by sub-periods (shares)



Scope: Metropolitan France, households excluding collective housing, 1970-2019.

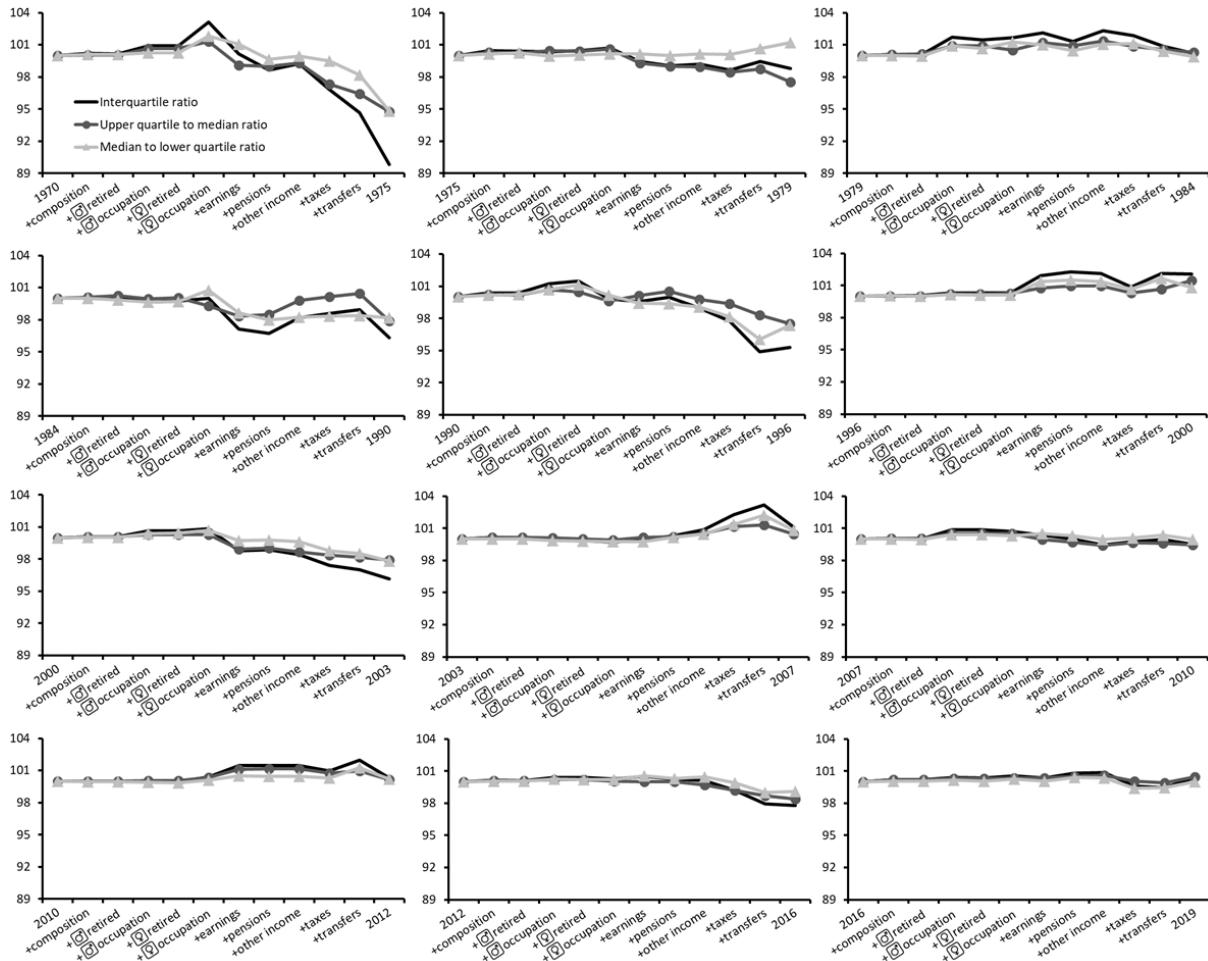
Source: ERF-ERFS, Insee.

First, it can be noted that all subperiods are different in their shape and thus in their main determinants (even if some subperiods, such as 1970-1975 and 1975-1979, are similar). In particular, the increase in inequality in the second part of the period does not mirror the decrease in the first period: the determinants are different.

However, there are some similarities: earned income and pensions generally have the largest impact of all the determinants in a given subperiod. The former include changes in the wage structure and in unemployment, which may be due to economic and technological change ([Autor and Dorn, 2013](#)), but also more institutional factors such as the evolution of the minimum wage, public sector compensation policies and, more generally, social bargaining policies ([Carbonnier and Palier, 2022](#)). The evolution of pensions, on the other hand, is the result of demographic changes (aging of the population), cohort effects where more complete careers lead to better pensions, and also political changes in the rules governing public pensions.

Socio-demographic determinants (family types, socio-professional categories, share of pensioners) generally have a smaller impact on the evolution of inequality than income determinants in a given subperiod. This is a reflection of the fact that, even if there are

Figure 6: Decomposition of inequality evolution by sub-periods (interquartile ratios)



Scope: Metropolitan France, households excluding collective housing, 1970-2019.

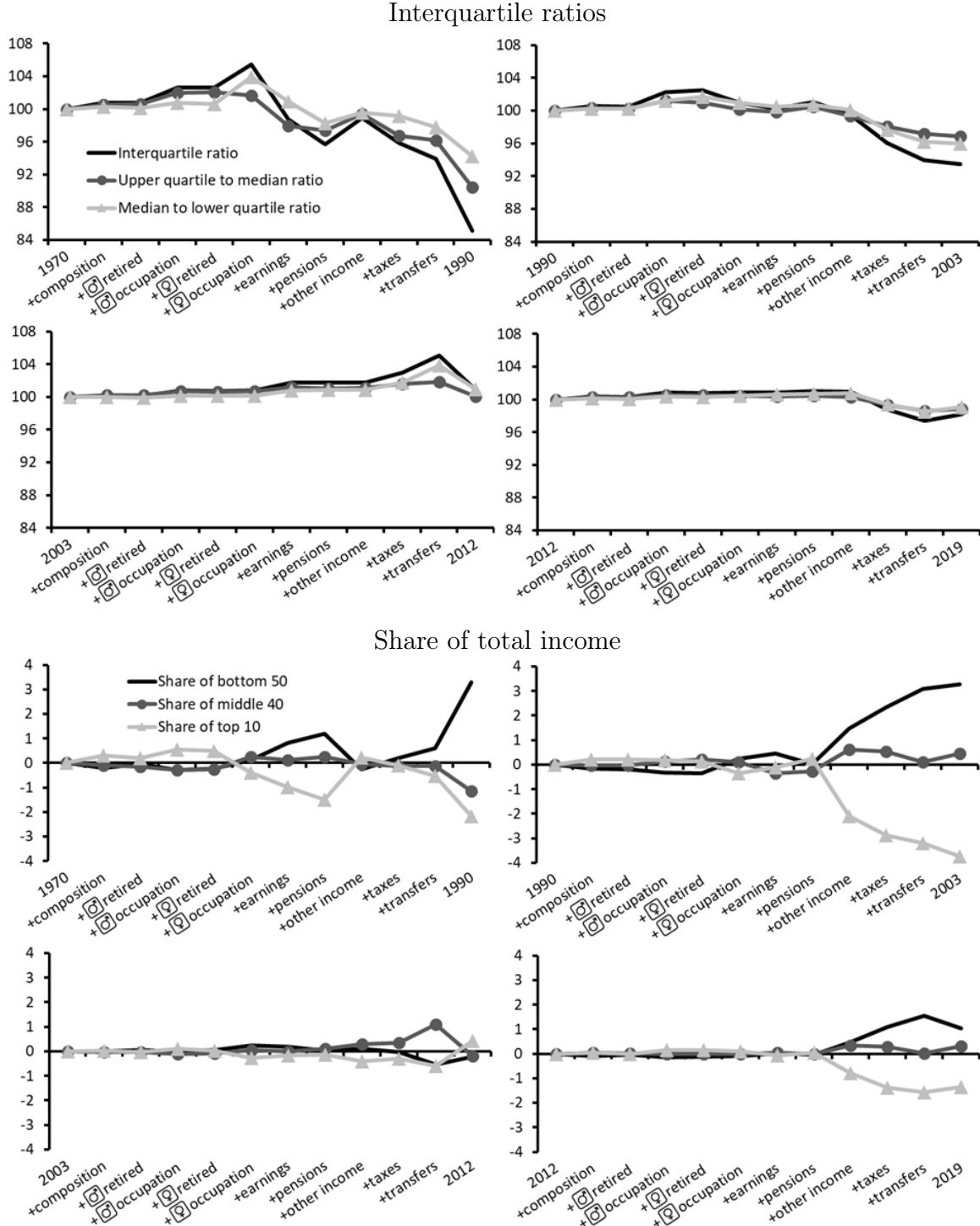
Source: ERF-ERFS, Insee.

significant income differences between these groups, there is still considerable inequality within groups, and thus changes in household composition are not perfectly correlated with changes in income inequality. Moreover, the structure of the population changes more slowly than incomes. However, their impact can be significant over longer periods of time, as the effects can add up.

It can also be noted that the decompositions of different inequality measures do not lead to the same results: in particular, the determinants of inequality within the bottom and top halves of the distribution differ for some periods (Figure 6). The determinants do not play the same role in each part of the income distribution. For example, earned income plays a significant role in the increase in income inequality in the early 2000s when looking at the share of income in the top 10%, while it is less visible in the interquartile ratios, indicating that its effect was mainly concentrated at the highest incomes. In the following sections we discuss when such determinants had a heterogeneous impact on the distribution of household income.

It can also be noted that determinants can have opposite effects on inequality, depend-

Figure 7: Decomposition of inequality evolution over large sub-periods



Scope: Metropolitan France, households excluding collective housing, 1970-2019.

Source: ERF-ERFS, Insee.

ing on the sub-periods. This is discussed in the following sections. In order to get a more general view of the long-term determinants of the evolution of income inequality, we sum up the contributions in the aggregate sub-periods 1970-1990, 1990-2003, 2003-2012 and 2012-2019. This allows us to see the extent to which slow changes such as family composition can add up to significant overall contributions, and the extent to which the varying

contributions of some determinants can cancel each other out. The results are shown in [Figure 7](#), where the contributions are scaled to the level of each inequality indicator in 1970 (so that the contributions can be compared between aggregate subperiods).

Looking at longer subperiods sheds light on somewhat more significant sociodemographic contributions to inequality changes. However, the contributions of changes in family types, socio-professional categories and the share of pensioners remain much smaller than those of changes in earned income and pension income. These two income categories, together with the evolution of transfers, are mainly responsible for the decrease in income inequality between 1970 and 1990.

After this period, the impact of pensions becomes negligible, while earned incomes continue to drive the evolutions, this time towards an increase in inequality from 1990 onwards. In the last period (2012-2019), this tendency to increase inequality is offset by changes in the tax-benefit system.

Changes in socio-professional categories, which are intermediate between income and family types, play different (and sometimes opposite) roles depending on the period. Men's and women's occupations push in opposite directions in the second aggregate subperiods (1990-2003), canceling each other out, while both contribute to a (small) increase in inequality in the first subperiod (1970-1990) and have very little impact after 2003.

In the following sections we discuss the contributions of each determinant over time, allowing us to see to what extent the contributions were stable or varied (in magnitude and direction) over time, and to discuss the underlying causes.

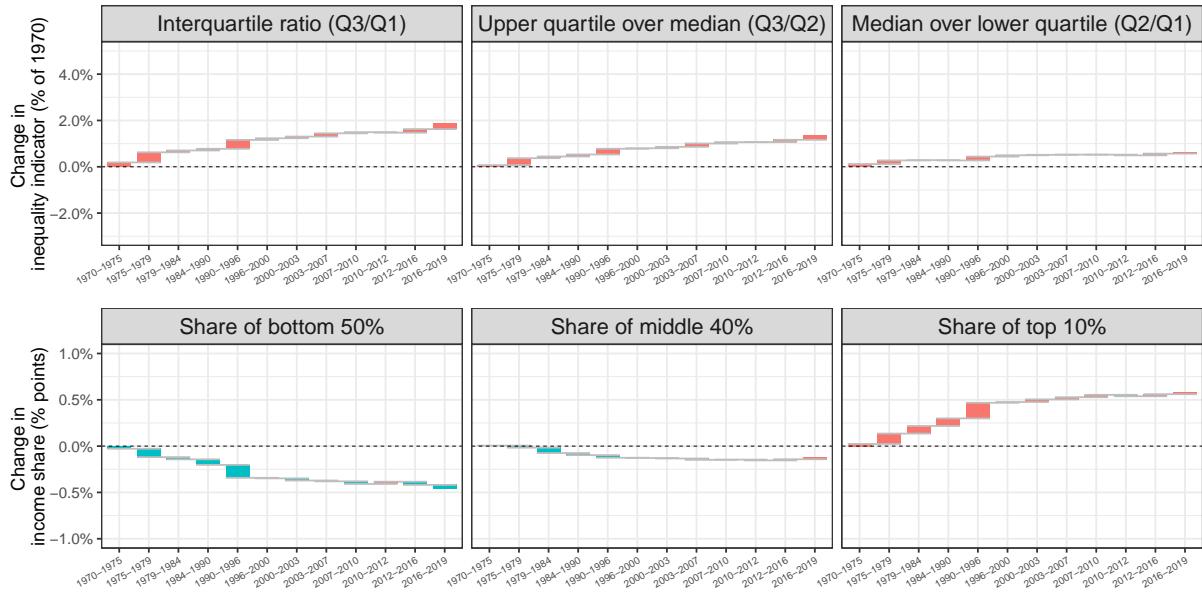
3.2 Evolution of the demographic characteristics

As shown in the previous subsection, the evolution of family compositions and socio-professional categories generally has a smaller impact on household income inequality than the evolution of income distributions in a given subperiod. Here we present the long-run effect of these determinants by summing their contributions over all subperiods.

Evolution of the impact of family composition on inequalities

The effect of changes in family compositions on the evolution of income inequality is quite small across the whole period. Adding up sub-periods, we observe a slow and continuous contribution to a rise in inequality: about +2% of the initial level of the interquartile ratio over the whole period ([Figure 8](#)). This can also be seen in the continuous decrease of the share of the bottom half of the distribution due to composition and an increase of the share of the top 10% (the share of the middle 40% is not impacted by the evolution of household compositions).

Figure 8: Evolution of the impact of family composition on inequality



A significant trend over the whole period is the decrease in the average size of households, mainly due to the decline in large families, the ageing of the population and the increase in single-parent families. This can have a significant impact on living conditions, as cohabitation involves economies of scale (thus justifying equivalence scales in the calculation of equivalized incomes).

On the other hand, the share of couples without children has been increasing throughout the period. This has contributed to an increase in income inequality, as couples without children are over-represented at the top of the income distribution.

In the second part of the period, single-parent families have become more common and are over-represented at the bottom of the income distribution (even in poverty). On the other hand, couples with two or more children became less common, which may have contributed to inequality in the opposite direction, as they also had a higher risk of poverty.

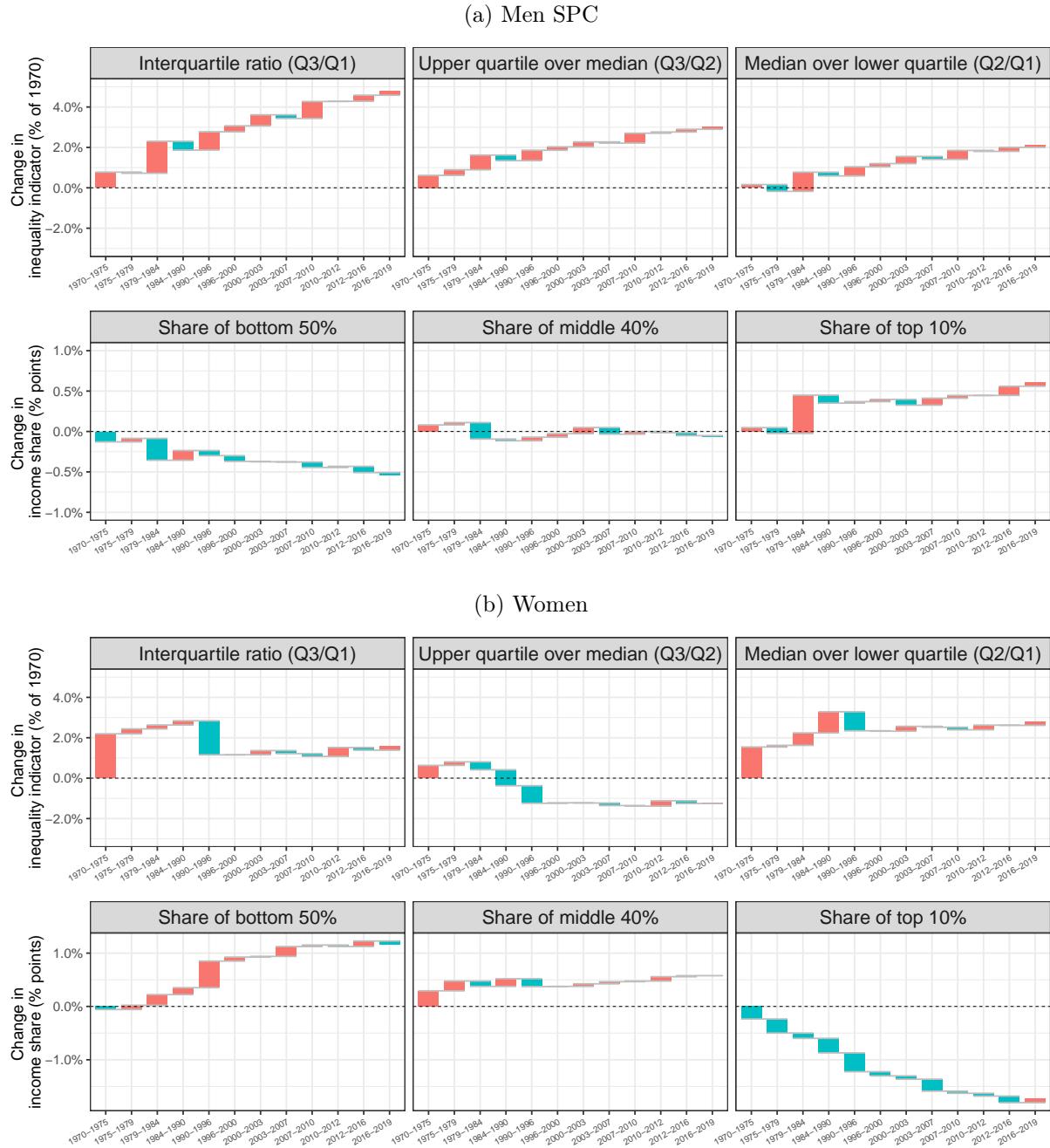
Overall, the effect of family types on the evolution of household income inequality remains moderate, partly because the changes associated with them are very slow compared to other determinants, and because there are still significant inequalities between each family type. This is thus consistent with the fact that the demographic face of low income has changed over time, with more single-parent families and fewer couples (Blasco and Picard, 2019).

Evolution of the impact of SPC on inequalities

In recent decades, many phenomena related to the labor market and occupations have been highlighted in relation to the evolution of inequality between households. In particu-

lar, there has been a significant evolution in the employment of women during this period. The part of the decomposition that measures the impact of socio-professional categories (separately for women and men) is shown in Figure 9.

Figure 9: Evolution of the impact of socio-professional categories



The effects of changes in socio-professional categories are different for men and women, notably because the changes themselves differ (Marchand, 2010). For men, the overall effect on the shares of income captured by the middle 40% and the top 10% is very small (with the exception of the 1979-1984 period), but their addition is not negligible and a small but continuous decline of the share of the bottom 50% is due to the evolution of male SPC. Moreover, the impact is more pronounced in the middle of the adjusted

income distribution (reflected in the interquartile ratios). The increase in qualifications has widened the differences within the middle classes between new entrants to the most skilled occupations and those who have remained employees or workers.

For women, the differences are more complex. The overall effect seems to be a reduction in inequality, clearly seen in the increase in the share of the bottom 50% and the decrease in the share of the top 10%. However, there are variations in the middle of the distribution, with an increase in the interquartile ratio in the early periods (1970-1990) and then relative stability after 1996.

More women contribute to the income of middle-class households, which leads to a homogenization of incomes in the upper half of the distribution during the first half of the study period. In the second half of the window, the increase in the female participation rate slowed down and its effect was dominated by the effect of the increase in the qualifications of working women.

Above all, for the period in which the rise in female participation is strongest – from 1970 to 1990 – we can observe totally opposite behavior in the various indicators. While the upper half of the distribution of equivalized income seems to be homogenizing (with a fall in the share of the top 10% and in the ratio between the third quartile and the median), the opposite is happening in the lower half of the distribution: the ratio between the median and the first quartile is rising sharply.

One explanation for this is the drop-out of single-earners. Before the rise in female participation, a single income from employment was sufficient for a couple to live well, but this is becoming less and less sufficient as the norm shifts to dual activity. This reduces inequalities between bi-active couples, but increases the difference with respect to mono-active couples.

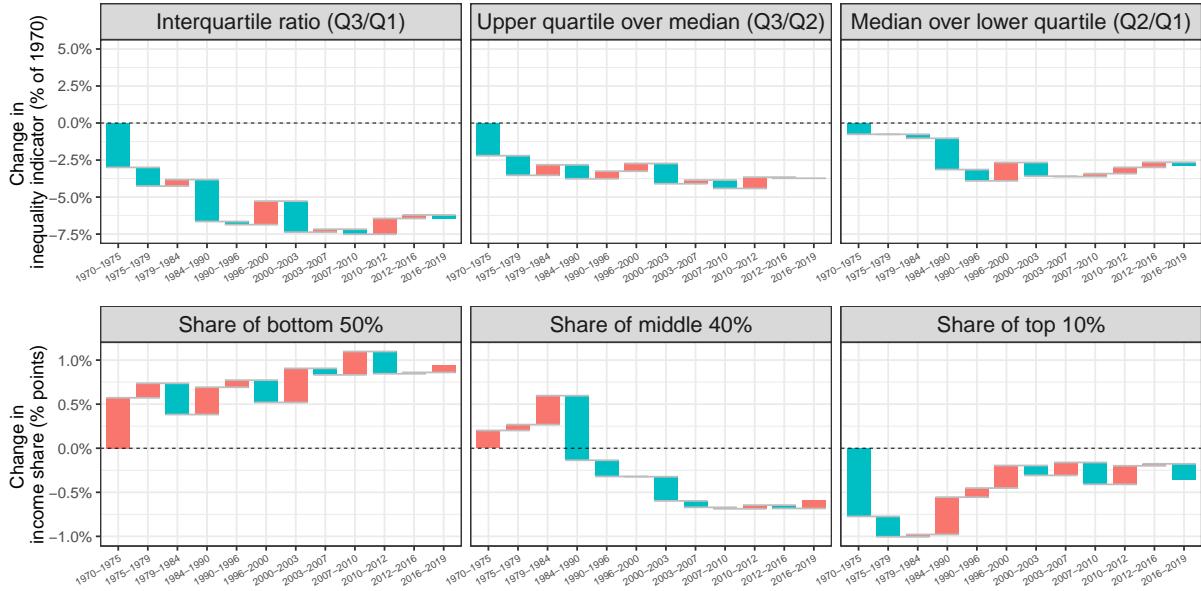
3.3 Evolution of income

In this section, we present determinant-by-determinant long-run effects on income inequality for the two main sources of household income, which are earned income (including wages, public unemployment insurance, self-employed income) and pensions. We show that incomes (conditional to household characteristics) are the main drivers of the evolution of income inequality, and that their impact has not been monotonic over time.

Evolution of the impact of earned income on inequalities

First, we analyze the impact of the evolution of earned income ([Figure 10](#)) whose total long-run effect on inequality is ambiguous, depending on the inequality indicator considered.

Figure 10: Evolution of the impact of earned income on inequality



There is a clear contribution to a decrease in inequality during the first part of the period, and a smaller contribution to an increase in inequality during the second part of the period. Looking at the share of the top 10% and the interquartile ratios, the increase in inequality brought about by labor income since the 2000s can be attributed to a steady relative decrease for the lowest incomes and a significant relative increase for the highest incomes (especially at the very end of the 1990s and just before the 2007 crisis).

Overall, earned incomes have contributed to an increase in the top 10% share of income since 1984, but an homogenization of the middle of the distribution since the share of the bottom 50% increases while the share of the middle 40% decreases. Regarding low incomes, the rise of inequality during the second period is linked to dispersion of income within the bottom half (although the share of overall bottom half increases), which is reflected in the median to bottom quartile ratio. This is confirmed when looking at the earned income gains by decile of equivalized disposable income ([Table 1](#)).

This table presents the mean per decile of the earned income modification due to earned income evolution following [eq. \(2.5\)](#), which corresponds to

$$\left[m_{j1}^Y - m_{j0}^Y + (\sigma_{j1}^Y - \sigma_{j0}^Y) \frac{Y_{i0} - m_{j0}^Y}{\sigma_{j0}^Y} \right]$$

where m_{ji}^Y is the mean earned income of households of category j in period i and σ_{ji}^Y its standard deviation. As the equivalized disposable income are normalized between the two periods, the sign of the correction does not correspond to actual changes in income but to relative change of earned income compared to overall disposable income aggregated at the population level, hence compared to aggregated other income sources.

Table 1: Earned income correction by decile

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1970-1975	219	217	-74	-227	-658	-1045	-1736	-2581	-3883	-13113
1975-1979	-206	-366	-285	-404	-620	-893	-1473	-2433	-4151	-9285
1979-1984	-160	-836	-1394	-1888	-1984	-2277	-2634	-2862	-3236	-16643
1984-1990	-167	-642	-1034	-1314	-1724	-1920	-2165	-2563	-2237	1053
1990-1996	1353	808	272	-180	-586	-1113	-1460	-2199	-3533	-15894
1996-2000	-391	-131	214	524	758	956	1229	1443	2303	7244
2000-2003	725	610	445	190	-14	-414	-899	-1381	-1880	-1973
2003-2007	-411	-583	-523	-698	-943	-1113	-1357	-1237	-1397	-392
2007-2010	-82	-230	-328	-162	-115	-122	-211	-142	-551	-4380
2010-2012	-234	-301	-407	-392	-348	-365	-388	-145	372	3564
2012-2016	329	402	519	655	748	1035	1132	1043	998	1697
2016-2019	139	243	191	355	746	802	889	766	606	-766

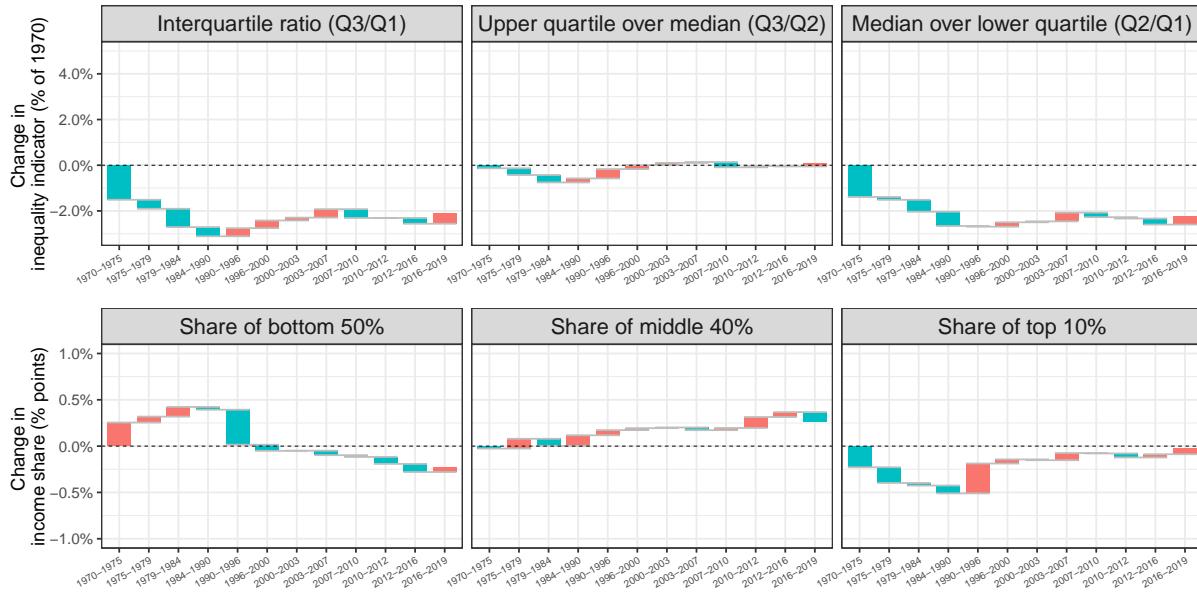
Corrections are mostly negative during periods of crisis and mostly positive during phases of growth, but these variations are heterogeneous within the population. For example, the 1984-1990 period was marked by an increase in the share of the top 10% due to earned income, a drop in the median-to-first quartile ratio, and no impact on the Gini coefficient or the third quartile-to-median ratio. Actually, this period sees a downward correction in earned income for everyone except the top tenth of the distribution, which has seen a relative increase (hence the effect on the share of the top 10%). At the bottom, the loss of earned income is more moderate than in the middle of the distribution, which explains the drop in the median to first quartile ratio. One explanation could lie in the fact that continued growth in the minimum wage has supported the lowest earners over the period.

Evolution of the impact of pensions on inequalities

Retirement pensions have a large impact on the reduction of income inequality (see [Figure 11](#)). However, one can easily distinguish two periods during which they played different roles.

From 1970 to the 1990's, pensions play a continuous and clear role in the reduction in inequality, being one of the most prominent factors. This is clearly visible at the lower part of the income distribution (strong decrease of the median to bottom quartile ratio) because households of pensioners are among the poorest households during that time.

Figure 11: Evolution of the impact of pensions on inequality



This is due to the fact that those households could not pretend to a full old-age pension, since the main public system was too recent for them to have contributed during their whole careers. During that period, more and more pensions have been paid to an ever growing part of the population, which was progressively lifted out of poverty. This thus has a significant impact on the shares of income captured by the bottom 50% (increase) and the 10% income (decrease), leveling out incomes between households. This did not have a strong impact on the top quartile to median ratio, given that these households generally did not all cross the median.

After that period, the impact of pensions income has been ambiguous. They might have contributed to an increase in income inequality, since median household equivalized income of pensioners have exceeded that of active population, and mean pensions have continued to grow until late 2000's (and have generally decreased since then, because of pension reforms and less complete careers of the following generations, see [DREES, 2022](#)). The average modifications of income by decile due to pension correction are presented in [Table 2](#).

As the pensions are determined through an inter-temporal schedule, they are not impacted by the business cycle in the short term (except for specific decision not to adjust the pensions with inflation). Hence, the global correction is the opposite way as the business cycle as it is a relative contribution to income evolution. This can be particularly seen from 2000; previously the overall increase in the amount of pensions – due to the retirement of new pensioners having had full career in time of growth – allow the pension growth to match earned income growth even in time of GDP growth.

Thanks to this increase, the inequality reduction due to pensions has been strong

Table 2: Pensions correction by decile

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1970-1975	644	673	566	475	387	358	332	346	332	218
1975-1979	457	517	310	261	234	199	172	176	131	118
1979-1984	162	172	221	179	143	139	104	144	95	166
1984-1990	502	928	655	589	448	446	386	388	332	36
1990-1996	236	266	219	269	176	167	173	54	-31	51
1996-2000	79	127	126	151	200	197	180	196	196	-31
2000-2003	-237	-179	-84	-34	2	50	58	45	64	18
2003-2007	359	141	-49	-253	-318	-402	-503	-650	-846	-1349
2007-2010	-187	-48	115	199	274	382	470	607	848	1058
2010-2012	41	90	240	329	415	471	574	782	1032	1636
2012-2016	257	632	742	699	632	493	396	337	58	-329
2016-2019	-262	-444	-520	-532	-607	-584	-628	-684	-739	-718

during the three last decades of the XXth century, specifically the median over first quartile ratio. This reflects that rising pensions have particularly supported the incomes of households in the bottom half of the equivalized income distribution. This can be seen in [Table 2](#), where, from 1970 to 2000, pension corrections were stronger for the lowest deciles, not only in relative terms but even in absolute terms.

The phenomenon was reversed between 2007 and 2012, with pensions holding up much better for the top deciles than for the bottom (the positive corrections for these years reflect the rise relative to earned income in crisis). This led to a rise in all inequality indices over the period. The 2012-2016 period presents a fall in inequality due to a drop in pensions for the better-off, before pensions contributed again to the rise in inequality over the 2016-2019 recovery period, during which the correction to the drop in pensions was very little differentiated in amount along the distribution of adjusted incomes, meaning that relative to income, the drop was less pronounced the better-off the household.

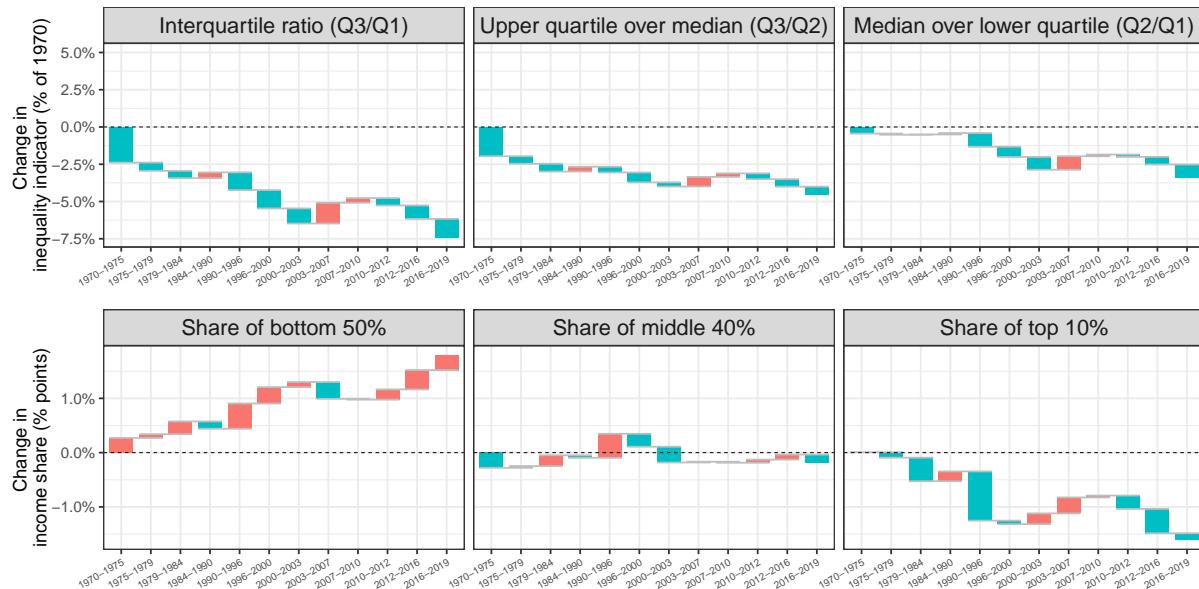
3.4 Evolution of redistribution

The last two elements of the decomposition are taxes and benefits. Since these determinants are modified conditionally on all previous determinants, measured contributions ought to be interpreted as changes in tax and benefits schedules.

Evolution of the impact of taxes on inequalities

Overall and by subperiods, the impact of taxes on the evolution of disposable income inequality is large (Figure 12) and contribute to the decrease of inequalities, with the exception of a contribution increasing inequalities between 2003 and 2010. In addition to the personal income income tax, the second direct tax is the generalized social contribution (CSG), created in 1991 and which main rate was raised from 1.1% to 7.5% in 1998 and 9.2% in 2018. It is close to a flat tax and thus has limited redistributive effect. Direct taxes also include housing taxes, of lower magnitude and which do not present a clear redistributive pattern: a regressive pattern due to the tax base (housing consumption) is partially compensated by progressive schemes added in the schedules – tax reduction depending on income, age and children in charge (Carbone, 2019).

Figure 12: Evolution of the impact of taxes on inequality



Opposite impacts of direct taxes are observed at the two side of the income distribution but not in the middle since the share of income captured by the middle 40% is not impacted. The share of the top 10% decreases due to taxes during the overall period (with the exception of an increasing share between 2000 and 2010) and the share of the bottom 50% increases (with the exception of a decreasing share between 2003 and 2010).

From 1970 to 2007, the income tax has continuously decreased in magnitude (despite a hike in the late 1990's), mainly because of reforms that removed its upper brackets (André and Guillot, 2014). Indeed, its average weight on household income was almost halved during the period. Most gains are concentrated at the top of the income distribution in absolute terms (Table 3) but do not impact much more the top of the distribution in proportion to their income.

Table 3: Taxes correction by decile

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1970-1975	15	34	65	92	83	78	74	99	208	-479
1975-1979	-26	-18	-4	39	87	147	186	93	-107	308
1979-1984	-47	-75	-124	-194	-205	-223	-279	-297	-333	-3240
1984-1990	-54	-54	-86	-143	-254	-332	-383	-431	-193	762
1990-1996	167	248	306	421	509	546	657	725	300	-7153
1996-2000	212	355	550	698	894	1116	1296	1561	2315	5663
2000-2003	85	55	5	-95	-159	-275	-428	-669	-1102	-2706
2003-2007	25	54	93	41	-25	-83	-173	-237	-347	-203
2007-2010	-133	-278	-439	-436	-356	-307	-227	-194	-97	-1386
2010-2012	43	167	270	340	357	375	430	586	865	2003
2012-2016	42	64	109	223	308	425	563	698	940	2429
2016-2019	-18	-11	-68	-85	6	56	123	106	192	-300

After the 2007 crisis, reforms of the income tax have increased its rates. This produces a rapid decrease in the inequality impact of direct taxes, that almost offsets the increase of the previous period.

Overall, direct taxes had ambiguous effect on income inequality: on one hand the income tax has been weakened, contributing to higher inequality at the top. On the other hand, housing taxes have been decreased for lower incomes, reducing inequality at the bottom.

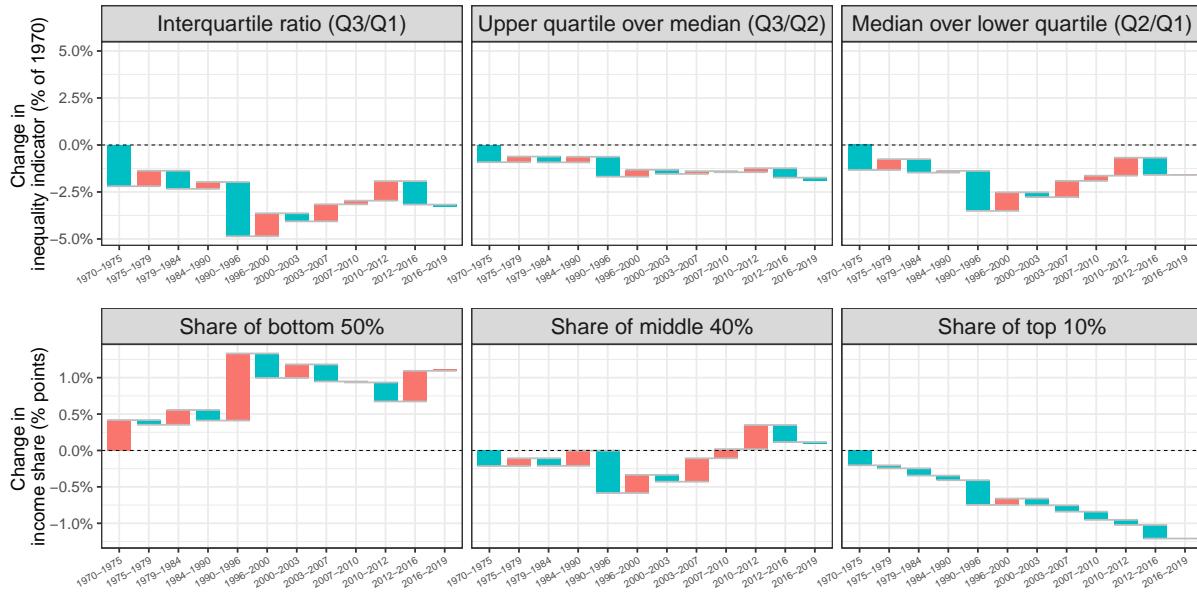
Evolution of the impact of transfers on inequalities

Transfers are an important part of household income and matter a lot in terms of inequality. They mainly consist in minimum income benefits, family allowances and housing allowances. Over the whole period, the evolution of transfers have contributed significantly to a reduction in household income inequality ([Figure 13](#)).

From 1970 to the mid 1990's, transfers have strongly contributed to a decrease in income inequality according to all indicators. This can be mainly attributed to the creation and the growth of housing allowances from 1971 onwards, and of the general minimum income benefit (RMI) in 1988; those transfers are means-tested and thus contribute to a reduction in inequality.

In the following decade (1996-2007), transfers tend to be less and less progressive

Figure 13: Evolution of the impact of transfers on inequality



as the income requirements of some family allowances are loosened. At the same time, the schedule of progressive transfers lags behind the growth of incomes, which yields an erosion of total allowances paid (IPP, 2023). This impacts particularly the bottom of the adjusted income distribution (decrease of the share of income captured by the bottom 50% between 1996 and 2012 due to the relative erosion) compared to the middle and upper middle classes (increase of the share of income captured by the middle 40% between 1996 and 2012 due to loosening of income requirements). This is highlighted by the fact that the most increasing inequality indicator is the median to first quartile ratio. This can also be seen in Table 4 presenting the distribution per decile of transfers' correction for each subperiods.

The transfers' drop between 1996-2000 (relatively to growing earning income during this expansion period) is particularly pronounced for the bottom of the distribution. Following subperiods 2000-2003 and 2003-2007 present increases in transfers for the 4th to 9th tenths of the equivalized income distribution, while transfers for the bottom deciles stagnated or even dropped. Globally, this period from 1996 to 2007 offsets between one quarter (according to the Gini) and almost half (according to Q2/Q1) of the reduction in inequality due to the evolution of transfers in the previous period.

From 2007 onwards, transfers start to contribute more to a reduction in inequality. Indeed, some transfers are increased as a response to the economic crisis (so that lower incomes are better supported), and family allowances becomes means-tested (which benefits less to high incomes). However, most changes in the distribution of transfers after the 2008 economic crisis are not due to changes in the benefit schedule, but rather to the automatic income stabilization allowed by transfers. Indeed, as of 2010, while transfers

Table 4: Transfers correction by decile

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
1970-1975	289	379	498	413	314	249	167	97	50	-17
1975-1979	141	26	-61	-24	-4	47	107	109	70	-57
1979-1984	118	135	140	155	104	59	38	15	14	16
1984-1990	175	190	260	280	221	153	149	134	126	70
1990-1996	1556	1171	1033	1031	836	674	538	369	256	292
1996-2000	-151	-275	-259	-196	-162	-116	-83	-52	-32	-37
2000-2003	-21	-68	-26	45	114	209	226	241	160	-17
2003-2007	3	-58	30	127	199	249	288	227	191	18
2007-2010	339	293	279	237	200	188	158	145	126	102
2010-2012	129	101	114	89	66	54	35	14	-14	-8
2012-2016	511	410	384	334	255	210	124	47	-29	-59
2016-2019	30	-6	39	50	39	42	8	7	-10	-14

were distributed as progressively than in 1990, the benefit scheduled was actually less progressive than in 1990: the gap is explained by the fact that pre-tax incomes were more unequal in 2010 than in 1990 ([Eidelman, Langumier, and Vicard, 2012](#); [Blasco and Picard, 2019](#)).

4 Conclusion

This paper analyzed the evolution of income inequality in France between 1970 and 2019 in sub-periods according to economic cycles. We measured the respective contributions of changes in household structure, occupations, wages, pensions, taxes and transfers to the evolution of income inequality using a semi-parametric decomposition approach.

The results show a strong contribution of labor income and the pension system to the decline in inequality at the beginning of the period, before a neutralization and even a reversal of the effect (albeit minor for pensions) at the end of the period. The strong increase in female employment did not lead to a decrease in household income inequality, and in some subperiods it even increased, probably because of homogamy. The evolution of family compositions, in particular the rise of single-parent families, has contributed slowly but steadily to an increase in income inequality. Finally, taxes reduce inequality over the period, and social benefits had a strong inequality-reducing effect from 1970 to 1996, which was partially withdrawn afterwards.

There are several elements that deserve further study, in order to understand the effects

of public policies in more detail. In particular, changes in labor income are considered here as a single determinant, whereas they depend on multiple phenomena, including policies affecting wage negotiations in firms and minimum wage policies. This would merit a specific analysis measuring the effect of wages close to the minimum wage, which our method allows because we model the whole distribution of counterfactual incomes.

Another extension would be to analyze the question of working hours, and particularly part-time work, which is more frequent among women, but potentially with a differential effect according to social category, and thus a possible impact on inequalities in household income.

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Chapter 3

Measuring extreme poverty in developed countries: a cumulative indicator of income and material deprivation

Abstract

In developed countries, income-based measures of poverty identify large shares of the population (17.1% of the EU at the 60% threshold in 2018). Defined as such, the ‘poor’ are very diverse in terms of the severity of their situations. In this work, we propose an indicator that targets those of the income-poor that experience harsher living conditions. We show that it is not possible to achieve a significant targeting of extreme poverty using income data only: at the lowest levels of income, it ceases to be correlated with other indicators of economic distress. The insufficiency of income to identify extreme poverty still holds when imputed rents of owners or remunerations in kind are taken into account. Adding material deprivations, however, allows to take into account non-income components of a household’s standard of living, such as wealth, health or occupational status. Using European data on households income and living conditions, we show that households who combine low income and a high number of material and social deprivations suffer from a more severe situation of poverty, in terms of subjective well-being and other measures of economic distress, and stay longer in poverty.

Keywords: Poverty; Income; Material deprivation; EU-SILC.

1 Introduction

In developed countries, income-based measures of poverty identify large proportions of the population: in 2018, 17.1% of people in the European Union live below the poverty line at 60% of the national median income in 2018. This is more than one in six Europeans, or around 80 million people. Defined as such, the "poor" experience a significantly disadvantaged situation compared to the rest of the population (in terms of employment, education, health, deprivation). However, they are also very diverse in terms of income, wealth, living conditions, life satisfaction or life trajectories.

Given this heterogeneity, it may not be efficient to combat poverty the same way for all these individuals. In particular, it might be relevant to try and identify those that suffer from the most difficult situations, in order to enact specific actions.

In this paper, we tackle the following question: *can we find a statistical indicator that identifies the poorest among the poor?* The difficulty residing here in finding a relevant way to define “poorest”.

We first present some advances in the measurement of poverty, and of what is known on the relative heterogeneity of the people identified by usual measures of poverty. We also review some arguments in favor of the measurement of extreme poverty, and some attempts to define it.

After presenting the data and core indicators used in this paper, we present our preliminary findings: income or material deprivations alone are not sufficient to identify extreme poverty in developed countries. We show that this is mainly due to the fact that, below a certain threshold, there is no significant correlation between income and deprivations. After a more in-depth analysis based on French data, we show that this pattern holds for most of the EU.

We then present our main contribution: a cumulative indicator of extreme poverty that combines income and material and social deprivation. We show that it defines a sub-population of poverty that 1) suffers more hardship according to living conditions, employment status and subjective life satisfaction, and 2) remains in poverty longer. We demonstrate how this affects the European cross-country perspective on poverty.

Finally, we offer two elements for discussion. First, we consider the implications of the choice of thresholds in measures that include income and/or material deprivations. Second, we examine the mismatch between income and deprivations, and propose two extensions to the definition of income, in an effort to strengthen the link between income and material and social deprivations. We show that including additional components in order to fill in missing parts of the equivalized income is not sufficient to correct the mismatch between income and material poverty, and discuss the implications for poverty indicators.

2 Literature

The measurement of poverty has undergone major developments in recent decades. While indicators based on household income have long been the dominant statistical measure of poverty, there has been increasing efforts to implement other poverty indicators. One example is the measure of material and social deprivations, another measure of poverty based on household surveys collected annually in the European Union ([Nolan and Whelan, 1996](#); [Anne-Catherine Guio, 2009](#); [Guio et al., 2016](#)). In such measures, households are asked whether they can afford some goods and services, or whether they suffer financial deprivations.

Whether based on income or living conditions, most measures can be seen as an application of Peter Townsend's influential definition of poverty in developed countries, established in his 1979 book "Poverty in the United Kingdom" ([Townsend, 1979](#)):

Individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or are at least widely encouraged or approved, in the societies to which they belong. Their resources are so seriously below those commanded by the average individual or family that they are, in effect, excluded from ordinary living patterns, customs and activities.

In light of this definition, measures of material and social deprivation differ from income poverty in that they directly measure deprivations of what can be considered characteristic of a "customary" equivalized income, whereas measures of income identify a lack of resources that is believed to cause these deprivations. In this respect, income poverty is sometimes referred to as an "indirect" measure of poverty, whereas measures of material deprivation are called "direct" ([Ringen, 1988](#)). Income measures can therefore be problematic if low incomes are not effectively associated with a lack of what can be considered customary goods and services, especially if there are problems in the measure of income (which can be the case for such specific populations). On the other hand, measures of material and social deprivations can miss their target if the observed lacks (or non-consumption) of such goods and services are not caused by low resources.

The populations identified by each of these indicators can be very heterogeneous in terms of employment, wealth, economic difficulties, or income ([Fusco, Guio, and Marlier, 2010](#); [European Commission. Statistical Office of the European Union., 2018](#)). While the flaws of these indicators are often seen as necessary evils for the purpose of tracking changes in poverty over time and across countries, they can become problematic if one wants to focus on the very poor, i.e. the most vulnerable fraction of the poor. Considering these indicators separately, it may not be enough to tweak income or deprivation thresh-

olds to identify the most extreme situations in terms of economic difficulties, exclusion from society or persistence of poverty.

In this work, we show that it is not possible to identify a subpopulation of standard income poverty that experiences harsher and more persistent difficulties using only a lower income poverty line. We also show that the link between income and material and social deprivations is very strong in the middle of the income distribution, but weakens at the bottom. We investigate the mismatch between low incomes and high deprivations, and argue that material and social deprivations alone cannot be used to define extreme poverty, as such an indicator would capture households with quite significant income, in particular some households close to the median.

We thus draw on the existing literature on multidimensional poverty indicators (notably [Nolan and Whelan \(1996\)](#) and [Whelan, Nolan, and Maître \(2014\)](#)) to propose an indicator of extreme poverty for developed countries, based on income and material deprivations taken together. This indicator identifies a subgroup of standard income poverty that meets two criteria. First, the identified population suffers from more intense economic difficulties than other people identified as poor (as measured by employment status, material deprivation, and subjective well-being). Second, this population remains significantly longer in poverty than other people identified as poor.

With an application on European data, we demonstrate that this indicator can be used as a tool to identify the profiles of the most vulnerable part of the poor population in developed countries, while allowing for time and cross-country comparisons.

2.1 Poverty: a large and heterogeneous part of population

In developed countries, the most commonly used statistical measure of poverty is the share of individuals whose household income is below a defined threshold, called the poverty line. In the European Union, one generally defines the poverty threshold at 60 percent of the median equivalized disposable income of the country. In the United States, the Census Bureau uses a monetary threshold based on the valuation of a basket of goods, which depends on family composition and is updated annually to account for inflation ([Semega et al., 2020](#)).

In both cases, income is defined at the household level, after application of an equivalence scale that allows for comparisons of households with different compositions. These measures simply provide two different responses to [Townsend \(1979\)](#)'s definition of what constitutes "customary" living standards.

These income poverty indicators identify significant portions of the population as being in poverty, even in the richest countries. In the European Union in 2019, 16.5% of the population is considered to be in income poverty [Eurostat \(2022\)](#). This figure exceeds 20% for seven countries (Romania, Latvia, Bulgaria, Estonia, Spain, Lithuania and Italy) and

is above 10% for all countries, with the lowest rates below 13% for six countries (Czech Republic, Finland, Slovakia, Slovenia, Hungary and Denmark).

The income poor have significantly different characteristics than the rest of the population, that characterize their relative exclusion from the customary way of life: they are much more often unemployed, less educated, less healthy ([Eurostat, 2022](#)), and more often report material and social deprivations ([Blasco and Gleizes, 2019](#)) and low subjective well-being ([Clark, D'Ambrosio, and Ghislandi, 2016](#)).

While they experience more economic difficulties than the rest of the population, the poor defined by these indicators remain very heterogeneous in terms of their income and wealth ([Kyzyma, 2020](#); [Azpitarte, 2012](#)), their living conditions ([European Commission. Statistical Office of the European Union., 2018](#)) but also in terms of their situation on the labor market ([Eurostat, 2022](#)) or life satisfaction ([Diener et al., 1993](#)).

Moreover, the poor also have very diverse life trajectories: in particular, a large share of the population in income poverty one specific year moves durably out of poverty from the following year, while others remain durably in poverty ([Hill, 1981](#); [Muffels, Fouarge, and Dekker, 2000](#); [Cappellari and Jenkins, 2002](#)). In France, while 20 percent of the poor one year move out of poverty for at least the next three years, 40 percent of the poor remain durably below the poverty threshold during this period ([Albouy and Delmas, 2020](#)).

2.2 Motivation for an indicator of extreme poverty

Given that the poor as defined by the usual indicators can represent a large share of the population and are very heterogeneous, one can ask whether it is possible to define an indicator that focuses on the very poor, i.e. the most vulnerable fraction of the poor population.

According to the definition of [Townsend \(1979\)](#), poverty is a situation in which insufficient resources cause exclusion from the standard way of life of the population. We can therefore assume that extreme poverty should meet such a definition, but would also have a more intense, more extreme or more urgent character that remains to be defined.

The measurement and treatment of extreme poverty are recurrent demands in the public debate, reflected in the objectives of various national and international institutions: the first of the United Nations' Sustainable Development Goals is the eradication of extreme poverty ([United Nations Department for Economic and Social Affairs, 2021](#)), and the French National Council for Statistical Information identifies the measurement of extreme poverty as a necessity (recommendation no. 6 of the Demographics and Social Issues Committee of the medium-term recommendations, [CNIS \(2019\)](#)). It thus seems necessary to complement the current indicators for measuring poverty with indicators focused on the most vulnerable and most exposed part of poverty.

However, while several measures of poverty have been proposed, definitions of extreme poverty remain quite simple, are generally not based on theory and do not win consensus. In France the 2019 report of the Economic, Social and Environmental Council (CESE) considers as living in “extreme poverty” anyone living on less than half the median equivalized income of the population, or 885 euros per month in 2018 ([CESE, 2019](#)). [Lecerf \(2016\)](#) considers that “severe poverty” can be measured using a threshold at 40% of the population’s equivalized income, although “extreme poverty” would occur when people cannot meet their most basic needs, and cannot be measured relatively. The World Bank establishes an international threshold of “extreme poverty” at \$2.15 per person per day, or just under 60 euros per person per month [World Bank \(2022\)](#).

The definition of the World Bank, whose main function is to monitor the evolution of extreme poverty in developing countries, is not relevant for Europe and the majority of developed countries, where almost the entire population has an income of more than 60 euros per month. The definitions of [CESE \(2019\)](#) and [Lecerf \(2016\)](#), if simple, have no particular theoretical or empirical justification other than being a tweak of the commonly used income poverty line. One can try and define an indicator of extreme poverty that has better properties, starting by determining the criteria it should meet.

A definition of extreme poverty was first proposed in a landmark report to the French Economic and Social Council by [Wresinski \(1987\)](#). It was subsequently taken up by the United Nations in a more recent report ([United Nations Human Rights, 2012](#)):

The combination of income poverty, human development poverty and social exclusion, when a prolonged lack of basic security simultaneously affects several aspects of people’s lives, seriously compromising their chances of exercising or regaining their rights in the foreseeable future.

This definition highlights two properties that can define extreme poverty: a situation of great hardship that can be assessed on several dimensions, and one that is persistent over time. The relevance of the indicator in identifying real situations of hardship will therefore be judged by its association with multiple dimensions of poverty (distance from employment, material deprivation, subjective feeling of poverty, etc.).

The other desirable property of the indicator is its persistence over time. As the life trajectories of people in poverty are quite heterogeneous, the aim is to identify people who remain in situations of poverty, and are thus in more severe hardship than those who manage to escape. This dimension falls in line with the vision of [Sen \(1999\)](#), who defines poverty not only as a lack of material resources, but also as a deprivation of the “capabilities” of the population, i.e. the material and non-material resources necessary to act and improve one’s situation.

Finally, unsurprisingly, extreme poverty is conceived as something exceptionally serious, and therefore particularly rare. It is expected that the population in extreme poverty

will be significantly less numerous than that in poverty, ideally a sub-part of it.

The aim is thus to define an indicator of extreme poverty that would identify a subgroup of standard poverty, suffering multiple social and economic difficulties together, and characterized by a certain persistence of the situation.

2.3 The measure of material and social deprivations

Material and social deprivation is a non-monetary measure of poverty based on household surveys ([Nolan and Whelan, 1996](#); [Anne-Catherine Guio, 2009](#); [Guio et al., 2016](#)). Respondents are asked whether they can afford certain goods and services, or whether they suffer from specific economic difficulties.

These difficulties are related to housing (not being able to maintain adequate temperature, to change out-of-use furniture), to their financial situation (having payment arrears, not being able to meet an unexpected expense), to clothing and food (not being able to replace worn-out clothes with new ones), or to social life and leisure.

This type of indicator has theoretical foundations in common with income poverty, since it defines poverty as a situation of relative deprivation: the basket of goods and services does not correspond to a minimum of survival, but is chosen in such a way as to represent a common equivalized income, i.e. “the goods and services necessary to lead a decent life”. The existence of a norm in the population is therefore necessary to define the list of items. In the case of material and social deprivation, the basket of goods and services is defined at the EU level.

Material deprivation, however, differs from income poverty in the object that is measured: while income poverty aims to measure the resources needed to avoid the deprivation of goods and services customary of a decent life, material deprivation directly measures whether the household has access to these items or whether its resources prevent it from doing so. In this respect, material deprivation is deemed a “direct” measure of poverty, while income poverty is an “indirect” measure ([Ringen, 1988](#)). Moreover, the measurement of material deprivation by survey is not affected by the methodological difficulties of measuring income.

It is known that material deprivation and income poverty do not necessarily identify the same populations ([Nolan and Whelan, 1996](#); [Anne-Catherine Guio, 2009](#); [Godefroy and Ponthieux, 2011](#); [Bertrand Maître, Brian Nolan, and Christopher T. Whelan, 2014](#); [Hick, 2013](#)). In particular, a significant share of those experiencing material and social deprivation are not among the lowest income earners, especially among retirees or those in poor health. Conversely, a significant proportion of people living below the income poverty line are not among those experiencing the most deprivations, particularly among the young and self-employed. This can arise from the fact that measured income is not a sufficient description of the household’s financial resources, whether because of supplemen-

tary resources (in-kind benefits, auto-consumption, wealth, inter-households transfers) or because of additional difficulties. It may also come from the fact that individuals with similar resources do not experience similar deprivations because of different needs, preferences, or self-assessed perception of one's situation.

The indicator combining income poverty at the 60% threshold and material deprivation is called consistent poverty in some works ([Nolan and Whelan, 1996](#); [Whelan, Nolan, and Maître, 2014](#)). This type of indicator is also referred to as “cumulative poverty” in some francophone work ([Godefroy and Ponthieux, 2011](#)). It is known that people identified by these cumulative indicators are associated with greater social and economic vulnerabilities than people who suffer from income poverty alone. In this paper, we use an updated version of this “consistent poverty”, by including items of social deprivations that were not present in previous versions. But more importantly, we build a “severe” version of this indicator by tightening the income and deprivation thresholds, and argue that it is to date the most adequate answer to the problem of measuring extreme poverty in developed countries.

3 Data and method

3.1 The Statistics on Income and Living Conditions survey

The European Union Statistics on Income and Living Conditions (EU-SILC) is a set of harmonized national household surveys conducted by the members of the European Union and their partners. They cover topics such as income, poverty, social exclusion and living conditions. They have been conducted annually since 2004 and form the basis for official statistics on income and living conditions at the EU level. These surveys include detailed information on income (before and after taxes) and multiple non-monetary variables, such as education, employment status, occupation, health, material deprivations, subjective well-being, etc. They have a panel dimension: all respondents are interviewed four years in a row. The French survey that we use for most of this work also includes additional variables that are not part of the harmonized European questionnaire.

These surveys cover information at the household level, as well as information at the individual level for respondents aged 16 years or older. The sample size is large: most national surveys include between 10,000 and more than 50,000 individual-level observations. In this study, we primarily use the 2019 survey, one of the most recent available for all EU countries, for both cross-sectional and longitudinal analysis¹. To increase the sample size, longitudinal analyses are conducted using three stacked panels: 2014-2017, 2015-2018, and 2016-2019. When we study four-year trajectories, we therefore present

¹At the time of this study, the 2020 wave is available but might not be suitable for our work, as households experienced unprecedented shocks on their income and living conditions.

average results over these three periods.

The EU-SILC household surveys cover all national territories, but are limited to people living in permanent, independent private households. They therefore exclude people living in institutions such as old people's homes, university dormitories, prisons, and so on. They also exclude homeless people and people living in mobile homes. In general, the population covered by these surveys represents more than 98 percent of the total population (see [Section A](#)). In France, the remaining portion consists mainly of people living in retirement homes and students living in collective housing, while the homeless represent about 0.3 percent of the population.

To measure the different dimensions of poverty and the characteristics of vulnerable populations, we can therefore mobilize numerous themes covered by the SILC surveys, whether it be demographic data (age, gender, education, nationality, family situation), data on employment and occupation, income (including taxes and benefits, inter-household transfers, self-consumption), financial situation (including savings, indebtedness, financial comfort), living conditions (housing, material and social deprivations), health, subjective well-being.

In EU-SILC, the reference period for income data is not the same as for the other variables of the survey. Indeed, income data refers to the calendar year before the survey was taken, while most other variables refer to the moment the survey is taken. Depending on when the survey was taken, this creates a lag of 1 to 11 months between the end of the income reference period and that of the other variables. This is a feature that is specific to SILC surveys, but it does not represent a major challenge. Indeed, the definition of the right time frame for income data is a problem for every possible definition of current income, and it is not obvious that the total income aggregated on the current calendar year –including income not yet received at the date of the survey– is a better determinant of living conditions. Using the panel component of this data, we checked and confirmed that income of calendar year N is actually not significantly better correlated with living conditions than income perceived at calendar year N-1.

The EU-SILC survey is a panel in which each respondent is interviewed for at least 4 consecutive years². This is useful because it allows for greater depth in the assessment of a household's situation and because it can be used for analysis of short-term life trajectories. However, selective attrition can bias panel analyses: the proportion of individuals missing at least one of the four consecutive waves is between 10% and 50% for most countries, and these are not randomly distributed (e.g. younger individuals are more likely to drop out). While this is a situation that needs to be taken into account, especially for countries with high dropout rates, it is not a major concern for the present work for two reasons. First, we use longitudinal weights provided by the EU-SILC producers, which account for most

²4 years is the minimum mandatory panel duration, but some Member States (such as France until 2019) enforce longer panel durations.

of the attrition bias ([Van Kerm et al., 2017](#)). Second, when using the panel dimension (e.g. to compare the duration of poverty between two groups), we never compare estimates based on the subsample of consecutive respondents with estimates based on the full cross-sectional sample.

We use mainly French data for most of the demonstration, as it would be tedious to describe the characteristics of poverty in every country. On the other hand, it would be difficult to make sense of an aggregation of all European households into the same population, as the income poverty thresholds and the standards of living are different in each country. Therefore, both for the preliminary results and for the main results, we conduct the main analysis using French data then provide a broader perspective using European data.

3.2 Measuring income and material deprivations

The income poverty line is defined relatively, generally at 60% of the median equivalized income of the population. Equivalized income is defined here as the household's disposable income in relation to an equivalence scale based on the number and age of the household members: the first adult weighs 1 unit, each subsequent adult (person aged 14 or over) weights 0.5, and each child under 14 weights 0.3. Disposable income includes all income from labor or capital, plus social benefits, minus taxes. A more restrictive version of the poverty line can also be defined, at 50% of the median equivalized of the population. As an example, this brings the poverty threshold in France at approximately 1100€ per month in 2019, with 9 million people living under it, or 14.6% of the population ([Yann Guidevay and Jorick Guillaneuf, 2021](#)).

The other poverty indicator used in this study is material and social deprivation: it is based on a list of deprivations defined at the European level and collected in all SILC surveys ([Guio et al., 2016](#)). The list of deprivations is as follows (and the proportion of the population affected in France in 2018):

- Not being able to face an unexpected expense in the range of the monthly poverty line (31%)
- Not being able to afford a week's vacation away from home (22%)
- Not being able to afford to replace worn-out furniture (22%)
- Not being able to spend a small amount of money on oneself without consulting anyone else (13%)
- Not being able to afford a regular leisure activity (15%)
- Having unpaid loan payments, rent or utility bills (9.2%)
- Not being able afford to buy new clothes (9.0%)
- Not being able to afford a meal with meat, fish or vegetarian equivalent at least every other day (6.8%)

- Not being able to afford two pairs of good shoes (5.4%)
- Not being able to afford to keep one's home at the right temperature (4.9%)
- Not being able to afford to meet up with friends or family at least once a month for a drink or meal (8.1%)
- Not being able to afford a personal car (3.2%)
- Not being able to afford an access to the Internet (1.7%)

A person is in material and social deprivation if they suffer at least 5 deprivations from the list of 13. A more restrictive version, called severe material and social deprivation, is when a person experiences at least 7 out of 13 deprivations. Importantly, the lack of some goods and services is considered a deprivation only if this is an *enforced* lack, that is to say that the individual does not access a good or service for financial reasons, and not because they do not need or want it. More precisely, the question that defines the deprivation “furniture” is as follows³:

Does your household replace any worn out furniture?

and proposed answers are (one answer only):

1. We do this
2. We would like to do this but cannot afford this at the moment
3. We do not want/need this at the moment

Other deprivations are measured via a card, where the respondent selects everything that they can “afford”:

Looking at this card, can I just check whether your household could afford the following?

and listed items are (select all that apply)

- To have a week's annual holiday away from home
- To eat meat, chicken or fish (or vegetarian equivalent) every second day
- To pay an unexpected, but necessary, expense of £800⁴
- To keep your home adequately warm

This measure has the advantage of being based on direct observation of living conditions. On the other hand, it does not impose any constraint on income, so that one can be in a situation of material and social deprivation (including severe deprivation) while having a disposable income around the median of the population (see *infra*).

³These questions are those of the British questionnaire. Exact wordings of other questionnaires may differ due to translations.

⁴This amount varies for every country, so that it roughly equals the monthly poverty line.

Moreover, this measure is subjective in its assessment of certain deprivations (e.g. “face” an unexpected expense, “afford” an item) or in determining whether the deprivation is present for financial reasons or not. This poverty indicator may therefore be sensitive to heterogeneity in response behavior across individuals, or even to changes in response behavior over time (e.g. due to preference adjustment, see [Pan Ké Shon, 2015](#)).

4 Preliminary results: unidimensional measures

4.1 The intersection of low income and high deprivations

In EU countries, the rates of income poverty at 60 percent and of ordinary material and social deprivation (5 out of 13 deprivations) are of the same order of magnitude, with an average of 16.5 percent for the former and 12.3 percent for the latter in 2019 ([Figure 1](#)). However, the variations between countries are much greater for material and social deprivation, with rates ranging from 4 percent in Luxembourg to 38 percent in Romania, while income poverty ranges from 10 percent in the Czech Republic to 24 percent in Romania. The observation is similar when comparing income poverty at 50% and severe material and social deprivation (7 out of 13 deprivations).

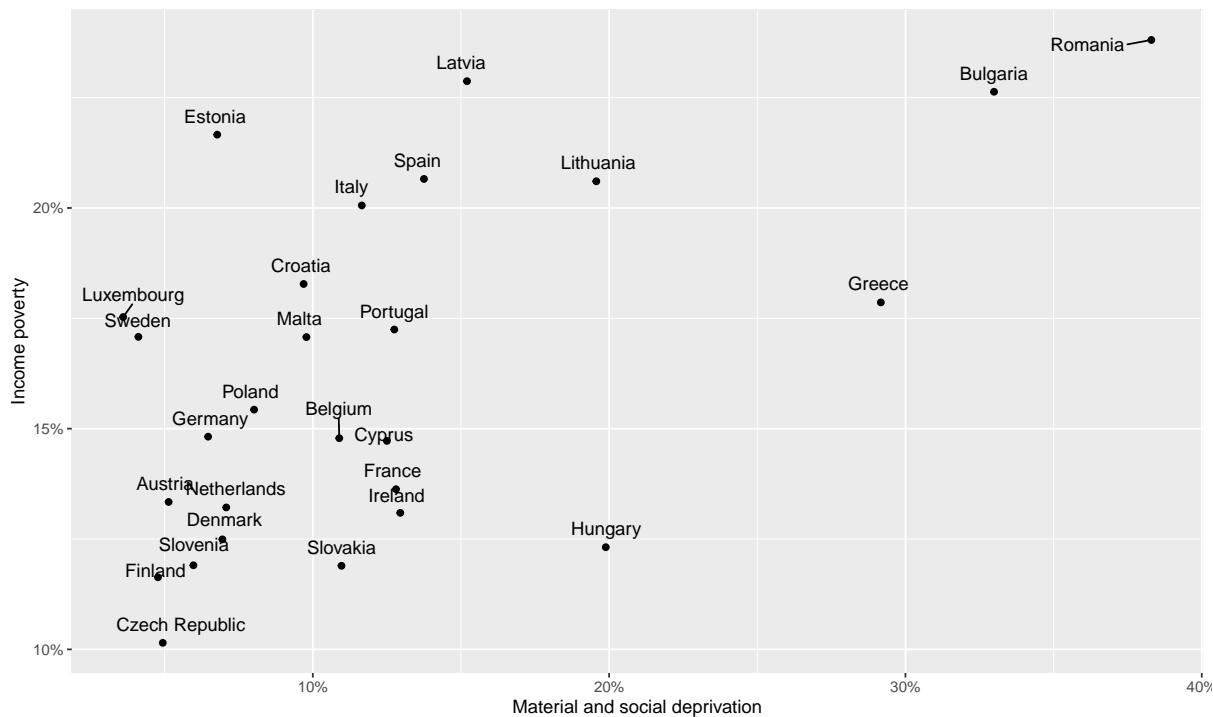


Figure 1: Income poverty and material and social deprivation rates in the EU

In this subsection, we use France as an example in 2018, with a 60 percent income poverty rate of 13.6 percent and a 50 percent income poverty rate of 6.8 percent ([Table 1](#)). These rates place France among the 10 countries with the lowest income poverty rates in the European Union. Its rate of ordinary material and social deprivation is 12.8 percent,

and that of severe material and social deprivation is 7.0 percent. These proportions place France in a median position in the European Union.

Number of deprivations	Income bracket (proportion of median)			Total
	< 50%	50–60%	> 60%	
≥ 7	1.9	1.4	3.6	7.0
5 or 6	1.2	1.1	3.5	5.8
< 5	3.6	4.4	79.2	87.2
Total	6.8	6.9	86.4	100.0

Table 1: Share of the population by poverty group (in %, France 2019)

The people affected by these two types of poverty are far from completely overlapping: 1.9 percent of the population is in a situation of severe material and social deprivation and income poverty at the 50 percent threshold.

People with low incomes thus have variable living conditions: between a quarter and a third of those living below the 50% poverty line are in a situation of severe material and social deprivation, and therefore in extreme poverty. Half of them suffer strictly less than 5 material and social deprivations.

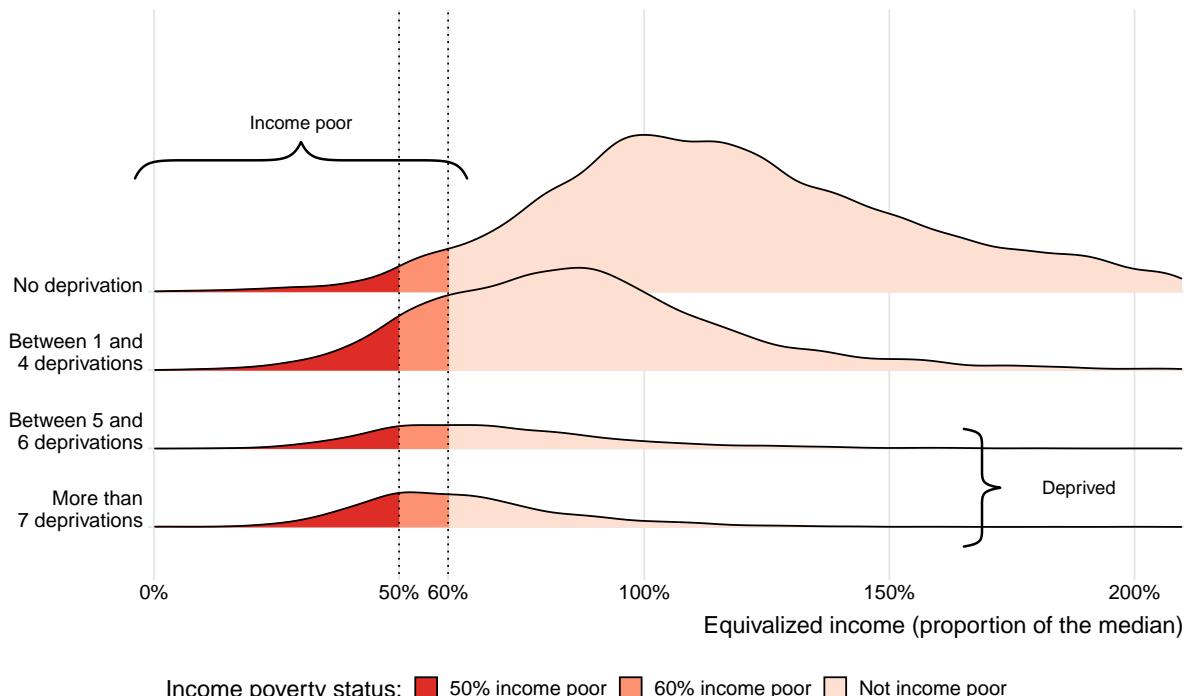


Figure 2: Income distributions by deprivation level

Similarly, people experiencing material deprivation do not necessarily have an equivalized income below the poverty lines (Figure 2): between one-third and one-quarter of

people in severe deprivation live below the 50% poverty line.

There is thus a significant mismatch between these two types of poverty measures: the income distribution of people in material and social deprivation (ordinary or severe) extends all the way to the median. Similarly, the income distribution of people who experience no deprivation or between 1 and 4 deprivations, i.e. the majority of the population, extends below the income poverty lines.

4.2 Targeting extreme poverty cannot be done with income alone

In this section, we show that it is not possible to approach extreme poverty by varying the income threshold alone in order to make a restrictive version of income poverty.

First, we show that the link between income and material and social deprivation is strong, except for the highest and lowest parts of the income distribution. In particular, deprivation ceases to be correlated with income below a certain threshold. We then show that the population targeted by a very severe income poverty indicator (40%) does not have the properties of extreme poverty as discussed above.

The three regimes of deprivation, and the “glass floor” of income poverty

Although material and social deprivation can have multiple causes, their main determinants are monetary resources, particularly income. All else equal, the higher the income, the lower the deprivation score. In France in 2018, the average number of material and social deprivations experienced by people in income poverty is 4.2, compared to 1.5 for the general population.

To go more in detail on the link between income and material deprivation, we reproduce here an approach initiated by [Townsend \(1979\)](#), who used the link between material deprivation and income to define a monetary poverty line:

Households are ranked according to income. [...] In descending the income scale, it is hypothesized that, at a particular point for different types of family, a significantly large number of families reduce more than proportionately their participation in the community’s style of living. They drop out or are excluded. These income points can be identified as a poverty line.

Here, Townsend was looking for a “kink” in the deprivation-income curve, i.e. a level of income below which the risk of deprivation increases much more significantly as income decreases ([Figure 3](#)).

In general, for a large part of the population, there is a strong relationship between the number of material and social deprivations experienced and the equivalized income

(Figure 3). More specifically, there is a log-linear relationship between income and the deprivation score in a certain income domain: for the population between half and 130 percent of the median income, a 20 percent drop in the standard of living generates on average an additional material and social deprivation.

However, this link is not so linear across the distribution: above 130% of the median, there is no longer any link between income and the number of deprivations, which remains very close to zero. Below 60% of the median income, the number of material and social deprivations suffered is very heterogeneously distributed, and below 50% of the median, it is no longer correlated with income.

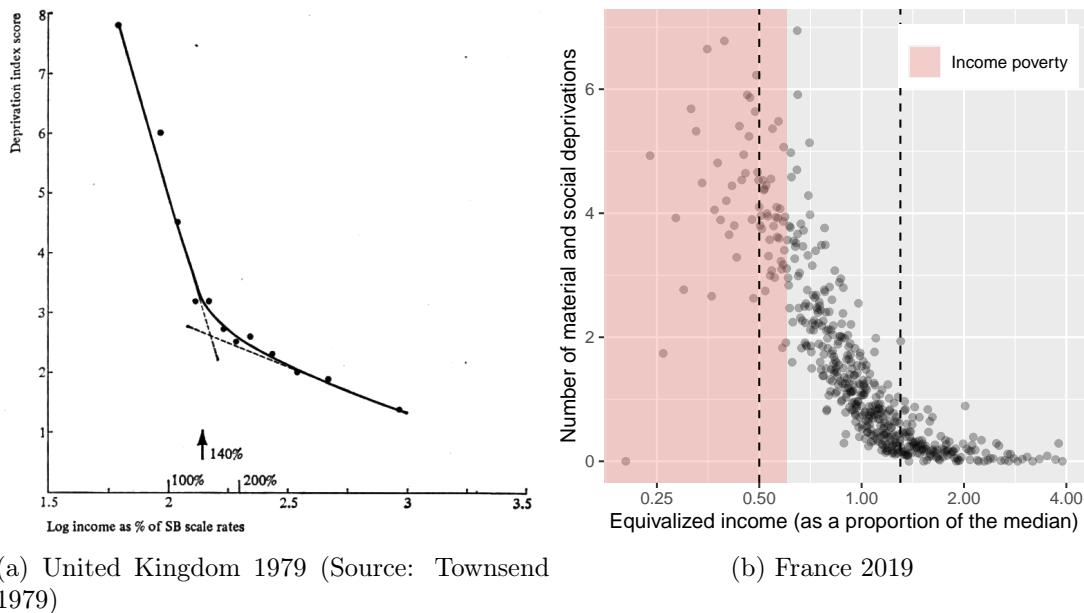


Figure 3: Number of material and social deprivations by log of income

A similar picture emerges for all European countries: in every country, income is strongly negatively correlated with material and social deprivation. There is a log-linear relationship between income and the deprivation score in some income domains: depending on the country, a one-point decrease in the average deprivation score requires an increase in equivalized income of between 50 percent and over 200 percent. At both ends of the income distribution, however, the number of material deprivations is no longer correlated with income. Above a certain income threshold, material deprivation is very rare and is not associated with income. On the other hand, below a certain threshold, material and social deprivations are very high on average, but are not correlated with income and have a high variance.

The analysis of the relationship between income and material deprivation thus no longer reveals two regimes as in (Townsend, 1979), but three regimes of relationship between income and material deprivation:

1. Low income: a high average number of deprivations, with high variance and no

correlation with income.

2. Middle income: Decreasing log-linear relationship between deprivation and income.
3. High income: an average number of deprivations close to zero, with low variance and no correlation with income.

We perform a piecewise linear regression using the MARS (multivariate adaptive spline, see [Friedman, 1991](#)) algorithm to identify these patterns for each of the 28 EU countries. This allows us to compute the associated cut points as well as the correlation coefficient in the middle income area. The cutpoints and regression coefficients are determined by the algorithm to minimize the sum of squares of the residuals, under the constraint of having no more than three different slopes. The results are presented in [Figure 4](#) for each of the 28 countries.

The algorithm clearly shows three regimes of relationship between income and the number of material and social deprivations. Interestingly enough, the intermediate regime of deprivation, the one where the mean number of deprivations rises continuously with income, extends well beyond the median of income for most countries. On the other hand, the thresholds determined by the algorithm for the lower bound (the first regime) are mainly between 0.20 and 0.45 times the median.

When selecting the population whose equivalized income is below 50% of the median for each country, there is a significant negative correlation between income and the number of material and social deprivations for only 9 out of 28 countries ([Figure 5](#)). For the other countries, the correlation is not significant.

The existence of such a low-income domain where the average deprivation score does not depend on income implies that it is not possible to define an ever lower income threshold in order to focus on more and more severe hardship, with respect to material and social deprivation. In most countries, an income poverty line below 50 percent of the median already makes it impossible to target a poorer population in terms of deprivations.

Characteristics of an indicator of extreme income poverty

In this section, we define what an income-only indicator of extreme poverty would be, in the line of [Lecerf \(2016\)](#), that is to say a poverty threshold at 40% of the median equivalized income. In France 2019, this represents 752€ per month and per consumption unit in 2019. While we have shown in the previous section that this 40% threshold is located in a zone where income is no longer correlated with material and social deprivations, we nevertheless present here the characteristics of such a sub-population.

Students and the self-employed are particularly overrepresented among people living below the 40% income threshold ([Figure 6](#)). This can be problematic because, for these households, income (in particular income measured by tax sources) may not fully represent

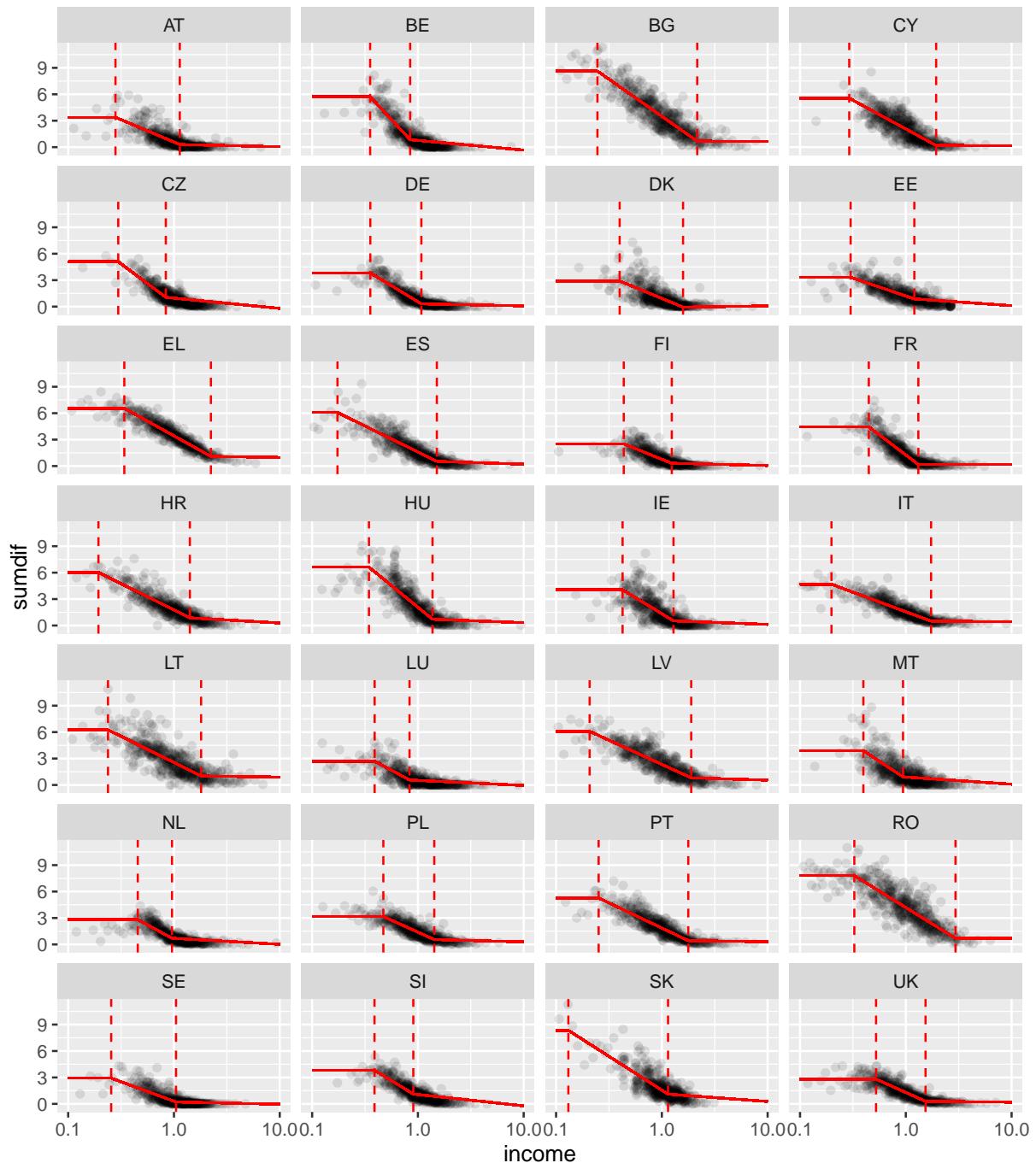


Figure 4: Piecewise log-linear regressions of deprivation by income

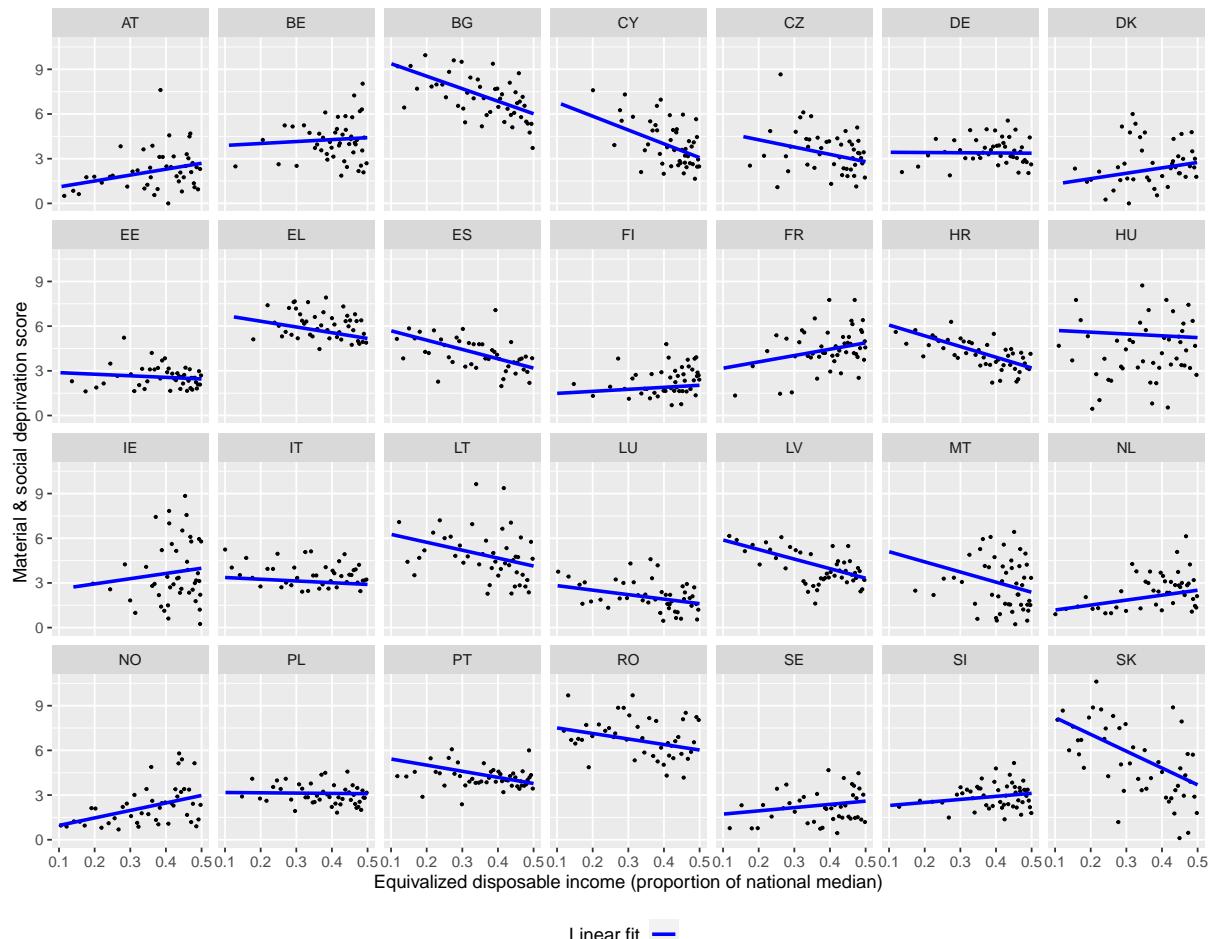


Figure 5: Correlation between income and material and social deprivation under 50% of the median

their capacity to consume, due to greater reliance on financial assistance from other households, the possibility of self-consumption, or the more significant presence of assets or highly variable or untaxed income.

As for the first half in terms of financial assets⁵, they are much less frequent in each of the poverty groups than in the general population. They are, however, not less frequent in extreme income poverty (17%) than in standard income poverty (15%).

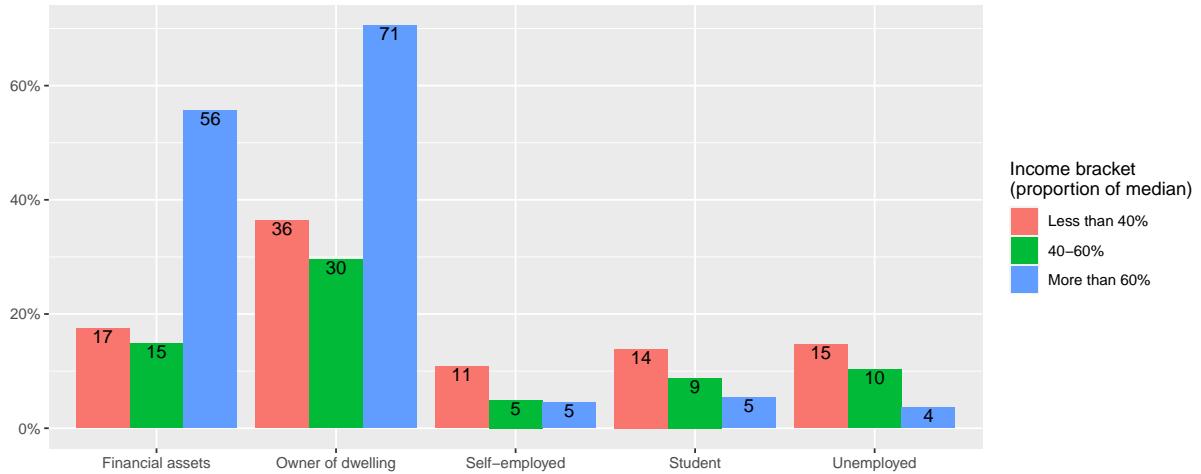


Figure 6: Characteristics of households under 40% threshold

Consistent results are found when looking at the ability to “make ends meet” financially. People with an equivalized income below the 60% threshold are much more likely than the rest of the population to say they can’t make ends meet it without incurring debt. In contrast, people with an equivalized income below the 40 percent threshold are no more likely than those with an income between the 40 percent and 60 percent thresholds to be in this situation. From this point of view, lowering the income poverty line does not therefore identify a population with greater difficulties.

This ineffective targeting of people below the 40% threshold is confirmed when looking at the persistence of poverty situations: people below the threshold at 40% of the median are not significantly more likely than those in the superior income bracket to remain durably in poverty at 60%.

⁵Here, financial assets are assessed in a very simple way: for each asset category, the household is asked in which bracket the total value of their assets falls. These bins are ordered from 1 to 7 (and correspond to wealth fractiles), and the number of the highest band among all categories is taken. The top 50% in terms of financial assets corresponds to a score of at least 4.

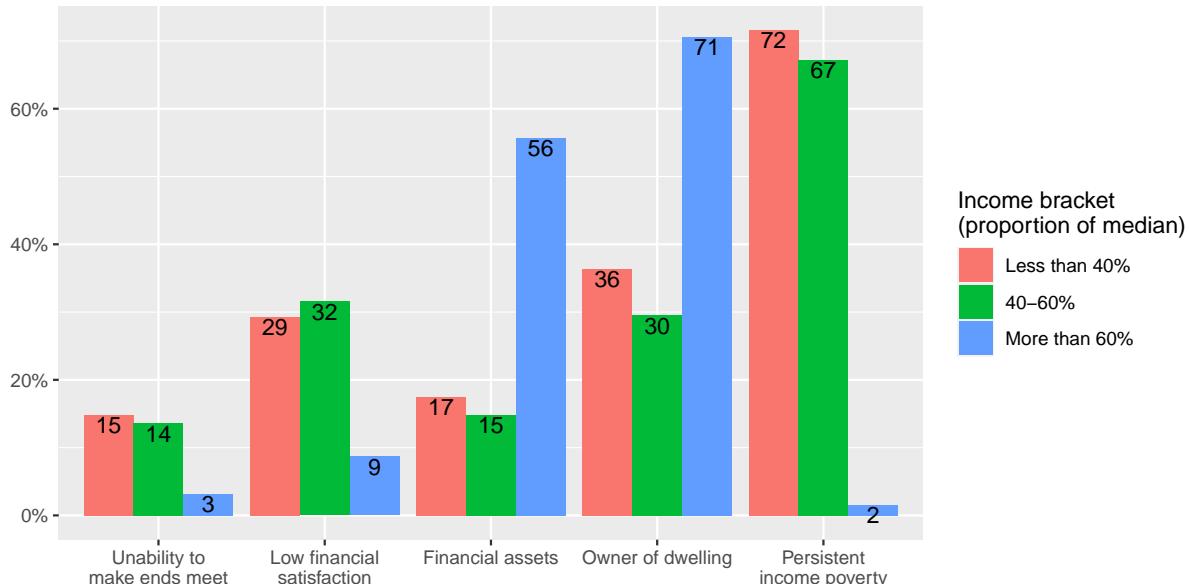


Figure 7: Economic hardship depending on income bracket (France 2018)

5 Main results: the cumulative indicator of extreme poverty

The indicator of extreme poverty that we develop in this work corresponds to being in a situation of severe income poverty and material and social deprivation, i.e. having an equivalized income below 50% of the median equivalized income of the population, as well as suffering at least 7 material and social deprivations from the list of 13.

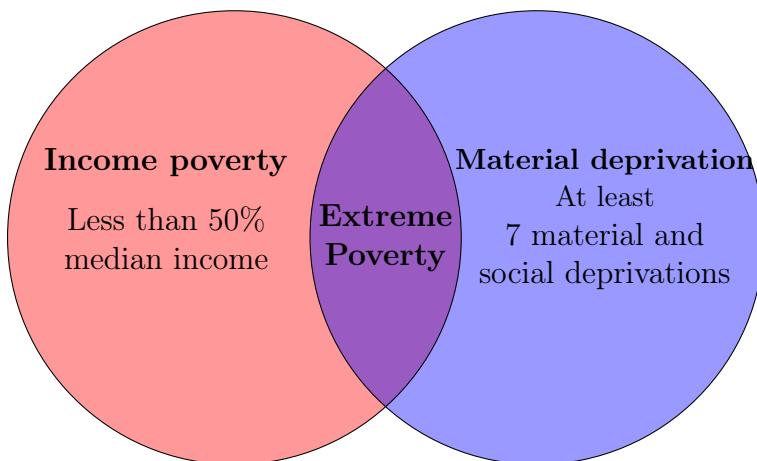


Figure 8: Definition of cumulative extreme poverty

This indicator updated (with new items of social deprivation) and tightened (to focus on extreme poverty) version of the “consistent poverty” proposed by [Nolan and Whelan \(1996\)](#) and [Whelan, Nolan, and Maître \(2014\)](#). In what follows, after describing the populations covered by such an indicator, we show that it does indeed define a subgroup of the poor population, whose socioeconomic difficulties are greater along many dimensions, and who experience a more persistent form of poverty. We then show how this indicator

can be used to provide an alternative view of international comparisons of poverty. Finally, we show that targeting a poverty group with similar properties cannot be done using an income-based measure alone.

In the following section, we analyze the profile of these people at the intersection, and compare the characteristics of this poverty subgroup relative to the rest of the income poor, according to different dimensions of socioeconomic hardship, as well as according to the persistence of their situation. We perform this analysis on data from a single country (here France) to keep a population with a homogeneous income poverty line. In the third section, we extend the demonstration to other European countries, and we show how this indicator of extreme poverty completes the European panorama of poverty.

5.1 Profiles of households in cumulative extreme poverty

In order to measure the differences between the situation of people experiencing extreme poverty and those affected by only one or other of the indicators, we separate the poor populations into disjointed subgroups.

People experiencing income poverty or material and social deprivation share certain characteristics: they are more often unemployed, in single-parent or large families, and more often workers than managers.

On the other hand, certain profiles are mainly affected by income poverty (young people and the self-employed), while others are more frequently poor in the material and social sense (retired people) ([Table 2](#)). In particular, the self-employed are much less frequent in cumulative extreme poverty than they were below the 40% income threshold, with a frequency closer to that in standard income poverty.

Thus, 18% of adults in severe income poverty but experiencing less than 5 deprivations are self-employed, while this is the case for only 6% of adults experiencing neither income poverty nor material and social deprivation, and 2% of those experiencing at least 7 deprivations but not income poverty.

In the case of France, pensioners are more represented in high deprivation than in low income: they represent 15 percent of people experiencing both severe material and social deprivation and severe income poverty, but 30 percent of people in severe material and social deprivation living above the income poverty line. Their retirement pensions or the minimum old age pension coupled with any housing allowances generally enable them to have an equivalized income above the poverty line.

When the two indicators are combined, the profile of the poor changes significantly compared to one or the other of the indicators taken in isolation. In order to better understand what differentiates, within income poverty, those who suffer material and social deprivation from those who do not, we construct a logistic model that explains the

	Income bracket (proportion of median)			Income bracket (proportion of median)		
Deprivations	< 50%	50–60%	> 60%	< 50%	50–60%	> 60%
≥ 7	3	1	2	34	17	14
5 or 6	9	3	3	23	13	11
< 5	18	6	6	11	7	3

(a) Independent worker	(b) Unemployed
	Income bracket (proportion of median)
Deprivations	< 50%

(c) Retired	(d) Living in a single parent family
	Income bracket (proportion of median)
Deprivations	< 50%

Table 2: Frequency of each characteristic by deprivation and income status (in % of adults, France 2019)

Reading example: 3% of adults with income below 50% of the median and at least 7 material and social deprivations are independent workers

probability of being in a situation of severe material and social deprivation as a function of different socio-demographic characteristics.

Unemployed people are more frequent among those who suffer from both income and material poverty than in income poverty alone. Moreover, all other characteristics being equal (including equivalent incomes), living in a household where the reference person is unemployed significantly increases the chances of being in material and social deprivation ([Table 3](#)).

Similarly, blue-collar workers are more frequent among the cumulative poor than the rest of the poor in the income sense and, other characteristics being equal, are more likely to be in both types of poverty than to be in income poverty alone. This is the opposite situation for managers, whose rate of income poverty is already low, but who have an even lower risk of accumulating it with material and social deprivation. The difference in risk of material and social deprivation between workers, managers and the unemployed is therefore not solely due to differences in income between them.

From the point of view of family configuration, people living in single-parent families are over-represented in the accumulation of poverty, compared to income poverty alone. The fact that this type of family is more often in a situation of material and social deprivation than others, at equal equivalized incomes, tends to suggest that, in measuring

poverty, the equivalence scales commonly used underestimate the needs of single-parent families ([Martin and Périvier, 2018](#)).

Those results are confirmed using an alternative way of appraising the link between those socio-economic variables and material deprivations: a classification tree ([Section C](#)).

Compared to material deprivation alone, people accumulating both types of poverty have many similar characteristics: in particular, they are just as frequently blue-collar workers or living in single-parent families. On the other hand, the share of unemployed people is significantly higher among those combining income and material poverty, and the share of retired people is much lower.

Table 3: Effect of some characteristics on the probability of suffering material and social deprivation among those below the 60% income poverty line

	Term	Estimate	Odd-ratio	p-value
Family type: Reference = Single adult				
Couple without children	-0.43	0.65	0.02**	
Single parent family	-0.28	0.76	0.08*	
Couple with one or two children	-0.50	0.61	0.01***	
Couple with three children or more	-1.09	0.34	0.00***	
Other type of household	-0.51	0.60	0.01***	
Occupation status: Reference = Service workers				
Farmers	0.02	1.02	0.97	
Independent craftsmen, merchants and directors	-0.47	0.63	0.05*	
Managers	-0.28	0.76	0.51	
Associate professionals	-0.24	0.79	0.26	
Manual workers	0.27	1.31	0.05**	
Retired	0.81	2.25	0.00***	
Other inactive	0.24	1.27	0.43	
Students	-1.63	0.20	0.00***	
Activity status: Reference = Employed, retired or student				
Unemployed	1.10	3.00	0.00***	
Other inactive	0.51	1.66	0.07*	
Housing status: Reference = Owner				
Tenant	0.20	1.22	0.10	
Free housing	0.10	1.11	0.72	
Financial assets: Reference = No assets				
First third	-0.24	0.79	0.02**	
Second third	-0.72	0.48	0.00***	
Third third	-1.55	0.21	0.00***	

Table 3: Effect of some characteristics on the probability of suffering material and social deprivation among those below the 60% income poverty line (*continued*)

	Term	Estimate	Odd-ratio	p-value
Income bracket: Reference = 50-60%				
	Less than 40%	0.60	1.82	0.00***
	40-50%	0.38	1.46	0.00***
Loan repayment burden: Reference = No loan				
	Not a burden	-0.07	0.93	0.67
	Slight burden	0.00	1.00	1.00
	Heavy burden	0.71	2.04	0.00***
Financial burden of housing: Reference = Not a burden				
	Slight burden	0.88	2.40	0.00***
	Heavy burden	1.46	4.31	0.00***
Limitations in activities due to health: Reference = None				
	Limitations	-0.19	0.83	0.16
	Strong limitations	-0.32	0.72	0.07*
Self-perceived health: Reference = Very good				
	Good	0.43	1.54	0.01***
	Fairly good	0.51	1.66	0.00***
	Bad	1.38	3.99	0.00***
Paris urban area: Reference = Not living in Paris				
	Living in Paris	0.30	1.35	0.04**

Note: Age of the head of the household is included as a control, but not presented here.

5.2 Resources and difficulties

In addition to data on the employment or demographics of poor individuals, survey data also provide information on resources or expenses that allow for a more precise assessment of the standard of living, beyond disposable income.

Among people below the income poverty line, those in a situation of severe material and social deprivation are less likely to own their main residence and less likely to have financial assets. This is true for all other characteristics, especially at a given income (Table 3). This lack of real estate or financial assets partly explains why it is less easy to cope with deprivation. In particular, people with substantial financial assets are much less frequent in cumulative extreme poverty than in income poverty at the 40% threshold. People with the first half of financial assets represent 3 percent of those in cumulative extreme poverty, compared to 6 percent of those in severe material and social deprivation and 17% of the income-poor at the 40% threshold.

For people who are poor in the income sense, all other characteristics being equal, having high housing costs or repayments significantly increases the risk of being in material and social deprivation. People who have low or bearable credit repayments are less likely to be in material and social deprivation than those who have no repayments at all. Interestingly, the above model has been tested with debt ratios and housing effort rates, and subjective measures are much more correlated to the risk of being in material and social deprivations than objective ones. This suggests that the effective cost and the disposable income are not the only factors that make a burden “bearable”, and that the subjective assessment is more important than the effective ratio when determining deprivations.

People living in a household where the reference person assesses their health status as poor or very poor are two to four times more likely to be in cumulative poverty than in income poverty alone. All other things being equal, among people in income poverty, a deteriorated health status of the reference person in the household, whether assessed subjectively or through the presence of functional limitations or a chronic disease, is very significantly associated with being in a situation of material and social deprivation.

Having repayment credits or functional limitations due to health may be indicative of additional burdens that are not included in the equivalized income measure. Thus, for a given income, people who face these are more likely to be in material deprivation. The cumulative extreme poverty indicator therefore selects these people first.

The more difficult socio-economic situation of people in poverty can also be measured by a set of subjective indicators. For example, adult respondents to the SILC survey are asked to rate their satisfaction with their current life and financial situation on a scale of 0 to 10 (0 = most dissatisfied and 10 = most satisfied). Similarly, they are asked how easy it is to “make ends meet,” with possible responses grouped into five modalities representing increasing difficulty, the last being “can’t make it without going into debt.”

All of the subgroups affected by at least one of the poverty types report life satisfaction, and especially financial satisfaction, at a much lower level than the rest of the population ([Figure 9](#)). Among the different poverty groups, it is the people in income poverty only who declare on average a higher score (7.2 on average against 7.5 for those experiencing neither income poverty nor material and social deprivation, and 6.2 against 7.1 concerning the financial situation). The choice of the income threshold has no impact on the average satisfaction reported.

People in situations of material and social deprivation report lower life satisfaction, and the threshold is important here: people in situations of severe material and social deprivation report a significantly lower average than those with between 5 and 6 deprivations at most.

People in extreme cumulative poverty thus report lower satisfaction than other poor people in the income sense, but similar to those in material and social deprivation (5.2 for those with both income and severe material deprivation, and respectively 5.7 and

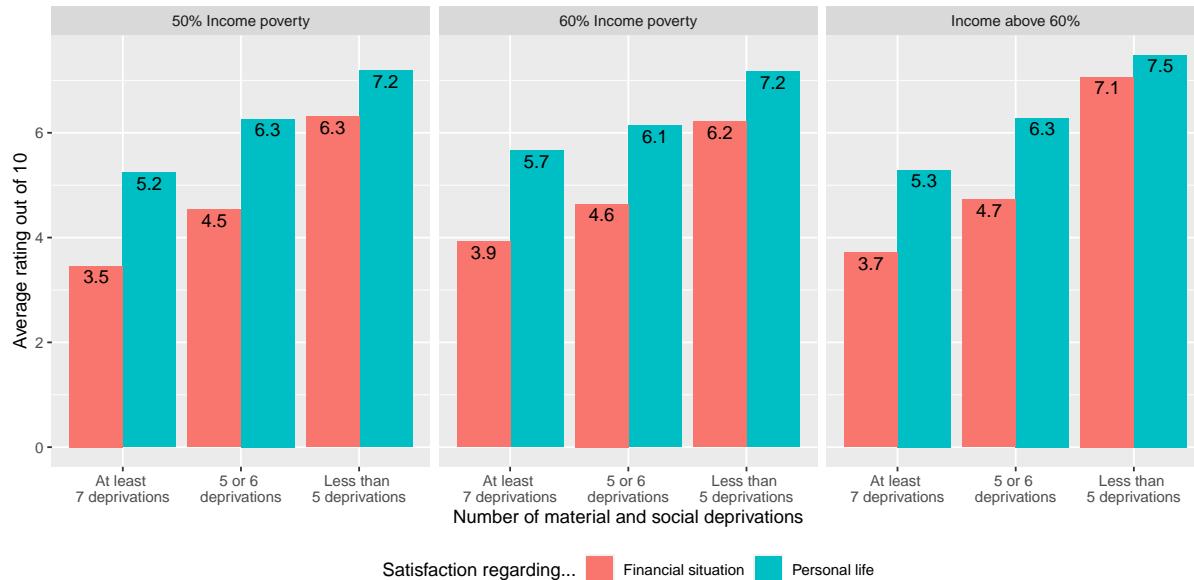


Figure 9: Life and financial satisfaction according to poverty status

5.3 for those in severe deprivation but whose income is respectively less than 60% and greater than 60% of the median): the addition of income poverty does not reduce their satisfaction.

This gap between income poverty and material and cumulative poverty is even more important in terms of satisfaction with the household's financial situation. While people with a low equivalized income declare an average satisfaction of 6.2 (6.3 for the 50% threshold) when they are not in a situation of material and social deprivation, people in a situation of material and social deprivation declare a satisfaction of between 4.5 and 4.7 depending on their income bracket, and those in a situation of severe material and social deprivation declare an average of up to 3.5 for people in a situation of cumulative poverty.

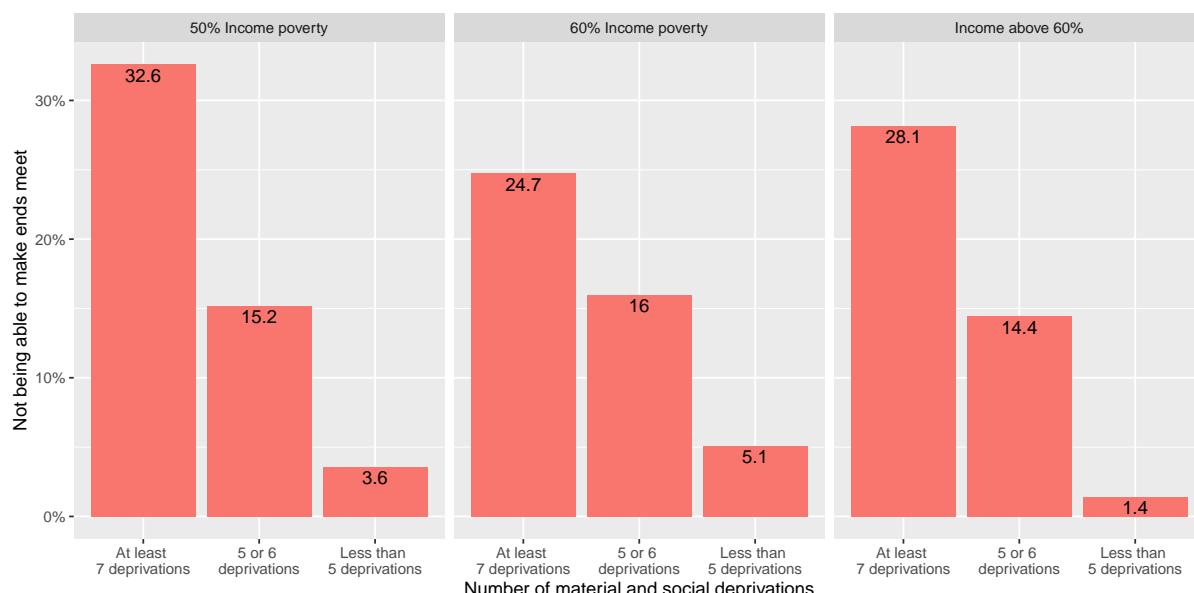


Figure 10: Share of people not able to make ends meet by poverty group

These same results are found when we look at the ability to “make ends meet” ([Figure 10](#)). People whose equivalized income is below the 60 percent threshold are much more likely to say that they “cannot make ends meet without incurring debt” than the rest of the population (between 3.6 percent and 5.1 percent of those who are not materially and socially deprived, depending on their equivalized income, compared to 1.4 percent of the rest of the population). On the other hand, among the populations that combine income poverty and material and social deprivation, the proportion of people who cannot manage without incurring debts is even higher than among the rest of the people living below the income poverty line, and reaches its maximum for people in a situation of cumulative extreme poverty (33%).

In conclusion, people who experience both income and material poverty are more often unemployed than people who experience only one of the two types of poverty, and they more often live in single-parent families. They are more often manual workers, in poor health and with heavy repayment or housing costs than people who are only in income poverty, and less often students, self-employed or with real estate or financial assets. On the other hand, they are less likely to be retired and more likely to be unemployed and, by definition, have a much lower equivalized income than the rest of the materially and socially deprived. These specific (lack of) resources and difficulties result in a more degraded situation as measured by subjective indicators of well-being or financial difficulties.

The fact of targeting, among poor people, those who suffer material and social deprivation, thus allows us to focus on a sub-section of the population that suffers more intense poverty.

5.3 Persistence of situation

Moreover, these people experience more lasting poverty: among people below the income poverty line, those who are also in a situation of severe material and social deprivation remain in poverty longer than others.

To measure whether indicators reflect persistent poverty, one cannot compare indicators that represent too different proportions of the population. This is because more inclusive indicators are inherently more likely to be persistent than more restrictive indicators (see [Section B](#)).

To assess the persistence of situations associated with the different forms of poverty, it is therefore necessary to look at all the subsequent poverty states of individuals. This avoids the possibility that the threshold by which individuals’ poverty trajectories are assessed changes as one moves from one poverty group to another.

Thus, among those who were in 50% income poverty and severe material and social deprivation, 26% are still in this situation three years later ([Figure 11](#)). 73% of them are in income poverty at 60% (regardless of the number of deprivations), and 46% in severe

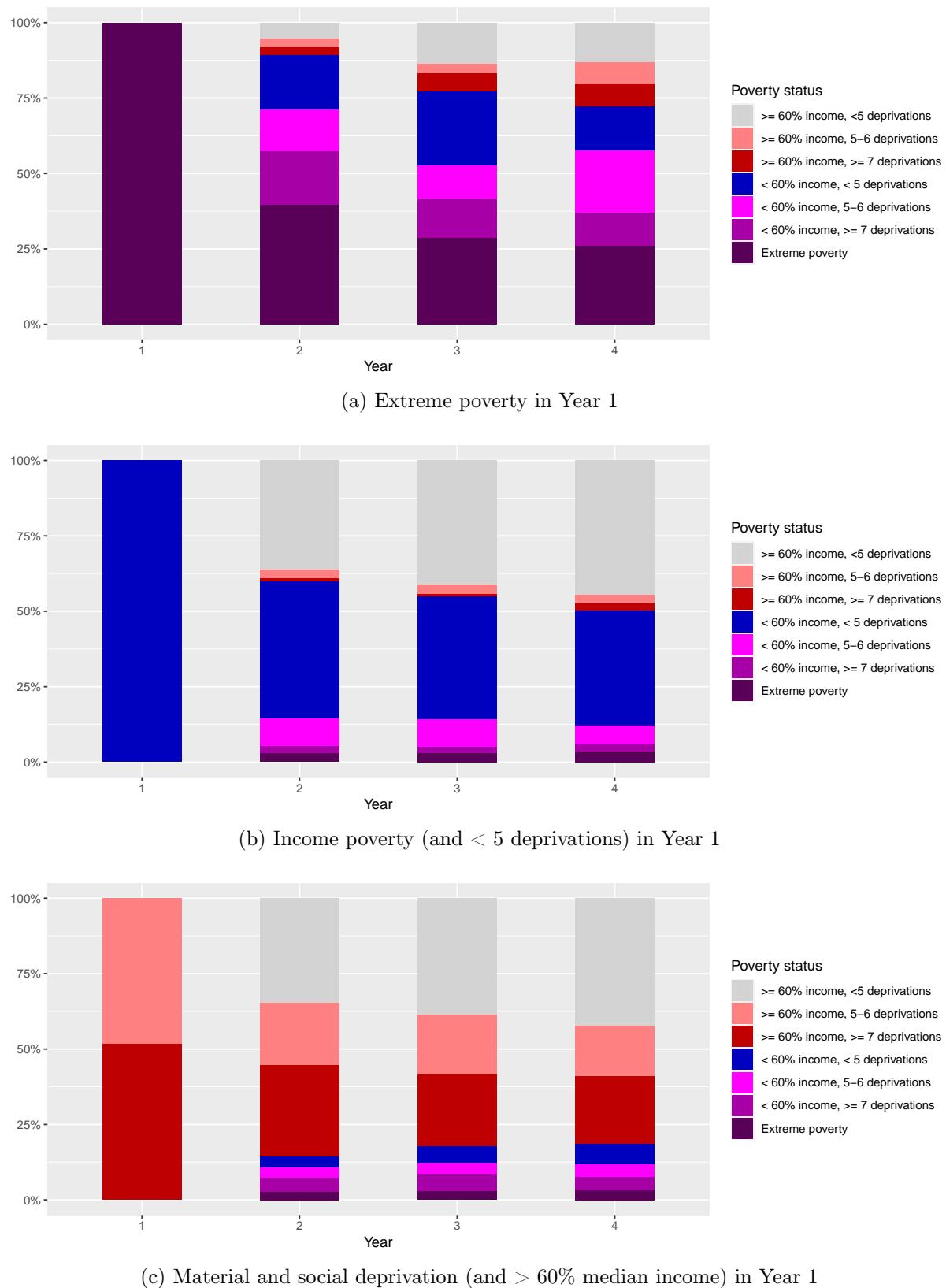


Figure 11: Subsequent poverty states depending on state in year 1

material deprivation (regardless of their income). 13% experience neither income poverty nor material and social deprivation.

Individuals who experience a combination of income poverty and material deprivation, although relatively unlikely to remain in the most severe versions of these conditions, are nevertheless very likely to remain in at least one form of poverty. Compared to the 60% of all poor people in the income sense, almost half (43%) are no longer in income poverty three years later, so one third (34%) are not in material and social deprivation either.

[Table 4](#) uses a synthetic indicator to compare the persistence of poverty states: for each poverty subgroup in T0, we measure the probability of remaining at least 3 years out of 4 in each type of poverty.

Poverty status in T0	Probability of staying at least 3 out of 4 years in...				
	Extreme poverty	≥ 5 deprivations	≥ 7 deprivations	50% income poverty	60% income poverty
< 50% median income ≥ 7 deprivations	29	71	49	59	84
< 50% median income 5 or 6 deprivations	1	49	5	45	71
< 50% median income < 5 deprivations	1	5	1	44	66
50-60% median income ≥ 7 deprivations	2	81	56	7	73
50-60% median income 5 or 6 deprivations	0	52	6	2	61
50-60% median income < 5 deprivations	0	4	1	5	47
> 60% median income ≥ 7 deprivations	0	72	48	2	8
> 60% median income 5 or 6 deprivations	0	41	7	1	5
> 60% median income < 5 deprivations	0	1	0	0	1

Table 4: Probability of staying at least 3 years out of 4 in poverty for each subgroup

The states that give the highest risk of remaining 60% poor in the income sense for at least three years out of four (last column of the table) are, firstly, the states that combine income and material poverty, whatever the thresholds chosen, then the states of income poverty, then the states of material and social deprivation (without income

criteria). However, people in cumulative extreme poverty are no more likely to remain in a situation of severe material and social deprivation than others.

People who combine income poverty and material and social deprivation are more likely to remain in income poverty than those who are not in material and social deprivation. Being in material and social deprivation thus reinforces the persistence of income poverty. This is not due to the fact that people who experience both types of poverty have a lower initial equivalized income than those who experience income poverty alone. Indeed, among people living below the 60% income poverty line, the median equivalized income of those who are also in a situation of severe material and social deprivation is 11,071 euros, compared to 11,136 euros for all the income poor. Using a regression model similar than in [Table 3](#) including longitudinal elements, we confirm that, all other characteristics being equal, being in material and social deprivation increases the probability of remaining in income poverty for several years.

The link between persistence in income poverty and material and social deprivation status is confirmed by the fact that people who have lived in income poverty for several years in previous years are more likely to be in material and social deprivation. This had already been noted in the European ECHP data by [Whelan, Layte, and Maître \(2003\)](#).

People in cumulative extreme poverty are thus, among those who are poor according to one or other of the criteria, those who have the most deteriorated socio-economic situation (absence of non-monetary resources, burdens, low subjective well-being), and also those who remain the longest in poverty situations.

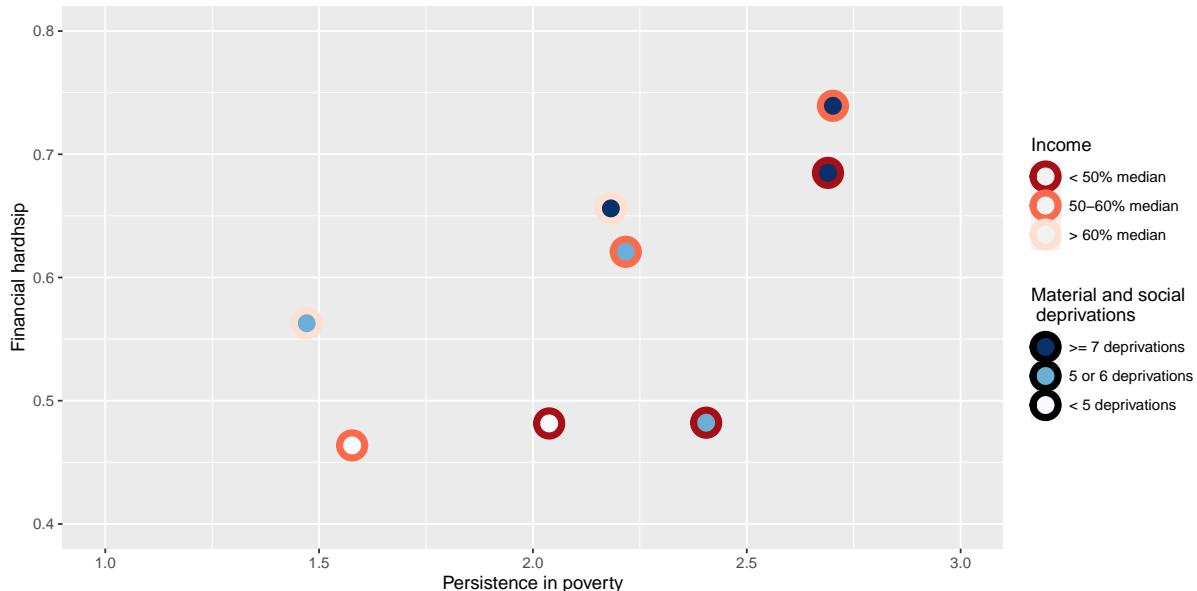


Figure 12: Summary of persistence in income poverty and frequency of self-assessed economic hardship according to poverty group

5.4 The European overview of extreme poverty

The international data from the European EU-SILC system allows us to measure the prevalence of extreme poverty in ordinary housing in the different countries of the European Union (EU) by applying a harmonized definition. In this situation, the poverty line is the national poverty line, at 50% of the median living standard of the population. It therefore varies from country to country. The list of 13 deprivations is the same, however, as is the threshold of 7 out of 13 deprivations to be considered in a situation of severe material and social deprivation.

Like the rates of income poverty and material and social deprivation, the share of the population in extreme poverty varies greatly across the EU (Figure 13). The share of the population in extreme poverty, i.e., combining these two poverty situations, varies from 10 percent in Romania to less than 1 percent in Finland, the Czech Republic and Slovenia, among others. France is in a median position, at 1.9%: of the 28 EU countries, 14 have a lower rate of extreme poverty.

This is mainly due to France's material and social deprivation rate, which is in the middle position among EU countries. Moreover, as the range of material and social deprivation rates is higher than that of income poverty rates, the countries with the lowest share of the population in both poverty situations (mainly in Northern Europe) are also those with the lowest material and social deprivation rates. For these countries, the share of the population in extreme poverty is almost zero. Conversely, countries such as Romania or Bulgaria, where severe material and social deprivation is very common, have high rates of extreme poverty.

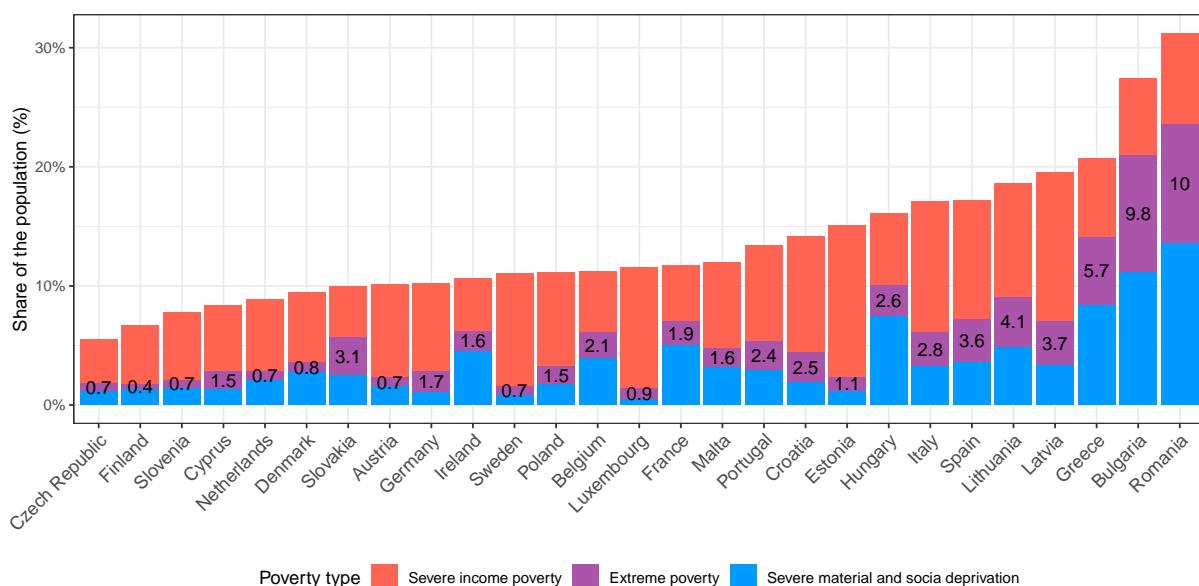


Figure 13: Share of income poverty, material deprivation and cumulative extreme poverty in the European Union

The cumulative indicator of extreme poverty thus has a hybrid nature that takes on a

particular meaning in the case of international comparison. The list of material and social deprivations is the same for all countries, and aims to measure whether or not people can access a certain basket of goods and services considered necessary for a decent life in the European Union. In this respect, the people affected by these deprivations in the different countries share similar living conditions.

The income poverty line, on the other hand, depends on the median equivalized income of the national population, and is therefore different from one country to another. Taking into account price differences between countries, the equivalized income threshold to be considered as income poor in France is, for example, four times higher than in Romania and a quarter lower than in Luxembourg. The people affected by income poverty in the different countries do not therefore have a common equivalized income, but share the characteristic of having a equivalized income significantly lower than the equivalized income in their country.

The populations identified by extreme poverty in the different countries of the European Union thus share two characteristics. The first is a characteristic of exclusion: their income places them in a marginal position in relation to the rest of the population of their country. The second is deprivation: what these people have in common is that they cannot access a common basket of goods and services because of their financial resources.

Due to the annual dissemination of the EU-SILC surveys, this indicator can be used to measure the evolution of extreme poverty over time. Some work remains to be done on the impact of crises such as the COVID-19 pandemic and lockdowns on this measure of poverty. Recent work shows that household budgets generally appear to be less constrained in early 2021. This may be due to the fact that leisure activities are limited and therefore households do not report deprivation for financial reasons. Life satisfaction, however, has fallen dramatically ([Gleizes, Legleye, and Pla, 2022](#)). This highlights the need for multiple indicators to capture the impact of such events.

6 Discussion

6.1 Which thresholds to choose?

The above evidence shows that the cumulative indicator of extreme poverty has advantages over the use of income poverty alone in several respects:

- it is better correlated with indicators of economic hardship, in particular unemployment, material deprivation or subjective measures of well-being;
- it has a smaller share of measured very low income profiles whose characteristics suggest that they would have other resources (students, self-employed, people with financial savings);

- it is characteristic of more durable poverty situations: people who are affected by both types of poverty remain longer in one or the other type of poverty.

While these elements show the relevance of crossing the income and material dimensions of poverty, one may wonder whether there are income and deprivation thresholds that are more relevant than others, the choice of these levels being necessarily conventional and partly arbitrary. Without giving a definitive justification to this question, this section documents the impact of choosing a severe definition of income poverty (50% of median income rather than 60%) and material and social deprivation (7 deprivations rather than 5).

The first effect of choosing different thresholds is to vary the share of the target population in the total population. In France, the cumulative indicators vary from 1.9% of the population to 5.6% depending on whether one takes the severe or ordinary versions of the income and material thresholds.

Income poverty		
Material and social deprivation	50% threshold	60% threshold
Severe (at least 7 deprivations)	1.9	3.4
Ordinary (at least 5 deprivations)	3.1	5.6

Table 5: Share of the population by each income and deprivation threshold (%), France 2019)

In varying the income poverty line, a notable effect is the variation of the share of the unemployed population in the target indicator. Indeed, employed people are more likely to have incomes above the 50% threshold. In some countries, such as France, which provides an income floor for the majority of the retired population, lowering the income threshold also means lowering their share of the target population (see [Section E](#)). Apart from this, the socio-demographic characteristics of the individuals identified remain similar.

It is also not obvious how to define a material deprivation threshold that would define qualitatively different populations on either side of the threshold. From the perspective of equivalized income and other characteristics, the clearest qualitative distinction is known to be between those who report no deprivation and those who report at least one ([Bediük, 2018](#)). Beyond that, the differences by number of deprivations are rather continuous. In the following, we show however that targeting individuals who accumulate the highest deprivations gives unity to the target population insofar as these individuals almost all share the most frequent ones.

One must first note that, if there is indeed a hierarchy between the different material and social deprivations in terms of prevalence in the population, it is not the case that those who suffer the rarest deprivations all suffer the most common deprivations first. In

		Mean number of deprivations, excluding the baseline and...												
		Unexpected	Furniture	Arrears	Temperature	Holiday	Meat	Car	Shoes	Money	Internet	Go-out	Leisure	Clothes
Baseline people affected by...	Unexpected	6.5	7.0	7.2	6.6	7.0	7.3	6.9	6.7	7.4	6.8	6.6	6.7	
	Furniture	6.5	7.0	7.2	6.6	7.0	7.3	7.0	6.7	7.4	6.9	6.6	6.7	
	Arrears	6.8	6.8	7.4	6.9	7.2	7.6	7.2	7.1	7.7	7.2	6.9	7.0	
	Temperature	7.0	7.1	7.5	7.4	7.1	7.5	7.8	7.5	7.3	7.9	7.3	7.2	
	Holiday	6.6	6.6	7.0	7.2	7.0	7.3	7.0	6.8	7.4	6.9	6.7	6.7	
	Meat	6.9	6.9	7.3	7.5	7.0	7.7	7.3	7.1	7.7	7.2	7.0	7.1	
	Car	7.2	7.2	7.6	7.8	7.2	7.6	7.6	7.4	8.0	7.5	7.3	7.4	
	Shoes	7.0	7.0	7.5	7.7	7.1	7.5	7.8	7.2	7.9	7.3	7.1	7.1	
	Money	6.7	6.7	7.2	7.3	6.8	7.1	7.5	7.1	7.5	7.0	6.8	6.8	
	Internet	7.5	7.5	8.0	8.1	7.5	7.8	8.2	7.8	7.6	7.7	7.5	7.6	
		6.9	6.9	7.3	7.5	6.9	7.3	7.6	7.3	7.1	7.7	6.9	7.0	
		6.6	6.6	7.1	7.3	6.7	7.1	7.4	7.0	6.8	7.5	6.9	6.8	
		6.7	6.7	7.2	7.3	6.8	7.1	7.5	7.0	6.9	7.5	7.0	6.8	

Table 6: Mean number of deprivations according to baseline deprivation (among people suffering from at least 7 deprivations)

fact, among people experiencing severe material and social deprivation, those who suffer the rarest deprivations do not have a higher average number of deprivations, and a fortiori do not necessarily suffer all the more frequent deprivations.

Table 6 shows, among people in severe material and social deprivation, the mean number of deprivations suffered by people affected by one baseline deprivation, when excluding the baseline and one other deprivation at a time. For example, the average number of deprivations suffered by people affected by the baseline “cannot face unexpected expenses” deprivation is 6.5 when excluding the baseline and the “cannot afford replacing furniture” deprivation, 7.0 when excluding the baseline and the “have housing or credit arrears” deprivation, and 7.2 when excluding the baseline and the “cannot afford adequate temperature in house” deprivation (in yellow in the table).

In particular, the deprivation “unexpected expenses” is experienced by 98% of people experiencing material and social deprivation, and the deprivation “cannot afford internet” is experienced by 16% of them. However, apart from these two deprivations, the average number of deprivations experienced by people in situation of material and social deprivation who experience the deprivation “unexpected expenses” is 7.4, while it is 7.5 for people who experience the deprivation “internet” (in green in the table). Thus, people who experience the very rare “internet” deprivation do not necessarily have a worse situation than those who experience the “unexpected expense” deprivation, one of the most common. In other words, among those experiencing material and social deprivation, the distribution of individuals’ deprivation scores is close to what it would be if the deprivations were distributed independently of each other.

However, some deprivations stand out from this point of view. For example, the deprivation “not being able to afford two good pairs of shoes” is associated with a relatively larger number of other deprivations, while the deprivation “being in arrears” is associated with a relatively smaller number of other deprivations.

Thus, among those experiencing at least 7 out of 13 material deprivations (i.e. a state

of severe deprivation), there is indeed a common core of deprivations shared by all, but it is much smaller than 7. Almost all of these individuals experience the deprivations “unexpected expenses” and “vacation”, the following two most frequent deprivations (“furniture” and “leisure”) each affect more than 90% of the population, and 80% combine the four altogether. Beyond this common base of the most widespread deprivations, there is no clear hierarchy between material and social deprivations: they do not follow in the same order for all individuals.

In this paper, we have focused on the poverty indicator of a standard of living below 50% of the median, and at least 7 out of 13 material deprivations. As discussed earlier, the people identified by this indicator are those who are least likely to escape income poverty or material and social deprivation. Because of their income, they are in the bottom half of the income-poor population and are even more frequently unemployed than the others. While their material and social deprivations are diverse, they all have in common that they suffer the most common deprivations.

6.2 Reducing the mismatch between income and deprivations

In this section, we discuss whether the mismatch between income and material poverty can be reduced depending on the definition and coverage of income. More precisely, we propose extended definitions of income, which allow to strengthen the link with material deprivation.

As seen in the previous sections, there is a significant mismatch between the population with the lowest incomes and those with the highest deprivations. This discrepancy might be explained in part by missing elements in the definition of income, or by the existence of additional expenses or resources that result in different living conditions for the same income.

More specifically, poor people in the income sense may benefit from resources that are not taken into account in the measurement of income: ownership of one’s main residence, financial savings, assistance from other households, self-consumption. These elements may allow a household to escape material and social deprivation despite a low disposable income.

On the other hand, some households may face significant burdens, such as loan repayments, or additional costs due to their health status. We have shown in the previous sections that these factors increase the probability of being in a situation of material and social deprivation, all other things being equal (including equal income). Moreover, the equivalence scales used in the standard way seem to underestimate the needs of single-parent families for these parts of the population.

In this section, we propose an adjusted definition of disposable income, which includes income items such as imputed rent received by owners of their main residence, as well

as non-monetary income: benefits in kind, self-consumption. We also adjust for local cost of living, using local purchasing power parities calculated by [Carbonnier \(2022\)](#). We then measure the extent to which this adjusted definition of income reduces the mismatch between income and material poverty, by measuring the proportion of people in income poverty who are also among the most materially and socially deprived. Namely:

$$\begin{aligned}\text{Adjusted income} = c_{PPP} \times & (\text{Disposable income} + \text{Imputed rents} \\ & + \text{Self-consumption} + \text{In-kind income})\end{aligned}$$

where c_{PPP} is the sub-national purchasing power parity coefficient from ([Carbonnier, 2022](#)), that is different for every region and level of urbanization of the territory. It is a way of accounting for different costs of life depending on those two parameters. The adjusted income is then equivalized in the same way as is done for disposable income.

In order to take into account elements that cannot be directly assimilated to income, such as the possession of financial savings, the payment of reimbursement charges, or the costs induced by a deteriorated state of health, we propose an even more extensive definition of income (“extended income”). To the adjusted income is added the “monetary” value of the different elements mentioned. This value is calculated using a logistic regression model on the probability of being in a situation of material and social deprivation: the monetary value of each of these elements is thus equal to the amount of income necessary to equal its effect on the probability of being in material and social deprivation.

In order to do that, a regression model on the probability p of being in material and social deprivation is calculated, with independent variables being income, the level of financial savings⁶ (discretized in five bins), health measured by self-assessment and by limitations, activity status (employed, self-employed, retired, unemployed, inactive), family type (single-parent family, single, couple, couple with kids). The following equation is estimated:

$$\log \left(\frac{p}{1-p} \right) = \alpha \log(\text{Adjusted income}) + \beta_S \text{Savings} + \beta_H \text{Health} + \beta_A \text{Activity} + \beta_F \text{Family}$$

Therefore, we can define an extended income⁷ as:

$$\text{Extended income} = \text{Adjusted income} \times \exp \left(\frac{\beta_S \text{Savings} + \beta_H \text{Health} + \beta_A \text{Activity} + \beta_F \text{Family}}{\alpha} \right)$$

⁶The variables in which respondents estimate the value of their financial wealth are not included in the harmonized EU-SILC questionnaire, but rather in a specialized module of the French questionnaire.

⁷Note that ranking individuals by this Extended income is the same as ranking them by the value of the linear predictor of the regression equation above. Expressing this as an extended income allows to interpret the “monetary value” of these different variables, with regards to the probability of being in material and social deprivation.

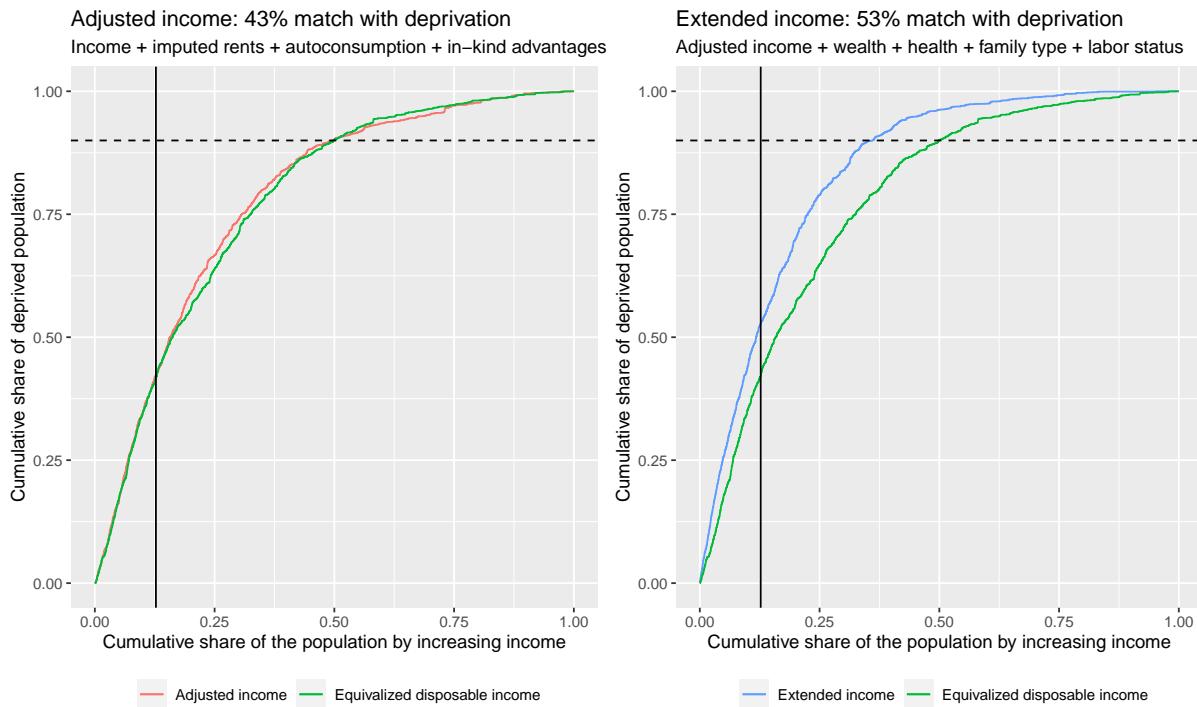


Figure 14: Intersection between lowest incomes and highest deprivations following definition of income

The mismatch between income and material poverty persists to a very large extent, even when adjusted by the local cost of living, income through imputed rent, self-consumption and benefits in kind. One reason for this is that the share of homeowners is relatively low in this part of the population, and the other two types of income are relatively rare or in small amounts. The mismatch is reduced by only 1 percentage point (Figure 14).

If we add the value of the various non-monetary elements mentioned above, the mismatch decreases much more significantly: 11 percentage points. Health in particular has a very strong impact.

Even if we assign a monetary value to the elements that can vary the utility associated with income, there is still a large part of the mismatch between the lowest income and the greatest material and social deprivation. This suggests that the presence of material and social deprivation cannot be explained simply by differences in household income. It is also possible that inter-household support is underestimated in income surveys. In particular, a large share of young people's income comes from parental assistance: the amount of this assistance measured by the survey is all the more important the more detailed the questionnaire is, as can be seen by comparing the amount of assistance provided to young people measured in the ENRJ survey (which is a survey dedicated to the income of the young) with that provided in the SILC survey. In particular, it appears that the use of administrative sources on income overestimates the income poverty rate of young people by 5 points on average, compared to a survey that includes a detailed questionnaire on parental assistance (Martel et al., 2023).

Another possible explanation to the mismatch could be that the assessment of one's own deprivation may vary from one individual to another. There is some degree of subjectivity in this assessment, as noted in [Pan Ké Shon \(2015\)](#). It is also worth noting that subjective assessments of the weight of housing or credit are much better correlated with material and social deprivation than actual measures of effort rate or debt ratios ([Table 3](#)). If we believe that at least some fraction of this subjective variability is undesirable because it does not inform on the individual's actual situation, then it would be another argument for not using material and social deprivations alone as an indicator of poverty, and for imposing an income restriction, as long as one aims at a poverty indicator that is sufficiently correlated with economic factors.

However, it may also be the case there are other determinants to material and social deprivations than what can be captured by such economic measures. Indeed, budget constraints can arise from discrepancies between the time income is received and the time necessary expenses are due ([Morduch and Schneider, 2017](#)). It may very well be the case that households answer that they "cannot afford" something despite having the necessary income or savings at the moment, simply because they anticipate future difficulties, and feel they need to prepare for them. This specific relation with future and time is highlighted by [Papuchon and Duvoux \(2019\)](#), who note a discrepancy between self-perceived and income-based measures of poverty, and interpret the former as an indicator of "lasting social insecurity".

7 Conclusion

We have shown that the material and social deprivations associated with low income allow us to identify a more vulnerable fraction of the population. The people targeted by these indicators constitute a subgroup of income poverty in the classical sense, and the socio-economic difficulties experienced by these people are more intense and more lasting. In this sense, we can speak of an indicator of extreme poverty.

These two dimensions of poverty reinforce each other: adding a criterion of material deprivation to the criterion of income poverty not only increases the correlation with other external indicators of vulnerability, but also increases the duration of income poverty itself. The income measure, on the other hand, is not sufficient to identify those who suffer the most intense and persistent forms of poverty. It therefore seems necessary to use both dimensions together.

This proposed indicator of extreme poverty can be used as a complement to the usual measure of poverty: it defines a sub-section included in poverty in the income sense, and the size of this sub-section can be monitored over time and compared from one country to another, as is the case at the European level with income poverty.

The present work, while focusing on the bottom part of the income distribution, also provides some insights into the rest of the population. Indeed, the analysis of the joint distribution of material deprivation and income highlights the fact that the zone below which a loss of income is associated with a higher probability of deprivation starts quite high in the income distribution, and in most countries above the median. Thus, the zone of “vulnerability” to deprivation is much wider than the zone of poverty itself.

Moreover, the analysis of extreme poverty in the cumulative sense excludes all populations that meet one of the two criteria without meeting both. If the present analysis shows that a partial measure of income for certain categories of the population may be the cause of the mismatch, it is important to question the fraction of the population that suffers a large number of material and social deprivations without living below the income poverty line. These populations are probably subject to specific difficulties or needs that require attention without being dismissed as having too high a measured income. Should we define another type of vulnerable population, the so-called “highly constrained budgets”?

In general, the difficulty of reconciling income and material measures of poverty points to an important line of research. The study of the distribution of material and social deprivation reveals a continuum that is highly correlated with, but does not exactly mirror the distribution of income. It seems necessary to clarify why these measures differ, and to what extent they can be reconciled, so that informed choices can be made about which indicators to use.

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Appendix

A Comparison of populations between SILC surveys and the population census

With the exception of Luxembourg and France, SILC surveys cover more than 98% of the national population in all EU countries. In France, this is due to the fact that the overseas territories of Guadeloupe, Martinique, French Guiana and Reunion are not included in the survey. In each country, the missing part of the population is mainly made up of people who do not live in individual dwellings.

Country	SILC	Population Census	Ratio
Austria	8,652,285	8,822,267	0.98
Belgium	11,241,426	11,398,589	0.99
Bulgaria	7,062,605	7,050,034	1.00
Cyprus	860,478	864,236	1.00
Czech Republic	10,384,504	10,610,055	0.98
Germany	81,010,774	82,792,351	0.98
Denmark	5,730,396	5,781,190	0.99
Estonia	1,304,309	1,319,133	0.99
Greece	10,542,856	10,741,165	0.98
Spain	46,182,803	46,658,447	0.99
Finland	5,427,885	5,513,130	0.98
France	63,375,027	67,026,224	0.95
Croatia	4,064,395	4,105,493	0.99
Hungary	9,609,413	9,778,371	0.98
Ireland	4,860,657	4,830,392	1.01
Italy	60,239,812	60,483,973	1.00
Lithuania	2,808,901	2,808,901	1.00
Luxembourg	576,957	602,005	0.96
Latvia	1,911,538	1,934,379	0.99
Malta	467,291	475,701	0.98
Netherlands	16,932,312	17,181,084	0.99
Poland	36,894,291	37,976,687	0.97
Portugal	10,291,027	10,291,027	1.00
Romania	19,577,005	19,533,481	1.00
Sweden	10,117,667	10,120,242	1.00
Slovenia	2,016,211	2,066,880	0.98
Slovakia	5,352,011	5,443,120	0.98
United Kingdom	65,479,666	66,273,576	0.99

Table A.1: Coverage rate of SILC surveys compared to total population

B Persistence of indicators of different sizes

It is difficult to compare the persistence of poverty indicators that cover very different sizes of the population. In general, the larger the share of the population covered by a poverty indicator, the smaller the proportion of people who move out of poverty from one year to the next. This greater persistence of the most “inclusive” forms of poverty does not necessarily mean that these forms of poverty are more marked or compromise the chances of individuals improving their situation in the future. Rather, it is a mechanical effect due to the fact that the larger the share of the population covered by an indicator, the less likely it is that an individual will escape.

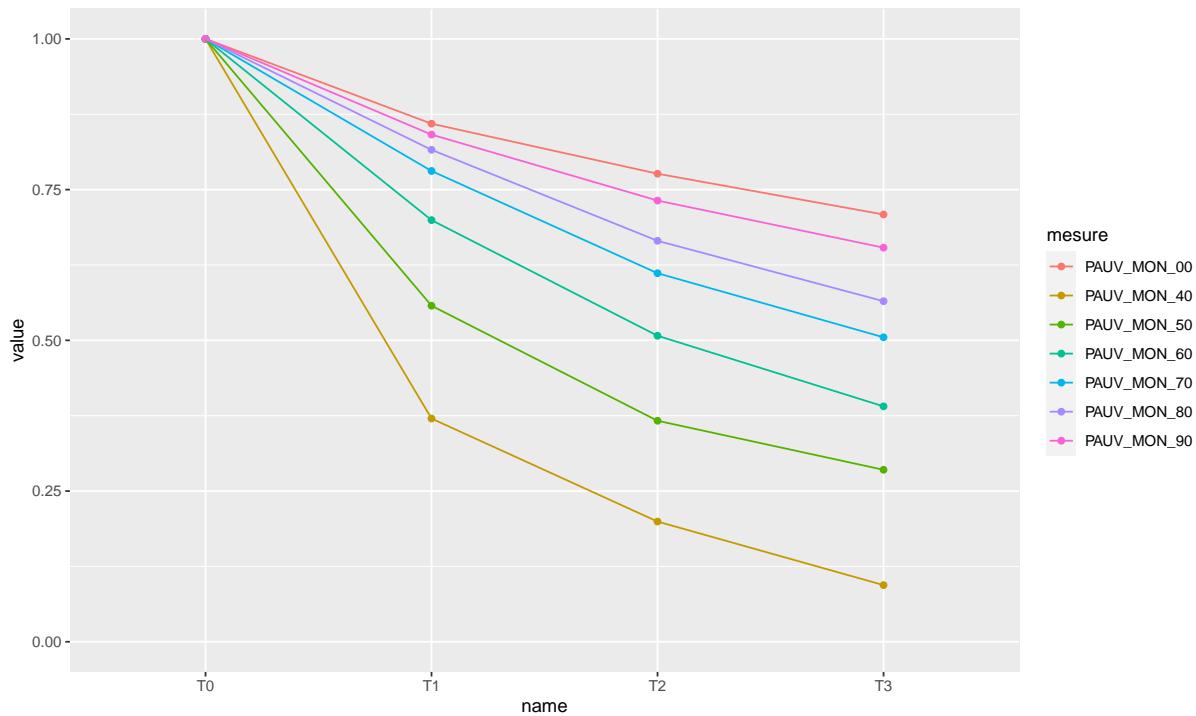


Figure B.1: Share of people staying continuously below the poverty line, by threshold

For example, 71% of people whose equivalized income was below the median in 2015 remained continuously below the median in 2016, 2017, and 2018, while 40% of people whose equivalized income was below the 60% poverty line in 2015 remained below that line in 2016, 2017, and 2018.

This mechanical effect is large enough that we cannot compare the persistence over time of two different poverty indicators, if the indicator that covers the largest share of the population is also the one from which one exits the least frequently. On the other hand, if the indicator that is exited from the least frequently is the one that covers the smallest share of the population, then we can conclude unambiguously that this form of poverty is more persistent.

C Classification of the poor using classification trees

As a complement to the logistic model presented in [Table 3](#), one can use a partition tree to get a sense of the different subgroups of poverty in terms of material and social deprivation.

Given a sample of individuals, a dependent variable, and a set of independent variables, one can build a decision tree to best predict the value of the dependent variable. Here, the goal is to use socio-demographic and economic variables about people in income poverty to determine whether they suffer from material and social deprivation. The process of choosing the best possible decision tree⁸ will reveal interesting associations between the independent variables and the dependent variable.

We present in [Figure C.1](#) the result of a recursive partitioning based on the same variables used in [Table 3](#). Only the most informative variables are shown, according to a trade-off between complexity of the tree and predictive power (see [Therneau, Atkinson, and Foundation, 2022](#), for a description of how this trade-off is implemented). This decision tree consists of 16 classes that differ in their average rate of material and social deprivation. For example, the first group consists of individuals:

- who report a financial burden of housing as "not a burden" or "a slight burden".
and
- whose occupational status is "Farmers", "Business owners", "Managers", "Intermediate" or "Students".

This group has an average material deprivation rate of 0.12 and represents 18% of the population of the sample of people in income poverty.

The groups in red color are those where material and social deprivation is the most prevalent. For example, the group who reports that the financial burden of their housing is a "Heavy burden" and who are unemployed or inactive represents 14% of the sample, and their average material and social deprivation rate is 0.79.

This confirms several of the results of the logistic regression. First, the most important variable is a rather subjective one: it is a qualitative assessment of the “burden” of housing expenses. Second, occupations and activity statuses play a major role, in particular the fact of being unemployed. Third, the role of income (below the poverty threshold) is ambiguous. It appears as a decision rule within a subgroup, and being under the threshold of 43% of the median income actually *decreases* the probability of being in material and social deprivation.

⁸There is actually no algorithm that can efficiently find *the* optimal decision tree, but some algorithms, such as the one used here, provide good enough second-best, i.e., locally optimal solutions.

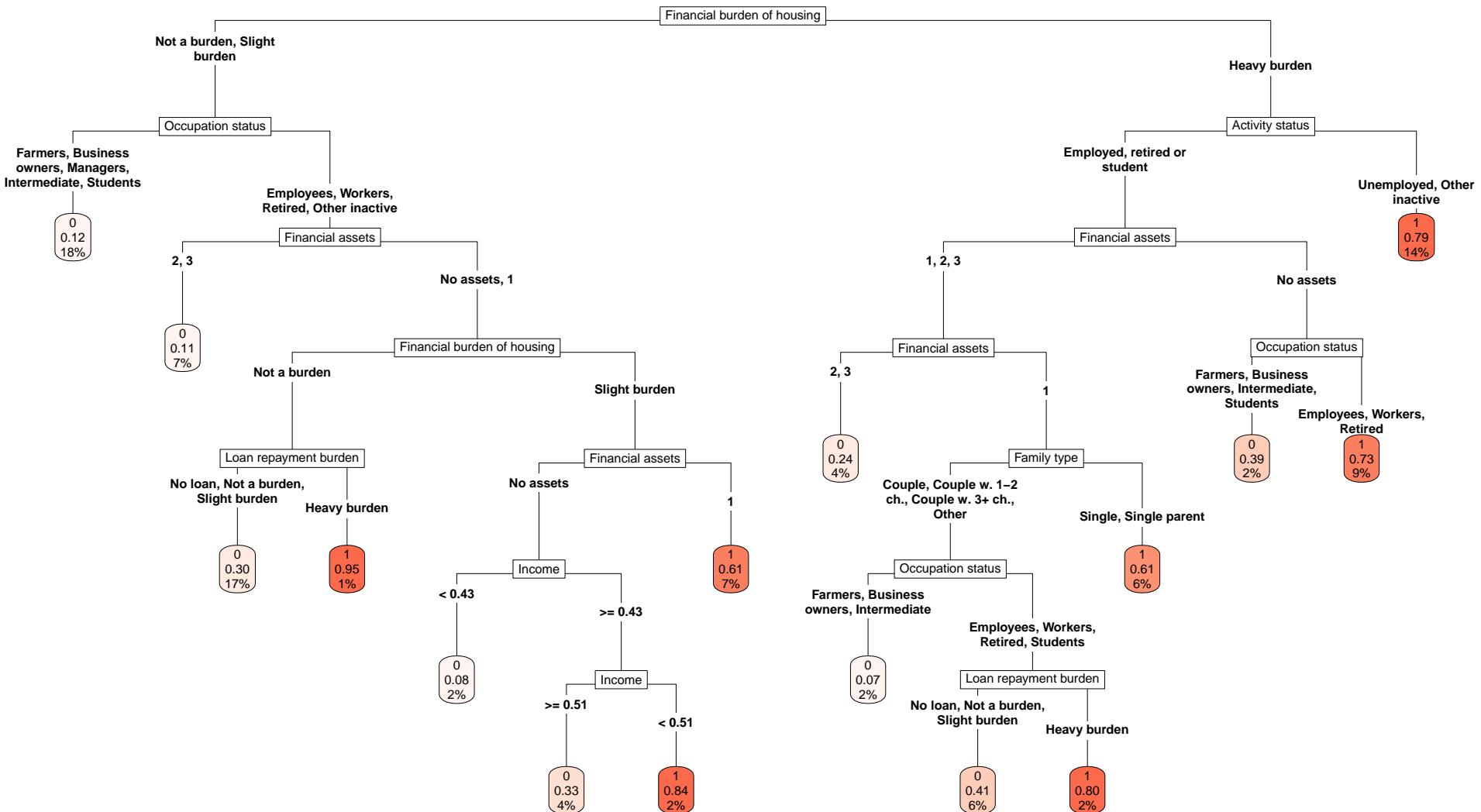


Figure C.1: Classification using a regression tree

D Extreme poverty in non-ordinary households

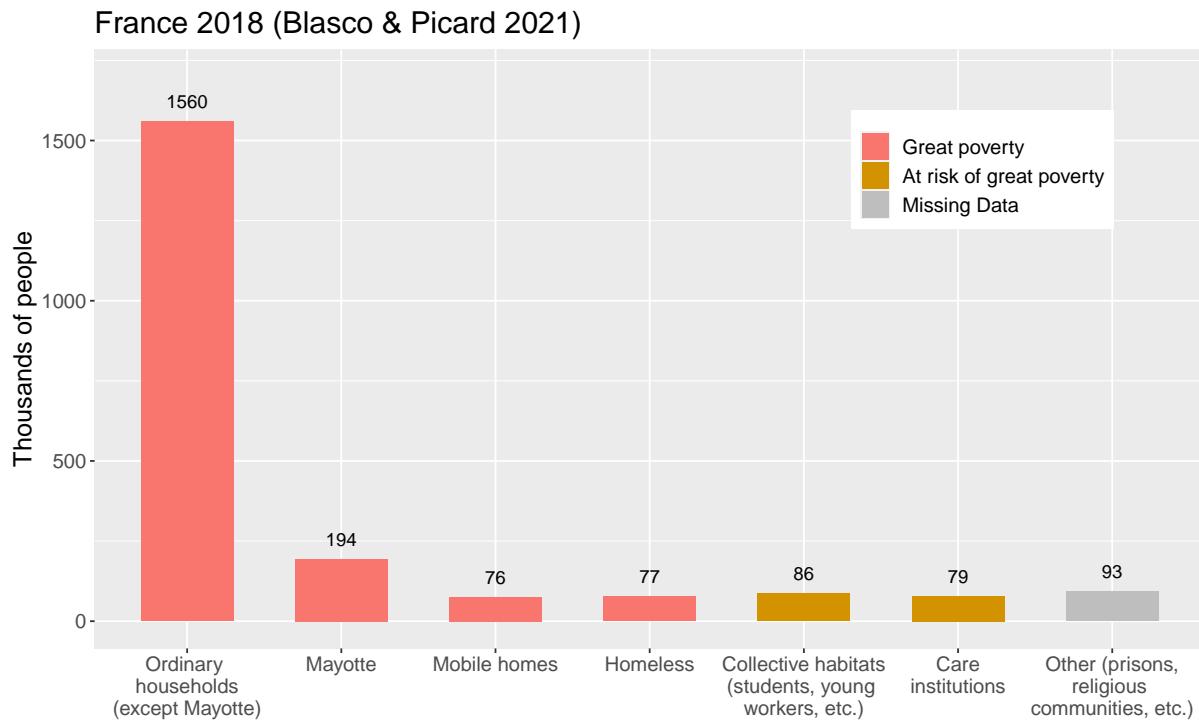


Figure D.1: Headcount of extreme poverty including people not living in ordinary households (France 2018)

To supplement the information obtained from ordinary households, other statistical sources can be mobilized (population census, surveys in collective establishments, surveys of recipients of minimum social benefits, etc.). In France in 2018, ordinary households represent at least 80% of people in extreme poverty, outside of Mayotte⁹ (Blasco and Picard, 2021). Half of the remaining 20% are homeless or living in confirmed economic hardship in mobile homes, and half are living in collective housing and in severe income poverty, but whose living conditions cannot be observed in surveys (young workers' hostels, ehpad, etc.).

These proportions may vary between countries depending on the prevalence of non-ordinary housing situations, in particular the proportion of the population living without shelter. However, the order of magnitude confirms that measuring extreme poverty with household surveys allows us to capture the largest share of extreme poverty in the sense described above.

E The impact of the monetary poverty line in France

A significant proportion of people in situations of material and social deprivation (severe or ordinary) have an equivalized income above the poverty thresholds of 50% and 60% of the median. In France, among the people in a situation of ordinary material and social deprivation, 12% even have an equivalized income above the median.

⁹Here Mayotte is counted separately, as income and living conditions in this territory differ greatly from that of the rest of France.

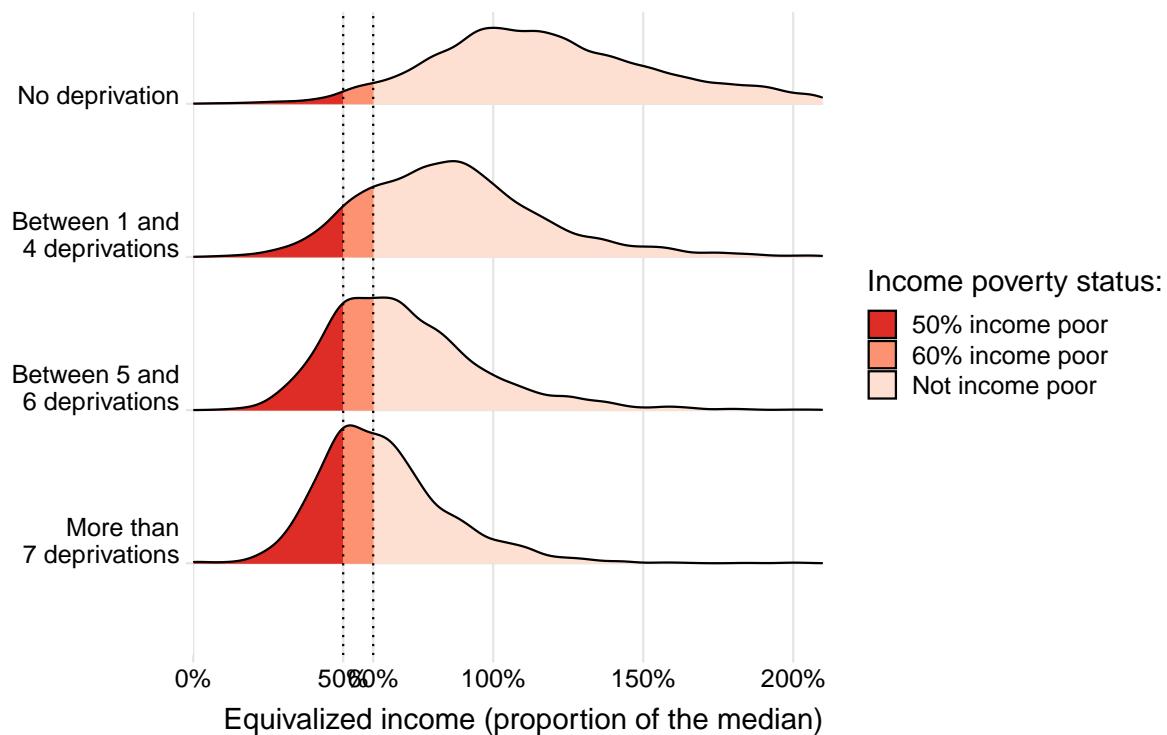


Figure E.1: Income distribution by deprivation level (France 2019)

It is these profiles whose presence in the target population will be affected by the choice of monetary threshold. In particular, the choice of the monetary poverty line has an important implication on the proportion of seniors and retirees who will be identified by the indicator. Indeed, in France, these people have a narrower distribution of income, especially at the lower end of the income scale: the proportion of retirees whose equivalized income is below 60 percent of the median is much lower than in the rest of the population, and even lower below the threshold of 50 percent of the median.

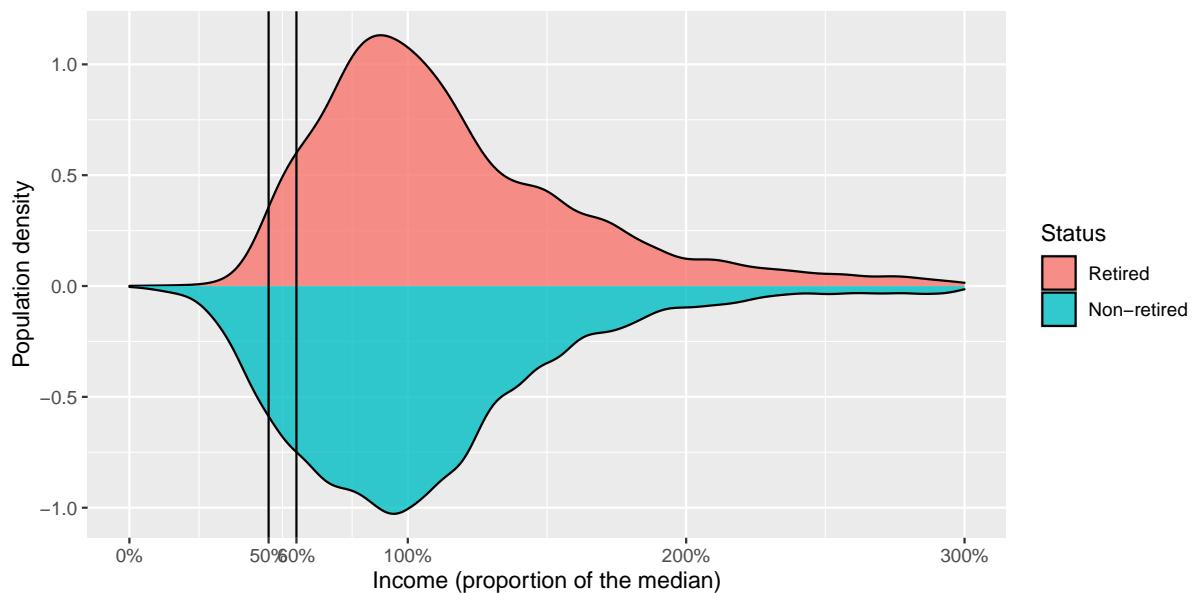


Figure E.2: Density of equivalized income for retired and non-retired

It is all the more important to keep this in mind that retirees have a material and social deprivation rate that is significantly higher than their income poverty rate: while

their income poverty rates are much lower than those of the rest of the population, their material and social deprivation rates are close to the rest of the population. As a result, in the case of France, imposing an income threshold results in a significant proportion of retirees whose equivalized income is above the poverty line, but who may still suffer significant material and social deprivation, being removed from the indicator's target.

Conclusion (en français)

– [English version on page 193.](#)

Après plus d'un demi-siècle d'avancées méthodologiques et conceptuelles, les inégalités de revenu ont pris une place centrale dans les champs académique et politique. Cependant, certains obstacles subsistent dans la mesure du revenu, et plusieurs définitions de celui-ci coexistent sans recouvrir la même réalité.

Cette thèse présente trois contributions à la mesure des inégalités économiques et de la pauvreté, qui complètent les approches usuelles fondées sur le revenu pour le rendre plus adapté aux différentes questions qu'on souhaite lui poser. Ces contributions poursuivent des buts différents : la première est une extension de la mesure du revenu, la deuxième en est une décomposition, et la troisième en est un complément.

La première contribution montre que le revenu disponible des ménages peut être étendu en y intégrant les taxes à la consommation payées par ceux-ci. Comme les taxes à la consommation représentent une part du revenu plus importante pour les ménages pauvres que pour les ménages plus aisés, cela donne à voir une distribution des revenus plus inégalitaire que ce qui pouvait être mesuré précédemment, et le pouvoir redistributif des systèmes socio-fiscaux s'avère diminué. La prise en compte des taxes à la consommation permet de préciser les comparaisons internationales d'inégalités de revenus et de redistribution, car l'impact de ces taxes varie de manière importante d'un pays à l'autre.

La deuxième contribution analyse l'évolution des inégalités de niveau de vie en France sur les cinquante dernières années. Elle montre que ce sont principalement l'augmentation des pensions de retraites et les variations de revenu salarial qui ont déterminé l'évolution des inégalités de niveau de vie sur la période, même si les changements des configurations familiales ont contribué à une augmentation constante des inégalités de niveau de vie. Cette analyse permet d'ouvrir « la boîte noire » du revenu en mesurant les contributions relatives de la structure de la population, d'une part, et de la composition des revenus, d'autre part, à l'évolution de la distribution des niveaux de vie.

La troisième contribution propose de compléter la mesure du revenu par celle des privations matérielles afin d'identifier les situations de grande pauvreté dans les pays développés. Elle montre que le revenu seul est insuffisant pour identifier les personnes

qui subissent les plus grandes difficultés socio-économiques et celles qui resteront plus longtemps en situation de pauvreté. En revanche, les personnes qui cumulent des faibles revenus et des privations matérielles et sociales sont effectivement dans des situations de pauvreté plus intenses et plus durables. Cette contribution montre que la grande pauvreté n'est pas réductible à une situation de faibles revenus, aussi bien mesurés soient-ils, et que des mesures complémentaires sont nécessaires.

Les travaux présentés dans cette thèse, par leurs façons différentes de compléter l'approche usuelle de la mesure du revenu, appellent à différentes perspectives et études ultérieures. Certaines d'entre elles promettent une meilleure qualité et une meilleure comparabilité des mesures d'inégalité et de pauvreté. D'autres ouvrent plutôt la voie à une meilleure compréhension de la nature de ces inégalités, de ce qui les cause et de ce qu'elles signifient pour les populations.

Le modèle d'imputation des taxes à la consommation permet une meilleure comparabilité des niveaux d'inégalités de revenus entre les pays, et met en lumière l'effet différencié que ces taxes peuvent avoir sur l'effet redistributif des systèmes socio-fiscaux. Ce modèle pourrait être intégré à divers travaux de comparaison internationale des inégalités, comme ceux des comptes nationaux distribués, en particulier quand des données sur la consommation ne sont pas forcément disponibles. Il gagnerait à être affiné par de meilleures hypothèses sur la progressivité des taxes implémentées par les différents pays, ainsi que par une exploration plus précise des déterminants des écarts de propension à consommer entre ménages pauvres et ménages aisés.

La méthode de décomposition des inégalités présentée dans cette thèse est prometteuse car elle peut s'adapter à de nombreuses données et cadres d'analyse. L'étude sur la France gagnerait à intégrer plus de dimensions, comme un repérage plus précis du chômage et de la quotité de travail, ou encore l'utilisation des diplômes ou du secteur d'activité. Ces améliorations sont possibles avec les séries des enquêtes Revenus fiscaux et sociaux disponibles depuis 1996. Une modélisation plus adaptée des évolutions de la distribution des revenus catégoriels pourrait également faire gagner le modèle en pouvoir explicatif. Par ailleurs, ce type d'analyse pourrait tout à fait être réalisé dans un contexte international, avec des données LIS ou SILC par exemple, pour aller au-delà de la comparaison internationale des tendances d'inégalités.

L'indicateur de grande pauvreté pourrait éclairer des analyses en comparaison internationale et temporelle. Par ailleurs, les questions qui ont présidé à sa construction, c'est-à-dire les écarts entre mesures du revenu et des privations, devraient être approfondies pour saisir le fond de ce qui les différencie. Cela soulève des questions de subjectivité, de rapport au temps, de stratégies de consommation des personnes pauvres. Il s'agirait également de mieux comprendre le lien entre revenus et privations matérielles et sociales au milieu de la distribution des revenus, dans la zone où les personnes ne sont pas considérées comme pauvres, mais sont en risque de privation.

* * *

Cette thèse donne quelques pistes pour mieux utiliser le revenu dans la mesure des inégalités économiques et de la pauvreté. Cet indicateur reste un de nos meilleurs outils pour comprendre les forces qui structurent et stratifient notre société : il nous informe sur les dynamiques qui permettent une prospérité partagée et sur celles qui participent à l'isolement des plus vulnérables. À nous de faire en sorte d'imposer les premières et de combattre les secondes.

Conclusion (in English)

After more than half a century of methodological and conceptual advances, income inequality has taken center stage in academic and political debates. However, certain obstacles to the measurement of income remain, and several definitions of income coexist without covering the same reality.

This thesis presents three contributions to the measurement of economic inequality and poverty, which complement the usual approaches based on income to make it more suitable for the different questions we wish to ask. These contributions pursue different goals: the first is an extension of income measurement, the second is a decomposition, and the third is a complement.

The first contribution shows that household disposable income can be extended by including consumption taxes paid by households. As consumption taxes represent a larger share of income for poorer households than for better-off households, this reveals a more unequal income distribution than previously measured, and the redistributive power of socio-fiscal systems is diminished. Taking consumption taxes into account enhances international comparisons of income inequality and redistribution, as the impact of these taxes varies significantly from one country to another.

The second contribution analyzes the evolution of living standards inequality in France over the last fifty years. It shows increases in retirement pensions and changes in labor income were the main determinants of the evolution of living standards inequality over the period, even if changes in family configurations have contributed to a constant increase in living standards inequality. This analysis opens up the black box of income by measuring the relative contributions of population structure and income composition to changes in the distribution of living standards.

The third contribution proposes to complement the measurement of income with that of material deprivations, in order to identify situations of extreme poverty in developed countries. It shows that income alone is insufficient to identify those who suffer the greatest socio-economic difficulties and those who will remain in poverty for longer. On the other hand, people who combine low income with material and social deprivation are indeed in more intense and longer-lasting situations of poverty. This contribution shows that extreme poverty is not reducible to a situation of low income, however well measured,

and that complementary measures are needed.

The works presented in this thesis, in their different ways of complementing the usual approach to income measurement, call for different perspectives and further studies. Some promise better quality and comparability of inequality and poverty measures. Others open the way to a better understanding of the nature of these inequalities, what causes them and what they mean for populations.

The consumption tax imputation model enables better comparability of income inequality levels between countries, and highlights the differentiated effect these taxes can have on the redistributive effect of socio-fiscal systems. This model could be integrated into various international comparisons of inequalities, such as those based on distributed national accounts, particularly when consumption data are not necessarily available. It would also benefit from being refined by better assumptions on the progressivity of taxes implemented by different countries, as well as by a more precise exploration of the determinants of differences in propensity to consume between poor and well-off households.

The inequality decomposition method presented in this thesis is promising because it can be adapted to a wide range of data and analytical frameworks. The study on France would benefit from incorporating more dimensions, such as more precise identification of unemployment and work share, or the use of education or sector of activity. These improvements are possible with the series of surveys available since 1996. More appropriate modeling of changes in the distribution of categorical incomes could also enhance the explanatory power of the model. Furthermore, this type of analysis could be carried out in an international context, using LIS or SILC data for example, to go beyond the international comparison of inequality trends.

The extreme poverty indicator would benefit from being confronted with analyses based on international and temporal comparisons. In addition, the issues that underpinned its construction, i.e. the differences between measures of income and deprivations, need to be explored in greater depth, to get to the heart of the differences between them. This raises questions about subjectivity, the relationship to time, and the expenditure strategies of the poor. We also need to better understand the link between income and material and social deprivation in the middle of the income distribution, the zone where people are not considered poor, but are at risk of deprivation.

* * *

This thesis outlines a number of ways in which income can be better used to measure economic inequality and poverty. This indicator remains one of our best tools for understanding the forces that structure and stratify our society: it informs us about the dynamics that enable shared prosperity and those that contribute to the isolation of the most vulnerable. Making sure the former are enforced and the latter combated is up to us.

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