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Anasuya Raj

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INSTITUT POLYTECHNIQUE DE PARIS

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Thèse de doctorat

Essays in Public Economics and Political Economy

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Introduction Générale

Cette thèse s'inscrit dans les domaines de l'économie publique et de l'économie politique. Comme son nom l'indique, l'économie publique s'intéresse au secteur public et traite de la conception ainsi que des effets des politiques publiques – tout particulièrement de la fiscalité, la redistribution et la fourniture de biens publics. L'économie politique, pour sa part, cherche à comprendre les implications de la politique sur l'économie. Les deux coexistent en tant que disciplines à part entière, mais dans chacune, l'hétérogénéité entre individus occupe une place centrale. En effet, si la société était homogène et tous les individus étaient identiques, il n'y aurait pas d'inégalités donc aucune raison de redistribuer et il n'y aurait aucun conflit d'intérêts donc aucune raison de voter. De plus, ces deux domaines se complémentent. En effet, une grande partie du champ de l'économie politique concerne l'un des principaux objets d'étude de l'économie publique : la redistribution. L'économie publique, quant à elle, repose traditionnellement sur l'existence d'un gouvernement bienveillant adoptant des politiques qui maximisent le *bien-être*[1] de la société. Inclure des considérations politiques en examinant l'interaction entre les institutions démocratiques d'une part et des individus et décideurs publics intéressés[2] d'autre part enrichit évidemment considérablement ces analyses. Ceci permet à la fois de déterminer quelles politiques publiques seraient réalistes politiquement dans des contextes donnés et d'expliquer pourquoi certaines politiques seraient plus répandues que d'autres. À une époque où les économistes sont de plus en plus appelés à conseiller les décideurs publics, il semble dès lors crucial de comprendre quelles politiques gagneraient l'approbation d'une majorité électorale.

Cette thèse s'articule selon deux parties : l'une empirique, l'autre théorique. Dans la partie empirique, j'étudie les opinions de décideurs publics via l'utilisation de données de sondages. Pour sa part, mon travail théorique se concentre sur les politiques de redistribution, plus précisément sur l'impôt sur le revenu, et cherche à enrichir des modèles classiques de taxation. Premièrement, en intégrant des considérations politiques, je cherche à expliquer une caractéristique particulière de nombreux systèmes fiscaux des pays développés : l'importante proportion de la population exemptée de l'impôt sur le revenu. Deuxièmement, dans un monde de plus en plus connecté, comprendre l'impact des relations humaines sur la conception des politiques publiques s'avère primordial. Ces considérations sont au cœur de mon analyse de l'impact des liens familiaux et sociaux sur la conception de l'impôt sur le revenu.

1. Politiques publiques et systèmes d'imposition

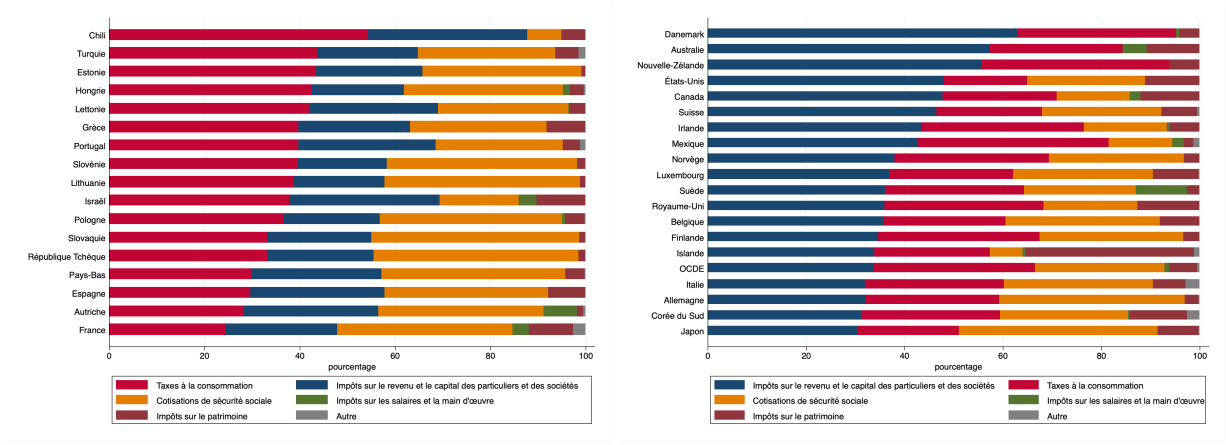
À travers le monde, les gouvernements diffèrent de par la diversité de leurs systèmes politiques ainsi que des politiques publiques qu'ils mettent en place. Leurs dépenses varient aussi bien dans leurs montants que dans leurs compositions et dans leurs sources de financement. Mais, malgré l'hétérogénéité des voies empruntées par les différents pays, l'État a considérablement gagné en importance au XXe siècle. Ceci est tout particulièrement visible si l'on s'intéresse à la part des dépenses publiques rapportées au PIB, qui a doublé au cours des années 1920, avant de connaître une seconde accélération significative entre les années 1960 et 1980 (voir Lindert (2004)). Cette croissance des dépenses publiques est logiquement financée par une augmentation des recettes publiques, lesquelles varient en termes de parts du PIB et de sources selon les pays. En général, les recettes des pays à

[1] Notion certes très subjective, mais qui sera formalisée plus bas.
[2] Par opposition à une attitude désintéressée.

revenus plus élevés représentent un pourcentage plus important de leur PIB et proviennent principalement des recettes fiscales[3]. Ainsi, en 2011, les recettes publiques s'étalaient de 11% du PIB à Madagascar et au Bangladesh à 68% du PIB au Koweït ; en 2016, elles représentaient en moyenne 42% du PIB dans les pays de l'OCDE. Et aujourd'hui, pour la plupart des pays, les impôts perçus représentent la majorité des recettes publiques : au sein de l'OCDE, ils en constituent au minimum 67% au Mexique et au maximum 91% en Italie. Même dans des pays comme le Botswana et la République du Congo, où les recettes non fiscales constituent une part importante des recettes publiques, les impôts perçus représentent tout de même environ la moitié des recettes publiques[4].

Les impôts[5] représentent une part de plus en plus substantielle des revenus de nos gouvernements actuels. Dans la plupart des pays à revenu élevé[6], la capacité fiscale[7] a considérablement augmenté : la part des impôts dans les recettes publiques est passée de moins de 10% en 1880 à 25-30% en 1960 ; ils représentent aujourd'hui 25% du PIB aux États-Unis ou au Japon, tandis qu'ils s'élèvent à environ 45% du PIB en France ou dans les pays scandinaves.

Les recettes fiscales proviennent de cinq sources principales : l'impôt sur le revenu des particuliers, l'impôt sur le revenu des sociétés, les cotisations de sécurité sociale, les taxes à la consommation et l'impôt sur le patrimoine. La structure fiscale varie considérablement d'un pays à l'autre et depuis le début des années 1960, au sein des pays à revenu élevé, la part des taxes à la consommation et des impôts fonciers a diminué au profit des cotisations de sécurité sociale – l'Islande constituant une exception notable à cette tendance en dépendant encore largement de son impôt sur le patrimoine. La Figure 1 montre ces décompositions pour les pays de l'OCDE. Dans les pays en développement, en revanche, la tendance a été d'abandonner le recours aux droits de douanes comme principale source de recettes fiscales dans les années 1980, pour en collecter aujourd'hui l'essentiel via des taxes à la consommation (la TVA en particulier). Avec l'augmentation du nombre de salariés et donc l'avènement des déclarations faites par les employeurs, les impôts sur le revenu commencent seulement à gagner de l'importance dans ces pays (l'Ouganda en est un exemple frappant avec ses réformes menées depuis 2012 visant à augmenter le nombre de contribuables, qui atteint aujourd'hui environ 45% de la population), mais représentent toujours une part très faible du total des recettes fiscales.



(a) Taxes à la consommation (b) Impôts sur les particuliers et les sociétés

FIGURE 1 – Recettes fiscales par source principale, OCDE 2016

Source : *Base de données mondiale des statistiques des recettes publiques* de l'OCDE.

[3]Les recettes non fiscales proviennent des d'amendes, de loyers perçus par l'État et de redevances issues de l'extraction des ressources.

[4]Les chiffres figurant dans ce paragraphe proviennent du Département des finances publiques du FMI et des bases de données de l'OCDE sur les statistiques des recettes mondiales.

[5]Selon la définition de l'OCDE, c'est-à-dire en incluant les cotisations de sécurité sociale.

[6]Selon la classification de la Banque Mondiale en 2019.

[7]La capacité de l'État à lever l'impôt.

Visibles dans la vie de tous les jours, que ce soit en passant devant des agences "spécialisées en déclarations d'impôts" dans certains quartiers de villes américaines, en levant les yeux devant l'*Impostômetro* de l'Association commerciale de Sao Paulo enregistrant en temps réel le montant des impôts perçus dans l'année au Brésil, en écoutant et participant au débat public, en lisant la presse dans les jours précédant la date limite de déclaration de revenus, les impôts font partie des piliers fondateurs de nos États-nations. Historiquement, ils ont longtemps occupé une place centrale pour les États, conditionnant leur existence, leur administration et leur pouvoir. Les premières taxes dont nous avons connaissance remontent à l'Égypte ancienne, aux alentours de 3000-2800 avant JC, où des produits tels que l'huile étaient taxés, et où les recettes fiscales étaient utilisées en grande partie pour financer des guerres. Évoluant à travers les empires grec et romain, elles ont également commencé à acquérir une fonction de protection sociale en finançant les retraites de certaines parties de la population (en général les militaires). Depuis la nuit des temps, les taxes sont utilisées pour financer les biens publics, les guerres, et pour corriger ou changer des comportements individuels – une anecdote amusante à ce propos étant l'introduction en 1698 par l'empereur Pierre Ier de Russie, d'une taxe sur les barbes visant à aligner les canons de beauté russes avec ceux de l'Europe occidentale ; un exemple plus standard étant celui des taxes pigouviennes visant à réduire les émissions polluantes. Cela a simultanément soulevé la question de la répartition de la charge fiscale ; et il existe de nombreux exemples d'impôts croissant avec la richesse des ménages, même dans l'Égypte ancienne où les gens étaient taxés en fonction de la valeur des biens qu'ils possédaient, ou, plus récemment, d'une taxe sur les pianos établie pour quelques années en 1893 en France, ou d'une taxe sur les fenêtres mise en place dans de nombreux pays européens au XIXe siècle, destinée à cibler les plus riches. Avec l'avènement de l'État-providence, les impôts ont également commencé à être considérés comme des instruments de redistribution en eux-mêmes.

Aujourd'hui, l'OCDE définit les impôts comme des "versements obligatoires effectués sans contrepartie au profit des administrations publiques"[8], et, comme l'écrit l'historien Nicolas Delalande, "longtemps présenté comme un symbole d'arbitraire et de coercition, l'impôt a été investi d'une nouvelle signification avec l'avènement de la modernité démocratique : il est devenu l'un des vecteurs du lien social et de la redistribution, une institution fondatrice du pacte social". C'est ainsi que l'impôt s'étend au-delà même du rôle lui ayant été attribué dans l'article 13 de la Déclaration des droits de l'homme et du citoyen de 1789 : "Pour l'entretien de la force publique, et pour les dépenses d'administration, une contribution commune est indispensable : elle doit être également répartie entre tous les citoyens, en raison de leurs facultés."

Enfin, il apparaît désormais essentiel que les impôts reposent sur le consentement et non plus sur la violence. Pour la France, de nombreux exemples historiques de recours à la force sont disponibles dans *Les batailles de l'impôt* de Delalande ; en reprenant l'exemple de la taxe sur les barbes mise en œuvre par l'empereur Pierre Ier de Russie au XVIIe siècle, il est dit que pour faire respecter cette interdiction, le tsar avait autorisé la police à raser de force et publiquement ceux qui refusaient de payer la taxe. La notion de consentement est au cœur de l'article 14 de la Déclaration des droits de l'homme et du citoyen, qui dispose que : "Tous les Citoyens ont le droit de constater, par eux-mêmes ou par leurs représentants, la nécessité de la contribution publique, de la consentir librement, d'en suivre l'emploi, et d'en déterminer la quotité, l'assiette, le recouvrement et la durée."

2. Économie Publique et Économie Politique

La fiscalité est l'un des principaux objets de l'Économie Publique, qui s'intéresse plus largement à la conception et aux effets des politiques gouvernementales. Même si ce domaine s'est développé au milieu du XXe siècle, les problématiques qu'il soulève lui étaient bien antérieures au sein de la science économique – notamment celles en rapport avec la fiscalité. En 1776, Adam Smith lui-même avait déjà exposé les "quatre canons de taxation" dans

[8] Les "impôts n'ont pas de contrepartie en ce sens que, normalement, les prestations fournies par les administrations au contribuable ne sont pas proportionnelles à ses versements" et les "administrations publiques comprennent l'administration centrale et les organismes dont les opérations sont sous son contrôle effectif, les administrations régionales et locales et leurs services, les organismes de sécurité sociale et les entités publiques autonomes, à l'exception des entreprises publiques".

La Richesse des Nations.

Cependant, c'est au milieu du XXe siècle, que Paul Samuelson et Richard Musgrave, ainsi que plusieurs autres économistes, ont contribué à faire de l'économie publique un domaine à part entière. En 1959, Musgrave définit trois responsabilités au gouvernement :
(1) Lever des revenus pour financer les biens publics et allouer les ressources le mieux possible grâce aux incitations fiscales[9] ;
(2) Redistribuer les richesses pour les répartir d'une façon jugée socialement désirable ;
(3) Stabiliser l'activité.

Dans l'introduction de son ouvrage sur la théorie des finances publiques[10], Musgrave met également l'accent sur deux approches aux questions d'économie publique, conformes d'ailleurs aux articles 13 et 14 de la Déclaration des droits de l'homme et du citoyen mentionnés dans la section ci-dessus. Il s'agit d'une approche *normative*, dans laquelle on se pose la question de savoir comment les politiques gouvernementales doivent être conçues pour atteindre certains objectifs et d'une approche par l'*économie politique*[11] dans laquelle la question est plutôt de savoir pourquoi certaines politiques publiques sont effectivement observées et quelles seraient les politiques publiques réalisables compte tenu de certaines contraintes politiques, sociales et économiques. Les deux approches s'appuient sur des *analyses positives* des politiques gouvernementales, dont l'objectif est de déterminer l'effet de ces politiques sur l'économie (via le comportements des ménages et des entreprises). Dans cette thèse, j'adopte des perspectives à la fois normative et d'économie politique pour aborder la question de la conception des systèmes fiscaux, et je m'appuie sur les résultats de la littérature positive pour les applications de mes résultats théoriques.

Dans ce qui suit, nous exposons plus en détails l'approche normative de l'économie publique en mettant l'accent sur la théorie de la fiscalité optimale ; et l'économie politique, à la fois comme champ en soi, et comme application de l'économie publique en se concentrant plus particulièrement sur la redistribution.

L'approche normative de l'économie publique. L'économie publique normative s'intéresse à la conception de *politiques publiques optimales* par le gouvernement, considéré comme un *Planificateur social bienveillant* cherchant à maximiser une certaine agrégation des préférences individuelles, la *fonction de bien-être social*, sous un ensemble de contraintes. Le premier type de contraintes relève de l'impératif d'équilibre budgétaire. Le second se rapporte aux contraintes d'incitation, dues à l'asymétrie d'information entre le gouvernement et les individus, qui permet aux individus d'ajuster leurs comportements. Dans le cas de la fiscalité, de tels ajustements peuvent se traduire par des situations dans lesquelles des particuliers travaillent moins lorsque les impôts augmentent, ou se déplacent d'une zone géographique à une autre pour échapper à certains types d'impôts. Dans l'exemple de l'impôt sur les fenêtres mentionné dans la section précédente, certains individus évitaient partiellement l'impôt en scellant ces dernières[12].

Le problème exposé ci-dessus correspond au cadre utilisé en *taxation optimale*, cadre visant à informer la conception de l'impôt sur le revenu sous certains objectifs. De façon générale, on considère que les individus sont dotés d'aptitudes hétérogènes déterminées de façon exogène. Ces aptitudes déterminent la productivité des individus. Formellement, supposons que la société est composée de I individus, indéxés par $i = 1, ..., I$, chacun avec une utilité u_i et un revenu y_i, et supposons que le gouvernement requiert de façon exogène un budget d'un montant de E. Son objectif est ensuite de mettre en place un impôt sur le revenu $T(y)$ qui maximise la Fonction de Bien-Être Social $FBS(u_1, ..., u_I)$ sous la contrainte budgétaire que les recettes fiscales sont supérieures ou égales au budget

[9] Et ainsi corriger les défaillances du marché.
[10] Intitulé *The Theory of Public Finance*, et qu'il considère comme un manuel d'économie publique, tout en préférant se référer aux finances publiques, car c'est le terme établi pour la discipline à l'époque.
[11] Que Musgrave appelle sociologie de la politique fiscale.
[12] Nous verrons que dans le cas de l'impôt sur le revenu, ces réactions comportementales peuvent être exprimées en utilisant l'élasticité du revenu imposable, voir par exemple Piketty, Saez et Stantcheva (2014).

requis : $T(y_1) + ... + T(y_I) \geq E$, et tout en respectant les contraintes d'incitation.

Il convient de noter ici que cette approche de la fiscalité ne peut être dissociée de la philosophie morale et politique, car elle doit établir deux principes fondamentaux, eux-mêmes entremêlés : le rôle du gouvernement d'une part, et la manière d'agréger les préférences des individus d'autre part. Outre la correction des défaillances du marché, le gouvernement devrait-il également s'occuper de redistribution ? Si oui, comment redistribuer ? Si non mais s'il est tout de même nécessaire de générer des recettes pour financer des biens publics, comment répartir la charge fiscale entre les citoyens ? En termes mathématiques, quelle devrait être la forme de la fonction de bien-être social $FBS(u_1, ..., u_I)$?

Ces débats ont connu une intensité particulière au XXe siècle mais remontent à une période beaucoup plus ancienne. Pour ne citer que quelques économistes et philosophes qui ont examiné ces questions, nous pouvons remonter à la fin du XVIIIe siècle, en particulier à Jeremy Bentham, l'un des fondateurs de l'utilitarisme moderne, dont l'axiome fondamental dans son ouvrage de 1776 *A Fragment on Government* est le suivant : "c'est le plus grand bonheur du plus grand nombre qui est la mesure du bien et du mal". Au milieu du XXe siècle, l'utilitarisme a donné naissance à la règle de John Harsanyi selon laquelle la fonction de bien-être social serait égale à l'espérance des utilités. John Rawls, en revanche, dans son ouvrage de 1971 *A Theory of Justice*, aborde la question de la justice distributive et, en introduisant le concept du choix derrière un "voile d'ignorance"[13] conclut que l'État devrait être guidé par le *principe du maximin* : il devrait maximiser l'utilité de l'individu le moins aisé de la société. La réponse de Robert Nozick trois ans plus tard dans *Anarchy, State and Utopia* s'oppose à ces théories. Nozick défend une perspective libertarienne, plaidant pour un État minimal destiné uniquement "à protéger contre la force, la fraude, le vol et à l'administration des tribunaux".

D'autres considérations ont émergé vers la fin du XXe siècle, avec Amartya Sen notamment. Ce dernier commence par remettre en cause un élément fondamental de la théorie de la fiscalité optimale du revenu : le concept d'aptitude déterminant la productivité des individus. Considérant que ce n'est pas une bonne mesure du bien-être potentiel des individus, il introduit le concept de "capabilité" dans les années 80 : ce ne sont pas les aptitudes ou productivités individuelles qui comptent d'après lui ; ce qui est important, c'est la capacité individuelle à transformer ces aptitudes – capacité qui dépend en grande partie de l'environnement dans lequel évoluent les individus.

Dans la plupart des travaux contemporains, une certaine forme d'utilitarisme (pondérée ou non) est utilisée (l'utilitarisme pondéré recouvre bien le critère de *maximin*, car cela correspond à une situation dans laquelle tout le poids est placé sur l'utilité de l'individu le moins aisé). Fleurbaey et Maniquet (2011), ainsi que Saez et Stantcheva (2016)[14] proposent des cadres d'analyse encore plus généraux.

Cela nous amène donc à l'approche moderne de l'imposition optimale des revenus introduite par Mirrlees dans son article de 1971. L'arbitrage fondamental auquel est confronté un décideur lorsqu'il redistribue le revenu d'individus à productivité élevée aux individus à productivité moins élevée est l'*arbitrage équité-efficacité* : d'une part, la redistribution sert à réduire les inégalités, mais d'autre part, elle a pour effet de décourager les individus plus productifs à travailler autant qu'en l'absence de prélèvement d'une partie de leurs revenus – l'idée étant que le gouvernment connaît le revenu des individus mais ignore leur productivité[15]. D'une part, donc, la redistribution de ceux qui ont une capacité de production plus élevée à ceux pour qui elle est plus faible augmente le bien-être social (la somme pondérée des utilités individuelles). En effet, l'utilité étant concave, les individus à plus faible productivité sont moins aisés et ont donc une utilité marginale plus élevée ayant pour conséquence qu'ils gagnent plus à percevoir un revenu supplémentaire via la redistribution permise par les impôts. D'autre part, ce gain

[13] Ceci se réfère à une situation où personne ne connaît sa place dans la société, ou ses talents.

[14] Saez et Stantcheva (2016) étudient des *fonctions de bien-être généralisées* avec des poids qui ne sont pas nécessairement compatibles avec la maximisation d'une fonction de bien-être social utilitaire. Les pondérations généralisées peuvent également refléter des jugements de valeur ou des forces d'économie politique non utilitaires.

[15] Ou aptitude.

de bien-être social s'accompagne d'une perte : si les impôts sont plus élevés pour les individus plus productifs, ces individus peuvent être amenés à travailler moins et à prétendre que leurs capacités productives sont plus faibles, profitant ainsi de l'asymétrie d'information entre eux-mêmes et le gouvernement. Ce faisant, les individus choisissent la quantité de travail qui maximise leur propre utilité, qui n'est plus celle qui maximise la fonction de bien-être social : les impôts distordent les décisions d'offre de travail. L'arbitrage équité-efficacité traduit donc cet équilibre que le gouvernement doit opérer entre les gains redistributifs de la fiscalité, et les pertes créées par la distorsion des décisions d'offre de travail des individus.

Depuis Mirrlees (1971), puis avec Piketty (1997) et Saez (2001), nous connaissons la formule des taux marginaux d'imposition optimaux pour chaque niveau de revenu. En combinant la formule des taux marginaux avec les contraintes budgétaires du gouvernement, nous obtenons la forme optimale du schéma d'imposition. Le taux d'imposition marginal à un niveau de revenu donné est égal au montant des impôts qui seraient prélevés sur l'euro[16] supplémentaire gagné. À un niveau de revenu donné, l'augmentation des taux d'imposition marginaux : (i) permet de générer plus de recettes fiscales, prélevées sur tous les individus aux revenus supérieurs à ce niveau ; (ii) nuit à tous les individus ayant des revenus supérieurs à ce niveau (ceci est une considération subjective, et dépend des poids que le gouvernement accorde à l'utilité de ses différents citoyens, ces poids étant donné par la fonction de bien-être social FBS) ; (iii) distord les décisions d'offre de travail des individus ayant des revenus supérieurs ou égaux à ce niveau[17], ; (iv) a un effet qui dépend du rapport entre le nombre de personnes ayant ce niveau de revenu et le nombre de personnes ayant un revenu supérieur.

Le barème optimal de l'impôt sur le revenu dépend donc de trois *statistiques suffisantes* (telles que définies dans Chetty (2009)) : (i) l'élasticité du revenu imposable, c'est-à-dire la variation en pourcentage des revenus consécutive à une augmentation de 1% du taux d'imposition marginal ; (ii) la distribution des revenus imposables ; (iii) les *pondérations sociales* que le gouvernement attribue aux individus (c'est-à-dire la forme de FBS).
Ces statistiques sont toutes endogènes au système fiscal[18], mais l'idée sous-jacente aux statistiques suffisantes réside dans le fait que pour de petites variations, ces facteurs peuvent être mesurés et transposés à différents contextes. Un des volets de l'économie publique positive a d'ailleurs pour rôle d'utiliser des méthodes empiriques pour mesurer ces statistiques suffisantes.

Dans la plupart des travaux qui ont suivi Mirrlees (1971), les poids dans la fonction de bien-être social sont considérés comme donnés. Cependant, des travaux récents ont commencé à adopter une perspective positive concernant ces questions (voir Bourguignon et Spadaro (2012), Lockwood et Weinzierl (2014), Jacobs, Jongen et Zoutman (2017)) : étant données les politiques en place dans les différents pays, que peut-on déduire du profil des poids que les gouvernements attribuent aux différents individus de leur société ? Cela nous conduit naturellement vers l'approche de l'économie politique face aux questions fiscales, approche pour laquelle il est fondamental de connaître les préférences des décideurs publics lors de l'analyse des politiques publiques.

L'économie politique. Même si l'économie politique a été pendant un temps perçue comme un sous-champ de certains domaines de la science économique[19], elle y occupe aujourd'hui une place importante, mais a changé de nature au fil du temps. D'abord utilisé comme synonyme de l'économie, comme l'indique la définition donnée par Marshall en 1890 selon laquelle "l'économie politique ou l'économie étudie l'humain dans les affaires ordinaires de la vie ; elle examine cette partie de l'action individuelle et sociale qui est le plus étroitement liée à l'atteinte

[16](/ dollar / roupie / franc / rouble / real / ...)

[17]Ou tout simplement ceux des individus à ce niveau de revenu, s'il n'y a que les effets de substitution qui entrent en jeu et non les effets revenu.

[18]Elles en dépendent.

[19]Comme c'est toujours le cas dans les codes de classification JEL, où l'économie politique n'est pas affectée à un domaine particulier, mais apparaît plutôt comme un sous-champ de la Microéconomie (D) – dans l'analyse de la prise de décision collective (D7) –, de l'Économie Internationale (F) – dans les relations internationales, la sécurité nationale et l'économie politique internationale (F5) –, et enfin des Systèmes Économiques (P) – dans le capitalisme (P1), le socialisme (P2) et les autres systèmes économiques (P4)).

et à l'utilisation des conditions matérielles du bien-être", le terme d'économie politique a commencé au début du XXe siècle à être employé pour désigner une discipline séparée. En 1939, Robbins commence à distinguer les deux dans ses essais en économie politique, définissant l'économie comme "un système de connaissances théoriques et positives", tandis que l'économie politique, elle, est réservée à des sujets appliqués tels que l'étude des monopoles, de la planification et des politiques fiscales du gouvernement[20]. Vers la fin du XXe siècle, avec les ouvrages de Drazen d'une part et de Persson et Tabellini d'autre part, l'Économie Politique, ou la *Nouvelle* Économie Politique comme la nomme Allan Drazen, se fait une place à part entière, devenant même l'un des Programmes du NBER en 2006. On peut rapprocher l'Économie Politique de "Théorie des Choix Publiques" de Buchanan et Tullock, qui a apporté des contributions significatives à la théorie constitutionnelle et à la modélisation des politiciens en tant qu'agents intéressés[21], mais qui était peu intégrée dans la science économique traditionnelle, exception faite de quelques économistes qui avaient déjà commencé à prendre en compte de telles considérations dans leurs travaux (comme c'est le cas dans le modèle des lobbies de Becker, ou le modèle politique des cycles économiques de Nordhaus notamment).

La tendance est aujourd'hui à l'augmentation des analyses des politiques publiques au travers du filtre de l'économie politique. Ceci aide tant à la compréhension de certaines politiques observées de nos jours, qu'à l'élaboration de politiques publiques réalistes d'un point de vue politique – voir par exemple l'encouragement à cette tendance dans *Capital et Idéologie* de Piketty (2019). En fait, cette approche peut également être considérée d'une certaine manière comme un objectif normatif. Le planificateur social peut toujours chercher à maximiser une fonction de bien-être social traditionnelle, mais en tenant compte d'un troisième ensemble de conditions : des conditions de faisabilité politique. Prenons l'exemple d'une démocratie pour laquelle, selon Roberts, si "les partis politiques font des choix dans le but de maximiser leurs chances d'être élus, il est possible de considérer les options proposées comme étant déterminées, quoiqu'indirectement, par un processus de vote. La question n'est pas de savoir si les choix dans le domaine public sont *faits via* un mécanisme de vote, mais si les procédures de choix *reflètent* un mécanisme de vote." Dans son cas, la condition de faisabilité politique se traduit par le fait qu'au moins la moitié de la population doit bénéficier de la politique proposée. Alors que les économistes sont de plus en plus appelés à des fonctions de conseillers dans les campagnes politiques, comprendre quelles politiques publiques rassemblent suffisamment de gagnants et pourraient donc s'avérer viables politiquement devient un élément crucial à prendre en compte.

La prise en compte des forces politiques en présence dans la conception des politiques de redistribution remonte aux années 1970. La littérature dans ce domaine est vaste et couvre de nombreuses facettes des politiques redistributives, dans des contextes où tous les individus sont confrontés au même système d'imposition ou des situations où les gouvernements peuvent effectuer des transferts hétérogènes à différents types de populations ; les modèles aujourd'hui permettent de tenir compte des positions idéologiques, des activités de recherche de rente, de la redistribution entre les générations, de l'existence de plusieurs niveaux de gouvernement et de la possibilité de passer d'une juridiction fiscale à une autre.

Deux des articles fondateurs de l'économie politique de l'impôt sur le revenu sont ceux de Roberts (1977) et de Meltzer et Richard (1981). Ces deux articles se restreignent à l'étude d'un régime d'impôt sur le revenu *linéaire* (c'est-à-dire pour lequel le taux d'imposition marginal est le même pour tous les niveaux de revenu), en cas de vote à la majorité, et lorsque tous les individus se voient proposer le même schéma d'imposition (c'est-à-dire lorsque les pouvoirs politiques ne peuvent pas cibler certaines catégories de la population en particulier à l'aide de transferts : il s'agit d'un "traitement égalitaire"). Ils établissent un *théorème de l'électeur médian* : il existe un taux d'imposition qui rassemble une majorité de votes, et c'est le taux préféré de l'individu au revenu médian. Ainsi, plus la société est inégalitaire avant redistribution, plus les revenus médian et moyen sont éloignés, plus le régime fiscal issu du vote à la majorité est redistributif. Par conséquent, l'extension du droit de vote à une plus

[20] Voir la section économie politique dans *Le nouveau dictionnaire de l'économie Palgrave*, Durlauf et al. (2008).
[21] Par opposition au "Planificateur Social bienveillant" de la section précédente.

grande part de la population devrait s'accompagner de taux d'imposition plus élevés. La plupart des hypothèses principales de ces modèles ont depuis été relâchées : l'absence de facteur idéologique, le "traitement égalitaire" des catégories de la population, le caractère statique du modèle, etc. Assouplir l'hypothèse de linéarité s'est en revanche avéré particulièrement compliqué, du fait que, sans aucune hypothèse supplémentaire, le vote sur des barèmes fiscaux non linéaires donnerait lieu à des *cycles de Condorcet*, empêchant qu'une réforme unique ne soit préférée par la majorité des votants.

Enfin, à l'aide d'enquêtes (Alesina, Tabellini et Trebbi (2017), Stantcheva (2020), Fisman, Gladstone, Kuziemko et Naidu (2017), Weinzierl (2016)), les économistes commencent également à explorer empiriquement les préférences des individus, en tenant compte des dimensions culturelles et politiques de ces préférences. Mais pour mener à bien les réformes, le soutien des citoyens n'est pas suffisant. En effet, que ce soit dans une démocratie ou un cadre supranational, une volonté politique est également primordiale. Dès lors, il est utile de récolter des données sur les préférences des décideurs politiques ainsi que d'améliorer notre compréhension des principales dimensions de leurs préférences – en particulier les dimensions culturelles et idéologiques.

L'économie des réseaux. Nous concluons cette section en notant que dans le monde de plus en plus connecté dans lequel nous vivons, les relations, donc les *réseaux* sont plus importants que jamais. Ces réseaux existent depuis toujours : les premières théories sur l'étude des liens sociaux remontent au moins aux époques grecques et romaines tandis que les réseaux de commerce tels que les routes du commerce transsaharien ou la route de la soie existent respectivement depuis des siècles et des millénaires (voir Curtin (1984), Pomeranz et Topik (2017)). Aujourd'hui, la multiplication des connexions ramène les considérations de réseaux au premier plan de la science économique – et Jackson (2010, 2019) en donne de nombreux exemples. La prise en compte des liens familiaux, amicaux, professionnels, religieux ou communautaires permet de mieux comprendre comment les environnements sociaux des individus influencent leurs comportements, et il devient donc essentiel de les inclure dans les analyses positives, normatives et d'économie politique des actions publiques.

En économie politique, des approches positives permettent de comprendre comment les effets de pairs affectent les taux de participation aux élections[22] ou même la nature des votes[23]. En matière fiscale, des approches positives ont également été adoptées pour comprendre l'impact des réseaux sur la facilité d'accès des individus à l'évasion fiscale[24] ou la façon dont les réseaux affectent l'information que les individus ont sur des caractéristiques spécifiques des barèmes d'imposition[25]. C'est récemment que la formalisation de l'économie des réseaux s'est faite en appliquant une partie de la théorie des graphes à l'économie, mais les liens entre individus – sans s'y référer sous le terme de réseaux – étaient déjà étudiés depuis un certain temps. Becker construit une théorie sur les liens intra-familiaux dès 1981. Plus généralement, une importante littérature normative dans les années 1980 s'intéresse à l'interaction entre l'altruisme (qui implique forcément que d'autres personnes soient prises en compte) et la conception des politiques publiques avec par exemple Arrow (1981) ou Bergstrom, Blume et Varian (1986). D'un point de vue normatif également, Bramoullé et Kranton (2007), Bloch et Zenginobuz (2006 ; 2007) ont utilisé les nouveaux outils de l'économie des réseaux pour étudier la fourniture de biens publics.

3. Contributions

Le premier et le deuxième chapitres se concentrent sur le deuxième pilier des rôles du gouvernement selon Musgrave : les politiques de redistribution. Plus précisément, ils présentent des contributions à la théorie de l'impôt sur le revenu et adoptent respectivement une perspective normative et une perspective d'économie politique. Les troisième et quatrième chapitres contribuent à fournir une meilleure compréhension des forces politiques qui

[22] Voir Cho, Gimpel et Dyck (2006), Fafchamps, Vaz et Vicente (2020).
[23] Voir Harmon, Fisman et Kamenica (2019).
[24] Voir Nordblom et Ohlsson (2006), Di porto et Ohlsson (2016) pour l'évasion fiscale dans le contexte des familles italiennes ou Alstadsæter, Kopczuk et Telle (2018) dans le contexte de la Norvège.
[25] Voir Chetty, Friedman et Saez (2013) dans le contexte des États-Unis.

guident les réformes dans les ensembles supranationaux tels que l'Union Européenne. Ils se concentrent sur les préférences d'individus qui jouent un rôle de premier plan dans les processus décisionnels mais sur lesquels nous avons peu de données directes : les hommes et femmes politiques.

Le cadre mis en place par Mirrlees pour l'analyse de la taxation optimale contient une série d'hypothèses dites simplificatrices, qui permettent cependant d'obtenir des résultats très intuitifs. Comme le dit si bien Joseph Kessel dans un contexte certes très différent – son reportage sur la Syrie en 1926[26] – les hypothèses simplificatrices s'avèrent parfois nécessaires : "Pourtant, au bout de quelques jours, on commence à pouvoir lire dans ce grimoire qui paraissait indéchiffrable. Les grands plans apparaissent. Sans doute, en simplifiant, on ne peut tout exposer. Mais n'est-ce pas le seul moyen de comprendre et de se faire comprendre ?" Dans mes premier et deuxième chapitres, en tentant d'éviter l'ajout de complexité superflue, je cherche à enrichir les modèles standard de taxation afin de mieux tenir compte de contextes institutionnels et sociaux. Le Chapitre 1 se penche sur la question de la conception d'un système d'imposition lorsque l'on tient compte des liens entre individus. En effet, jusqu'à présent, la théorie de l'imposition des revenus s'est toujours penchée sur la question de la redistribution entre individus séparés (ou couples). Mais dans de nombreux contextes, les individus ont des liens avec leur famille, leurs amis, les membres de leur village ou de leur communauté, et leur font des transferts réguliers. Ces transferts se font des plus riches vers les plus pauvres, et représentent donc une forme de redistribution informelle. Ma question de recherche est la suivante : comment l'existence de ces transferts informels mais redistributifs devrait-elle affecter la conception des systèmes d'imposition ? Le Chapitre 2 étudie une caractéristique saillante des systèmes fiscaux de nombreux pays développés : la proportion importante de la population qui ne paie pas l'impôt sur le revenu. En utilisant les outils de la littérature fiscale normative que nous appliquons à un cadre d'économie politique, nous étudions l'économie politique des réformes fiscales non linéaires, ce qui nous aide à comprendre pourquoi une part si importante de la population est exonérée de l'impôt sur le revenu dans certains pays. Même si les deux chapitres sont théoriques, j'utilise des données administratives et d'enquête pour illustrer et tirer des conclusions empiriques de mes modèles. Dans le Chapitre 1, j'utilise la base de données «US PSID» (*Panel Study of Income Dynamics*)[27] pour simuler et ainsi illustrer les barèmes d'imposition que j'obtiens théoriquement. Dans le Chapitre 2, j'utilise à la fois les bases de données «ERFS» (*Enquête sur les Revenus Fiscaux et Sociaux*, données d'enquête) et «POTE» (données administratives), qui contiennent des informations sur les revenus et impôts français payés depuis 1996. Celles-ci me permettent de mieux documenter les caractéristiques de la population non imposable en France ainsi que de mener des simulations suggérant que la stabilité observée du seuil d'entrée dans l'impôt sur le revenu pourrait bien être la conséquence de contraintes politiques.

Les troisième et quatrième chapitres s'appuient sur des enquêtes menées auprès des parlementaires français et allemands concernant leur avis sur les politiques qui revêtent une importance particulière à la lumière du débat public des dix dernières années : les politiques du marché du travail et l'Union économique et monétaire européenne. Ils offrent une approche différente aux questions d'économie politique et documentent les préférences d'un ensemble d'acteurs au rôle crucial dans les processus de prise de décision : les hommes et femmes politiques, pour qui, en dehors de leurs déclarations et votes publics, peu de données directes sur leurs opinions sont disponibles. Dans ces chapitres, nous cherchons principalement à démêler lequel des deux facteurs est le plus important dans les différences observées : le facteur culturel ou le facteur idéologique ? Ces chapitres permettent également d'apporter une contribution à la question de la construction d'une union politique. Enfin, même si l'utilisation des données administratives a pris le pas sur celle des données d'enquête au cours des trente dernières années, M-turk permet aujourd'hui aux enquêtes à grande échelle de revenir au premier plan de la recherche en économie (voir Stantcheva (2020) pour un exemple récent). Notre enquête se limite à un champ plus restreint, étant donné que la population sur laquelle nous nous concentrons est beaucoup plus petite, mais est la première à fournir des données directes sur les préférences de cette population vis-à-vis de politiques européennes.

[26] *En Syrie*, 1926.
[27] La base de données *PSID* est une enquête panélisée portant sur les ménages américains dont la première vague date de 1968.

Chapitre 1. Taxation optimale des revenus en présence de réseaux d'altruisme.

Contexte. Conformément à la tradition de Mirrlees (1971), les problèmes d'imposition optimale des revenus se concentrent généralement sur la question de la redistribution opérée par l'État entre des individus indépendants. En pratique, cependant, les individus sont liés à leur famille, leurs amis, leurs voisins ou à des membres d'une communauté, et font ainsi partie de réseaux à travers lesquels circulent informations, argent ou aide. Et dans les faits, les gouvernements tiennent souvent compte de ces liens dans les systèmes fiscaux qu'ils mettent en place, en imposant, par exemple, les particuliers au niveau de foyers fiscaux[28]. Pourtant, l'interaction entre les réseaux familiaux et sociaux et la fiscalité optimale a peu a été prise en compte dans la théorie économique.

Dans ce chapitre, j'analyse la fiscalité optimale en présence de réseaux d'altruisme. L'existence d'altruisme entre individus a longuement été étudiée dans la littérature académique, que ce soit en économie, en sociologie ou en anthropologie. En particulier, les articles de Becker en 1974 et en 1981 ont donné lieu à une vaste littérature en science économique, à la fois théorique et empirique[29]. L'altruisme prend différentes formes dans les pays développés et dans les pays en voie de développement, et peut exister au-delà des cercles familiaux proches. Dans les pays en développement, les réseaux d'altruisme peuvent englober des individus de familles élargies, du même village ou de la même caste ou communauté (voir Cox et Fafchamps (2007), Munshi (*forthcoming*)). Dans les pays développés, même si l'altruisme est généralement considéré comme existant principalement entre parents et enfants, il peut également y avoir des liens d'altruisme au sein des familles élargies – en particulier entre grands-parents et petits-enfants. L'augmentation récente du nombre et de l'echelle des cagnottes[30] pourrait constituer une preuve supplémentaire de la présence d'altruisme au-delà des cercles familiaux.

L'impôt sur le revenu, pour sa part, devrait prendre en compte l'existence de l'altruisme car celui-ci a d'importantes implications théoriques. En effet, l'altruisme est l'une des principales raisons sous-jacentes des transferts privés entre individus – que ce soit entre ménages ou au sein même des ménages[31]. De plus, les transferts motivés par l'altruisme sont redistributifs : ils se font des ménages les plus riches aux ménages les plus pauvres. Ces transferts privés représentent ainsi une forme de redistribution informelle au sein des réseaux et posent la question de leur interaction avec la redistribution publique.

Questions de recherche. La présence de transferts privés à motivation altruiste dans une société soulève un certain nombre de questions, et notamment : comment ces deux modes de redistribution (par l'État et au sein des réseaux) coexistent-ils ? Et comment cela devrait-il affecter la conception de l'impôt sur le revenu par l'État ?

Un postulat simple serait que la redistribution peut se faire dans l'économie sans intervention de l'État, en laissant simplement les transferts monétaires s'opérer au sein des réseaux, entre ménages plus riches et ménages plus pauvres. Cependant, les individus qui reçoivent des transferts au sein de leurs réseaux ne coïncident pas nécessairement avec les agents auxquels l'État voudrait redistribuer. En effet, un individu peut être plus pauvre relativement aux autres membres de son réseau, mais beaucoup plus riche que les membres d'autres réseaux.

Le postulat inverse voudrait que l'État évince complètement les transferts privés et conçoive son impôt sur le revenu sans en tenir compte. L'essence même des questions autour de la fiscalité du revenu repose sur le fait que les décisions d'effort productif ne sont pas observables par l'État, ce qui crée une asymétrie d'information entre les agents et ce dernier. L'État ne pouvant observer ni les niveaux de productivité ni l'effort productif, il doit redistribuer entre individus en fonction de leurs revenus, distordant ainsi les décisions d'effort productif et

[28] Appélés *fiscal units* aux États-Unis.

[29] Voir par exemple, Arrow (1981), Cox (1987) , Cox, Hansen et Jimenez (2004), Cox, Galasso et Jimenez (2006), Farhi et Werning (2013), Alger et Weibull (2010), Bourles, Bramoullé et Perez-Richet (2017), Bourles, Bramoullé et Perez-Richet (2018) et le chapitre du manuel par Mercier Ythier (2006).

[30] Des exemples récents étant la contribution des particuliers aux caisses de grèves ou aux soutiens du personnel soignant.

[31] Voir Rapoport et Docquier (2006) pour une enquête sur les différents motifs des transferts informels.

générant par là même une perte d'efficacité. C'est l'*arbitrage équité-efficacité* évoqué supra : augmenter les taux d'imposition permet plus de redistribution, mais est accompagné d'un coût, celui de la diminution des incitations des agents à fournir un effort productif, ce qui réduit ensuite la taille des recettes totales que l'État peut répartir entre les individus. En revanche, les transferts altruistes ont l'effet suivant : soit ils ne distordent pas les décisions d'effort productif, soit ils encouragent les individus les plus productifs à travailler plus afin de pouvoir donner à leurs pairs (et les moins productifs à travailler moins). Par conséquent, la redistribution altruiste privée n'entraîne aucune perte d'efficacité productive totale, et entraîne même potentiellement un gain d'efficacité. Cela a donc un impact sur l'arbitrage classique entre l'équité et l'efficacité.

Résultats. Dans ce chapitre, en me basant sur les articles de Bourlès, Bramoullé et Perez-Richet (2017) et Arrow (1981), je développe un modèle qui met en lumière la façon dont les transferts privés altruistes affectent l'arbitrage classique entre l'équité et l'efficacité du modèle de Mirrlees. Tout au long du chapitre, j'illustre mes résultats à l'aide de simulations.

Sous des hypothèses standard sur la nature des fonctions d'utilité, je montre d'abord qu'un impôt linéaire réduit partiellement les transferts privés. Effectivement, un impôt sur le revenu linéaire a un effet qui peut être décomposé en deux. D'une part, la redistribution permise par cet impôt augmente les revenus disponibles de tous les individus et d'autre part, le taux prélevé diminue le revenu disponible des personnes plus qualifiées davantage que celui des personnes moins qualifiées. Ces deux effets diminuent les transferts altruistes. Comme l'impôt sur le revenu linéaire a pour conséquence de diminuer les efforts de productivité des individus contrairement aux transferts altruistes privés, le taux d'imposition optimal dépend toujours des préférences redistributives du planificateur social et de l'élasticité du revenu imposable mais doit être ajusté à la baisse pour tenir compte de la dérivée des transferts par rapport au taux d'imposition.

L'impôt non linéaire permet par définition de faire varier les taux marginaux d'imposition avec les revenus. Dès lors, le gouvernement peut réduire les taux marginaux sur les revenus qui sont statistiquement plus présents dans les groupes au sein desquels plus de redistribution s'opère pour encourager une redistribution altruiste – qui vient sans distortion. La formule de *statistiques suffisantes* standard de Diamond (1998), Piketty (1997) et Saez (2001) donnant les taux marginaux à l'optimum doit être modifiée pour tenir compte de l'impact des taux marginaux sur les transferts privés. Ce terme supplémentaire met désormais en évidence un effet indirect de l'impôt sur le bien-être qui peut entraîner la baisse ou, de façon assez surprenante, la *hausse* des taux marginaux par rapport à une situation dans laquelle il n'y aurait pas d'altruisme. D'une part, augmenter la charge fiscale d'un petit montant sur un groupe entier induit une augmentation des transferts effectués par les personnes plus productives vers les personnes moins productives au sein de ce groupe. Cela réduit le coût social de l'augmentation des taux d'imposition marginaux sur les revenus inférieurs à ceux de ce groupe, et appelle donc à l'augmentation des taux marginaux. En revanche, augmenter l'impôt sur les personnes plus productives d'un groupe mais pas sur les personnes moins produtives de ce groupe a pour effet de diminuer les transferts privés effectués au sein du groupe. Cela agit comme un impôt indirect sur les travailleurs moins productifs de ce groupe et appelle à des taux marginaux inférieurs.

À l'aide de simulations sur la base de données américaine *PSID* de 2016, j'illustre la façon dont l'impôt non linéaire sur le revenu est affecté par différentes structures de groupes altruistes. Cela me permet de mettre en évidence que pour certains niveaux d'altruisme, les taux d'imposition peuvent être affectés de plus de 10 points de pourcentage.

Contributions. Cette analyse est, à ma connaissance, la première à prendre en compte les réseaux d'altruisme dans un cadre de taxation *optimale* des revenus.

L'interaction entre redistribution altruiste privée et redistribution étatique a de fait déjà été étudiée dans une

série d'articles fondateurs ; voir Barro (1974), Becker (1974), Bergstrom, Blume et Varian (1986), Bernheim et Bagwell (1988) et Mercier-Ythier (2006). Ces articles présentent des résultats de neutralité, selon lesquels, sous certaines conditions, les transferts privés d'une part, et la redistribution de la richesse[32] mise en place par l'État d'autre part, permettent d'atteindre le même équilibre[33]. Ainsi, lorsque le gouvernement cherche à redistribuer des riches vers les moins riches, il remplace simplement les transferts privés préexistants. Une conséquence de ce résultat réside dans le fait que si la redistribution opérée par l'État s'accompagne de coûts administratifs, alors le rôle redistributif de l'État est soit limité soit tout simplement superflu. Il existe cependant des aspects critiques que ces articles ne prennent pas en compte et qui sont à la base du modèle de taxation optimale des revenus : en pratique, les individus ne sont pas dotés d'un niveau de revenu déterminé de façon exogène[34] et il existe une asymétrie d'information entre l'État et les individus. D'autre part, la plupart de ces articles reposent sur l'existence de "chaînes de transferts opérationnels" (positifs) qui relient les individus, même après l'introduction d'un impôt, et ne considèrent donc pas les situations pourtant courantes dans lequelles les individus ne sont pas tous liés par des transferts, ni celles où certains individus appartenant à des réseaux d'altruisme ne font ni ne reçoivent de transferts.

Chetty et Saez (2010) examinent l'interaction entre la redistribution opérée par l'État et celle opérée par l'assurance informelle. Mes résultats contrastent avec ceux de leur article, dans lequel les objectifs de l'État et d'un certain planificateur central dans l'économie informelle (l'assureur privé) coïncident. Dans mon analyse, même sans aléa moral entre les individus, l'équilibre du jeu non coopératif n'est pas efficace au sens de Pareto et ne coïncide donc pas avec l'optimum d'une fonction de bien-être social. Par conséquent, contrairement à Chetty et Saez (2010), le taux d'imposition linéaire optimal doit ici tenir compte des transferts informels. Ceci rappelle l'analyse de Chang et Park (2017) pour les taxes non linéaires. Dans leur article, en revanche, les auteurs considèrent la taxation optimale des revenus en présence de marchés d'assurance privés. Contrairement au cadre de mon analyse, les assurances publiques et privées y sont donc toutes deux formelles.

Mes résultats mettent également en évidence la nécessité de mesurer de nouvelles statistiques suffisantes, afin de mesurer d'une part l'impact sur les transferts privés d'un transfert forfaitaire à l'échelle de la société d'une part, et d'une augmentation du taux marginal sur une tranche donnée d'autre part. Même si, dans les pays en développement, l'effet des programmes de redistribution publique sur les transferts privés (voir par exemple Strupat et Klohn (2018), Heemskerk, Norton et De Dehn (2004), Cox et Jimenez (1992)) a été mesuré empiriquement dans divers contextes, il s'est généralement concentré sur l'élasticité des transferts privés aux impôts et subventions sur certaines parties de la population.

Extensions possibles. En assouplissant certaines hypothèses du modèle de référence et en l'élargissant de façon appropriée, il serait possible d'explorer plusieurs applications dans différents contextes.

Fiscalité dans les pays en développement. Il existe de nombreux cadres dans lesquels les transferts monétaires entre particuliers sont omniprésents. Dans les pays en développement en particulier, la part des transferts privés entre particuliers dans le revenu total est en général relativement importante. Cox et Jimenez (1990) fournissent des exemples de montants moyens de transferts en pourcentage du revenu moyen global[35] dans divers pays. Dans l'Inde rurale, sur la période 1975-1983, cette part était de 8%, et en 1974 au Kenya et en Malaisie de 3% et 11% respectivement. Dans la mesure où les transferts altruistes (voir Cox, Galasso et Jimenez (2006)) sont importants dans le contexte des pays en développement, mes résultats contribuent à la littérature sur la fiscalité dans les pays en développement en examinant comment ces transferts affectent les schémas d'imposition du revenu. Une fois les nouvelles statistiques suffisantes mesurées, elles peuvent être utilisées pour dériver un barème fiscal optimal propre à chaque situation. Cela complèterait la littérature sur la fiscalité dans les pays en développement, qui

[32] Dette publique et sécurité sociale dans le cas de Barro (1974).
[33] Voir Mercier-Ythier (2006) pour une exposition détaillée de ces résultats.
[34] Aucun des articles susmentionnés ne traite de ce point , sauf Bernheim et Bagwell (1988).
[35] C'est-à-dire en tenant compte du revenu des ménages qui n'effectuent pas ou ne reçoivent pas de transferts.

jusqu'à présent s'est principalement concentrée sur le renforcement de la capacité fiscale des États (voir Pomeranz et Vila-Belda (2019) pour un aperçu complet des recherches dans ce domaine).

Fiscalité des familles. La littérature de taxation optimale a étudié de manière approfondie la fiscalité des couples (voir Chiappori (1988), Chiappori (1992), Alderman et al. (1995), Keven, Kreiner et Saez (2009), et plus récemment Gayle et Shephard (2019), Obermeier (2018)). Le modèle développé dans ce chapitre permet en revanche d'aborder la question de la fiscalité des familles avec enfants. En supposant que les groupes sont des familles composées d'un ou deux parent(s) et d'un certain nombre d'enfants, le gouvernement peut observer les groupes et identifier le type de groupe auquel les parents appartiennent. Cela pourrait aider à expliquer une caractéristique du système fiscal français, par exemple, dans lequel les familles avec enfants ne reçoivent pas seulement des allocations familiales mais voient également en moyenne leur taux marginal d'imposition diminuer.

Chapitre 2. Économie politique du seuil d'entrée dans l'impôt sur le revenu.

Le deuxième chapitre est co-écrit avec Pierre Boyer.

Contexte. En ce qu'il détermine la proportion de contribuables dans une population, le seuil d'entrée dans l'impôt sur le revenu[36] occupe une place fondamentale dans la sphère publique et fait l'objet de nombreux débats. Les débats précédant élections présidentielles américaines de 2012 en sont un bon exemple, avec la déclaration du candidat républicain, Mitt Romney selon laquelle "47% des Américains voteront pour le président [M. Obama], quoi qu'il arrive. [...] Ce sont des gens qui ne paient aucun impôt sur le revenu. Quarante-sept pour cent des Américains ne paient aucun impôt sur le revenu"[37]. En France, la proportion de citoyens exemptés du paiement de l'impôt sur le revenu fait également l'objet d'un débat récurrent, particulièrement visible dans la presse chaque année au moment de la déclaration de revenus, avec des titres comme "Qui paie encore sur le revenu en France ?"[38] "Près de 6 Français sur 10 ne paient plus d'impôt sur le revenu"[39].

Mais le seuil d'entrée dans l'impôt traduit également un objectif que se fixe soigneusement le gouvernement. Au Royaume-Uni, George Osborne, Chancelier de l'Échiquier de 2010 à 2016, déclare que son objectif est celui d'un "système fiscal où les moins payés sont totalement exonérés d'impôts, tandis que les recettes fiscales provenant des plus riches augmentent" (Déclaration budgétaire – mars 2012). Le Projet de Loi Finances français de 2016 indique comme l'un de ses objectifs l'exonération de l'impôt sur le revenu de 50% de la population, afin d'augmentater le pouvoir d'achat des "ménages les plus pauvres" et de rendre le schéma d'imposition plus progressif[40].

Et en effet, au cours des trente dernières années, la proportion des contribuables payant l'impôt est restée étonnamment stable dans de nombreux pays occidentaux. En France par exemple, le pourcentage de foyers fiscaux payant l'impôt sur le revenu est d'environ 50% depuis 1986 (voir Figure 2). Au Royaume-Uni, cette part se situe entre 55 et 65% depuis 1990 (voir Miller et Roantree (2017)).

[36] Auquel nous nous référons dans la suite comme le seuil d'entrée dans l'impôt.

[37] Ceci est effectivement vrai pour l'impôt fédéral sur le revenu aux États-Unis : en 2011, 46,4% des foyers fiscaux américains n'ont payé aucun impôt fédéral sur le revenu, voir http ://www.taxpolicycenter.org/model-estimates/tax-units-zero-or-negative-tax-liability/baseline-distribution-tax- units-no-tax.

[38] Le Figaro, 15/10/2015

[39] Les Échos 18/07/2017.

[40] (voir le *Projet de Loi Finances, 2016*, page 49)

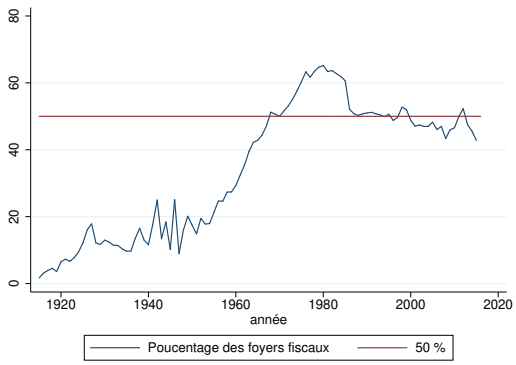


FIGURE 2 – Pourcentage des foyers fiscaux payant l'impôt sur le revenu en France depuis 1915

Sources : André et Guillot (2014) et depuis 2014 *Cahiers Statistiques Direction Générale des Finances Publiques.*

Questions de recherche. Quelles coalitions de contribuables seraient nécessaires pour modifier le seuil d'entrée dans l'impôt sur le revenu ? Ces éléments peuvent-ils expliquer la stabilité du seuil d'entrée dans l'impôt dans certains pays ?

Résultats. Dans la première partie du chapitre, nos principaux résultats théoriques montrent la relation entre les types de réformes affectant le seuil d'entrée dans l'impôt et l'identité des électeurs décisifs qui les rendent politiquement réalisables.

Nos résultats se déclinent selon deux ensemble. Dans le premier, nous mettons en lumière les types de réformes pour lesquelles un théorème de l'électeur médian est encore valable : celles pour lesquelles la faisabilité politique passe par un soutien nécessaire de l'individu au revenu médian. Il s'agit de réformes pour lesquelles le revenu médian est inférieur au seuil d'entrée dans l'impôt avant et après leur mise en place, ou bien de réformes qui augmentent le seuil d'entrée et conduisent ainsi davantage de contribuables à devenir non-imposables. Dans le deuxième, nous mettons en évidence les réformes qui ne nécéssitent pas nécessairement l'assentiment de l'électeur médian. Par exemple, une réforme qui réduit les taux marginaux pour toutes les personnes imposables et baisse simultanément le seuil d'entrée – réforme aux schémas d'impôt souvent proposée dans le débat public – devient politiquement réalisable lorsqu'il existe une coalition des électeurs à faibles revenus et à revenus élevés contre les électeurs à revenus moyens.

Dans la seconde partie du chapitre, nous montrons comment les décideurs politiques français utilisent un mécanisme, la "*décote*" pour contrôler efficacement le nombre de contribuables. Nous étudions tout d'abord comment le seuil d'entrée dans l'impôt a été ajusté au fil du temps et ceci sous divers gouvernements. Puis, à l'aide de la base de données ERFS, nous documentons les caractéristiques de la population non-imposable, et montrons en particulier qu'elle est assez hétérogène[41], et qu'il serait donc délicat pour un gouvernement de la cibler spécifiquement dans d'autres domaines de politiques publiques afin de compenser le fait d'en rendre une partie imposable. En utilisant la base de données POTE, nous simulons des réformes fiscales sur le barème actuel de l'impôt sur le revenu, et constatons qu'une très faible proportion de réformes visant à abaisser le seuil d'entrée dans l'impôt rassemble les coalitions requises ; preuve que la stabilité de la part des contribuables à environ 50 % de la population est certainement une conséquence de contraintes politiques.

Contributions. Ce modèle est le premier à tenter d'expliquer une caractéristique saillante de nombreux systèmes fiscaux modernes : la part importante de la population qui ne paie pas l'impôt sur le revenu. Les simulations

[41] C'est-à-dire que la population payant l'impôt sur le revenu n'est pas constituée d'un type particulier de contribuables, tels que des étudiants, chômeurs ou retraités.

que nous menons constituent également une nouvelle méthode d'analyse systématique des réformes politiquement réalisables.

Nous développons notre cadre d'étude à partir du modèle de référence de taxation optimale de Mirrlees (1971). Le processus décisionnel que nous étudions ne repose cependant pas sur la maximisation d'une fonction de protection sociale, mais s'inscrit dans un cadre d'économie politique : nous envisageons de potentielles réformes d'un schéma d'imposition sous l'angle de la faisabilité politique, une réforme ayant lieu si elle est soutenue par une majorité d'électeurs. Deux des articles fondateurs de cette littérature, Roberts (1977) et Meltzer et Richard (1981) considèrent des barèmes fiscaux linéaires et démontrent des théorèmes de l'électeur médian : l'électeur avec le revenu médian est celui auquel il revient de décider si le barème lui bénéficie ou non, et s'il devrait donc être mis en place ou non.

Cependant, afin d'étudier l'impôt sur le revenu et le seuil d'entrée dans l'impôt en tant que tel, il est indispensable d'étudier des réformes non linéaires des barèmes d'imposition non linéaires : il doit être possible pour certaines personnes de n'avoir à *verser* aucun impôt (indépendamment du fait de recevoir un crédit d'impôt). Nous utilisons la méthode des perturbations pour analyser les réformes du système fiscal[42] – méthode utilisée dans l'approche normative de la fiscalité – et l'appliquons à une configuration d'économie politique. Pour ce faire, nous utilisons le cadre développé par Bierbrauer, Boyer et Peichl (2019) pour l'analyse de la faisabilité politique de réformes non linéaires des barèmes fiscaux non linéaires, mais introduisons un nouvel instrument pour les décideurs politiques : le seuil d'entrée dans l'impôt. De plus, à l'aide de simulations, nous confrontons de manière systématique nos résultats théoriques à l'analyse empirique des réformes fiscales.

Extensions possibles. Il s'agit de l'un des premiers cadres permettant d'étudier à travers le prisme de l'économie politique des changements discrets s'oppérant à certains seuils dans des schémas non linéaires qui sont généralement étudié de façon normative en économie publique. Cela pourrait apporter une nouvelle perspective à l'analyse des pensions de retraite, de l'assurance-chômage, des cotisations au marché du travail, et de certains types de subventions.

Chapitres 3 et 4 – De l'avenir de l'Union Européenne.

Les chapitres 3 et 4 sont co-écrits avec Pierre Boyer, Friedrich Heinneman, Eckhardt Janneba et Sebastian Blesse. Le chapitre 3 rédigé en français, tandis que le chapitre 4 l'est en anglais. Ils visent à documenter les préférences des parlementaires français et allemands sur des questions décisives concernant l'Union européenne. Dans le chapitre 3, nous nous concentrons sur de possibles réformes du marché du travail et dans le chapitre 4 sur la construction de l'Union économique et monétaire européenne. Il s'agit de deux sujets primordiaux pour la construction de l'Union européenne : commençant à gagner en importance à la suite de la crise de 2007, ces sujets sont, aujourd'hui, au milieu de la crise sanitaire due au Covid-19, plus que jamais d'actualité. En effet, se posent de façon pressante les questions de la possible nécessité de s'appuyer sur une certaine forme d'assurance chômage à l'échelle européenne et/ou sur des euro-obligations pour nous aider à nous remettre de la crise[43].

Depuis le rejet du traité constitutionnel en France et aux Pays-Bas en 2005, la construction européenne a été remise en cause par une série de crises. La décision du Royaume-Uni de quitter l'Union Européenne (UE) en juin 2016 en est le dernier épisode. Ces crises ont amené au premier plan la nécessité d'un débat sur les compétences à allouer à l'échelon européen. Les suggestions de réformes sont nombreuses, allant de stratégies visant à une

[42] Voir Piketty (1997), Saez (2001), Golosov, Tsyvinski et Werquin (2014), Jacquet et Lehmann (2017)

[43] Voir par exemple, https ://www.lemonde.fr/idees/article/ 2020/04/03 / coronavirus-il-n-est-pas-totalement-indecent-de-chiffrer-les-risques-economiques-du-confinement_6035432_3232.html, https : // www. lemonde.fr/idees/article/2020/04/02/klaus-regling-la-solidarite-europeenne-doit-prendre-forme-en-recourant-rapidement-aux-institutions-et-aux-instruments-existants_6035340_3232.html, https ://voxeu.org/article/covid-perpetual-eurobonds, https ://voxeu.org/article/corona-bonds-great-idea-complicated-reality.

union fédérale conférant plus de compétences politiques à l'échelon européen à des stratégies de désintégration, donnant plus d'autonomie à l'échelon national.

La quête de légitimité pour les décisions de l'UE ou de la zone euro est souvent associée à une nécessité de consensus large et d'une implication plus forte des parlements nationaux. Ainsi, nous avons recueilli l'opinion de parlementaires français de l'Assemblée nationale et du Sénat, et de parlementaires allemands du Bundestag concernant l'élargissement des compétences de l'UE. Contrairement aux analyses régulières faites sur les préférences en matière d'intégration des citoyens européens (cf. les différentes vagues de l'Eurobaromètre depuis 1973), un manque de données persiste sur l'opinion des responsables politiques face à l'évolution du projet européen. En utilisant un modèle Probit, l'analyse économétrique des réponses présentée dans cet article contribue donc à enrichir les grands débats contemporains sur l'intégration européenne.

Un consensus des parlementaires des deux côtés du Rhin ne garantit certainement pas l'acceptation de propositions d'intégration par le reste des membres de l'UE. Cependant, étant donné l'importance historique de ces deux nations dans le processus d'intégration européenne et la difficulté d'obtenir une majorité qualifiée au Conseil de l'Union Européenne sans l'aval d'au moins un des deux pays, il est probable que des réformes soutenues ni par le parlement français ni par le parlement allemand auraient peu de chances d'être adoptées. Nous voyons donc un consensus franco-allemand comme une condition nécessaire pour la faisabilité de réformes liées à l'intégration européenne.

Notre enquête a été menée entre avril et juillet 2016.

Contributions. Ces chapitres présentent les résultats de la première enquête menée auprès des parlementaires français et allemands sur l'avenir du projet européen dans deux domaines : les politiques du marché du travail et l'Union économique et monétaire européenne. Nous mettons en évidence de potentiels terrains d'entente entre les deux pays.

Nos résultats, confirmés par plusieurs tests de robustesse montrent des différences *idéologiques* entre membres des parlements nationaux quantitativement plus importantes et plus robustes que les différences *nationales*. En particulier, les opinions sur la création d'une assurance chômage européenne et la flexibilité du marché du travail révèlent une fracture idéologique (gauche/droite) bien plus marquée qu'une fracture franco-allemande.

Ces résultats sont cohérents avec ceux de Alesina, Tabellini et Trebbi (2017), où les auteurs se concentrent sur un échantillon de pays de l'Union européenne et trouvent une hétérogénéité culturelle parfois plus forte au sein des pays qu'entre les pays.

Enfin, il ressort du fort clivage droite/gauche mis en évidence sur plusieurs questions que l'euroscepticisme observé dans certains discours politiques, pourrait en fait relever de positions idéologiques plutôt que d'opinions nettes contre l'intégration européenne elle-même.

Extensions possibles. Dans les chapitres 3 et 4, nous cherchons à établir selon quelles dimensions les parlementaires français et allemands diffèrent statistiquement : de par leur nationalité ? Ou de par des différences idéologiques ? Nous nous appuyons sur une enquête réalisée en 2016, et avons depuis lors mené une autre enquête en 2018. Nous visons à poursuivre ces enquêtes à chaque législature et avons déjà commencé à y inclure d'autres pays (l'Italie, pour l'instant). Nous aimerions aller au-delà des analyses effectuées jusqu'à présent, en utilisant des méthodes de traitement automatique du langage naturel tout d'abord pour comparer nos réponses avec des données de votes et de débats publics et ensuite pour exploiter le fait que nous avons plusieurs vagues d'enquêtes. Nous pourrions ainsi utiliser certains chocs ayant eu lieu ces dernières années afin de mettre en lumière de possibles retranchements d'opinions vis-à-vis de l'intégration européenne lorsque les pays font face à des chocs qui

obligent leurs politiques à s'adresser en priorité à leurs électeurs plutôt qu'à adopter des perspectives de plus long terme.

Chapitre 3. Intégration européenne et politiques du marché du travail.

Contexte. Les politiques liées au marché du travail sont un volet essentiel dans la politique des États membres et elles sont soumises à une attente de résultats forte des citoyens vis-à-vis de leurs représentants (selon l'Eurobaromètre de 2016, les citoyens placent régulièrement l'emploi parmi leurs préoccupations essentielles de la vie quotidienne). Des réformes dans ce domaine sont régulièrement faites mais elles restent l'apanage des États membres et soulèvent de vives critiques. La perception des parlementaires sur l'opportunité d'allouer plus de compétences à l'UE dans le domaine du marché du travail est donc particulièrement intéressante.
Les parlementaires ont pu exprimer leur approbation ou leur opposition par rapport aux questions suivantes :
1. Marché du travail : "L'UE pourrait donner des directives contraignantes aux États membres relatives au marché du travail (par exemple sur les modalités de la protection des salariés contre les licenciements ou sur les clauses du contrat de travail à durée déterminée)".
2. Politique salariale : "L'UE pourrait avoir des droits d'intervention plus importants dans les politiques salariales des États membres (par exemple sur le niveau du salaire minimum légal)".
3. Assurance chômage européenne[44] : "Pour pallier une éventuelle récession de certains États membres dans la zone euro il faudrait créer une assurance chômage commune européenne".
4. Marché du travail plus flexible[45] : "Une croissance plus forte dans la zone euro requiert que les États comptabilisant un nombre important de chômeurs de longue durée rendent plus flexible leur marché du travail (par exemple en assouplissant les conditions de licenciement ou en baissant le niveau du salaire minimum)".

Questions de recherche. Quelles sont les réformes qui font émerger un consensus entre parlementaires français et allemands ? Les différences observées relèvent-elles surtout de la nationalité ou de l'idéologie ?

Résultats. Nos résultats montrent que la création d'une assurance chômage européenne et la flexibilité du marché du travail révèlent un clivage partisan plutôt qu'un clivage national. Cela met en lumière deux pistes potentielles surlesquelles l'intégration européenne pourrait être poussée et recevoir un support politique. Les questions de directives contraignantes dans le marché du travail et de la politique salariale ne trouvent d'alignement ni des pays ni des partis. La première, cependant, fait ressortir un clivage partisan de moindre ampleur que les autres questions.

Chapitre 4. Intégration européenne et réformes concernant l'Union Économique et Monétaire Européenne.

Contexte. La crise financière de 2007 a donné lieu à un consensus selon lequel l'Union économique et monétaire européenne dans sa configuration initiale en ressortait comme une "maison à moitié construite" (selon les termes de Bergsten (2012)). Plusieurs lacunes du Traité de Maastricht initiale ont été corrigées depuis le printemps 2010 et les temps forts de la crise. Les règles de gouvernance budgétaire et macroéconomique ont été affinées et les règles du pacte de stabilité et de croissance ont été renforcées. En outre, 25 États membres de l'Union européenne ont signé le Pacte budgétaire, qui oblige les pays signataires à fixer des plafonds de déficit dans leur législation nationale, conformément à des standards contractuels plancher. La Banque centrale européenne (BCE) a pris le rôle de prêteur en dernier ressort par le biais des Opérations monétaires sur titres, programme qui autorise les achats d'obligations de pays en crise sous réserve d'un accord avec le Mécanisme européen de stabilité[46]. Une union bancaire a été mise en place, avec une surveillance européenne des grandes banques sous la responsabilité de

[44] L'introduction d'une assurance chômage commune européenne est une piste pour introduire un mécanisme de partage des risques affectant les pays membres en cas de chocs touchant différemment les pays en temps de crises.
[45] Les réformes structurelles visant à plus de flexibilité du marché du travail représentent typiquement une politique d'offre.
[46] Qui lui-même joue un rôle clé dans la stabilisation de la zone euro depuis 2012.

la BCE et la mise en place d'un Mécanisme de résolution bancaire européen. Malgré cette longue liste de réformes, le débat politique et académique sur ces réformes reste intense et l'avenir de la zone euro reste incertain. Notre enquête couvre donc les sujets du débat sur les réformes de l'Union économique et monétaire européenne. Nous avons demandé aux députés d'exprimer leur approbation ou leur opposition par rapport aux questions suivantes :
1. Achats d'emprunts par la BCE[47] : "Pour combattre la crise, la Banque centrale européenne s'est engagée fortement dans les années passées en achetant des emprunts d'États de la zone euro. Cet engagement devrait se poursuivre."
2. Pacte budgétaire européen : "Le pacte budgétaire européen ratifié en 2012 par 25 États de l'UE engage les États signataires, comme la France et l'Allemagne, à limiter leur déficit public (corrigé des variations conjoncturelles) à 0,5% du produit intérieur brut. Pensez-vous que la France devrait respecter les exigences du pacte budgétaire européen ?"
3. Politique fiscale[48] : "Le Conseil l'UE pourrait statuer avec une majorité qualifiée sur les impôts perçus dans les États membres (par exemple sur les limites minimales et maximales obligatoires des impôts sur les Sociétés)."
4. Assurance chômage européenne[49] : "Pour pallier une éventuelle récession de certains États membres dans la zone euro il faudrait créer une assurance chômage commune européenne."
5. Euro-obligations : "La zone euro devrait émettre des euro-obligations et les États membres s'en porter tous garants solidairement et bénéficier du même taux d'intérêt."

Questions de recherche. Dans le chapitre 4, nous analysons les préférences des mêmes députés que dans le chapitre 3 sur des questions en rapport avec l'Union économique et monétaire européenne. Nous menons plus loin la réflexion en déduisant les coalitions nécessaires pour que certaines réformes soient soutenues par les parlementaires nationaux de deux des pays ayant le plus grand poids dans les processus de décision européens.

Résultats. De nouveau, nous trouvons que les différences idéologiques entre les membres des parlements nationaux sont quantitativement plus importantes et plus robustes que les différences nationales. Cependant, pour des politiques phares de l'Union économique et monétaire européenne telles que les euro-obligations, le pacte budgétaire et une plus forte implication de la BCE, nous constatons une différence importante et significative entre les parlementaires des deux pays, même lorsqu'ils appartiennent à la même famille politique. Il sera intéressant de voir comment ces positions évolueront au cours des années à venir.

[47] Cette question nécessite l'évaluation d'un aspect crucial de l'implication de la Banque centrale européenne : ses interventions sur le marché des obligations d'État de la zone euro.

[48] En effet, un sujet récurrent dans le débat sur la réforme de l'Union économique et monétaire européenne concerne la possibilité d'une restriction de l'autonomie fiscale nationale et d'un transfert de pouvoir au niveau de la zone euro. La récente note de la Commission européenne sur l'approfondissement de l'Union européenne via une trésorerie européenne commune et un ministre européen des Finances (Commission européenne, 2017) souligne la pertinence de ce débat. Les deuxième et troisième questions concernant l'Union économique et monétaire Européenne couvrent deux aspects différents de l'autonomie fiscale : la limitation du déficit et un vote concernant les impôts au Conseil européen.

[49] Cette question aborde également un problème dans le domaine de la politique budgétaire, mais attire l'attention sur un nouvel instrument : une capacité fiscale pour la zone euro via une assurance chômage européenne.

General Introduction

This thesis lies in the fields of Public Economics and Political Economy. As its name might suggest, Public Economics concerns the economics of the public sector; it deals with the design and effects of public policies – with a focus on taxation, redistribution, and the provision of public goods. Political Economy, on the other hand, seeks to understand the implications of politics for economic outcomes. They exist as separate fields, but at the heart of both lies the heterogeneity between individuals. Indeed, if society were homogeneously constituted, that is, if everyone were identical, there would be no inequality and hence no redistribution required; no conflict of interest and hence no reason for voting. Futhermore, both fields complement each other. A large part of Political Economy is concerned with one of the main objects of Public Economics: redistribution. And Public Economics traditionally relies on the existence of a benevolent government which decides to enact policies that maximize the *well-being*[50] of its society. Adding political considerations to these analyses by examining the interplay between democratic institutions and self-interested individuals and politicians, enriches them considerably – helping both to inform which policies would be politically feasible in a given context, and to explain why it might be that certain policies are more prevalent than others. In a day and age where economists are increasingly mobilized in designing policies, understanding which policies would gain the approval of an electoral majority is of significant importance.

The thesis has two parts: one empiricial, the other theoretical. In the empirical part, I use surveys to inform the opinions of policy makers. The focus on my theoretical work is on redistributive policies. More precisely, I focus on income taxation, and approach it through angles that seek to complement the traditional ways it has been studied. First, by including political considerations into standard models of income taxation, I attempt to explain a particular feature that may be observed in many well-developed tax systems: the high proportion of the population which has no income tax liability. Second, in an increasingly connected world, understanding the impact of human connections on policy design is of primordial importance. These considerations lie at the heart of an investigation into the extent to which familial and social ties ought to affect the design of income taxes.

1. Public policies and tax systems across countries and time

Across the world, governments differ in their political systems, as well as in the policies they enact. In particular, large variations can be observed in their expenditures, spending composition, and sources of revenue. Despite the heterogeneity in their choices and strategies, states experienced significant growth in the twentieth century: In the 1920s they doubled their share of expenditures as compared to the previous century, with an important acceleration between the 1960s and 1980s (see Lindert (2004)). And this growth in expenditures was financed by an increase in governments' revenues. Across countries, these revenues both represent different shares of GDP and come from different sources. In general, revenues in higher income countries represent a higher percentage of their GDP and are made up of a greater share of tax revenues.[51] In 2011, governments' revenues as a percentage of GDP were as low as 11% in Madagascar and Bangladesh and as high as 68% in Kuwait; in 2016, they averaged around 42% of GDP in OECD countries. And today, in most countries, taxes make up the majority

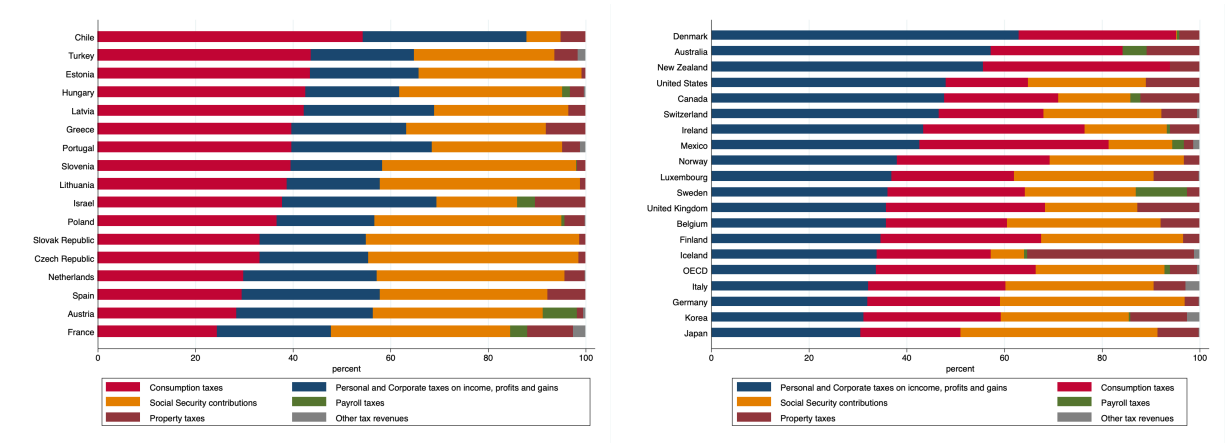
[50] A very subjective notion indeed, which we come back to later in this Introduction.

[51] Non-tax revenues represent government revenues which are raised through fines, rents and royalties from resource extraction.

of government revenue: Within the OECD, they make up from 67% of government revenue in Mexico to 91% in Italy. Even in countries such as Botswana and the Republic of Congo where non-tax revenues make up an important share of government revenues, tax revenues still represent about half of government revenue.[52]

Taxes[53] have indeed been making up an increasingly important part of the revenues of modern governments. In most high-income countries,[54] fiscal capacity has grown considerably: Taxes have gone from constituting less than 10% of government revenue in 1880 to 25-30% in 1960, with a stabilization of low tax countries at around 25% of GDP (United States, Japan) and of high-tax countries at around 45% (France, Norway, Finland).

There are five main components of government tax revenue: the personal income tax, the corporate income tax, social security contributions, consumption taxes and property taxes. Tax structure varies widely across countries, and in high-income countries, the shares of consumption and property taxes have been declining since the early 1960s while that of social security contributions has been growing – with the exception of Iceland which still largely relies on its property taxes. Figure 3 shows these shares for OECD countries. In developing countries, on the other hand, governments generally switched from relying on trade taxes in the 1980s, to currently gathering most of their tax revenue from value-added taxes. With the rise of salaried workers and thus third party reporting, income taxes there are only now starting to gain importance (Uganda for example has been introducing reforms since 2012 to increase the number of taxpayers, and has now reached around 45% of its population that is subject to the income tax), but still represent very low shares of total tax revenue.



(a) Countries that rely more on consumption taxes (b) Countries that rely more on income and corporate taxes

Figure 3 – Sources of revenue of OECD countries, 2016

Source: author's calculations using the OECD's Global Revenue Statistics database.

Visible in every day life – passing by *tax preparer* outlets[55] in some areas of US cities, looking up at the Commercial Association of Sao Paulo's *Impostômetro* recording in real time the amount of taxes collected in the year, listening to public debates, reading the press around tax days – taxes are among the pillars of our nation-states. Historically, they have long held a central place for states, conditioning their existence, administration and power. The first recorded taxes date back to ancient Egypt around 3000–2800 BC, where goods such as oils were taxed, and where tax revenue was used in large part to finance wars. Evolving through the Greek and Roman Empires, they also started to acquire a social security function as a way of financing the retirements of certain parts of the population (generally the military). Throughout history, taxes have been used to finance public goods, wars, and to correct or change behaviours – an amusing anecdote here being the introduction in 1698 of a *beard tax*

[52] Figures in this paragraph are from the IMF's Fiscal Affairs Department and the OECD's Global Revenue Statistics databases.
[53] According to the OECD definition – that is, including social security contributions.
[54] According to the World Bank 2019 classification.
[55] Outlets which offer services to help people fill in their tax declaration forms in order to claim benefits.

by Emperor Peter I of Russia to bring Russian beauty standards in line with Western Europe's; and a more standard example being Pigouvian taxes aimed at reducing pollution emissions. This has simultaneously raised the issue of the distribution of the tax burden – and there are numerous examples of taxes being higher on more wealthy families, dating back even to Ancient Egypt where people were taxed according to the value of their possessions, or more recently with a tax on pianos that the French had briefly established in 1893, or with a tax on the number of windows in homes in many European countries in the nineteenth century, all meant to target the wealthiest. With the birth of the welfare states, taxes have also started to be considered as instruments in and by themselves of redistribution.

Today, the OECD defines taxes as "compulsory, unrequited payments to general government".[56] As phrased by historian Nicolas Delalande, "long perceived as a symbol of arbitrariness and coercion, taxes have been invested with a new meaning by the advent of democratic modernity: They have become one of the vectors of social links and redistribution, a founding institution of the social contract". In this way, taxes go even beyond the role that they were assigned in Article 13 of the 1789 Declaration of the Rights of Man and of the Citizen: "For the maintenance of the public force and for the expenditures of administration, a common contribution is indispensable; it must be equally distributed to all the citizens, according to their ability to pay."

Moreover, it is now essential that taxes rely on consent and not on violence – for France, many examples of uses of force are available in Delalande's *Les batailles de l'impôt*; we can also go back to the tax on beards implemented by Emperor Peter I of Russia where it is said that to enforce the ban on beards, the Tsar empowered the police to forcibly and publicly shave off those who refused to pay the tax. And indeed, consent is at the center of Article 14 of the Declaration of the Rights of Man and of the Citizen: "Each citizen has the right to ascertain, by himself or through his representatives, the need for a public tax, to consent to it freely, to know the uses to which it is put, and of determining the proportion, basis, collection, and duration."

2. Public Economics and Political Economy

Taxation is one of the main focuses of Public Economics, which is concerned with the design and effects of government policies. Even though this field was developed in the mid twentieth century, the questions with which it is concerned already existed in economics long before – especially regarding taxation. In 1776, Adam Smith himself had already set out "four canons of taxation" in *The Wealth of Nations*.

It is in the mid-twentieth century, however, that Paul Samuelson and Richard Musgrave along with several other economists, contributed to making Public Economics a field in its own right. In 1959, Musgrave defined three responsibilities for the "Fiscal Department":
(1) "Secure adjustments in the allocation of resources" (i.e., the correction of market failures)
(2) "Secure adjustments in the distribution of income and wealth" (i.e., redistribution)
(3) "Secure economic stabilization" (i.e., macroeconomic stabilization).

In the introduction of his *Theory of Public Finance*,[57] Musgrave also emphasizes two approaches to Public Economic issues, interestingly enough in line with Articles 13 and 14 of the Declaration of the Rights of Man and of the Citizen cited above. The first is *normative*, where the question asked is how government policies ought to be designed in order to attain certain objectives. The second is a *political economy* approach,[58] where

[56] Taxes are unrequited in the sense that "benefits provided by government to taxpayers are not normally in proportion to their payments" and "general government" consists of supra-national authorities, the central administration and the agencies whose operations are under its effective control, state and local governments and their administrations, social security schemes and autonomous governmental entities, excluding public enterprises.

[57] He conceives of it as a Public Economics textbook, but prefers to refer to Public Finance, as this is the established term for the discipline at the time.

[58] Musgrave refers to this as the sociology of fiscal politics.

the question is rather about why certain public policies are observed and what policies would be feasible given certain political, social and economic contexts. Both rely on *positive analyses* of these government policies, the objective of which is to determine the effect of these policies on the economy (i.e., on the behavior of households and firms). In this thesis, I adopt both perspectives as applied to the question of the design of tax systems, and rely on the results of the positive literature to run applications of my theoretical results.

In the following, I delve deeper into the normative approach to public economics with a focus on optimal taxation theory; and into political economy both as an application of public economics (redistribution in particular), and as a standalone area of economics.

Normative public economics. Normative public economics deals with the optimal design of public policies by the government, which is taken to be a benevolent social planner seeking to maximize an aggregation of individual preferences – the *Social Welfare Function* – subject to a set of constraints. The first type of constraints translate budget balance. The second type of constraints are called incentive compatibility constraints; they are due to the information asymmetry between the government and individuals, which enables individuals to adjust their behavior. In the case of taxation, such adjustments can be translated by individuals working less when taxes are increased, and/or moving countries to escape certain kinds of taxes. In the example of the nineteenth century tax on windows cited above, certain individuals partially avoided the tax by walling off their windows.[59]

This is the framework used in the optimal income taxation literature to inform the design of income taxes given certain objectives. Individuals are considered as heterogeneous and in general, are endowed with exogenously determined abilities, which determine their productivity. Formally, assume that there are $i = 1, ..., I$ individuals, each with utility u_i and income y_i, and that the government has an exogenous budget requirement E. Then, the government's objective is to set a tax $T(y)$ which is such that it will maximize the Social Welfare Function $SWF(u_1, ..., u_I)$ under the budget constraint that the total tax revenue is at least equal to the budget requirement: $T(y_1) + ... + T(y_I) \geq E$, and under incentive compatibility constraints.

It is worth noting here that this approach to taxation cannot be dissociated from Moral and Political Philosophy, as it needs to establish two fundamentals, which are themselves intertwined: the role of the government and the way to aggregate preferences of individuals. Apart from correcting market failures, should the government also take on the role of redistributing between individuals? If so, how much redistribution should there be? If not, and if there is a need to raise revenue to finance public goods, how should the tax burden be distributed amongst citizens? In mathematical terms, what should be the shape of the Social Welfare Function $SWF(u_1, ..., u_I)$?

Such debates were widespread in the twentieth century, though they date back to a much earlier period. To cite but a few economists and philosophers who examined these questions, we may go back to the end of the eighteenth century with Jeremy Bentham, one of the founders of modern utilitarianism, whose fundamental axiom in his 1776 *Fragment on Government* is that "it is the greatest happiness of the greatest number that is the measure of right and wrong". In the mid twentieth century, utilitarianism gave rise to John Harsanyi's rule of the social welfare function being the expectation of utilities over the population. John Rawls, in contrast, in his 1971 *Theory of Justice*, by addressing the issue of distributive justice and by introducing the concept of choosing behind a "veil of ignorance"[60] concludes that the state should be guided by the *maximin* principle: It should maximize the utility of the least well-off individual in society. Robert Nozick's response in his 1974 *Anarchy, State and Utopia* is in opposition to these theories. He defends a libertarian perspective, advocating for a minimal state only destined to "protect against force, fraud, theft, and administer[ing] courts of law".

[59] As we shall see below, in the case of the income tax these behavioral reactions can be expressed using the Elasticity of Taxable Income, see Piketty, Saez and Stantcheva (2014).

[60] This refers to a situation where individuals know neither their place in society, nor their abilities.

Other considerations emerged towards to end of the twentieth century, with Amartya Sen for example, who starts by putting into question a basis itself of the theory of optimal income taxation: the individual's productive ability. He considers that this is not the right measure of an individual's potential well-being, and introduces the concept of "capabilities" in the 1980s: Productive abilities per say are not what counts as they can lead to very different outcomes depending on the context.

In most of today's works, some form of utilitarianism (weighted or unweighted) criterion is used (weighted utilitarianism covers the maximin criterion, as all the weight is then put on the utility of the least well-off individual). Fleurbaey and Maniquet (2011) and Saez and Stantcheva (2016)[61] propose frameworks that enable analyses to be even more general and inclusive.

This brings us to the modern approach to optimal income taxation as it was laid down in Mirrlees's 1971 article. The fundamental trade-off a decision-maker is faced with when redistributing income from higher ability individuals to lower ability ones is the *equity-efficiency trade-off*: On the one hand redistributing income serves to reduce inequalities, but on the other hand, this comes at the cost of discouraging more productive individuals from working as much as they would have if part of their income were not being taken from them – a fundamental hypothesis here being that the decision-maker can only observe individual incomes and not abilities. The idea is that redistributing income from those with higher productive ability to those with lower productive ability increases welfare (some weighted sum of individual utilities), because utilities being concave, lower ability individuals have higher marginal utility and thus gain the most from receiving extra income. At the same time, the gain in welfare comes with a loss: If taxes are higher for more productive individuals, then these individuals might be inclined to work less and pretend their ability is lower – this is where the information asymmetry between the government and individuals takes effect. In so doing, the individuals choose the amount of work which maximizes their own utility, which is not that which maximizes the social welfare function anymore: Taxes distort labor supply decisions. The equity-efficiency trade-off thus represents the balance the government has to operate between the redistributive gains of taxation versus the losses created by the distortion in labour supply decisions.

Ever since Mirrlees (1971), followed by Piketty (1997) and Saez (2001), we know the formula for the optimal marginal tax rates at each income. Combining these with the government's budget constraint gives us the shape of the optimal income tax scheme. The marginal tax rate at a given income level is equal to the amount of taxes that would be levied from the extra euro[62] earned above this level. At a given income level, increasing marginal tax rates: (i) enables to raise more revenue from all individuals with incomes above this level, (ii) harms all the individuals with incomes above this level (this is a subjective consideration, which will depend on how much weight the government assigns to its different citizens), (iii) distorts the labor supply decisions of the individuals with incomes equal to or above this level,[63] (iv) has an effect that depends on how much the individuals with this level of income matter as compared to those whose incomes are above this level.

The optimal income tax schedule thus depends on three *sufficient statistics* (as defined in Chetty (2009)): (i) the elasticity of taxable income – the percentage change in incomes with a 1% increase in the marginal tax rate, (ii) the distribution of taxable incomes, (iii) the welfare weights assigned by government to different individuals.
These statistics are all endogenous to the tax system, but the idea behind sufficient statistics is that for small variations, these factors can be measured and transposed to various contexts. The role of a strand of positive public economics is to use empirical methods to measure these sufficient statistics.

[61] Saez and Stantcheva (2016) study generalized welfare functions with weights that need not be consistent with the maximization of a utilitarian social welfare function. The generalized weights could as well reflect alternative, non-utilitarian value judgments or political economy forces.

[62] (/dollar/rupee/franc/rubble/real/...)

[63] Or just those of individuals at that level of income, if only substitution effects – and not income effects – are at play.

In most of the work that followed Mirrlees (1971) the weights in the Social Welfare Function are taken as given. However, recent work has started to adopt a positive perspective to these questions (see Bourguignon and Spadaro (2012), Lockwood and Weinzierl (2016), Jacobs, Jongen and Zoutman (2017)): Given the policies in place in different countries, what does this imply for the profile of weights that the governments assign to the different individuals in their society? This brings us closer to the political economy approach to taxation issues where it is important to know what politicians' preferences are when considering the design of policies.

Political economy. Even though Political Economy was for some time perceived as a sub-field of certain areas in economics,[64] it has held an important and long-lasting place in the discipline of Economics, despite changing in nature over time. Initially treated as a synonym for Economics, as is clear with Marshall's 1890 definition of Economics which assimilates both – "Political Economy or Economics is a study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of well-being", it then started at the turn of the twentieth century to be treated as a separate discipline. Robbins in his 1939 essays in Political Economy started making a distinction between the two, defining economics as "a system of theoretical and positive knowledge", while political economy was reserved for applied topics such as monopoly, protection, planning and government fiscal policy.[65] Towards the end of the twentieth century, and with Drazen (2000) on the one hand, and Persson and Tabellini (2002) on the other, Political Economy, or *New* Political Economy in the terms of Drazen has established itself as a field in its own right, even becoming one of the Programs of the NBER in 2006. It can be related to the "Public Choice School" of Buchanan and Tullock, which made significant contributions to constitutional theory and to modeling politicians as self-interested agents[66] – but which was not commonly integrated into mainstream economics, with the exception of some economists who had already started to account for such considerations in their work (see Becker' model of lobbies, Nordhaus's political business cycle model...).

The tendency today is to increasingly call for Political Economy analyses of public policies, both helping to understand certain policies that can be observed today, as well as better inform the political feasibility of public policies – see for example Piketty's recent *Capital and Ideology*. In fact, the latter view can also be seen in a certain way as a normative objective. The social planner can still seek to maximize a traditional Social Welfare Function, but with a third set of conditions: political feasibility conditions. Take the example of a democracy, where according to Roberts's view if "political parties make choices so as to maximize the likelihood of being elected then it is possible to view the chosen options as being determined, albeit indirectly, by a voting process. The point is not whether choices in the public domain are made through a voting mechanism but whether choice procedures mirror some voting mechanism." In that case the political feasibility condition is that at least half of the population benefits from the policy being proposed. In a day and age where economists are increasingly called upon as advisors in political campaigns, understanding which policies gather enough winners, and could thus be supported politically, becomes an important factor.

The consideration of political economy forces in the design of redistributive policies dates back to the 1970s. The literature is vast and covers a lot of ground, from its application to taxation where all individuals face the same tax and transfer system, to accounting for pandering – where governments can make differential transfers to different types of populations – and for ideological positions, rent-seeking activities, redistribution across generations, multiple levels of governments, and the possibility of moving between jurisdictions with different tax systems.

[64] As is still the case with JEL classification codes, where Political Economy is not assigned a particular field, but rather appears as a subfield of Microeconomics (D), more precisely the Analysis of Collective Decision-Making (D7), of International Economics (F), more precisely International Relations, National Security, and International Political Economy (F5), and finally of Economic Systems (P) with Capitalist (P1), Socialist (P2) and Other Economic Systems (P4)).

[65] See the political economy section in *The New Palgrave Dictionary of Economics*, Durlauf, Blume et al. (2008).

[66] As opposed to "benevolent social planners" as discussed in the previous section.

Two of the founding articles in the political economy of income taxation are those of Roberts (1977) and Meltzer and Richard (1981). Focusing on a linear income tax system (that is, where the marginal tax rate is the same for all incomes), they obtain the equilibrium tax schedule under majority voting when all individuals undergo "equal treatment" and are thus offered the same tax and transfer system (politicians cannot target transfers to certain categories of the population). They establish a *median voter theorem*: The equilibrium tax rate is the median-income individual's preferred rate. Thus, the less equal a society before redistribution, the farther away the median income from the middle income, the more redistributive the tax system voted in. As a consequence, the extension of the franchise should be accompanied by a larger size of government. Most of the main hypotheses of these models have since been released: the absence of an ideological factor, the "equal treatment" of categories of the population, the fact that the model is static, etc. However, relaxing the linearity hypothesis has proven to be complicated due to the fact that without any additional assumption, voting over non-linear tax schedules would give rise to *Condorcet cycles*, with no unique reform preferred by a majority of the voters.

Finally, using surveys (Alesina, Tabellini and Trebbi (2017), Stantcheva (2020), Fisman, Gladstone, Kuziemko and Naidu (2017), Weinzierl (2016)) economists are also beginning to empirically explore the preferences of individuals, taking into account cultural and political dimensions. But in order to carry out reforms, citizen support is not all that is needed – whether in a democracy, or in multi-state unions – a political will is important too. It is thus important to gather some knowledge on the preferences of politicians as well and which of their cultural or ideological backgrounds are strongest in shaping these preferences.

Network considerations. Let me conclude this section by noting that in the increasingly connected world we live in, relations, and hence *networks* matter more than ever. These links have existed from time immemorial: Social links were theorized upon as early as the Greek and Roman eras and networks of trade such as the silk road or the trans-Saharan trade road have existed respectively for millennia and centuries (see Curtin (1984), Pomeranz and Topik (2017)). Today, the growing strength and number of ties has pushed network considerations to the forefront of economics – see the numerous examples in Jackson (2010; 2019). Accounting for familial, friendship, professional, religious or community ties enables to better understand how individuals' social environments influence their behaviors, and it thus becomes of great importance to include these in positive, normative and political economy analyses of public policies.

In Political Economy, positive approaches have been used to uncover how peer effects affect turnout[67] or even votes.[68] In taxation, positive approaches have also been adopted to understand how networks either impact the access individuals have to tax avoidance schemes[69] or affect the information available to individuals regarding specific features of the tax schedules.[70] There has been a recent formalization of networks in economics by bringing graph theory to economics, but considerations of links between individuals were present even earlier – though not designated as networks. Becker for example theorized intra-family links as early as 1981. More generally there was a large normative literature in the 1980s including Arrow (1981) or Bergstrom, Blume and Varian (1986) which considered the interaction between other-regarding preferences – altruism more precisely – and the design of public policies. From a normative perspective as well, Bramoullé and Kranton (2007), Bloch and Zenginobuz, (2006; 2007) have used the new tools of the economics of networks to study the provision of public goods.

[67] See Cho, Gimpel and Dyck (2006), Fafchamps, Vaz and Vicente (2020).
[68] See Harmon, Fisman and Kamenica (2019).
[69] See Nordblom and Ohlsson (2006), Di Porto and Ohlsson (2016) for tax avoidance in the context of Italian families or Alstadsæter, Kopczuk and Telle (2018) in the context of Norway.
[70] See Chetty, Friedman and Saez (2013) in the context of the United States.

3. Contributions

This thesis is articulated around two axes. The first and second chapters focus on the second pillar of the role of the government's Fiscal Department according to Musgrave: redistributive policies. More precisely, they present contributions to the theory of income taxation, and adopt both a normative and a political economy perspective. The third and fourth chapters are grounded in political economy and contribute to providing a better understanding of the political forces guiding reforms in multi-state unions, notably the European Union. They seek to provide a better understanding of the preferences of individuals who are of great importance in the decision-making process but for whom little direct evidence is available: politicians. They document the points of views of members of national parliaments on different dimensions of European integration.

The standard Mirrlees framework of optimal income taxation, even though it contains a series simplifying hypotheses, is extremely insightful. As expressed so well by Joseph Kessel in a very different context – his account of Syria in 1926[71] – simplifying hypotheses and arguments sometimes turns out to be a necessity: "Yet, after a few days, one can start reading through this seemingly indecipherable grimoire. The broad lines become clear. There is no doubt that by simplifying matters one cannot expose everything. But isn't it the only way to understand and to be understood?" Here, while maintaining tractability, I seek to enrich standard taxation models with a better account of both institutional and social contexts. Chapter 1 accounts for links between individuals when designing a redistribution system. Indeed, income taxation problems have so far preponderantly dealt with redistribution between individuals, or couples, as separate entities. But in a lot of contexts, individuals are actually part of networks that may include family, friends, village or community members, and make transfers to them on a regular basis. This should matter to governments, because these transfers flow from richer to poorer individuals, and thus represent another form of redistribution, albeit an informal one. My research question is then: How should the existence of such informal but redistributive transfers affect the design of income taxes? Chapter 2 starts from the observation of a salient feature of many countries that have well-developed tax systems, where a sizeable proportion of their population is not liable to the income tax. Using tools from the normative taxation literature, we study the political economy of reforms of non-linear tax systems, which helps us understand why it might be the case that such important shares of the population are income-tax-exempt. Even though these chapters are theoretical, I use administrative and survey data in both. In Chapter 1, I use the US PSID (Panel Study of Income Dynamics) to simulate and thus illustrate the optimal tax schedules that I obtain theoretically. In Chapter 2, I use both the ERFS (Enquête sur les Revenus Fiscaux et Sociaux: survey data) and the POTE (administrative data) databases, which contain information on the French incomes and taxes paid since 1996. These enable us to better document the non-tax paying population in France over this period as well as to conduct simulations which confirm that the observed stability of the French taxpaying population at around 50% is a by-product of political constraints.

The third and fourth chapters are based on surveys conducted on French and German Members of Parliament on their opinion about policies which hold particular importance in light of continuing debates over the past ten years: labor market policies, and the Economic and Monetary of the European Union (EMU). They provide a different perspective on political economy questions, and inform the preferences of an important set of actors in decision-making processes: politicians – for whom, apart from their public votes and statements little direct evidence is available. In these chapters we mainly seek to disentangle which of the two factors is most significant in the differences observed: the cultural, or the ideological? Moreover, the object of these chapters provides some insights into the question of the construction of a political union. Finally, even though the use of administrative data has been taking over that of survey data in the past thirty years, M-turk has enabled large-scale surveys to come back to the forefront of economic research (see Stantcheva (2020) for a recent example). Although our survey is more on a reduced scale given that the population we are concentrating on is much smaller, it is nonetheless the first to provide evidence about the preferences of these politicians regarding the European Union.

[71] *En Syrie*, 1926.

Chapter 1. Optimal income taxation in the presence of networks of altruism.

Setting. Following the tradition of Mirrlees (1971), static optimal income taxation problems are typically concerned with redistribution by the state between independent individuals. In practice, however, individuals have links with one another — with their family, friends, neighbors or with members of a community —, and are thus part of networks through which information, money or help circulate. As a matter of fact, governments often take into account such ties in the design of income tax schedules by, for example, taxing individuals at a household level.[72] Yet little has been done in the economics literature to understand the interaction between familial and social networks and optimal income taxation.

In this Chapter, I analyze the design of optimal income taxation in the presence of networks of altruism. The existence of altruism between individuals is well-grounded in the academic literature, be it in economics, sociology or anthropology. Starting with Becker (1974; 1981), it has given rise to a large literature in economics – both theoretical and empirical.[73] Altruism can take different forms in developed and developing countries, and in particular, may expand beyond close family circles. In developing countries, these kinship networks may encompass individuals from one's extended family, village, or even caste or community (see Cox and Fafchamps (2007), Munshi (*forthcoming*)). In developed countries, even though altruism is generally thought of as existing primarily between parents and children, evidence suggests it is also present in extended families – especially between grand-parents and grand-children. The recent rise of individual or even nation-based crowd funding might constitute further evidence for altruism being present beyond family circles.

The design of income taxation, in turn, should be concerned with altruism as it has important theoretical implications. Indeed, altruism is one of the principal underlying reasons for private transfers between individuals – inter-households, or intra-household.[74] Moreover, altruistically motivated transfers are redistributive: They flow from richer to poorer households. These private transfers thus represent a form of informal redistribution within networks and raise the question of their interaction with public redistribution.

Research questions. The presence of private altruistically motivated transfers in the society raises a number of questions, notably: How do these two modes of redistribution – by the state and within networks – co-exist? And how ought this to affect income tax design by the state?

A straightforward postulate might be that redistribution can be achieved in the economy without state intervention by simply letting monetary transfers flow from richer to poorer households within networks. However, individuals who receive transfers from their networks do not necessarily coincide with the agents to whom the state would want to redistribute. Indeed, an individual might be poorer relative to the other members of their network, but much richer than members of other networks.

The mirror postulate would be that the state should completely crowd out private transfers and design its income tax without accounting for these. The essence of income taxation problems, however, is that endogenous effort decisions are unobservable by the state – which creates an asymmetry of information between the agents and the state. Since the state cannot observe exogenous productivity levels (and endogenous productive effort), it has to redistribute as a function of income, thus distorting productive effort decisions and generating an efficiency loss. This is the equity-efficiency trade-off. Higher tax rates enable more redistribution, but come at a cost: Marginal tax rates distort agents' incentives to exert effort, which then reduces the size of the total income

[72] For example, the "foyer fiscal" in France, the "tax unit" in the US, ...

[73] See for example, Arrow (1981), Cox (1987), Cox, Hansen and Jimenez (2004) Cox, Galasso and Jimenez (2006), Farhi and Werning (2013), Alger and Weibull (2010), Bourlès, Bramoullé and Perez-Richet (2017), Bourlès, Bramoullé and Perez-Richet (2018) and the handbook chapter by Mercier Ythier (2006).

[74] See Rapoport and Docquier (2006) for a survey on the different motives for informal transfers.

that the state can split between agents. Altruistic transfers, on the other hand, either do not distort productive effort decisions, or encourage more productive individuals to work more (and less productive ones to work less). Hence, private altruistic redistribution comes with no total (productive) efficiency loss, and even potentially an efficiency gain – thus impacting the classic equity-efficiency trade-off.

Results. In this Chapter, I first develop a framework based on Bourlès et al. (2017) and Arrow (1981), that gives some key insights into how altruistic private transfers affect the classic equity-efficiency trade-off of the Mirrlees model. Throughout, I illustrate my results with simulations.

Under standard assumptions on the nature of utility functions, I first show that a linear tax on income partially crowds out private transfers. Indeed, the effect of a linear income tax on transfers can be decomposed into two. Through lump-sum redistribution it increases all individuals' available incomes and through the linear income tax rate, it decreases the available incomes for higher skilled individuals more than it does for lower skilled ones. Both effects decrease altruistic transfers. The linear income tax, however, distorts productive effort decisions, whereas private altruistic transfers do not. The optimal income tax rate thus still depends on the redistributive tastes of the Social Planner and on the elasticity of earnings to the net-of-tax rate but should be adjusted downward to take into account the derivative of transfers with respect to the tax rate.

I then investigate the design of a non-linear income tax, which enables to better target individuals. The idea is that the government can now reduce tax rates on incomes that are statistically more present in groups in which higher redistribution takes place to encourage more non-distortive redistribution. The standard sufficient statistics formula of Diamond (1998), Piketty (1997) and Saez (2001) pinning down marginal tax rates at the optimum is modified to take into account the impact of marginal tax rates on private transfers. This extra term now highlights an indirect welfare effect that might result in decreased, or, quite surprisingly, in *increased* marginal tax rates as compared to a situation where there is no altruism. On the one hand, increasing the tax burden by a small amount for a whole group induces an increase in the transfers made by higher skilled individuals to lower skilled ones within this group. This reduces the welfare cost of raising marginal tax rates on incomes below those of this group, calling for higher marginal tax rates. On the other hand, increasing the tax burden on high-skilled individuals of a group but not on the low-skilled decreases the private transfers made within the group. This acts as an indirect tax on the low-skilled of this group and calls for lower marginal tax rates.

Using simulations on the US 2016 PSID, I illustrate how the optimal non-linear income tax is affected by different group structures. This allows me to show that for certain levels of altruism, tax rates may be affected by more than 10 percentage points.

Contributions to the literature. This is, to my knowledge, the first analysis of the design of *optimal income taxes* in the presence of networks of altruism.

The interaction between private altruistic redistribution and state redistribution has actually been studied in a series of seminal papers – notably by Barro (1974), Becker (1974), Bergstrom et al. (1986), Bernheim and Bagwell (1988) and in an extension by Mercier Ythier (2006). These articles hold neutrality results, whereby under certain conditions, private transfers on the one hand, and exogenous, publicly decided redistribution of wealth[75] on the other hand, achieve the same equilibrium.[76] Thus, when the government seeks to redistribute from rich to poor, it just replaces the pre-existing private transfers. A consequence of this result is that if public redistribution comes with administrative costs, then the role of the state for redistribution is irrelevant or at best limited. There are critical aspects, however, that these articles do not consider, and which are the foundation of

[75] Public debt and social security in the case of Barro (1974).
[76] See Mercier Ythier (2006) for a detailed exposure of these results.

optimal income taxation models: In practice, individuals are not exogenously endowed with an income level[77] and there is an asymmetry of information between the state and individuals. Finally, most of these articles rely on the existence of "chains of operational [i.e., positive] transfers" that link individuals even after the introduction of a tax and thus do not consider that individuals may not all be connected through transfers – and in particular that some individuals neither make nor receive transfers even though they are part of a network of altruism.

Chetty and Saez (2010) consider the interaction between state redistribution and informal insurance. My results stand in contrast with their paper, where the objective functions of the state and of a central planner in the informal economy (the private insurer) coincide. In my setting, even though there is no moral hazard between individuals, the equilibrium of the non-cooperative game is not Pareto efficient, hence does not coincide with the optimum of any social welfare function. As a result, contrary to Chetty and Saez (2010), the optimal linear tax rate should account for informal transfers. This is in resonance with Chang and Park (2017) for non-linear taxes. In their paper however, the coauthors consider the optimal design of income taxes in the presence of private insurance markets. Both public and private insurance are thus formal.

My results also highlight the need for measuring new sufficient statistics: In order to calibrate tax schedules in different contexts, it would be important to measure the impact on private transfers of a society-wide lump-sum transfer by the state and of an increase in the tax rate on a given bracket. Even though the crowd-out effect of public redistribution schemes on private transfers in developing countries (e.g. Strupat and Klohn (2018), Heemskerk, Norton and De Dehn (2004), Cox and Jimenez (1992)) has been empirically measured in various settings, it has generally focused on the elasticity of private transfers to taxes and subsidies on certain parts of the population only (for example, the retired).

Potential for applications. Relaxing some of the assumptions of the baseline model and expanding it in appropriate dimensions would allow to explore several applications in different contexts.

Taxation in developing countries. In many countries and settings, small monetary transfers between individuals are pervasive. In developing countries in particular, total private transfers between individuals represent important fractions of total income. Cox and Jimenez (1990) provide examples of average transfer amounts as percentages of average (global[78]) income in a variety of settings. In rural India, over the years 1975-1983, this share was of 8 %, in 1974 in Kenya and in Malaysia it was of 3 % and 11 % respectively. To the extent that altruistic transfers (see Cox et al. (2006)) are important in this context, my results contribute to the literature on taxation in developing countries by considering how such transfers affect the optimal tax *design* in such a setting. They can be used to derive the optimal tax schedule in different contexts – after the measurement of the new sufficient statistics has been carried out. This would be complementary to the literature on taxation in developing countries, which so far has mainly been concerned with questions relating to state capacity (see Pomeranz and Vila-Belda (2019) for a comprehensive overview of the research in this field).

Taxation of families. The taxation literature has extensively studied couple taxation (see Chiappori (1988), Chiappori (1992), Alderman, Chiappori, Haddad, Hoddinott and Kanbur (1995), Kleven, Kreiner and Saez (2009), and more recently Gayle and Shephard (2019), Obermeier (2018)). The model developed in this chapter enables, on the other hand, to address the question of the taxation of families with children. Supposing that the groups are families consisting of (one or two) parent(s) and a number of children, the government can observe groups and tag on the type of group the parents belong to. This may help explain a feature of the French tax system, for example, where families with children do not only receive child-related benefits but also see their marginal tax rate decrease on average.

[77] None of the above-mentioned articles address this point, except for Bernheim and Bagwell (1988).
[78] That is, taking into account income of households who do not make or receive transfers.

Chapter 2. On the Political Economy of the Income-Tax Threshold.

The second chapter is co-written with Pierre Boyer.

Setting. Through the fact that the income-tax threshold determines the relative number of taxpayers in a population, it holds an important place in the public sphere and can be the object of much public debate. The run-up to the 2012 US presidential elections provides a good example of this, when the Republican candidate, Mitt Romney, stated that "There are 47 percent of the people who will vote for the president [Mr. Obama] no matter what. [...] These are people who pay no income tax. Forty-seven percent of Americans pay no income tax."[79] Or again, when reading the French press, one may notice that it is an issue that is raised every year.[80]

But the income-tax threshold can also be an objective carefully set by politicians or by the government. In the United Kingdom, George Osborne, Chancellor of the Exchequer from 2010-2016, states that his goal "is a tax system where the lowest paid are lifted out of tax altogether, while the tax revenues [they] get from the richest increase." (Budget statement - March 2012). The French government budgetary report of 2016 states that one of its objectives is to exempt 50% of the population from paying the income tax with the rationales of increasing purchasing power of "poorer households" and of making the schedule more progressive (see *Projet de Loi Finances, 2016* page 49).

And indeed, the proportion of the income-tax paying population has remained surprisingly stable in many western countries in the past thirty years. In France for instance the percentage of French tax units paying the income tax has been around 50% since 1986 (see Figure 4). In the United Kingdom, this share has been between 55 and 65 percent since 1990 (see Miller and Roantree (2017)).

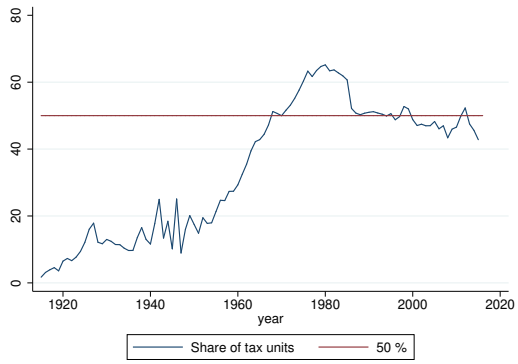


Figure 4 – Proportion of tax units paying the income tax in France since 1915
Sources: André and Guillot (2014) and *Cahiers Statistiques Direction Générale des Finances Publiques* since 2014.

Research question. What are the taxpayer coalitions that would be required to change the income-tax threshold? Can these explain the observed stability in the income-tax threshold in certain countries?

Results. In the first part of the Chapter, our main theoretical results show the relationship between the types of reforms affecting the income-tax threshold and the identity of the decisive voters who make them politically feasible.

[79] This is true for the federal income tax: In 2011, 46.4% of tax units in the United States did not pay any federal income tax, see Tax Policy Center results available at http://www.taxpolicycenter.org/model-estimates/tax-units-zero-or-negative-tax-liability/baseline-distribution-tax-units-no-tax.

[80] See titles such as "Qui paie encore l'impôt sur le revenu en France ?", Le Figaro, 15/10/2015, "Près de 6 Français sur 10 ne paient plus d'impôt sur le revenu", Les Echos 18/07/2017.

In a first set of results we find that the median income is the decisive individual for the political feasibility of reforms in two main instances: we highlight the type of reforms for which we still have a median voter theorem. This is the case either when the median income is below the income-tax threshold before and after a reform, or when reforms push taxpayers out of the income tax (thus raising the income-tax threshold). Our second set of results considers the political feasibility of reforms that are not supported by the median income. A compelling – because widely discussed in political debates – example of such a reform, is one that decreases marginal tax rates for all taxpayers and lowers the income-tax threshold. Such a reform doesn't require the assent of median income individuals and is actually politically feasible when there exists a coalition between low and high income individuals against middle income individuals.

In the second part of the Chapter we show how French politicians use a mechanism, the "*décote*" to effectively control the number of households with positive income tax liability, and how it interacts with reforms of the statutory tax rates. In particular, we first show how politicians effectively adjusted the income-tax threshold over time and over diverse presidencies. Using the ERFS database, we document the characteristics of the non-tax paying population. We find that given the heterogeneity of its composition, were politicians to make this part of the population tax-liable, it would not be straightforward for them to compensate it by pandering. Using the POTE database, we run simulations of tax reforms over the current income tax schedule, and find that a very low proportion of reforms aiming at lowering the income-tax threshold gather the required coalitions – evidence that the observed stability of the French taxpaying population around 50% is a by-product of political constraints.

Contributions to the literature. This model is the first to attempt to explain a salient feature of many modern tax systems: the important share of the population who does not pay the income tax. The simulations we run also constitute a novel method of systematically analyzing politically feasible reforms.

Our analysis is constructed within the optimal income taxation framework developed by Mirrlees (1971). The decision-making process, however, does not rely on the maximization of a social welfare function, but is embedded in a political economy framework: we look at reforms through the lens of political feasibility. A reform takes place if it is supported by a majority of voters. Two of the founding articles in this literature, Roberts (1977) and Meltzer and Richard (1981) consider linear tax schedules, and show median voter theorems: The voter with the median income is the decisive one.

However, in order to study income taxation, and the income-tax threshold as such, it is important to consider non-linear reforms of non-linear tax schedules: it should be possible for some individuals to have no tax liability independently from the tax credits they might receive. We use the tax perturbation method when analyzing reforms of the tax system[81] – a method used in the normative taxation literature – and apply it to a political economy set-up. In doing so we use the framework developed by Bierbrauer, Boyer and Peichl (2020) for the analysis of the political feasibility of non-linear reforms of non-linear tax schedules, but introduce a novel instrument for the politicians: the income-tax threshold. Moreover, we bring in a systematic manner our theoretical results to the empirical analysis of tax reforms using simulations.

We also bring a novel approach to the study of the income-tax threshold. Indeed, it has, to our knowledge, only been considered through two perspectives so far. On the one hand, as a salient kink point generating bunching (see Kleven (2016)), thus also providing the means to estimating the elasticity of taxable income for low income earners: see Saez (2010) and Lardeux (2017). On the other hand, as a factor varying through time and reflecting state capacity. Besley and Persson (2009; 2010; 2011; 2014) extensively study the role of state capacity in raising taxes (see also Aidt and Jensen (2009), on the introduction of income tax in Europe, North America, Japan and

[81] See Piketty (1997) and Saez (2001), Golosov, Tsyvinski and Werquin (2014), Jacquet and Lehmann (2017).

Oceania). Jensen (2016) studies the evolution of the income-tax threshold in developed and developing countries. He shows that as employment share rose in countries (or states), third-party reporting helped lower this threshold.

Our results complement the insights from the normative literature[82] by developing a political economy analysis for the base of the income tax with a focus on the income-tax threshold.

Potential for applications. This is one of the first frameworks that allows the study of discrete changes at certain thresholds in non-linear schemes which are generally considered normatively in Public Economics. This could bring a new lens to the analysis of retirement pensions, unemployment insurance, labor market contributions, or certain types of subsidies from a political economy perspective.

Chapters 3 and 4: About the future of the European Union.

Chapter 3 and Chapter 4 are co-written with Pierre Boyer and Friedrich Heinneman, Eckhardt Janneba and Sebastian Blesse. Chapter 3 is in French, and Chapter 4 in English. They aim to document the preferences of French and German members of parliament on important issues concerning the European Union. In Chapter 3, we focus on reforms of the labor market, and in Chapter 4 on reforms of the Economic and Monetary Union (EMU). These are two topics of paramount importance for the construction of the European Union: they started gaining increased importance in the wake of the 2007 crisis, and are still very actual today in the midst of the Covid-19 crisis, where the need to rely on some form of unemployment insurance becomes a first-order issue, and where debates have been raised again on whether Eurobonds might help recover from the crisis.[83]

Ever since the European Constitution was rejected in the French and Dutch referenda in 2005, the construction of the European Union has undergone a series of crises. The decision to leave the EU that was taken in June 2016 by the citizens of the United Kingdom has constituted one of the latest episodes of these crises, which have brought to the foreground the need for a debate on the competencies which should be allocated at the European level. There have been a number of reform suggestions, which have gone from federal union strategies to increase political competencies at the European level, to disintegration strategies, calling for more national autonomy.

Reaching some form of legitimacy for EU or euro-zone decisions requires consensus and a greater implication on behalf of national parliaments. This was the idea behind our survey of French (from the Assemblée Nationale and the Sénat) and German (from the Bundestag) members of Parliament – aiming to get a better understanding on their opinions on greater competencies for the EU on different policies. Contrary to the analyses carried out on a regular basis on European citizens' preferences (see the different waves of the Eurobarometer since 1973), we are still missing data on political leaders' opinions *vis-a-vis* an evolution of the European project. The econometric analyses using Probit models which we carry out in these chapters thus seek to enrich today's debates on further European integration.

A consensus on both sides of the Rhine certainly does not guarantee that integration proposals will be accepted by the other EU members. However, given the historical importance of France and Germany in the construction and integration process of the European Union, and given the difficulty of obtaining a qualified majority at the EU Council without the approval of at least one of these two countries, it is highly unlikely that reforms backed by neither the French nor the German parliaments would hold any chance of being adopted. In our perspective, a Franco-German consensus is thus a necessary condition for the political feasibility of European

[82] See, e.g., Wilson (1989), Slemrod and Kopczuk (2002), Kopczuk (2005), Gordon and Kopczuk (2014) and Ilzetzki (2018).

[83] See for example, https://www.lemonde.fr/idees/article/2020/04/03/coronavirus-il-n-est-pas-totalement-indecent-de-chiffrer-les-risques-economiques-du-confinement_6035432_3232.html, https://www.lemonde.fr/idees/article/2020/04/02/klaus-regling-la-solidarite-europeenne-doit-prendre-forme-en-recourant-rapidement-aux-institutions-et-aux-instruments-existants_6035340_3232.html, https://voxeu.org/article/covid-perpetual-eurobonds, https://voxeu.org/article/corona-bonds-great-idea-complicated-reality.

integration reforms. In this spirit, we use our survey to ask the members of national parliaments a series of questions linked to European integration – more precisely on specific instruments and options to push European integration further. It was carried out between April and July 2016.

Contributions to the literature. These chapters present the results of the first survey conducted among French and German members of parliament on the future of the European project regarding two areas of paramount importance: labor market policies and the Economic and Monetary Union. We highlight potential common ground between the two countries.

Our results, confirmed by several robustness tests, show that for almost all questions, ideological differences between members of national parliaments are quantitatively more important and more robust than national differences. For some questions, after controlling for ideology and personal characteristics, there is no significant difference between French and German responses. In particular, the creation of a European unemployment insurance and the flexibility of the labor market reveal an ideological (left/right) divide rather than a Franco-German divide. However, for EMU-related policies like Eurobonds, the Fiscal Compact and a strong ECB involvement we find strong and robust differences between parliamentarians of both countries even if they belong to the same party family.

These results are consistent with those of Alesina et al. (2017), where the authors focus on a sample of European Union countries and find cultural heterogeneity that is sometimes stronger within countries than between countries.

It also appears from the strong left/right divide highlighted on certain questions that the Euroscepticism observed in certain political speeches, could actually stem from ideological positions rather than from sharp opinions against European integration itself.

Potential for future work. In Chapters 3 and 4 we seek to establish along which dimensions French and German members of parliament differ statistically: Along nationality? Along ideology? We rely on a survey conducted in 2016, and have since then run another survey in 2018. We aim at pursuing these surveys at every legislature and have already started including other countries (Italy, for now). Going beyond the analyses carried out so far, natural language processing methods may be used first in order to compare the answers given with public votes and debates in the parliaments and second to exploit the fact that we have multiple waves of surveys to use shocks that have taken place in recent years in order to understand whether opinions on more integration may become more entrenched when countries face shocks that require their politicians to tend to their voters rather than adopt longer term perspectives.

Chapter 3. European Integration and Labor Market Policies.

Setting. Policies related to the labor market are a key component of Member States' agenda, and European citizens have high expectations regarding their results – Eurobarometer surveys find that employment is regularly mentionned as one of their main concerns. Labor market reforms are carried out on a regular basis but remain within the responsibilities of Members States, and have raise a number of complex questions. Gathering MP's perceptions of whether greater competencies should be allocated to the EU in this area is therefore particularly interesting.
The survey asked MPs their level of endorsement (or non-endorsement) on the following issues:
1. Labour market: "The EU should be able to make binding guidelines to the Member States regarding the labour market (e.g. regarding the design of dismissal protection or temporary contracts)."
2. Wage policy: "The EU should have stronger rights to intervene in Member States' wage policies (e.g. regarding the level of statutory minimum wages)."

3. European unemployment insurance:[84] "A common European unemployment insurance should be introduced to absorb recessions in individual Member States of the euro area."
4. More flexible labour markets:[85] "For higher economic growth in the euro area it is essential that countries with high levels of long-term unemployment make their labour markets more flexible (e.g. via an easing of dismissal protection regulations or a decrease in the statutory minimum wage)."

Research questions. What reforms find a consensus between German and French parliamentarians? Are the differences between members of parliament mainly along the national dimension or along the ideological one?

Results. The proposals to set up a European unemployment insurance scheme and to make the labour market more flexible reveal a left/right divide rather than a Franco-German one and thus reflect two potential areas of agreement between the two countries.
There is no alignment either between countries or between parties on the issues of binding guidelines regarding the labour market and wage policy. However, on binding guidelines on the labour market, the partisan divide is smaller than for the rest of the issues.

Chapter 4. European Integration and Economic and Monetary Union Reforms.

Setting. Following the 2007 crisis, the verdict that the EMU in its initial set-up resembled a "half-built house" (in the terms of Bergsten (2012)) has become a far-reaching consensus. Several shortcomings of the initial Maastricht constitution have been addressed since the outbreak of the acute crisis in the spring of 2010. Fiscal and macroeconomic governance rules have been refined and the rules of the Stability and Growth Pact have been strengthened. In addition, 25 European Union Member States have signed the Fiscal Compact, which forces signatory countries to establish deficit caps within their own national law according to contractual minimum standards. The European Central Bank (ECB) has effectively stepped into the role of a lender of last resort through the "Outright Monetary Transaction" (OMT) program, which allows purchases of crisis countries' bonds under the condition of an agreement with the European Stability Mechanism (ESM)[86] A banking union has been set up with a European supervision of large banks under the responsibility of the ECB and the establishment of a European Banking Resolution Mechanism. Despite this seemingly impressive list of reforms, the political and academic reform debate remains intense and the future of the Eurozone unclear. Our survey thus covers important topics of the EMU reform debate.

Regarding EMU institutions and policies, the survey asked MPs their level of endorsement (or non-endorsement) on the following issues:
1. Asset purchase program of ECB:[87] "The European Central Bank has taken a strongly active position in recent years by purchasing sovereign bonds of euro countries. This strongly active position of the ECB should continue."
2. Fiscal Compact: "The Fiscal Compact that was signed by 25 EU member states in 2012 commits the contracting parties like France and Germany to limit the general government deficit (cyclically adjusted) at 0.5% of Gross Domestic Product. Do you think it is desirable that [Germany/France] complies with the obligations of the Fiscal Compact?"
3. Tax policy:[88] "The European council should be able to vote on taxes with a qualified majority (e.g. binding

[84] The introduction of a common European unemployment insurance scheme constitutes an option for a mechanism to share the risks caused to Member States by shocks affecting countries differently in times of crisis.
[85] Structural reforms aimed at greater labor market flexibility typically represent a supply-side policy.
[86] Which has played a key role in the stabilization of the euro area since 2012.
[87] This question asks for an evaluation of a crucial aspect of the European Central Bank's involvement: the central bank's interventions in the market for euro area government bonds.
[88] Indeed, one recurring topic in the EMU reform debate is the possibility of a restriction of national fiscal autonomy and a transfer of power to the level of the Eurozone. The European Commission's recent reflection paper on the deepening of the European Union via a European Treasury and a European Finance Minister (European Commission, 2017) underlines the relevance of this debate. The second and third questions regarding the Economic and Monetary Union cover two different aspects of fiscal autonomy: deficit limits and voting in the European Council on taxes.

caps or floors for corporate taxes)."
4. European unemployment insurance:[89] "A common European unemployment insurance should be introduced to absorb recessions in individual member states of the EMU."
5. Eurobonds: "All euro countries are jointly liable for Eurobonds and all euro countries pay the same interest. The EMU should issue Eurobonds."

Research question. In Chapter 4 we analyze the preferences of the same MPs as in Chapter 3 on EMU reforms. We go a step futher in drawing the conclusions of what coalitions would be needed for these reforms to be supported by the politicians of two of the most important decision-makers in the EU.

Results. We find that ideological differences between members of national parliaments are quantitatively more important and more robust than national differences. Yet, for policies such as Eurobonds, the Fiscal Compact and a strong ECB involvement we find strong and robust differences between parliamentarians of both countries even when they belong to the same party family. It will be of interest, however, to see how these positions evolve over the coming years.

[89] This question addresses an issue in the area of fiscal policy as well, but shifts attention to a new fiscal instrument: fiscal capacity for the euro area through a European unemployment insurance (EUI).

Chapter 1

Optimal Income Taxation in the Presence of Networks of Altruism

Abstract. Following the tradition of Mirrlees (1971), static optimal income taxation problems are typically concerned with public redistribution by the State between independent individuals or couples. This is the first model, to my knowledge, to depart from this independence assumption and to account for the interaction between public redistribution and private transfers occurring between individuals within their familial and social networks. Here, individuals value the private utilities of their group's members and differ in their productivity levels. As a result, they have two dimensions of choice: their productive effort and the transfers they make to other members of their network. I characterize theoretically the optimal linear and non-linear income tax schemes in this context and provide sufficient statistics formulas for both, which highlight how tax design is affected by the existence of altruistic private transfers. I show that public and private redistribution are substitutes but at the optimum, private transfers are only partially crowded-out: the government may rely on these transfers to achieve its equity objective. Depending on the structure of groups, taking into account private redistribution may induce large efficiency gains – a finding I illustrate using numerical simulations. These novel insights can then be applied to a variety of settings, such as those of family taxation and of taxation in developing countries, for which I document the structure and nature of informal transfers using the World Bank's Living Standard Measurement Surveys.

Keywords: Optimal taxation, networks, private transfers, altruism.
JEL classification: D31, H21, H3, D64, D85.

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1.1 Introduction

Following the tradition of Mirrlees (1971), static optimal income taxation problems are typically concerned with redistribution by the State between independent individuals. However, as poet John Donne wrote, "no man is an island entire of itself". In practice, individuals have links with one another — with their family, friends, neighbors or with members of a community —, and are thus part of networks through which information, money or help circulate.[1] As a matter of fact, governments often take into account such ties in the design of income tax schedules by, for example, taxing individuals at a household level.[2] Yet little has been done in the economics literature to understand the interaction between familial and social networks and optimal income taxation.

This is to my knowledge the first analysis of the design of optimal income taxation in the presence of networks of altruism. The existence of altruism between individuals is well-grounded in the academic literature, be it in economics, sociology or anthropology. Starting with Becker (1974; 1981), it has given rise to a large literature in economics – both theoretical and empirical.[3] Altruism can take different forms in developed and developing countries, and in particular, may expand beyond close family circles. In developing countries, these kinship networks may encompass individuals from one's extended family, village, or even caste or community (see Cox and Fafchamps (2007), Munshi (*forthcoming*)). In developed countries, even though altruism is generally thought of as existing primarily between parents and children, evidence suggests it is also present in extended families – especially between grand-parents and grand-children. The recent rise of individual or even nation-based crowd funding might constitute further evidence for altruism being present beyond family circles. The design of income taxation, in turn, should be concerned with altruism as it has important theoretical implications. Indeed, altruism is one of the principal underlying reasons for private transfers between individuals – inter-households, or intra-household.[4] Moreover, altruistically motivated transfers are redistributive: they flow from richer to poorer households. These private transfers thus represent a form of informal redistribution within networks and raise the question of their interaction with public redistribution.

A straightforward postulate might be that redistribution can be achieved in the economy without State intervention by simply letting monetary transfers flow from richer to poorer households within networks. However, individuals who receive transfers from their networks do not necessarily coincide with the agents to whom the State would want to redistribute. Indeed, an individual might be poorer relative to the other members of their network, but much richer than members of other networks.

The mirror postulate would be that the State should completely crowd out private transfers and design its income tax without accounting for these. The essence of income taxation problems, however, is that endogenous effort decisions are unobservable by the State – which creates an asymmetry of information between the agents and the State. Since the State cannot observe exogenous productivity levels (and endogenous productive effort), it has to redistribute as a function of income, thus distorting productive effort decisions and generating an efficiency loss. This is the equity-efficiency trade-off. Higher tax rates enable more redistribution, but come at a cost: marginal tax rates distort agents' incentives to exert effort, which then reduces the size of the total income that the State can split between agents. Altruistic transfers, on the other hand, either do not distort productive

[1] These links were analyzed and theorized upon as early as the Greek and Roman eras, by Cicero for example, and more recently by philosophers such as Emmanuel Mounier, and more remarkably Georg Simmel. In economics, social networks are increasingly studied, see Jackson, (2010; 2019).

[2] For example, the "foyer fiscal" in France, the "tax unit" in the US, ...

[3] See for example, Arrow (1981), Cox (1987), Cox et al. (2004) Cox et al. (2006), Farhi and Werning (2013), Alger and Weibull (2010), Bourlès et al. (2017), Bourlès et al. (2018) and the handbook chapter by Mercier Ythier (2006).

[4] See Rapoport and Docquier (2006) for a survey on the different motives for informal transfers.

effort decisions, or encourage more productive individuals to work more (and less productive ones to work less). Hence, private altruistic redistribution comes with no total (productive) efficiency loss, and even potentially an efficiency gain – thus impacting the classic equity-efficiency trade-off.

The presence of private altruistically motivated transfers in the society therefore raises a number of questions, notably: how do these two modes of redistribution – by the State and within networks – co-exist? And how ought this to affect income tax design by the State? I first develop a baseline framework, that gives some key insights into how altruistic private transfers affect the classic equity-efficiency trade-off of the Mirrlees model. I subsequently expand the model by relaxing some of the initial assumptions and consider related applications. Throughout, I illustrate my results with simulations.

In the baseline framework, I account for altruistic links between individuals in an otherwise standard Mirrleesian framework, where (i) individuals are endowed with exogenous productivity levels that are unobservable to the State, and (ii) the State seeks to maximize a social welfare function that reflects its redistributive preferences. Individuals are altruistic and thus value the private utility of their peers. They then play a non-cooperative game in which they choose their productive effort as well as the transfers they make. I assume that the network of altruism is composed of different groups – for example, extended families, or communities – in order to account for heterogeneity in productivity levels within and across groups. I then derive the structure of incomes and transfers absent government intervention and find that redistribution may take place at the group level. Depending on how representative of society groups are, this may imply more or less redistribution society-wide. This is the context in which the government introduces an income tax in order to raise revenue and redistribute between individuals. I find that the formal system relies on the informal one, and at the optimum both positive tax rates and positive transfers co-exist. I characterize theoretically the optimal linear and non-linear income tax schemes. The sufficient statistics formula for marginal tax rates still depends on the distribution of skills in the society, the social planner's redistributive preferences and the elasticity of earnings to the net of tax rate, and is appropriately modified to include the effect of taxes on private transfers.

More precisely, I build on the setting of Bourlès et al. (2017), where individuals are all part of a network, in which they value the private utility of the agents they are linked to. In my setting, the structure of the network of altruism is such that individuals belong to different components of a network, and each component is complete as in Arrow (1981).[5] Within each component there are different distributions of individual skills. We refer to these components as groups. Unlike Bourlès et al. (2017) and Arrow (1981), however, earnings are endogenous. Thus, individuals should not only choose the transfers they make, but also their productive effort. The group structure enables me to consider two layers of heterogeneity. First, heterogeneity between agents: agents differ in their productivity levels and in the groups they belong to. Both determine an agent's final consumption. Second, heterogeneity between groups: groups may be composed of higher or lower productivity agents on average, so that an individual considered as low skilled in one group may be the one with the highest skill in another group. Finally, I model the individuals' choices as a simultaneous non-cooperative game, where individuals choose their productive effort and transfers taking the choices of the other individuals as given.

I characterize the economy when there is no government intervention. I prove that there exists a Nash equilibrium to the game described above and that it uniquely determines allocations.[6] This induces a new network, one of transfers. Quite intuitively, transfers do not take place between individuals of different groups. Moreover, I find that transfers only flow from higher skilled to lower skilled individuals, and do so only if altruism is high enough or if skill levels are different enough. Private transfers are thus redistributive: within groups, they reduce the consumption gap between higher and lower skilled individuals. All individuals of the same productivity level

[5] The adjacency matrix of the network of altruism is thus bloc-diagonal.

[6] This relies to the extensively studied literature on games on networks, see Jackson and Zenou (2014), Bramoullé and Kranton (2016).

and in the same group behave identically: they provide the same productive effort and make or receive the same sum of transfers.

Secondly, I characterize the optimal income tax in such a setting assuming that the government can observe neither productivity levels nor group belonging. The setting is a standard Mirrleesian one, in which, however, individuals are altruistically linked.

Under standard assumptions on the shape of utility functions, I first show that a linear tax on income partially crowds out private transfers. Indeed, the effect of a linear income tax on transfers can be decomposed into two. Through lump-sum redistribution it increases all individuals' available incomes and through the linear income tax rate, it decreases the available incomes for higher skilled individuals more than it does for lower skilled ones. Both effects decrease altruistic transfers. The linear income tax, however, distorts productive effort decisions, whereas private altruistic transfers do not. The optimal income tax formula thus still depends on the redistributive tastes of the Social Planner and on the elasticity of earnings to the net-of-tax rate but should be adjusted downward to take into account the derivative of transfers with respect to the tax rate. In particular, two interesting cases arise either when transfers flow from the very rich to the very poor, or when they only take place in a wider middle class. In the latter case, the tax rate might hardly adjust to transfers: the government faces two forces that go in opposite directions. Lowering the tax rate enables less productive effort distortion and more redistribution within the middle income group, but it does not enable enough redistribution from the very rich to the very (isolated) poor. These results stand in contrast with Chetty and Saez (2010). In their paper, the objective functions of the State and of a central planner in the informal economy (the private insurer) coincide. In my setting, even though there is no moral hazard between individuals, the equilibrium of the non-cooperative game is not Pareto efficient, hence does not coincide with the optimum of any social welfare function. As a result, contrary to Chetty and Saez (2010), the optimal linear tax rate should account for informal transfers.[7]

I then investigate the design of a non-linear income tax, which enables to better target individuals. The idea is that the government can now reduce tax rates on incomes that are statistically more present in groups in which higher redistribution takes place to encourage more non-distortive redistribution. The standard sufficient statistics formula of Diamond (1998), Piketty (1997) and Saez (2001) pinning down marginal tax rates at the optimum is modified to take into account the impact of marginal tax rates on private transfers. This extra term now highlights an indirect welfare effect that might result, quite surprisingly, in increased or decreased marginal tax rates as compared to a situation where there is no altruism. On the one hand, increasing the tax burden by a small amount for a whole group induces an increase in the transfers made by higher skilled individuals to lower skilled ones within this group. This reduces the welfare cost of raising marginal tax rates on incomes below those of this group, calling for higher marginal tax rates. On the other hand, increasing the tax burden on high-skilled individuals of a group but not on the low-skilled decreases the private transfers made within the group. This acts as an indirect tax on the low-skilled of this group and calls for lower marginal tax rates. Using simulations, I illustrate how the optimal non-linear income tax is affected by different group structures. This allows me to revisit the two cases examined in the linear income tax setting and to show that for certain levels of altruism, tax rates may be affected by more than 10 percentage points.

Potential Applications. The flexibility of my framework would enable me to explore several potential extensions, in which I relax some of the assumptions of the baseline model and expand it in appropriate dimensions. These applications mainly differ in the structure of information available to the State.

[7]Note that this is in resonance with Chang and Park (2017) for non-linear taxes. In their paper however, the coauthors consider the optimal design of income taxes in the presence of private insurance markets. Both public and private insurance are thus formal.

Taxation in developing countries. In many countries and settings, small monetary transfers between individuals are pervasive. In developing countries in particular, total private transfers between individuals represent important fractions of total income. Cox and Jimenez (1990) provide examples of average transfer amounts as percentages of average (global[8]) income in a variety of settings. In rural India, over the years 1975-1983, this share was of 8 %, in 1974 in Kenya and in Malaysia it was of 3 % and 11 % respectively. In Appendix A, I use the World Bank's Living Standard Measurement Surveys (LSMS) in six countries – Burkina Faso, Ghana, Mali, Niger, Tajikistan and Uganda – to present some evidence on the importance of these transfers, as well as on their potential observability and patterns. The years covered by these more recent surveys range from 2009 to 2014.
To the extent that altruistic transfers (see Cox et al. (2006)) are important in this context, my results contribute to the literature on taxation in developing countries by considering how such transfers affect the optimal tax *design* in such a setting. They can be used to derive the optimal tax schedule in different contexts – after the measurement of the new sufficient statistics has been carried out. This would be complementary to the literature on taxation in developing countries, which so far has mainly been concerned with building state capacity (see Pomeranz and Vila-Belda (2019) for a comprehensive overview of the research in this field).
Three other motives for private transfers have been widely studied: reciprocity (also referred to as quid pro quo, or exchange),[9] risk-sharing[10] and finally, social norms that translate into a kinship tax.[11] Transfers pertaining to risk-sharing relate to shorter-term income fluctuations, whereas kinship taxes and altruistic transfers relate to long term income differences between individuals. Using the World Bank's LSMS, I find that in the countries for which this data is available, half of the transfers are made on a regular basis: this provides evidence for the existence of transfers relating to longer-term income differences.
I sketch an extension of my model to include kinship taxes: agents are now linked through altruism in their direct network, and through kinship taxes with surrounding networks. Kinship taxation now adds two different aspects to the design of optimal income taxation. On the one hand, it could be optimal for (formal) income taxes to crowd out this kinship tax, but this would also imply crowding out altruistic transfers. On the other hand, if at the optimum kinship and State taxes co-exist, then the formal income taxe introduces a double distortion on the effort decision of individuals who are taxed both by their surrounding networks and by the State.

Taxation of families. The taxation literature has extensively studied couple taxation (see Chiappori (1988), Chiappori (1992), Alderman et al. (1995), Kleven et al. (2009), and more recently Gayle and Shephard (2019), Obermeier (2018)). My model enables, on the other hand, to address the question of taxation of families with children. Here, in future work, I would endeavor to relax the assumption that the State does not know the groups. Supposing that the groups are families consisting of (one or two) parent(s) and a number of children, the government can observe groups and tag on the type of group the parents belong to. This may help explain a feature of the French tax system, for example, where families with children do not only receive child-related benefits but also see their marginal tax rate decreased on average.

Related Literature. The interaction between private altruistic redistribution and State redistribution has been studied in a series of seminal papers – notably by Barro (1974), Becker (1974), Bergstrom et al. (1986), Bernheim and Bagwell (1988) and in an extension by Mercier Ythier (2006). These articles hold neutrality results, whereby under certain conditions, private transfers on the one hand, and exogenous, publicly decided redistribution of wealth[12] on the other hand, achieve the same equilibrium.[13] Thus, when the government seeks to redistribute from rich to poor, it just replaces the pre-existing private transfers. A consequence of this result is that if public redistribution comes with administrative costs, then the role of the State for redistribution is

[8]That is, taking into account income of households who do not make or receive transfers.
[9]See Cox and Fafchamps (2007) and De Weerdt, Genicot and Mesnard (2019).
[10]See the extensive work of Townsend starting with Townsend (1994), and also Fafchamps and Gubert (2007), Fafchamps and Lund (2003), Mobarak and Rosenzweig (2012; 2013).
[11]See Jakiela and Ozier (2015), Squires (2016), Baland, Guirkinger and Mali (2011), Carranza, Aletheia, Grosset and Kaur (2018), Boltz, Marazyan and Villar (2019).
[12]Public debt and social security in the case of Barro (1974).
[13]See Mercier Ythier (2006) for a detailed exposure of these results.

irrelevant or at best limited. There are critical aspects, however, that these articles do not consider: as discussed above, in practice, individuals are not exogenously endowed with an income level[14] and there is an asymmetry of information between the State and individuals. Finally, most of these articles rely on the existence of "chains of operational [i.e., positive] transfers" that link individuals even after the introduction of a tax and thus do not consider that individuals may not all be connected through transfers – and in particular that some individuals neither make nor receive transfers even though they are part of a network of altruism.

The crowd-out effect of public redistribution schemes on private transfers has been empirically measured in various settings. The literature focusing on the elasticity of private transfers to taxes and subsidies in developing countries (e.g. Strupat and Klohn (2018), Heemskerk et al. (2004)) finds evidence for partial crowding-out. For example, Cox and Jimenez (1992) find that in Peru, social security reduced the amount of private transfers from young to old by approximately 20 percent. The sufficient statistics highlighted in my analysis, however, would require measuring the impact of a society-wide lump-sum transfer by the State on private transfers, or of an increase in the tax rate on a given bracket.

Another perspective taken on by the literature has been the study of the coexistence of formal markets and informal networks. Theoretically, Kranton (1996) finds results that depend on the initial share of reciprocal exchange, and Gagnon and Goyal (2017) find that aggregate welfare, inequality and strength of social ties depend on whether the market and the network are complements or substitutes. In their paper, however, individuals have a choice to participate in the formal market: this cannot be the case here, as taxation applies to all individuals in a State. Finally in an interesting take on the question, Galasso and Profeta (2018) adopt a reverse perspective and seek to understand the impact of public pension schemes on the shape of social norms.

This chapter is organized as follows. In the next section I present the formal framework. In Section 1.3, I characterize the economy with no government intervention, and in Section 1.4, I derive the optimal linear and non-linear income taxes in this setting. In Section 1.5, I consider some applications of this framework. I conclude in Section 1.6. Appendix A documents patterns of private transfers in a selection of countries. In Appendix B, I detail how I conducted the numerical simulations. Unless otherwise stated, all proofs are in Appendix C.

1.2 The model

Consider an economy where individuals are endowed with different productivity or skill levels and have private and social preferences. Their social (or altruistic) preferences reflect the fact that they value the private utilities of their peers. This then defines a network of altruism, where any two individuals may be considered as nodes, and where one individual valuing the private utility of another individual implies that a link is present between these two nodes. We assume networks of altruism to be of the form of groups to account, for example, for family, extended family, caste or village structures. Our society thus consists of groups with more or less heterogeneity in the skills of individuals that compose them. Within this setting, individuals choose their productive effort and the transfers they make to their peers in order to maximise their altruistic preferences. Finally, we clarify what structures of information we shall consider, and what situations they may reflect.

Skills and private preferences. Individuals are endowed with a skill or productivity level ω, and have private preferences given by a utility function u. This utility function is increasing in private goods consumption – or after-tax-and-(private)-transfer income (ex-post income) – c. It is decreasing in earnings – or income or ex-ante income – y, thus reflecting the cost of working for the individual. The private utility that an individual

[14] None of the above-mentioned articles address this point, except for Bernheim and Bagwell (1988). In their paper, however, this productive effort is observable by the State.

of productivity ω derives from c and y is thus denoted by $u(c, y, \omega)$.[15]

We assume that $-\frac{u_y(c,y,\omega)}{u_c(c,y,\omega)}$, the marginal rate of substitution between labor and consumption is decreasing in the individual's skills, i.e. for any pair (c, y) and any ω, ω' with $\omega' > \omega$,

$$-\frac{u_y(c, y, \omega')}{u_c(c, y, \omega')} \leq -\frac{u_y(c, y, \omega)}{u_c(c, y, \omega)} .$$

In other words, individuals with higher ability need less compensation in consumption to work more: this is the Spence-Mirrlees single crossing property.

Altruistic preferences. The altruistic preferences of an individual i may be captured by their social utility, which, in the same spirit as Bourlès et al. (2017), we may write as:

$$U_i(c_i, y_i, \omega_i, \{(c_j, y_j, \omega_j)\}) = \frac{1}{1 + \sum_{j \neq i} \alpha_{ij}} \left\{ u(c_i, y_i, \omega_i) + \sum_{j \neq i} \alpha_{ij} u(c_j, y_j, \omega_j) \right\},$$

with $0 \leq \alpha_{ij} < 1$ the level of altruism i has for j.

Here are a few points that may be worth noting.

We normalize social utility by $1 + \sum_{j \neq i} \alpha_{ij}$ in order to ensure that social utility does not diverge with the number of individuals included in an agent's neighborhood (that is, the number of agents in $C(i)$).[16]

The strength of altruism between i and j α_{ij} being smaller than one implies that for equal consumption levels, individual i always values their own marginal consumption more than they do that of individual j.

The network of altruism A is the adjacency matrix that links social and private utilities. If U is the vector of social utilities and u the vector of private utilities in the society, then the network of altruism is such that $U = Au$. It has a diagonal A_{ii} of $\frac{1}{1 + \sum_{j \neq i} \alpha_{ij}}$, and other entries A_{ij} equal to $\frac{\alpha_{ij}}{1 + \sum_{j \neq i} \alpha_{ij}}$.

We define $C(i)$ to be the neighborhood of individual i – that is the set of individuals towards which i is altruistic (and by convention we include i in $C(i)$). These are the individuals on which they put a positive weight in their social utility function: $C(i) = \{j \text{ s.t. } \alpha_{ij} > 0\} \cup \{i\}$. We also refer to them as i's peers.

Game. Individuals make (potentially null) transfers to each other, so that consumption is of the following form:

$$c_i = y_i - T(y_i) - \sum_{j \neq i} t_{ij} + \sum_{j \neq i} t_{ji},$$

where t_{ij} are transfers from individual i to individual j and t_{ji} from individual j to individual i (so that by definition t_{ij} and t_{ji} are both non negative), and $T(.)$ is the income tax decided upon by the government. We define the *laissez-faire* as the situation in which there is no government intervention: $T(y) = 0$ for all y.

Individuals then choose their productive effort and the transfers they make at the same time taking the choices of the other individuals in their network as given. That is, productive effort and transfer levels are determined

[15] This may also be referred to, as in Pareto (1916), as their *ophelimity*.

[16] This is only one of the multiple ways this normalization could be done. We could also normalize it by the degree of individuals, $\frac{1}{\#C(i)}$ or by the maximal degree in society $\frac{1}{max_i\{\#C(i)\}}$. As stated in the text, this normalization just ensures that social utilities converge when the number of individuals present in an agent's network becomes large. It does not impact our results.

as a Nash Equilibrium of a non-cooperative simultaneous game.

Groups and skill attribution. In this chapter, we follow Arrow (1981) and consider individuals to be part of a specific type of network, a network composed of groups.[17] The group structure is useful for the following reasons. First, it allows us to capture altruism within families, extended families, castes, villages, religious or ethnic entities. Second, as will become clear below, it enables to add structure on the level of heterogeneity of skills at the society level on the one hand and at the peer level one the other hand.[18]

When our society is composed of groups, an individual i belongs to the set of neighbors of j if and only if their sets of neighbors are the same. In mathematical terms: $i \in C(j) \iff C(j) = C(i)$. We also consider that within a group C, individuals have the same altruistic links to each other, say α^C.[19] Let $\mathcal{C}$ be the set of groups. Thus, at the society level, the adjacency matrix of altruistic ties may be represented by a block diagonal matrix, whose $\#\{\mathcal{C}\}$ blocks are matrices with a diagonal equal to $\dfrac{1}{1+\alpha^C n^C}$ and all other entries equal to $\dfrac{\alpha^C}{1+\alpha^C n^C}$, $C \in \mathcal{C}$.

Groups have characteristics, and individuals belonging to them have different productivity levels ω. First, individuals are assigned to groups. Then, the process of group characteristic and skill realizations will be as follows. Let $C \in \mathcal{C}$ be a given group. In a first step, the characteristics $\boldsymbol{\theta}^C \in \Theta$ of group C are drawn from a distribution with cumulative distribution function $G(\boldsymbol{\theta})$. $\boldsymbol{\theta}^C$ is a vector, that may consist for example of a mean μ^C and a standard deviation σ^C – and eventually of bounds $\underline{\omega}^C$, $\overline{\omega}^C$. This then determines the cumulative distribution function $H(.|\boldsymbol{\theta}^C)$ of a new distribution. In a second step, the skills ω of individuals in group C are drawn from this distribution $H(\omega|\boldsymbol{\theta}^C)$.

Let us also define $F(\omega)$ with density $f(\omega) = \int_{\boldsymbol{\theta}} h(\omega|\boldsymbol{\theta})g(\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta}$.

Here, let us highlight four points.

First, the process of group and skill attribution enables us to capture both within and between group heterogeneity. Group characteristics $\boldsymbol{\theta}$ and the distribution of skills given these characteristics, H represent the within group heterogeneity in skills, while G, the distribution function of the characteristics of groups, represents between group heterogeneity. In particular, if G has a Dirac shape, then on average all groups are the same.

Second, and related, even though we model group formation as exogenous, the different $\boldsymbol{\theta}$'s may make the groups in society more or less homogeneous in productivity levels. For example if $\boldsymbol{\theta}$ consists of a mean and a variance, and variances are very small, then groups will tend on average to be very homogeneous in skill levels: this may be a way to account for homophily along the skill dimension.

Third, the definition of $\boldsymbol{\theta}$ may not be so limited. It may be more general, by defining $\boldsymbol{\theta}$ as partly determining the characteristics of the distribution of skills in the group, and partly other characteristics (for example, altruism α or size of groups n). In this case we may write $\boldsymbol{\theta} = (\boldsymbol{\theta}_1, \boldsymbol{\theta}_2)$, where for example $\boldsymbol{\theta}_1 = (\mu, \sigma)$ is relevant for the distribution of skills in the group,[20] and $\boldsymbol{\theta}_2 = (\alpha, n)$ determines its other relevant characteristics.

Fourth, note that in what follows we may use an abuse of notation in writing μ^θ, σ^θ, $\underline{\omega}^\theta$ and $\overline{\omega}^\theta$ for the mean,

[17] That is, the network of altruism is composed of disjoint networks, each of which is complete. Thus, if an individual belongs to one group, then they do not belong to another group.

[18] Other forms of networks may be considered, but some structure needs to be added in order to be able to draw systematic conclusions. If there were no structure, then both links between individuals and skills would be randomly drawn and uncorrelated.

[19] Altruism α may depend on the size n of the group. The only required assumption is that it converges as n becomes infinitely large.

[20] Within a group C, skills are then drawn from $H(\omega|\theta_1^C)$.

standard deviation, and lower and upper bounds of the distribution of skills in a group of type $\boldsymbol{\theta}$.

Information structure. The individuals know their own skill level, who their peers are (any i knows $C(i)$), and the skill levels of their peers. In the baseline model, the government does not know who the peers of an individual are, and does not know the size (or distribution of sizes) of groups either. Thus, the government only knows $H(\omega|\boldsymbol{\theta})$ and $G(\boldsymbol{\theta})$, as well as the individuals' earnings. This framework may be applied to the case of caste-based groups that span many villages as described in Munshi (*forthcoming*), extended family networks, religious or cultural networks that span many localities.
We refer to $(\omega_i, \boldsymbol{\theta}^{C(i)})$ as an individual i's type in the government's point of view: it is composed of their skill level and the characteristics of the group they belong to.

In some extensions and applications (see Section 1.5), we consider different structures of information. Indeed, the government may know the groups. This would apply for example to families: the government knows about the link between parents and children. It may know $\boldsymbol{\theta}$, for example if altruism is present at a village level, and the government knows the average skill level in different villages. Finally it may not perfectly observe earnings, as in many developing countries.[21]

Specification. In what follows, we shall use the following specification for the private utility functions:

$$u(c_i, y_i, \omega_i) = u\left(c_i - k\left(\frac{y_i}{\omega_i}\right)\right),$$

where utility u is increasing and concave and k, which reflects the cost of effort, is increasing and convex. By definition, this cost is thus given in consumption units.

Note that using the concave transformation of a quasi-linear utility function enables us to avoid income effects, and thus to isolate the interaction between taxes and private transfers on a single dimension. This assumption is quite common in the public finance literature (see e.g., Diamond (1998), Saez and Stantcheva (2016), Sachs, Tsyvinski and Werquin (2016), Chetty and Saez (2010), Saez, Slemrod and Giertz (2012)...) and consistent with the empirical evidence, which finds very small income effects (see e.g. Gruber and Saez (2002), Cabannes, Houdré and Landais (2014)).

Examples. In the following, I shall use two running examples in order to illustrate the effects at play. These also show that the group structure presents a pretty flexible framework.
In one example (*Example 1*), there are only two productivity types ω_H and ω_L, so that the important group characteristic is the proportion π of high-skilled individuals in the group. Thus g will refer to the distribution of these proportions. And h will then be discrete, with $h(\omega_H) := \mathbb{P}(\omega = \omega_H) = \pi$, $h(\omega_L) := \mathbb{P}(\omega = \omega_L) = 1 - \pi$.
In the other example (*Example 2*), I shall compare two kinds of societies:
- Society A, where all groups are the same (i.e. $\boldsymbol{\theta}$ is the same for all groups).
- Society B, where there are three kinds of groups. That is, $\boldsymbol{\theta} = \{\boldsymbol{\theta}_1, \boldsymbol{\theta}_2, \boldsymbol{\theta}_3\}$. Now g is discrete, with $g(\boldsymbol{\theta}_i) := \mathbb{P}(\boldsymbol{\theta} = \boldsymbol{\theta}_i) = p_i$, such that $p_1 + p_2 + p_3 = 1$. The groups will be more or less homogeneous in skill levels, and with higher or lower skill levels on average.

1.3 No government intervention

Let us first note that given the structure of the network of altruism, it is never the case that an individual belonging to a group makes a transfer to an individual belonging to another group of the network.

[21] Even though with the rise of formal employment and third party reporting, some attempts at broadening the tax base to include income taxation are starting to arise, see the recent reform in Uganda, World Bank (2018).

The program of individual i is the following:

$$\max_{\{y_i, t_{ij}, j\neq i\}} u\left(y_i - \sum_{\substack{j\neq i\\ j\in C(i)}} t_{ij} + \sum_{\substack{j\neq i\\ j\in C(i)}} t_{ji} - k\left(\frac{y_i}{\omega_i}\right)\right) + \alpha \sum_{\substack{j\neq i\\ j\in C(i)}} u\left(y_j - \sum_{\substack{k\neq j\\ k\in C(j)}} t_{jk} + \sum_{\substack{k\neq j\\ k\in C(j)}} t_{kj} - k\left(\frac{y_j}{\omega_j}\right)\right)$$

Their first order condition with respect to earnings y_i specifies that at the optimum the marginal rate of substitution between labor and consumption is equal to one:

$$u_c(c_i, y_i, \omega_i) = -u_y(c_i, y_i, \omega_i) \qquad (1)$$

With respect to transfer t_{ij}, it is such that at the optimum, the marginal utility of individual i is at least equal to the marginal utility of their peers, weighted by the strength of altruism:

$$-u_c(c_i, y_i, \omega_i) + \alpha u_c(c_j, y_j, \omega_j) \leq 0 \qquad (2)$$

If the transfer made by i to j is positive, i.e., $t_{ij} > 0$, then the second condition binds.

Moreover, transfers between two individuals cannot flow in both directions: if $t_{ij} > 0$, then $t_{ji} = 0$.[22]

Proposition 1 *A Nash equilibrium exists and is such that within each group C the following characterization can be made.*

General characterization.

(i) The longest path of transfers is of length 1.

(ii) Transfers may only flow from higher skilled to lower skilled individuals.

(iii) Income and consumption allocations are uniquely determined for each skill.

(iv) The sum of net transfers of each individual is unique, but the implementation of transfers is not.

Incomes. *Incomes are determined by the first order condition:* $\frac{1}{\omega}k'\left(\frac{y}{\omega}\right) = 1$.

Transfers.
Define ω_M^C (resp. ω_m^C) to be the largest (resp. smallest) skill level in C, and y_M^C (resp. y_m^C) to be the highest (resp. smallest) equilibrium income in group C.

Necessary and sufficient condition.

There are positive transfers in group C if and only if $u'\left(y_M^C - k\left(\frac{y_M^C}{\omega_M^C}\right)\right) < \alpha u'\left(y_m^C - k\left(\frac{y_m^C}{\omega_m^C}\right)\right)$.

[22] Indeed, suppose that at the equilibrium both are positive. Then,

$$u_c(c_i, y_i, \omega_i) = \alpha u_c(c_j, y_j, \omega_j) < u_c(c_j, y_j, \omega_j) \quad \text{and} \quad u_c(c_j, y_j, \omega_j) = \alpha u_c(c_i, y_i, \omega_i) < u_c(c_i, y_i, \omega_i),$$

which is a contradiction.
If both were positive, since altruism $\alpha < 1$ (individuals attach more weight to themselves than to their peers), one individual would have an incentive to deviate and this could not be an equilibrium.

Characterization.

If transfers take place in group C, then there exists a unique pair (Q_m^C, Q_M^C) such that:

All individuals with $y_i - k\left(\frac{y_i}{\omega_i}\right) < Q_m^C$ receive total transfers t_i such that $y_i + t_i - k\left(\frac{y_i}{\omega_i}\right) = Q_m^C$.
All individuals with $y_i - k\left(\frac{y_i}{\omega_i}\right) > Q_M^C$ make total transfers t_i such that $y_i - t_i - k\left(\frac{y_i}{\omega_i}\right) = Q_M^C$.
All individuals with $Q_m^C \leq y_i - k\left(\frac{y_i}{\omega_i}\right) \leq Q_M^C$ neither make nor receive transfers.

Proposition 1 is similar to Arrow (1981)'s charity game except for the fact that individuals are not assigned individual incomes, but make a productive effort decision that leads to an endogenous earnings distribution in the population.

The first point (i) of Proposition 1 can be put differently: transfers flow directly from donors to recipients. In the terms of Bourlès et al. (2017), they flow through paths of highest altruistic strength. If they did not, then, because individuals attach more weight to themselves than to their peers, there would be a profitable deviation for at least one agent along the path of transfers. In particular, an individual cannot be both a donor and a recipient.

The second point (ii) of Proposition 1 comes from the fact that working is more costly for lower skilled individuals than it is for higher skilled individuals, so that at equilibrium, their income net of their cost of effort is lower than that of higher skilled individuals. Hence, it is never optimal for them to make transfers to more productive individuals. In the same way, it would never make sense for two individuals of the same skill level to make transfers to each other. In particular, if the groups are completely homogeneous, then no transfers take place. Hence, the only kinds of transfers that might take place at equilibrium are transfers from higher productivity individuals to lower productivity ones. Note that this, as mentioned in the introduction, means that these transfers are redistributive.

Effect of an increase in altruism. The higher the altruism level in a group, the lower the inequality level in this group. (The proof is in the Appendix).

Point (iii) of Proposition 1 states that there is a unique equilibrium allocation for each individual; moreover, incomes and consumption are identical for each skill level within a group.

Moreover, since there are no income effects, productive effort decisions, therefore incomes are the same as what they would have been in the absence of altruism. Hence, incomes do no depend on the groups individuals belong to, but their consumption does.[23]

Transfers are then group-specific and determine individuals' consumption levels. Within each group, either there is no transfer at all, or transfers take place and the total sum of net transfers for each productivity level is uniquely determined. However, the implementation of transfers is not unique. For example, suppose we are in a group with two individuals A and B of skill level ω_H, and two individuals C and D of skill level ω_L, such that $\omega_L < \omega_H$. Suppose there are transfers taking place at the equilibrium, and that ω_L is the only benefactor skill level and ω_H is the only donor skill level. Then, A and B each make the same sum of transfers t. This could however take place in an infinity of ways. In particular, A could transfer t to C, and B could do the same to D. Or A could transfer $t/2$ to C and $t/2$ to D, and B the same.

[23] If there are income effects and private utility functions are separable in consumption and labor, then the general characterization of the equilibrium still carries out even though both income and consumption are then group-specific.

Let us name the condition for transfers to take place in a group C (T):

$$u'\left(y_M^C - k\left(\frac{y_M^C}{\omega_M^C}\right)\right) < \alpha u'\left(y_m^C - k\left(\frac{y_m^C}{\omega_m^C}\right)\right).$$

It is clear from this condition (T) that if α is too low, if skill levels are too close or if u is not concave enough, then no transfers occur in these groups. Indeed, income net of the cost of effort is larger for the most skilled individual than it is for the least skilled one, so that the former's marginal utility is lower than the latter's. For this to carry out when the marginal utility of the lowest skilled individual is weighted by a factor smaller than one, the altruism weight (α) should not be too low, skill levels should be different enough, or the utility functions should have enough curvature.[24]

In particular, it might be that in a group with a high variance in skills, an individual with given skill level makes or receives transfers. Had they been born in a more homogeneous group, they would not have done so. Thus, inequality in consumption net of effort is due both to the skill levels of individuals and the heterogeneity of skill levels in the group to which they belong.

Finally, in this structure of networks, net consumption in equilibrium has a specific form. If transfers take place in a group, then there are three types of agents in this group. There are Donors, Beneficiaries and agents who neither give nor receive (whom we shall call Neutral individuals). Of course, as made explicit by point (i) of Proposition 1, these types cannot overlap. What the characterization in Proposition 1 means, is that all Donors from group C have same final net consumption Q_M^C, all Receivers in group C have same final net consumption Q_m^C, and Neutral individuals consume what they earn.

Q_m^C and Q_M^C are related through the following equality $u'(Q_M^C) = \alpha u'(Q_m^C)$, and defined by

$$\sum_{i \text{ s.t. } y_i - k\left(\frac{y_i}{\omega_i}\right) > Q_M^C} \left(y_i - k\left(\frac{y_i}{\omega_i}\right) - Q_M^C\right) = \sum_{i \text{ s.t. } y_i - k\left(\frac{y_i}{\omega_i}\right) < Q_m^C} \left(Q_m^C - \left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)\right),$$

which is the exact translation that the sum of transfers made is equal to the sum of transfers received.

This structure of transfers thus gives rise to a specific form of redistribution: lower skilled individuals in a group are guaranteed a minimum utility level, which comes with a ceiling on the maximum utility level attainable by the highest skilled individuals in that group. However, note that this not imply that in practice we would observe consumption patterns in steps. Indeed, consumption itself is still increasing in the skill level: higher productivity individuals still consume more.[25]

Finally, the equilibrium is generally not Pareto-optimal – highlighting the presence of free-riding. As in Arrow (1981), it is Pareto-optimal only if at equilibrium there is only one agent making transfers. Indeed, if many individuals make transfers, they cannot coordinate, and fail to internalize the positive externality that their transfers have on the private utilities of the beneficiaries in their group and thus on their own social utility. Hence, resulting transfers may be too low.[26]

[24] Of course, we consider a society where there is at least one $\boldsymbol{\theta}$ such that (T) holds, so that the probability that private transfers take place in the society under consideration is positive.

[25] Indeed, for a Donor i in group C, consumption is equal to $y_i - t_i = Q_M^C + k\left(\frac{y_i}{\omega_i}\right)$. So that if j is another Donor in group C with $\omega_i < \omega_j$, their consumption $y_j - t_j = Q_M^C + k\left(\frac{y_j}{\omega_j}\right)$ is lower, because at equilibrium their productive effort is lower, so $k\left(\frac{y_j}{\omega_j}\right) < k\left(\frac{y_i}{\omega_i}\right)$.

[26] This may be seen with the following example. Suppose there are three individuals in a group, two with high skill ω_H, one with low skill $\omega_L < \omega_H$, and such that $u'\left(y_H - k\left(\frac{y_H}{\omega_H}\right)\right) < \alpha u'\left(y_L - k\left(\frac{y_L}{\omega_L}\right)\right)$. Then, both high-skilled individuals make a transfer

Illustration. *We illustrate the Nash equilibrium allocations for a group of ten individuals whose skills are between $\omega_m = 134$ and $\omega_M = 478$. This implies available incomes (income net of cost of effort) between 448 and 2340. Suppose that their utility function is CRRA with parameter $\eta = 0.9$ and that their cost function is iso-elastic with elasticity $\epsilon = 0.3$. Below are the net incomes and net consumption levels without altruism and with altruism $\alpha = 0.4$.*

(a) Net consumption without altruism
Gini = 0.202

(b) Net consumption with altruism $\alpha = 0.4$
Gini = 0.166

Figure 1.1 – Allocations with and without altruism

This figure illustrates Nash equilibrium allocations with and without altruism. The grey disks represent individuals' net incomes and the red circles their net consumption. When there is no altruism, both coincide: individuals consume what they earn. When there is high enough altruism, the richest individual(s) make transfers to the poorest individual(s). All donors have the same net consumption level, and all receivers have the same net consumption level.

Example 1. *Take a society where there are only two types of skills: $\omega_H > \omega_L$ and where groups differ in their proportion π of high productivity individuals. This example enables us to have comparative statics for when the difference between high and low skill changes (think for example of a parent and children: what is the impact on laissez-faire redistribution of the parent being more skilled), to understand the impact of the share of high skilled on ex-post inequality in the group, and to get some intuitions on how transfers vary with a simultaneous decrease in incomes in a group. Moreover, this allows us to illustrate the neutrality result in a direct way, as well as the changes that would occur to this result in an optimal income taxation setting. Of course however, this example does not highlight the existence of the three types of individuals in a group. Here, either high skilled individuals are Donors and low-skilled ones are Beneficiaries, or else there are no transfers.*

Take a group with proportion π of high-skilled individuals. The condition (T) for transfers to take place within a group may now be rewritten:

$$u'\left(y_H - k\left(\frac{y_H}{\omega_H}\right)\right) < \alpha u'\left(y_L - k\left(\frac{y_L}{\omega_L}\right)\right).$$

Where y_H and y_L are the same in all groups since there are no income effects.
This is a condition that does not depend on π. What is specific to this setting is thus that if α and utilities are the same in all groups, then if transfers take place in one group, they will take place in all the other groups and vice-versa.

If condition (T) holds, then from Proposition 1 (iii)-(iv), all individuals of high productivity make the same total transfer $t \geq 0$ to individuals of low type. Individuals of low type receive $\frac{\pi}{1-\pi}t$ each.

Let us use isoelastic utility and cost functions where $u\left(c - k\left(\frac{y}{\omega}\right)\right)$ is such that:

$$u(x) = \frac{x^{1-\eta}}{1-\eta} \quad \text{and} \quad k\left(\frac{y}{\omega}\right) = \frac{\left(\frac{y}{\omega}\right)^{1+\frac{1}{\epsilon}}}{1+\frac{1}{\epsilon}}.$$

of t each to the low-skilled individual, and this transfer is such that $u'\left(y_H - t - k\left(\frac{y_H}{\omega_H}\right)\right) = \alpha u'\left(y_L + 2t - k\left(\frac{y_L}{\omega_L}\right)\right)$. A planner who would intervene afterwards could increase both transfers by a small $0 < \varepsilon \ll 1$, and improve everyone's (social) well-being. Indeed, the high-skilled individuals' social utility would increase by $\varepsilon(1-\alpha)u'\left(y_H - t - k\left(\frac{y_H}{\omega_H}\right)\right) > 0$, and the low-skilled one by $2\varepsilon(1-\alpha^2)u'\left(y_L + 2t - k\left(\frac{y_L}{\omega_L}\right)\right)$.

Now incomes are equal to $y = \omega^{1+\epsilon}$. As mentioned above, labour supply does not adjust to transfers, and this stems from the fact that there are no income effects.

Condition (T) can be rewritten as $\alpha > \left(\frac{\omega_L}{\omega_H}\right)^{(1+\epsilon)\eta}$, which clearly highlights that α should not be too small, the ratio of skill levels should be low enough, or η, hence the curvature of utility functions should be high enough.

In that case, in a group C with a proportion π of high-skilled individuals, the transfers made by each high skilled individual each sum to:

$$t = \frac{1}{1+\epsilon}\frac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}}{\alpha^{1/\eta} + \frac{\pi}{1-\pi}},$$

so that consumption levels for high skilled and low skilled agents are respectively,

$$c_H = y_H - t = \frac{\frac{\pi}{1-\pi}\omega_H^{1+\epsilon} + \omega_L^{1+\epsilon}}{(1+\epsilon)(\alpha^{1/\eta} + \frac{\pi}{1-\pi})} \quad \text{and} \quad c_L = y_L + \frac{\pi}{1-\pi}t = \alpha^{1/\eta}\frac{\frac{\pi}{1-\pi}\omega_H^{1+\epsilon} + \omega_L^{1+\epsilon}}{(1+\epsilon)(\alpha^{1/\eta} + \frac{\pi}{1-\pi})}.$$

Here, as stated above, y_H and y_L are the same as if there wasn't any altruism. The inequality in consumption levels, however, is lower than if there wasn't any altruism. As expected, the total transfers t from each high skilled individual decrease when the proportion π of high skilled individuals in the group increases. However, the total transfers received by each low skilled individual, $\frac{\pi}{1-\pi}t$, increase as this proportion π increases. Moreover, the gap between the consumption level of high-skilled individuals and that of low-skilled individuals increases as π increases. Hence, in groups with higher shares of low productivity individuals, high skilled individuals operate more redistribution in absolute terms. In relative terms, the ratio between the two is constant, equal to $\alpha^{-\frac{1}{\eta}}$, so that it is lower the higher altruism is. On the other hand, consumption levels increase with the share of high-skilled individuals. Hence, the higher the share of high productivity individuals, the higher the consumption levels for all individuals in the group but the larger the difference in consumption levels of high and low-skilled agents.

Finally, if the level of altruism α does not depend on the size of groups n then transfers only depend on respective proportions of high to low skilled agents but not on the size of groups.

Transfers increase with altruism α; the level of consumption of high-skilled individuals decreases with α and that of low-skilled individuals increases with α. So even though altruism is two-sided, in private utility terms, an increase in altruism systematically benefits the low skilled individuals.

Note that this is also a framework that can enable us to think about groups as families. We can take groups as differing in size n, and suppose that groups represent families with one parent (of high-skill ω_H) and $n-1$ children (of low-skill ω_L). Then, $\frac{\pi}{1-\pi} = \frac{1}{n-1}$. The higher the skill of the parent, the higher the children's consumption levels, but the more children there are, the less the parent is able to operate redistribution (even though they increase their transfers).

Finally, suppose agents experience an exogenous lump-sum skill-specific decrease in their income that occurs simultaneously to their productive effort decision. That is, y_H is now equal to $\omega_H^{1+\epsilon} - \varepsilon_H$, and y_L to $\omega_L^{1+\epsilon} - \varepsilon_L$, where ε_H, $\varepsilon_L > 0$. We can of course write $\varepsilon_i = \lambda_i\omega_i^{1+\epsilon}$, for $i = H, L$. The condition for transfers to take place (T_ε) is now

$$\alpha^{1/\eta} > \frac{\omega_L^{1+\epsilon} - \varepsilon_L}{\omega_H^{1+\epsilon} - \varepsilon_H}$$

This condition is easier to satisfy than the initial condition if and only if the share of income lost by the lower skilled individual is higher than that of the higher skilled on: $\lambda_L > \lambda_H$. If this is the case, then transfers still take place, and the transfers made by each high-productivity agent sum to:

$$t = \frac{1}{1+\epsilon} \frac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon} + (\varepsilon_L - \alpha^{1/\eta}\varepsilon_H)}{\alpha^{1/\eta} + \frac{\pi}{1-\pi}}.$$

Hence, perhaps counter-intuitively, if altruism is sufficiently low (i.e. $\alpha^{1/\eta} < \varepsilon_L/\varepsilon_H$ – which we note is compatible with (T_ε) only if $\lambda_L > \lambda_H$), then transfers are higher than in the situation where agents have not experienced a lump-sum decrease in their incomes. Indeed, high-skilled agents with a low level of altruism initially make lower transfers to low-skilled agents. Hence, the latter's consumption level is initially lower. Given that utilities are concave, a decrease in their income thus marginally weighs more than if their consumption was initially higher. This can thus result in higher transfers. Note however that low-skilled individuals' consumption level (as opposed to the transfers they receive) is still lower than if altruism was higher (transfers decrease less with an increase in ε_H, the lump-sum decrease undergone by high-skilled agents).
If however, high productivity agents experience a decrease in their income that is proportionately higher (or equal) than that of the low productivity agents (i.e. $\lambda_H \geq \lambda_L$), then no counter-intuitive result arises: transfers are lower.

This also enables us to illustrate one form of the neutrality result. If an omniscient Social Planner levies ε from all high-killed individuals in a group and gives $\frac{\pi}{1-\pi}\varepsilon$ to all low-skilled ones, then final consumption levels are unchanged. It is immediately clear from this example that being able to observe individuals' types is key for the government to be able to operate such redistribution. In practice, this information is not available to the government, and redistribution operated by the State is thus distortive.

Both Proposition 1 and Example 1 enable us to see that altruism reduces inequality, but only at the intra-group level, and more or less so depending on heterogeneity in skills and altruism levels within groups, and finally on how representative of society groups are. Beyond the need to raise revenue, the government might thus also have scope to operate redistribution. In the following we analyse the design of optimal income taxes in such a context.

1.4 Optimal income taxation

The government is paternalistic. It chooses to maximize a function of private utilities:

$$SWF = \int z_i \Phi(u^i)\, \mathrm{d}\nu(i)$$

where z_i are (arbitrary) Pareto weights, Φ is increasing and concave, and $d\nu(i)$ is the distribution of individuals.[27]

Moreover, the government sets its tax ex-ante (before observing the realization of groups and skills in the society in question), and knows the game that individuals play. The tax is implemented simultaneously to the game played between the agents.

In the baseline model, as specified in Section **??**, we suppose that the government can observe neither group characteristics nor skills, and does not know to which group an individual belongs. We also suppose that either it assumes that groups are large enough or it has no information on the distribution of the size of groups. Thus,

[27] Another normative objective for the government would be to maximize a function of social utilities, SWF_s, where $SWF_s = \int z_i \Phi(U^i)\, \mathrm{d}\nu(i)$. In the following, however, we consider only a paternalistic social planner. This enables us to avoid reaching illiberal conclusions, as discussed in Sen (1970), Fleurbaey and Maniquet (2011), Fleurbaey and Maniquet (2018) and very clearly summed up in Bierbrauer (2019).

it reasons by considering representative groups. It only attaches more weight to a group if its characteristics are more prevalent in the society, but does not do so if the group is larger. In the government's perspective, an agent's (unknown) type is thus given by their skill level and the characteristics of the group they belong to: $(\omega, \boldsymbol{\theta})$.[28]

1.4.1 Optimal linear income taxation

When setting a linear income tax, the government uses a linear tax rate $\tau \in [0, 1]$ on incomes to finance a demogrant R, and potentially an additional exogenous non-transfer spending B. The demogrant is used to finance a lump-sum redistribution of the tax proceeds to the individuals in the population.

The general characterization results of Proposition 1 carry out. We are still in a situation where at equilibrium, in each group, either there are no transfers taking place, or individuals with ability above a certain threshold make transfers to individuals below a certain threshold. The reasoning follows very closely that of the situation with no government intervention. Moreover, we still have that incomes are only skill but not group dependent. Including income effects would call for multidimensional screening such as in Rothschild and Scheuer (2014), Rochet and Choné (1998).

The Social Planner thus seeks to maximize the following function with respect to the tax rate τ and the demogrant R:

$$\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi \left(u \left((1-\tau) y(\omega, \tau) - t(\omega, \boldsymbol{\theta}, \tau, R) + R - k \left(\frac{y(\omega, \tau)}{\omega} \right) \right) \right) h(\omega | \boldsymbol{\theta}) g(\boldsymbol{\theta}) \, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta},$$

under the (government) budget constraint

$$R = \tau \int_{\omega} y(\omega, \tau) \, f(\omega) \, \mathrm{d}\omega - B,$$

and taking the game played by the agents into account.

For ease of exposition, and since we know that the sum of transfers made or received by individuals is uniquely determined, we can express t to be the net sum of transfers for each individual: it is negative if the individual is a beneficiary, positive if they are a donor and null if they are neither (i.e., neutral). In a first step, the government establishes how agents react to a given tax rate and demogrant and solves the Nash equilibrium of the game of agents in each group by extending it to a continuum of individuals. This is what justifies the notation $t(\omega, \theta, \tau, R)$: from the government's point of view, an individual's net transfers depend on their productivity, the characteristics of their group, the tax rate and the demogrant.

As stated at the beginning of the section, $\Phi(.)$ is an non-decreasing and (potentially weakly) concave function.

The Pareto weights $z(\omega, \boldsymbol{\theta})$ may depend on the individual's productivity level as well as on the characteristics of the group they belong to.

Finally, we define aggregate earnings $\mathcal{Y}(\tau) := \int_{\omega} y(\omega, \tau) \, f(\omega) \, \mathrm{d}\omega$, which enables us to rewrite the demogrant R as $R = \tau \mathcal{Y}(\tau) - B$.

[28] Note that in this part of the model $\boldsymbol{\theta}$ cannot include the size of the group n.

We name this Problem (I).

Proposition 2 ***Optimal linear income tax rate.***
If it is positive, the optimal linear tax rate τ^* is a solution of the fixed-point problem:

$$\frac{\tau}{1-\tau} = \left(1 - \overline{\phi} - \psi\right) \frac{1}{e}.$$

Where the terms $\overline{\phi}$, e and ψ are defined as follows:

$$\overline{\phi} = \frac{\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi'(u(\omega, \boldsymbol{\theta}, \tau)) u'(\omega, \boldsymbol{\theta}, \tau) y(\omega, \tau)\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}}{\mathcal{Y}(\tau) \int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi'(u(\omega, \boldsymbol{\theta}, \tau)) u'(\omega, \boldsymbol{\theta}, \tau)\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}},$$

$$e = \frac{1-\tau}{\mathcal{Y}} \frac{\mathrm{d}\mathcal{Y}}{\mathrm{d}(1-\tau)},$$

$$\psi = \frac{\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi'(u(\omega, \boldsymbol{\theta}, \tau)) u'(\omega, \boldsymbol{\theta}, \tau) \frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega, \boldsymbol{\theta}, \tau)\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}}{\mathcal{Y}(\tau) \int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi'(u(\omega, \boldsymbol{\theta}, \tau)) u'(\omega, \boldsymbol{\theta}, \tau)\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}}.$$

First note that the optimal tax rate is negatively correlated with these three terms, and second that all three terms depend on the tax rate τ.

The first term $\overline{\phi}$ is the usual average normalized social marginal welfare weight weighted by (ex-ante) incomes. This is inversely related to government redistributive preferences. The higher it is, the lower the tax rate is.

The second term is the elasticity of aggregate earnings with respect to the net-of-tax rate. This translates the efficiency cost of taxation. The higher e is, the higher the distortion of productive effort induced by the tax, and the lower the tax rate is.

The last term is the new factor that the government should take into account: it is the ratio of the expectation of the derivative of transfers with respect to the tax rate weighted by the normalized social marginal welfare weights attached to each individual, over aggregate earnings. The higher it is, the lower the tax rate should be. In order to learn more from it, we require the sign of: $-\int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}(\tau,R)} \frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega, \theta, \tau, R(\tau))\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega = \int_{\omega_M^{\theta}(\tau,R)}^{\overline{\omega}^{\theta}} \frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega, \theta, \tau, R(\tau))\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega.$

Lemma 1 ***Variation of transfers with R: $\frac{\partial t}{\partial R}$.***
(i) If the utility function u exhibits constant absolute risk aversion, then an increase in the lump-sum transfer R leaves transfers unchanged.
(ii) If the utility function u exhibits decreasing absolute risk aversion, then an increase in the lump-sum transfer R decreases the proportions of donors and beneficiaries and crowds out private transfers.
(iii) If the utility function u exhibits increasing absolute risk aversion, then an increase in the lump-sum transfer R increases the proportions of donors and beneficiaries and crowds in private transfers.

The variations uncovered here are consistent with the shape of these utility functions.
Let us note that both CRRA and HARA utility functions exhibit property (ii) of Lemma 1.
Functions that have a negative third derivative exhibit property (iii) of Lemma 1.

In the rest of the chapter, we shall use the properties in (i) and (ii) of Lemma 1, as these are the most consistent with empirical estimates.

Denoting by t^B transfers received and by t^D transfers made, the total transfers received and made in a group of characteristics $\boldsymbol{\theta}$ are respectively equal to:

$$\int_{\underline{\omega}^\theta}^{\omega_m^\theta(\tau,R)} t^B(\omega,\theta,\tau,R)\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \quad \text{and} \quad \int_{\omega_M^\theta(\tau,R)}^{\overline{\omega}^\theta} t^D(\omega,\theta,\tau,R)\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega.$$

Lemma 2 ***Variation of transfers with τ: $\dfrac{\partial t}{\partial \tau}$.***
If the utility function u exhibits constant or increasing relative risk aversion then an increase in the tax rate τ decreases either the proportion of donors, or the proportion of beneficiaries, or both: it crowds out total private transfers.

Let us note that CARA, CRRA, HARA and utility functions with a negative third derivative (that are hence IARA) exhibit one of these properties.

Moreover, we have that the effect of an increase in the tax rate can be decomposed into two:

$$\frac{\mathrm{d}t^B}{\mathrm{d}\tau} = \frac{\partial t^B}{\partial \tau} + \frac{\partial R}{\partial \tau}\frac{\partial t^B}{\partial R} \quad \text{and} \quad \frac{\mathrm{d}t^D}{\mathrm{d}\tau} = \frac{\partial t^D}{\partial \tau} + \frac{\partial R}{\partial \tau}\frac{\partial t^D}{\partial R}$$

Hence, for tax rates such that $\frac{\partial R}{\partial \tau} > 0$, the linear income tax rate crowds out total transfers if the utility function exhibits constant or decreasing absolute risk aversion and constant or increasing relative risk aversion. This is the case for the usual utility functions, such CARA, CRRA and HARA utility functions.[29] Note also that at the optimal tax rate, $\dfrac{\partial R}{\partial \tau} > 0$.

This now enables us to further characterize our optimal linear income tax rate.

Comparison with the standard linear tax rate. The standard formula for the optimal linear income tax rate (see Piketty and Saez (2013)) is $\dfrac{\tau_{NA}}{1+\tau_{NA}} = \left(1-\overline{\phi}_{NA}\right)\dfrac{1}{e_{NA}}$, where NA stands for "no altruism".

If the optimal tax rate in the presence of altruism is such that all transfers are crowded out, then ψ is equal to 0 and individuals' consumption levels do not depend on the group they belong to. So if Pareto weights z do not depend on group characteristics, then the tax rate τ^* is the same as τ_{NA}.

Hence if transfers decrease with the tax rate, and if at the optimum there is no complete crowding out of transfers, then τ_{NA} represents an upper bound for the optimal tax rate in the presence of altruistic transfers.

Moreover, the demogrant $R = \tau\mathcal{Y}(\tau)$ is equal to $-B$ at tax rates of 0 and 1, is first increasing and then

[29] If the utility function is IARA, however, then the effect is ambiguous.

decreasing, and its derivative changes signs at the revenue maximizing tax rate $\underline{\tau}$, $\dfrac{1}{1+e(\underline{\tau})}$. At both optima (the altruistic and non altruistic ones), its derivative is positive. Thus, since $\tau^* \leq \tau_{NA}$, $R(\tau^*) \leq R(\tau_{NA})$. When there are no private transfers, the government uses a higher tax rate to redistribute more lump-sum to individuals.

Rawlsian social planner. In the absence of private transfers, the tax rate chosen by a Rawlsian social planner who only associates weight to the poorest individual in society is the revenue maximizing one, $\underline{\tau}$. Indeed, if the society is not perfectly equal (if F does not have a Dirac shape), then $\overline{\phi}_{NA}$ is equal to 0.[30] However, in the presence of altruism, this average social marginal welfare weight weighted by incomes is not necessarily equal to 0. For example, if groups all have the same characteristics, and if the optimal tax rate does not completely crowd out private transfers, then the objective of the government is to maximize $Q_m(\tau)$, the minimum guaranteed consumption for poorer individuals through transfers. It is straightforward to show that Q_m is decreasing at least from the revenue maximizing tax rate $\underline{\tau}$ onwards. Hence, the optimal tax rate of a Rawlsian social planner in an altruistic society is potentially lower than $\underline{\tau}$.

The weighted derivative of transfers with respect to the tax rate ψ. Suppose that Pareto weights are homogeneous in the population.[31] We know from Proposition 1 that if there are transfers taking place, all donors have the same net consumption and all beneficiaries have the same net consumption. Thus, using the fact that within a group total transfers received is equal to total transfers made, for each $\boldsymbol{\theta}$,

$$\int_\omega \Phi'(u(\omega,\boldsymbol{\theta},\tau))u'(\omega,\boldsymbol{\theta},\tau)\frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega,\boldsymbol{\theta},\tau)\,h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega$$
$$= (\Phi'(u(Q_M^\theta))u'(Q_M^\theta) - \Phi'(u(Q_m^\theta))u'(Q_m^\theta))\int_{\omega \text{ donor}} \frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega,\boldsymbol{\theta},\tau)\,h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega.$$

Now since $Q_M^\theta > Q_m^\theta$ and Φ and u are concave and increasing, $\Phi'(u(Q_M^\theta))u'(Q_M^\theta) < \Phi'(u(Q_m^\theta))u'(Q_m^\theta)$. So if transfers decrease with the tax rate (which from Lemma 1 and Lemma 2 we know is the case for standard utility functions), then $\psi > 0$, thus decreasing the optimal tax rate τ^*.

Moreover, the more concave Φ is, the greater ψ is, and hence the lower the tax rate is.

This highlights two opposing forces between $\overline{\phi}$ and ψ. Indeed, the more concave Φ is, the more weight the government attaches to poorer[32] individuals, and for a given distribution of after-tax net consumption levels, the lower $\overline{\phi}$ is and the higher ψ is.

Thus, by taking into consideration the partial crowding out of transfers, the government may take advantage of the fact that there is already some redistribution occurring at a private level – a redistribution that does not distort labor supply incentives – and thus decrease the marginal tax rate used to redistribute at the society level – thus also reducing the amount of distortion created by the tax: private transfers, if they are high enough, help the government achieve its equity goal at a lower efficiency cost.

Example 1. (Linear income tax) *Let us follow-up with our example from the previous section. This will give us a sense of when the social planner will find it efficient to encourage partial redistribution through private transfers while at the same redistributing at the society level.*

In this example, we suppose that altruism, elasticities and coefficients of relative risk aversion are the same in all groups.

[30] As there is a mass 0 of individuals with productivity $\underline{\omega}$.
[31] That is, for all skill levels ω, for all vectors of group characteristics $\boldsymbol{\theta}$, $z(\omega,\boldsymbol{\theta}) = z$.
[32] Poorer in net consumption levels.

Remember we use the following specifications for our utility and cost of effort functions:

$$u\left(c - k\left(\frac{y}{\omega}\right)\right) \quad \textit{such that} \quad u(x) = \frac{x^{1-\eta}}{1-\eta} \quad \textit{and} \quad k\left(\frac{y}{\omega}\right) = \frac{\left(\frac{y}{\omega}\right)^{1+\frac{1}{\epsilon}}}{1+\frac{1}{\epsilon}}.$$

Here, incomes of high and low ability individuals are the following:

$$y_H = (1-\tau)^{\epsilon}\omega_H^{1+\epsilon} \quad \textit{and} \quad y_L = (1-\tau)^{\epsilon}\omega_L^{1+\epsilon}.$$

Again, let us note that labor supply does not depend on transfers. It is the same as it would have been without any altruism in the society. The linear income tax, however, now distorts the productive effort decisions: the higher it is, the lower the earnings.

Suppose the government has no exogenous government budget requirement ($B = 0$): the tax is purely redistributive. Then, there are still transfers in equilibrium if and only if $\tau < \overline{\tau}$,

$$\textit{where } \overline{\tau} = \frac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}}{(\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}) + (1-\alpha^{1/\eta})(1+\epsilon)(\mu_\pi\omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})},$$

with $\mu_\pi := \mathbb{E}(\pi)$, the average of π's (the proportion of high skilled individuals in the various groups) over the population.

The necessary and sufficient condition for transfers to take place in the laissez-faire economy

$$\alpha^{1/\eta} > \left(\frac{\omega_L}{\omega_H}\right)^{1+\epsilon},$$

thus remains a necessary condition.

This enables us to notice that $\overline{\tau}$ is a function of exogenous parameters, and does not depend on specific values of π, but just on their average. Hence, the equilibria are of the same type in all groups of the network: at equilibrium, either there are transfers taking place in all groups (except the ones with $\pi = 0$ or 1, i.e., with only high-skilled or low skilled individuals) or no transfers are taking place. Moreover, $\overline{\tau}$ is decreasing in μ_π: the higher the average share of low skilled individuals, the more likely it is that the optimal tax rate will encourage some private transfers. Indeed, as we saw in the laissez-faire situation, the same comparative static can be made here: groups with lower shares of high skilled individuals operate more redistribution between high and low skilled individuals. If there are enough such groups, the social planner reaches higher social welfare by partially encouraging private redistribution. Moreover, this cut-off tax rate is also increasing in the altruism level of society.

If the tax rate τ is smaller than the threshold rate $\overline{\tau}$, in a group with a proportion π of high-skilled individuals, transfers made by high-skilled individuals are:

$$t = \frac{\frac{(1-\tau)^{1+\epsilon}}{1+\epsilon}(\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}) - R(\tau)(1-\alpha^{1/\eta})}{\alpha^{1/\eta} + \frac{\pi}{1-\pi}},$$

where $R(\tau) = \tau(1-\tau)^{\epsilon}(\mu_\pi\omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})$.

This enables us to notice that transfers will be lower than in the laissez-faire case for two reasons. On the

one hand, the term $\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}$ *is now weighted by* $\frac{(1-\tau)^{1+\epsilon}}{1+\epsilon} < 1$*: the linear tax rate partially crowds out transfers, as high ability individuals now have lower disposable income. On the other hand, since* $\alpha^{1/\eta} < 1$*, lump-sum redistribution* $R(\tau)$ *decreases the incentives to make transfers, as the government is already partially taking care of redistribution.*

Now, as in a non altruistic model, it cannot be that at the optimum, $\frac{\partial R}{\partial \tau} < 0$*. Hence and at the optimum,* $\frac{\mathrm{d}t}{\mathrm{d}\tau} \leq 0$*. This is in line with the examples we considered in the laissez-faire part of Example 1. Indeed, in this case, as long as* R *is positive, the proportion of disposable income lost by the higher skilled individuals is higher than that lost by the low-skilled individual.*[33]

Finally, we may partly characterize the optimum, where from the fact that the demogrant is non-decreasing at the optimum, $\frac{\mathrm{d}R}{\mathrm{d}\tau} \geq 0$*, we know that* $\tau^* \leq \frac{1}{1+\epsilon}$*, the revenue maximizing rate. We will have two cases:*

If $\overline{\tau} > \frac{1}{1+\epsilon}$*, then the optimal tax rate* τ^* *is such that transfers have not been completely crowded-out at the optimum, and the rate has to be adjusted downwards so as to encourage these to take place.*
Note that this is more likely the lower μ_π *is.*

If on the other hand $\overline{\tau} \leq \frac{1}{1+\epsilon}$*, then the optimal tax rate might be in* $[0, \overline{\tau})$ *and hence encourage transfers or in* $[\overline{\tau}, \frac{1}{1+\epsilon}]$ *and hence crowd out transfers. This will ultimately depend on the distribution of group shares of high-skilled individuals in the society (more specifically their mean).* This is summarized in the figure below.

$\overline{\tau} < \frac{1}{1+\epsilon}$ and $\tau^* < \frac{1}{1+\epsilon}$, so:

$t > 0$ at τ^* if $\tau^* < \overline{\tau}$: partial crowd out

$t = 0$ at τ^* if $\overline{\tau} \leq \tau^* < \frac{1}{1+\epsilon}$: complete crowd out

$\tau^* \leq \frac{1}{1+\epsilon} \leq \overline{\tau}$, so:

$t > 0$ at τ^*

Partial crowd out

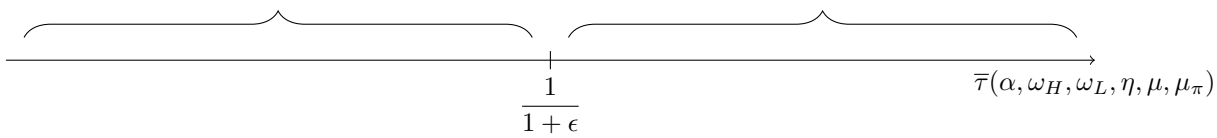


Figure 1.2 – Crowding-out at the optimum

From this figure it is clear that $\overline{\tau}$ being large enough (i.e., greater than the revenue maximizing rate $\frac{1}{1+\epsilon}$) is a sufficient condition for transfers and taxes to coexist at the optimum.

Example 2. (Linear income Tax) *In this example, let us consider a utilitarian social planner (so that* $\Phi = id$*, and Pareto weights are homogeneous) with no exogenous government expenditure (*$B = 0$*). Suppose all groups have the same level of altruism (which we may refer to as a society level of altruism), say* 0.6*.*

First case: Society A. The society is composed of groups with skills drawn from a $\mathcal{N}(400, 100)$*. Then, the optimal linear income tax when there is no altruism is equal to* 20%*. When the government adjusts the tax rate to take into account altruistic transfers, however, the optimal linear income tax rate is of* 5%*. There is a partial crowd out of transfers but the optimal tax rate is substantially decreased. Thus, the government chooses a tax rate that distorts productive effort decisions less. It is worth noting here that in the presence of a large number of*

[33] With the notations of Example 1 in Section 1.4, this is roughly saying that $\lambda_L < \lambda_H$.

individuals in each group, the individuals' objective function coincides the government's. However, as mentioned in the previous section, since the equilibrium is a non-cooperative one, the optimum that they achieve is possibly lower than the one the government, by centralizing the decision, can achieve. Hence the positive tax rate.

Second case: Society B. The society is composed of three types of groups with equiprobable realizations (i.e., $p_1 = p_2 = p_3 = 1/3$): skills are drawn either from a $\mathcal{N}(400, 100)$ or a $\mathcal{N}(200, 30)$ or a $\mathcal{N}(600, 30)$.[34] *In this society, there are two relatively homogeneous groups (the "poor" and the "rich") and one heterogeneous group (comprising "middle income" individuals). The optimal tax rate with no altruism would have been of 35%. Taking altruistic transfers into account it is of 34%. There is much less adjustment of the optimal linear income tax rate and greater crowding out of private transfers because of the gain from redistributing from very rich to very poor.*

This second case shows that there might be welfare gains if the government were better able to target some groups: either by tagging if it knows the characteristics of groups ($\boldsymbol{\theta}$), or by introducing a non-linear income tax.

Tagging. The government knows the characteristics of groups but not individual productivity levels.

Tagging has been extensively studied (see e.g., Akerlof (1978), Immonen, Kanbur, Keen and Tuomala (1998), Mankiw and Weinzierl (2010), Cremer, Gahvari and Lozachmeur (2010)) and relies on the government conditioning taxes on observable characteristics of individuals that affect their consumption level other than their productivity.[35] In this case, the government may condition taxes on group characteristics. Here, we still consider groups are large enough or the government has no information about sizes. The idea here is that *ex-ante* the government knows the characteristics of villages or communities for example, but does not know how many individuals there will be in them.

The government can now condition the tax rate and demogrant on group characteristics. Its problem (which we name Problem (II)) is thus to maximize with respect to $\tau(\theta)$ and $R(\theta)$:

$$\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi \left(u \left((1 - \tau(\theta)) y(\omega, \tau(\theta)) - t(\omega, \boldsymbol{\theta}, \tau(\theta)) + R(\theta) - k \left(\frac{y(\omega, \tau(\theta))}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta}) \, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$$

Under the constraint that

$$\int_{\theta} R(\theta) \, g(\theta) \, \mathrm{d}\theta = \int_{\theta} \tau(\theta) \underbrace{\int_{\omega} y(\omega, \tau) \, h(\omega|\theta) \, \mathrm{d}\omega}_{\mathcal{Y}(\tau(\theta))} \, g(\theta) \, \mathrm{d}\theta - B$$

and taking into account the individuals' reactions.

Adding the constraint that for all $\boldsymbol{\theta}$, $\tau(\theta) = \tau$ and $R(\theta) = R$ brings us back to Problem (I). Thus, welfare will be higher in this case than in the above one. This does not come as a surprise, as the government has more instruments in this setting.

The government may now adjust tax rates to the level of redistribution taking place in the group. Lump-sum redistristrbution (through the demogrant) then allows redistribution from groups that are richer on average to groups that are poorer on average.

[34] It is understood here that these distributions are truncated at 0.
[35] Note that these characteristics may not necessarily be *immutable*, see Piketty and Saez (2013).

Revisiting the second case of the above Example 2, setting a tax rate of 5% *on the middle income group and redistributing the tax proceeds gathered from this tax to the same group, while setting tax rates of* 0% *on our poor and rich groups and redistributing* 54 *lump-sum from the rich to the poor group yields a higher social welfare level.*

However, the characteristics of the groups are generally not known to the government – and this is the setting of our baseline framework. In that case, it has to rely on non-linear income taxes, which will be the object of the next section.

1.4.2 Optimal non-linear income taxation

In this section, the Social Planner may set a non-linear income tax $T(.)$ that maximizes the following objective:

$$\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi \left(u \left(y(\omega) - T(y(\omega)) - t(\omega, \theta, T) - k \left(\frac{y(\omega)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta}) \, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$$

subject to the government budget constraint:

$$\int_{\omega} T(y(\omega)) \, f(\omega) \, \mathrm{d}\omega \geq B.$$

(and as usual, taking individuals' responses into account).

In order to provide a tractable solution to this problem (which we shall refer to as Problem (III)), I use the perturbation method as in Saez (2001), Piketty (1997), Golosov et al. (2014), Bierbrauer and Boyer (2018), Jacquet and Lehmann (2017). Note however, that this provides us with necessary but not sufficient conditions.

In order for the tax perturbation to be sufficient, we need the following assumptions, from Assumption 2 in Jacquet and Lehmann (2017):

Assumption. Under the following assumptions, the tax perturbation method yields sufficient conditions:
i) The tax function $T(.)$ is twice differentiable.
ii) For all ω, the second-order condition holds strictly.
iii) For all ω, the function $y \mapsto u\left(y - T(y) - t - k\left(\frac{y}{\omega}\right)\right)$ admits a unique global maximum over $\mathbb{R}+$.

Tax perturbation. Starting from an initial tax schedule $T(.)$, the idea is to perturb the following objective function by a small τ on a small interval $[y_0, y_0 + dy_0]$:

$$\mathcal{L} = \int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \Phi \left(u \left(y(\omega) - T(y(\omega)) - t(\omega, \theta) - k \left(\frac{y(\omega)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta}) \, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} + \lambda \int_{\omega} T(y(\omega)) \, f(\omega) \, \mathrm{d}\omega.$$

More specifically, we perturb the initial tax schedule such that it is replaced by a new schedule that takes the following form:

$$T_\tau(y) = \begin{cases} T(y) & \text{if} \quad y \leq y_0 \\ T(y) + \tau(y - y_0) & \text{if} \quad y_0 \leq y \leq y_0 + dy_0 \\ T(y) + \tau dy_0 & \text{if} \quad y \geq y_0 + dy_0 \end{cases}$$

This may be illustrated as follows:

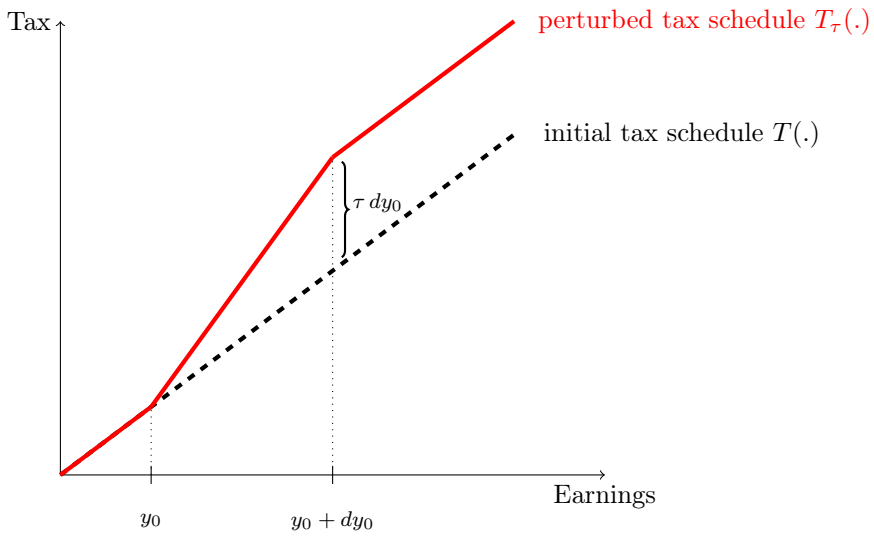


Figure 1.3 – Tax perturbation

Let us note that λ is the marginal cost of public funds and $\phi(\omega, \boldsymbol{\theta}) = \dfrac{z(\omega, \boldsymbol{\theta})\Phi'(u(\omega, \boldsymbol{\theta}))u'(\omega, \boldsymbol{\theta})}{\lambda}$ is the marginal social welfare weight of individual of type $(\omega, \boldsymbol{\theta})$.[36]

The incentive compatibility constraints are the first order and second order conditions determining the income choice of individuals. The first order condition is the following:

$$\frac{1}{\omega}k'\left(\frac{y}{\omega}\right) = 1 - T'(y)$$

Using the envelope theorem, we establish that the perturbation yields the usual three effects (mechanical, welfare and behavioral), but there is now a fourth effect, which arises if transfers still take place at the optimum. This effect is due to the indirect effect that taxes have on transfers and thus on welfare.

Let us refer to the density of earnings at $T(.)$ as $f_y(.)$ and to their cumulative distribution function as $F_y(.)$. As in Saez (2001), let us use the notation $f_y^*(\tilde{y})$ for the density of $\tilde{y}$ if $T(.)$ were linearized at $\tilde{y}$.[37]

The mechanical effect $dM = dy_0 d\tau(1 - F_y(y_0))$ translates the extra revenue that the State gathers thanks to a small uniform increase in tax liabilities for incomes over y_0.

The direct welfare effect $dDW = -dy_0 d\tau \int_{y_0}^{\infty} \phi(y) f_y^*(y)\, \mathrm{d}y$ accounts for the loss in welfare created by this increase in tax liabilities. This direct loss in welfare only impacts individuals with earnings greater or equal to y_0.

The behavioral effect $dB = -dy_0 d\tau e(y_0) y_0 \dfrac{T'(y_0)}{1 - T'(y_0)} f_y^*(y_0)$ accounts for the efficiency loss of increasing marginal tax rates: it quantifies the impact of the increase in marginal tax rates on productive effort. $e(y)$ is the elasticity of earnings with respect to the net-of-tax rate at income level y. Note here that since there are no income effects, this effect only arises for individuals between y_0 and $y_0 + dy_0$.

The additional effect comes from the reaction of transfer decisions to an increase in the tax rate at y_0. In

[36] Which implies that we may define the average marginal social welfare weight of individuals with income y as $\phi(y) = \int_{\boldsymbol{\theta}} \phi(\omega, \boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$ for ω such that $y(\omega) = y$.

[37] Refered to in Saez (2001) as the *virtual* density function.

order to derive it, it is important to clarify the notation of t. As in the linear case this notation refers to the net transfer: it is positive for donors, negative for beneficiaries and null for neutral individuals. It thus depends on the skill ω of the individual, but also on the distribution of skills in the group, $\boldsymbol{\theta}$, and on the policy in place, $T(.)$. Thus, for a given policy, it depends on the individual's available income $Y(\omega) = y(\omega) - T(y(\omega)) - k\left(\frac{y(\omega)}{\omega}\right)$ (where $y(\omega)$ depends on the policy in place, $T(.)$ through the individual's first order condition), and on the available incomes of all individuals in the group.
Now for all individuals of productivity at least ω_0, the perturbation has the following effect on their available income Y:

$$\frac{\mathrm{d}Y}{\mathrm{d}\tau} = -dy_0.^{38}$$

We then define $\delta_0 t$ to be such that the effect on t may be written as follows: $\frac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 \times \delta_0 t$. Hence, $\delta_0 t$ is the variation in t induced by an infinitesimal increase in all its components from $Y(\omega_0)$ onwards.
Thus our last term is the following:

$$dIW = dy_0 d\tau \int_{\boldsymbol{\theta}\,\text{s.t.}\,\omega_0 \leq \overline{\omega}^\theta} \int_\omega \phi(\omega, \boldsymbol{\theta}) \times \delta_0 t \times\ h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$$

where ω_0 is such that $y(\omega_0) = y_0$ under tax schedule $T(.)$.
We shall examine this term more closely in the following paragraphs. This indirect welfare effect is composed both of spillover and dampening or amplifying effects.

A necessary condition for the tax schedule to be optimal is then that $dM + dDW + dIW + dB = 0$ at y_0, which leads us to the following characterization.

Proposition 3 ***Optimal non-linear income tax rates.***
The optimal non-linear income tax rates are such that for each y_0:

$$\frac{T'(y_0)}{1 - T'(y_0)} = \left(\int_{y_0}^{\infty} (1 - \phi(y)) \frac{f_y(y)}{1 - F_y(y_0)}\, \mathrm{d}y + \frac{IW_0}{1 - F_y(y_0)} \right) \times \frac{1 - F_y(y_0)}{y_0 f_y^*(y_0)} \times \frac{1}{e(y_0)}$$

$$\textit{where } IW_0 = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \leq \overline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \delta_0 t\, \phi(\omega, \theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

The indirect welfare effect described by the IW_0 term is an additional sufficient statistics one would need in order to calculate optimal marginal tax rates; it reflects how transfers would vary with a change in marginal tax rates at different incomes in the distribution.

Let us note that this term affects the welfare part of the above formula. Transfers adjusting to a change in tax rates capture the indirect welfare effects of a change in taxes.

First, this term may be rewritten as:

$$IW_0 = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 < \underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \delta_0 t \phi(\omega, \theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} + \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \delta_0 t \phi(\omega, \theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$$

This shows how the welfare term is affected, depending on y_0 being part of networks where transfers occur (second term) or not (first term).

[38] Whereas it has no impact on the net earnings of individuals with productivity less than ω_0.

Let us partition society in three different groups for each y_0.
Define $\mathcal{C}_0$ to be the set of groups in which individuals of ability ω_0 are present (according to the government). Then, $\overline{\mathcal{C}}_0$ is the set of groups in which they are not because their income is lower than all incomes in those groups. Finally, $\underline{\mathcal{C}}_0$ is the set of groups in which they are not because their income is higher than all incomes in those groups.

Then, quite naturally, an increase of taxes on incomes larger or equal to y_0 does not affect groups in the last set $\underline{\mathcal{C}}_0$. It does, however, affect groups in both $\mathcal{C}_0$ and $\overline{\mathcal{C}}_0$. The effects will be of different natures.[39]

Multiplicative effects. In groups belonging to $\overline{\mathcal{C}}_0$, all agents experience a small increase in tax liability τdy_0, which directly weighs on the lower-skilled individuals of these groups more than it does on the higher-skilled ones. Thus, from Lemma 1, we know that if utility functions exhibit decreasing absolute risk aversion, the higher skilled agents of these groups will compensate the lower skilled ones by increasing their transfers, thus reducing the welfare cost associated to them. So that even though consumption levels decrease for all agents, they decrease less than one-for-one for beneficiaries, which *dampens* the welfare effect on them. In that case, as the government typically associates more weight to lower skilled individuals, the welfare cost associated to individuals in groups belonging to $\overline{\mathcal{C}}_0$ is lower than it would have been without transfers. This effect is illustrated in Panel (b) of Figure 1.4.

Additive and multiplicative effects. In groups to which individuals of type ω_0 belong (groups in $\mathcal{C}_0$), there are two kinds of effects that are at play: an additive (spillover) and a multiplicative (dampening) one. Their combined effect on the final welfare cost is ambiguous.

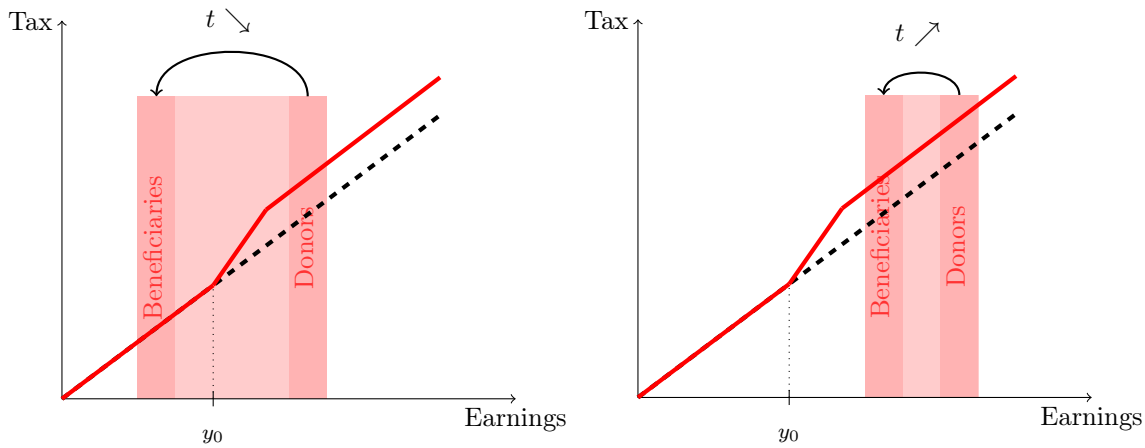
If the group is such that individuals directly affected by the tax increase (i.e., all individuals with skills higher or equal to ω_0) are neutral (neither donors nor beneficiaries) or donors, then the indirect welfare will consist in both additive and multiplicative effects. If individuals with skill ω_0 are neutral, then the net income of donors in their group is lower, so that the transfers they make decrease. Hence, beneficiaries in these groups are also affected even though their skill level is lower than ω_0: this adds an extra term to the welfare cost, a *spillover* effect. This effect is illustrated in Panel (a) of Figure 1.4. The same effect arises if the individuals of skill ω_0 are donors. Thus, through these extra terms, the welfare cost of increasing the tax liability of donors and neutral individuals is higher than it would have been without transfers: the additive effect is a spillover effect. However, there is also a dampening effect through the multiplicative term on the donors: indeed, for these individuals, since their transfers decrease, consumption varies less than one-for-one, so that the welfare cost that weighs on them is lower that it would have been without transfers.

In groups where individuals with skill ω_0 are beneficiaries, then again, both effects are at play. On the one hand, if they are not the lowest-skilled beneficiary in their group then the same kind of spillover (additive) effect occurs: the increase in tax liability of the donors in their group also affects the beneficiaries with skills lower than theirs (lower than ω_0). On the other hand, they might receive a similar compensation to that described for individuals in groups of type $\overline{\mathcal{C}}_0$: that is, their tax increase may be partly compensated by transfers made by the donors in their group. Moreover, this also translates into a multiplicative effect on donors.

Thus, the term IW_0 encompasses two types of indirect welfare effects: a multiplicative effect that dampens or amplifies the welfare cost associated to a uniform increase in tax liability (i.e., by transfers from donors to beneficiaries, whose final consumption levels are reduced more than a one-for-one factor for donors and less for beneficiaries), and a spillover effect that adds to the welfare cost by impacting individuals who would not have been impacted otherwise (i.e., beneficiaries whose tax liability is not increased but whose final consumption decreases as a result of decreased transfers from the donors in their group). The first kind of indirect effect – the multiplicative one – might lower or increase the welfare cost component depending on the relative welfare weights

[39] The combination of the direct and indirect welfare effects in mathematical terms can be found in Appendix B.

of donors and beneficiaries, as well as on their density: it may imply higher or lower marginal tax rates, but generally implies higher rates. The second kind of indirect effect – the additive one – unambiguously increases the welfare cost and implies lower marginal tax rates.



(a) Spillover effect
$\mathcal{C}_0$-type group

(b) Dampening effect
$\overline{\mathcal{C}}_0$-type group

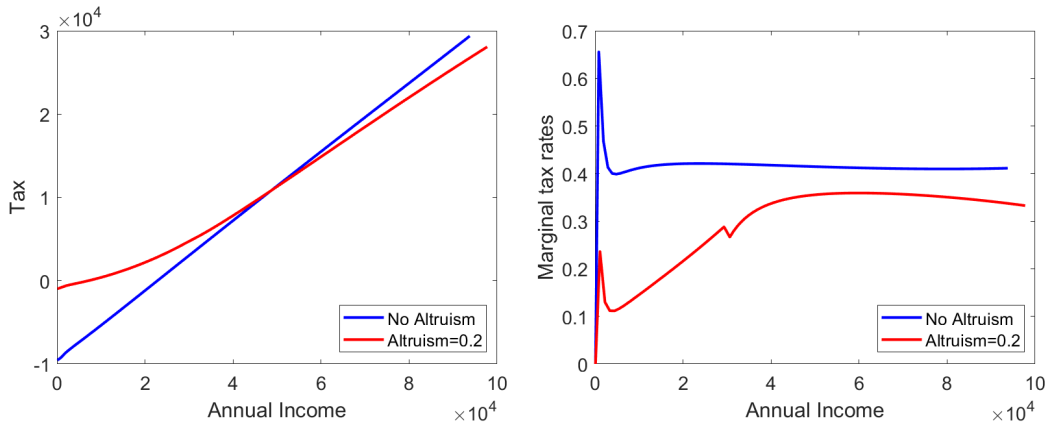
Figure 1.4 – Indirect welfare effect

This figure illustrates the new effect induced by private transfers: the indirect welfare effect. This effect may go in two opposite directions depending on the position of groups with respect to income y_0. Panel (a) illustrates the effect of a slight increase in the tax rate if y_0 is the income of a Neutral individual in a group. This decreases available income for Donors and thus decreases the transfers they make. Panel (b) illustrates the effect of a slight increase in the tax rate at y_0 on groups where all incomes are above y_0. Then, for all CRRA and DARA utility functions, this increases the transfers made.

Example 2. (Non-linear income tax) *In both cases, B, the government's exogenous expenditure requirement is equal to 4000. Again we compare the tax schedule set by a "naive" Social Planner who would believe that there is no altruism with that set with a Social Planner who is aware of the level of altruism in society. Here, the Social Planner is (unweighted) utilitarian. Here, we calibrate the distribution of incomes (hence skill levels) on the United States in 2016 using PSID data.*

Suppose we are in a Society of type A. That is, we only have one type of group (all groups are representative of the society as a whole). In the presence of CRRA utility functions and isoelactic costs of effort, the increase in consumption due to an infinitesimal increase in all disposable incomes from y_0 onwards for the beneficiaries ($\delta_0 Q_m$) is always greater than one (see Appendix C). Thus, the multiplicative effect is dampening on beneficiaries. However, the increase in consumption for donors ($\delta_0 Q_M$) may be lower or greater than one, so that the direction of its total effect is not clear.

In the following example, all groups follow the same log-normal distribution with a Pareto tail. Suppose they all have altruism level $\alpha = 0.2$. Then, marginal tax rates and the tax schedule are affected as follows:



(a) Tax schedule (b) Marginal tax rates

Figure 1.5 – Society A tax schedule

In Society A, all the groups have the same characteristics and span the whole society. Even though altruism is relatively low ($\alpha = 0.2$), marginal tax rates are much lower than in a non-altruistic setting: the spillover effect dominates. This in turn implies a much lower lump-sum transfer by the government, which may count on the higher-skilled individuals to redistribute to the lower-skilled individuals. This also enables the government to raise the required revenue.

In that case, the government raises revenue through two means: through the increase in incomes of all individuals (due to the lower efficiency cost of tax rates that are all lowered), and through lower lump-sum redistribution. It may rely on the donors in the groups to redistribute to the lower-skilled agents. As in Saez (2001), marginal tax rates are still U-shaped, but are considerably decreased on much of the population due to the spillover effects. Not that the sharp change in marginal tax rates occurs between neutral individuals' incomes and donors' incomes. The following figure shows a shift in earnings to the right: lower marginal tax rates on the whole population imply a lower distortion on productive effort decisions and hence an increase in all earnings.

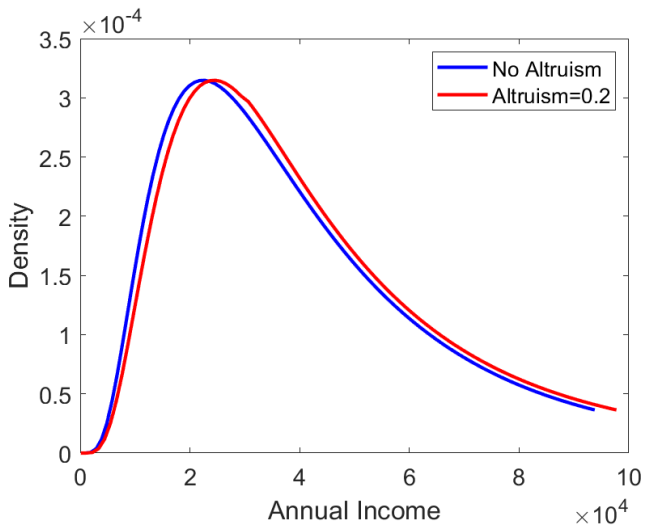
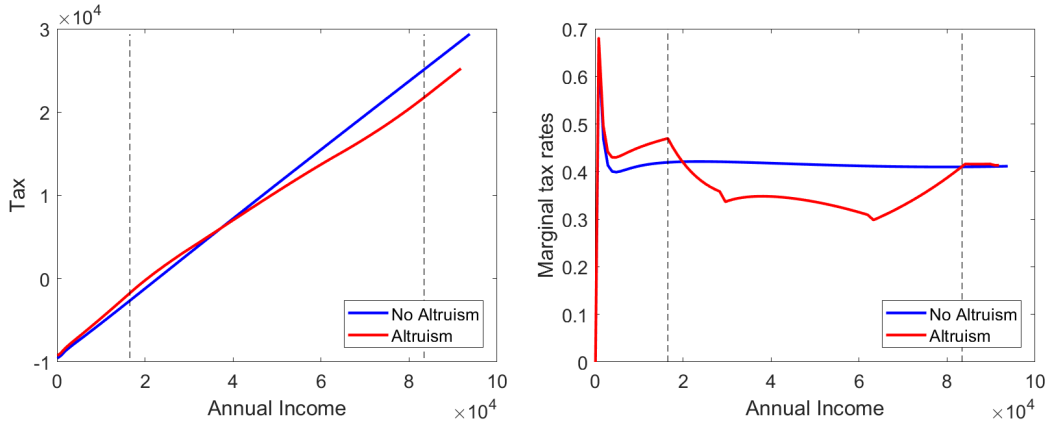


Figure 1.6 – Distribution of earnings in Society A

In Society A, marginal tax rates are much lower on all incomes and hence imply a lower distortion on productive effort.

In Society B, now, the distribution of skills is the same at the society level as a whole. There are three types of groups: lower skilled groups that comprise 19 percent of the population, medium skilled groups that comprise the next 70 percent of the population, and finally the highest skilled groups that comprise the last 11 percent of the population. In that case, as can be seen in Figure 1.7, lump-sum redistribution is hardly affected, but marginal tax rates are very different: they may be increased on the lowest-skilled group in order to reach a high enough tax

liability for higher skilled individuals while at the same time lowering the rates on the middle income group in order to encourage transfers at the group-level while raising more revenue. For higher skilled individuals, marginal tax rates are hardly affected. Indeed, not enough redistribution takes place in that group for the government to encourage it. For the first type of groups, the dampening effect is at play: it increases tax rates. For the second type of group, both dampening (as seen for the tax rates of a part of beneficiaries) and spillover effects are at play (as seen on the rest of the group): on these groups, tax rates are generally lower. Again, the sharp changes in marginal tax rates in the middle income group occurs when changing from beneficiaries' incomes to neutral individuals' and then from the latter's to donors'.



(a) Tax schedule (b) Marginal tax rates

Figure 1.7 – Society B tax schedule

Society B is composed of three types of groups. The lower-skilled and higher-skilled groups are homogeneous and hence operate little redistribution. The middle-income group spans a large set of skill levels and hence operates redistribution absent government intervention. This example enables to highlight both the spillover and the dampening effects. The higher marginal tax rates on the poorer individuals are due to the dampening effect. The lower marginal tax rate on middle income individuals due to spillover effects. Finally, the marginal tax rates on richer individuals are almost unchanged. The lump-sum transfer is now also hardly unchanged: the government has to take care of redistributing to the very poor.

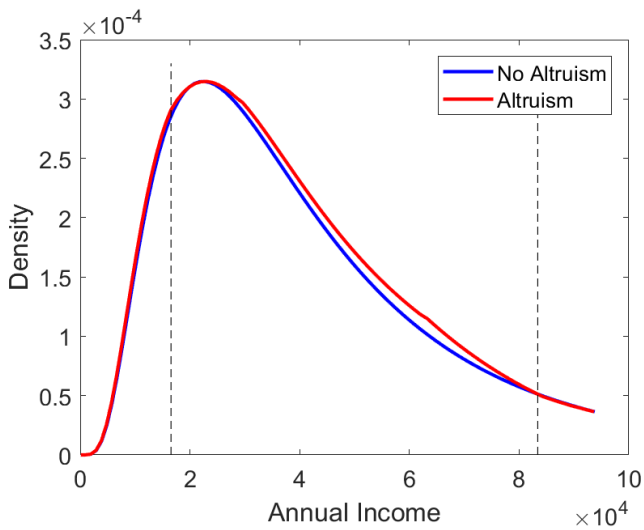


Figure 1.8 – Distribution of earnings in Society B

Here, the distortion on productive effort decisions is only lower for middle-income individuals.

Earnings are now higher only for the middle income group.

1.5 Potential Applications

1.5.1 Taxation in developing countries

As discussed in the Introduction, private transfers are pervasive in developing countries. A large part of the Public Finance literature in developing countries is focused on the emergence of tax systems and State capacity in such settings.
This framework, however, might provide some insights into the *design* of tax systems in these contexts. I extend it in two dimensions to account for important features of developing countries.

Kinship taxation

Social norms are an important factor explaining the presence of private transfers. While altruism might also be thought of as a social norm, it is not, as we have seen in the above analysis, a distortive one. Indeed, in the absence of income effects, productive effort decisions are not affected by transfers. Moreover, if they were, higher productivity individuals would exert more effort while lower productivity individuals would exert less. Thus, the resulting aggregate income would be higher than if there were no altruism. This is not, however, the kind of distortion that is described in the literature (see Baland et al. (2011), Jakiela and Ozier (2015), Squires (2016)): part of these transfers are also found to discourage productive effort. These kinds of transfers are due to a kinship tax, that exists for social norm purposes.

In order to illustrate the new effects that are at play now, let us place ourselves in a society where there are two groups, say C_1 and C_2. Within each group, individuals have altruistic ties towards their peers. Between both groups, there is a kinship tax. Thus, individuals observe both skill levels and earning levels within their group, and only earnings in the other group. Suppose both groups have the same variance in skill levels, but C_1 has a higher mean than C_2. Drawing from the empirical findings in Squires (2016), I model the kinship t_K tax as follows:

$$t^K(y) = \begin{cases} \tau^K \times (y - y^K) & \text{if } y \geq y^K \\ 0 & \text{otherwise} \end{cases}$$

Where τ^K and y^K are not the result of some maximization program, but are set by those imposing the tax. Tax proceeds are then split equally between these individuals. We suppose that ω^K the productivity level of individuals with earnings y^K when there is no tax is such that $\underline{\omega}^1 < \omega^K < \overline{\omega}^1$, and $\omega^K > \overline{\omega}^2$. Thus, the kinship tax is imposed on some individuals of group C_1 and redistributed lump-sum in group C_2. Now, when there is no government intervention, individuals with productivity level ω^K choose the same productive effort y^K as they would without the kinship tax. Individuals with incomes between ω^K and $\omega^K + \delta^K$ for some δ_K bunch at y^K, and individuals with higher productivity levels choose their productive effort according to the first order condition

$$\frac{1}{\omega} k' \left(\frac{y}{\omega} \right) = 1 - \tau^K$$

Let us now comment on the *laissez-faire* situation.

Incomes are still non decreasing in productivity levels within each group, so that transfers still have the same form: they flow from higher skilled to lower skilled individuals, and directly from donor to receiver.

Now, however, higher skilled individuals in group C_1 earn less. Thus, there is the possibility that they do not make any transfers in their group because of this kinship tax. At the same time, however, the kinship tax enables to make the poorer group, C_2, richer in terms of final consumption level, while at the same time potentially discouraging the individuals in it to make altruistic transfers to their poorer members and while now potentially making them richer than the poorer individuals in the taxed group C_1. While the kinship tax induces

an efficiency loss, it is also redistributive.

In this context it is interesting to consider what a social Planner would want to do. The tax introduced by the State will erode the tax base for the kinship tax – thus reducing inefficiencies caused by this tax, while at the same time introducing a new one. Crucially, the interaction between formal and informal redistribution will depend on whether τ^K, and especially y^K are endogenous to the groups' characteristics or not – for example, depend on relative income levels. For instance, we may suppose that $y^K = \gamma^K \times \big(y(\overline{\omega}^2) - T(y(\overline{\omega}^2)\big)$, where γ^K is some exogenously set positive integer. Thus, y^K is endogenous to the tax.

The Social Planner now wants to maximize the sum of the following two terms:

$$\int_{\underline{\omega}^1}^{\overline{\omega}^1} \Phi\left(v\left(y(\omega,\tau^K) - T(y(\omega,\tau^K)) - t^K[y(\omega,\tau^K) - T(y(\omega,\tau^K))] - t(\omega,\boldsymbol{\theta}_1,\tau^K) - k\left(\frac{y(\omega,\tau^K)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega$$

and $\displaystyle\int_{\underline{\omega}^2}^{\overline{\omega}^2} \Phi\left(v\left(y(\omega) - T(y(\omega)) - t(\omega,\boldsymbol{\theta}_2,L^K) + L^K - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega$

where $L^K = \displaystyle\int_{\underline{\omega}^1}^{\overline{\omega}^1} t^K(y(\omega,\tau^K) - T(y(\omega,\tau^K)))\, h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega$,

under the budget constraint $\displaystyle\int_{\underline{\omega}^1}^{\overline{\omega}^1} T(y(\omega,\tau^K))\, h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega + \int_{\underline{\omega}^2}^{\overline{\omega}^2} T(y(\omega))\, h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega \geq 2B.$

And subject to individual behaviors.

The government knows τ^K and either y^K if it is exogenously set, or else the shape of y^K (for example γ^K in the above example).
In the following, suppose y^K is exogenously set.

Proposition 4 *The marginal tax rates are of the following form:*

$$\frac{T'(y_0)}{1-T'(y_0)} = \left(\int_{y_0}^{\infty} (1-\phi(y))\frac{f_y(y)}{1-F_y(y_0)}\,\mathrm{d}y + \frac{IW_0}{1-F_y(y_0)}\right) \times \frac{1-F_y(y_0)}{y_0 f_y^*(y_0)} \times \frac{(1-\mathbb{1}\{y_0 \geq y(\omega'^K)\}\tau^K)}{e(y_0)}$$

IW_0 depends on whether individuals are in the extracting group, are in the extracted group but do not pay the kinship tax, or are in the extracted group and do pay the kinship tax.

If the individual of skill ω_0 is in group C_2, the extracting group, then

$$IW_0 = \int_{\underline{y}^1}^{\overline{y}^1} \delta_0 t\,\phi(y) f_1(y)\,\mathrm{d}y + \int_{\underline{y}^2}^{\overline{y}^2} \delta_0 t\,\phi(y) f_2(y)\,\mathrm{d}y + \tau^K \int_{y^K}^{\overline{y}^1} \phi(y)\, f_1(y)\,\mathrm{d}y$$

$$- \tau^K \int_{y^K}^{\overline{y}^1} f_1(y)\,\mathrm{d}y \int_{\underline{y}^2}^{\overline{y}^2} \phi(y)\, f_2(y)\,\mathrm{d}y.$$

If the individual of skill ω_0 is in group C_1, the extracted group, but does not pay the kinship tax, then

$$IW_0 = \int_{\underline{y}^1}^{\overline{y}^1} \delta_0 t\,\phi(y) f_1(y)\,\mathrm{d}y + \int_{\underline{y}^2}^{\overline{y}^2} \delta_0 t\,\phi(y) f_2(y)\,\mathrm{d}y + \tau^K \int_{y^K}^{\overline{y}^1} \phi(y)\, f_1(y)\,\mathrm{d}y$$

$$-\tau^K \int_{y^K}^{\overline{y}^1} f_1(y)\,\mathrm{d}y \int_{\underline{y}^2}^{\overline{y}^2} \phi(y)\, f_2(y)\,\mathrm{d}y.$$

If the individual of skill ω_0 is in group C_1, the extracted group, and pays the kinship tax, then

$$IW_0 = \int_{\underline{y}^1}^{\overline{y}^1} \delta_0 t\, \phi(y) f_1(y)\,\mathrm{d}y + \int_{\underline{y}^2}^{\overline{y}^2} \delta_0 t\, \phi(y) f_2(y)\,\mathrm{d}y + \tau^K \int_{y_0}^{\overline{y}^1} \phi(y)\, f_1(y)\,\mathrm{d}y$$

$$-\tau^K \left(e(y_0) y_0 f_1^*(y_0) + \int_{y_0}^{\overline{y}^1} f_1(y)\,\mathrm{d}y \right) \int_{\underline{y}^2}^{\overline{y}^2} \phi(y)\, f_2(y)\,\mathrm{d}y.$$

Again, we may write $\frac{dt}{d\tau} = dy_0 \delta_0 t$, but it is now of a different form because it includes the indirect effect of a change in L^K on transfers. For the extracting group, C_2, L^K decreases by an infinitesimal amount for all individuals, so that again for usual utility functions, we have a dampening effect: in this group, the richer individuals C_2 compensate the poorer individuals. At the same time, if y_0 is the income of Neutral individuals in group C_2, then an increase in the tax rate at y_0 also increases the burden on the donors and hence tends to decrease their transfers. So the effect on the extracting clear may go in one of these two directions. For the extracted group C_1, the kinship tax burden is reduced, thus encouraging more transfers to lower skilled individuals in the group. In general this should tend to increase the marginal tax rates on lower incomes even more. The higher τ^K is, the more the government wants to crowd-out the kinship tax, and increase marginal tax rates at the bottom of the income tax schedule.

Now, taxes on incomes in group C_1 also have an effect on transfers in group C_2. Because the lump sum they receive from individuals in C_1 decreases, they increase the transfers they make to the poorest in their group. So decreasing the kinship tax *crowds in* altruistic transfers in the extracting group, and has an ambiguous effect in the extracted group. On the one hand it increases the formal tax paid by donors, but on the other hand it also decreases the kinship tax they pay: hence, they might increase or decrease the transfers they make.

1.5.2 Family taxation

Here we relax the assumption that the government cannot observe groups. This typically applies to the taxation of families. The government can observe parents and children, knows that children have no productive ability, but does not know the skill level of parents. In this case, it can be shown that the number of children in a household represents a tag for the government on the consumption level of the parents. At the same time, if the children enter the social welfare function of the social planner, the social planner has an interest in encouraging private redistribution from parents to children. This might explain why in certain countries, such as France, not only do families with children receive benefits (lump-sum transfers), but they also see their tax rates decreased.

Formally, let us consider the introduction of a linear income tax. Suppose that groups now differ in the number of children that are in them, so that now there is a distribution of the skills of parents for each family size. The characteristic of a group is now given by $\theta = N$, the number of children in the family; and $h(\omega|\theta)$ is now the distribution of the income of parents for different family sizes. This allows to account for example for the fact that larger families tend to be lower or higher skilled. For simplicity, let us suppose that families are composed of two parents and N children, and that both parents have the same skill level. Suppose the maximum number of children is M. Let Π_N be the proportion of families with N children. Let y_L be the endowment of all children absent any parental transfers.

The social planner's social welfare function is thus equal to:[40]

$$\sum_{N=0}^{M} \Pi_N \int_\omega \Big\{ 2u\left((1-\tau_N)y(\omega,\tau_N) + R_N - t(\omega,N,\tau_N,R_N) - k\left(\frac{y(\omega,\tau_N)}{\omega}\right)\right) \\ + Nu\left(y_L + \frac{2t(\omega,N,\tau_N,R_N)}{N}\right)\Big\} h(\omega|N)\,\mathrm{d}\omega.$$

And the budget constraint is the following:

$$\sum_{N=0}^{M} \Pi_N \int_\omega \tau_N y(\omega,\tau_N)\, h(\omega|N)\,\mathrm{d}\omega \geq B + \sum_{N=0}^{M} R_N\,\Pi_N$$

Let λ be the shadow price of the budget constraint, then the Lagrangian is:

$$\mathcal{L} = \sum_{N=0}^{M} \Pi_N \int_\omega \Big\{ 2u\left((1-\tau_N)y(\omega,\tau_N) + R_N - t(\omega,N,\tau_N,R_N) - k\left(\frac{y(\omega,\tau_N)}{\omega}\right)\right) \\ + Nu\left(y_L + \frac{2t(\omega,N,\tau_N,R_N)}{N}\right)\Big\} h(\omega|N)\,\mathrm{d}\omega - \lambda\left(\sum_{N=0}^{M} \Pi_N \int_\omega \tau_N y(\omega,\tau_N)\, h(\omega|N)\,\mathrm{d}\omega - B - \sum_{N=0}^{M} R_N\,\Pi_N\right).$$

The first order condition defining τ_N is:

$$\frac{\partial \mathcal{L}}{\partial \tau_N} = \Pi_N \int_\omega \Big\{ 2\left(-y(\omega,\tau_N) - \frac{\partial t}{\partial \tau}\right) u'\left(\omega,N,\tau_N,R_N\right) + 2\frac{\partial t}{\partial \tau} u'\left(y_L,\omega,N,\tau_N,R_N\right)\Big\} h(\omega|N)\,\mathrm{d}\omega \\ -\lambda \Pi_N \int_\omega \left(y(\omega,\tau_N) + \tau_N \frac{\partial y}{\partial \tau}\right) h(\omega|N)\,\mathrm{d}\omega = 0.$$

The first order condition defining R_N is:

$$\frac{\partial \mathcal{L}}{\partial R_N} = \Pi_N \int_\omega \Big\{ 2\left(1 - \frac{\partial t}{\partial R}\right) u'\left(\omega,N,\tau_N,R_N\right) + 2\frac{\partial t}{\partial R} u'\left(y_L,\omega,N,\tau_N,R_N\right)\Big\} h(\omega|N)\,\mathrm{d}\omega + \lambda \Pi_N = 0$$

Suppose that h does not depend on N: the distribution of skills is the same for all types of families. We can then first show that in this case, if $N_1 > N_2$, it cannot be that both $R_1 < R_2$ and $\tau_1 > \tau_2$.[41]

1.6 Concluding remarks

This chapter develops a conceptual framework to study optimal taxation in the presence of altruism and thus private transfers between individuals. First, I establish the structure of incomes and transfers when there is no government intervention. Second, I characterize the optimal linear and non-linear income taxes and show that depending on the distribution of the homogeneity of groups, because of partial crowding out transfers, the optimal tax rates should take into account the reactions transfers to the tax rate. Indeed, the social planner might find it advantageous to encourage transfers at a private level before operating redistribution at the society level: by taking into consideration the partial crowding out of transfers, the government may take advantage of the fact that there is already some redistribution occurring at a private level – a redistribution that does not distort labor supply incentives – and thus decrease the marginal tax rate used to redistribute at the society level – thus also reducing the amount of distortion created by the tax. This framework can then be extended to a number of settings, such as family taxation and taxation in developing countries.

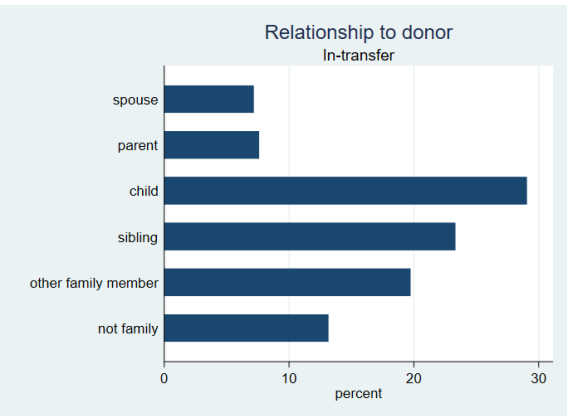
[40] Wlog, we consider an unweighted utilitarian objective function.
[41] Where we write R_i for R_{N_i} and τ_i for τ_{N_i}.

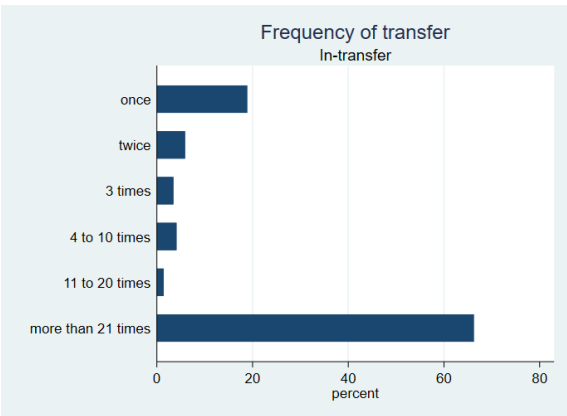
1.7 Appendix

1.7.1 Appendix A: Transfer patterns in a selection of countries

In this section, I use data from the Living Standard Measurement Surveys (LSMS) from the World Bank, that often include a section on private transfers between households. Even though these surveys are country-specific and do not as such allow for a comparison between countries (see Cox et al. (2006)), they allow me to provide some descriptive evidence on the extent, patterns and reasons for private transfers for six different countries for which this data was available in the last ten years: Burkina Faso, Ghana, Mali, Niger, Tajikistan and Uganda. I always consider the latest year available, which I specify at the beginning of each paragraph.
In 2017, these six countries are classified as low income countries by the World Bank (i.e., their Gross National Income per capita is below 996 current US $) and their government expenditure as a percentage of GDP is between 8% (for Ghana) and 18% (for Tajikistan, closely followed by Mali with 16.9% and Niger with 15.8%). Of course this section only aims to provide some descriptive evidence on transfers in these countries, and I shall only add some potential hypotheses for interpretation.

Burkina Faso – 2013. The LSMS provide very detailed data on private transfers between households in Burkina Faso. However, despite asking how often transfers were made or received in the past year, they do not say if the transfers are made on a regular basis or due to a temporary shock. Indeed a transfer made or received once a year may be yearly or one-shot in order to cover some unexpected expense. One benefit of this database is that it is specified at the very beginning of the section that it concerns transfers that are not made in exchange for anything. Thus, they enable us to eliminate the reciprocity motive (in the short term at least), but not consumption-smoothing transfers (i.e. due to a temporary shock).
Private transfers are widespread in Burkina Faso: 34% of households report having received at least a transfer in the past year, and 39% having made one. 66% of the receiving households indicate having received transfers more than 20 times in a year, and 62% of the households making transfers, having made more than 20. The main reason for transfers is family support, with health and education coming (quite far) behind – which might be an indication for regular transfers (special events such as funerals or weddings only represent 4% of transfers). More than half of the transfers are either given in person or carried by someone else – thus not directly observable by the State. More than two thirds of transfers are made by households living in Burkina Faso, and 96% of recipients live in Burkina. Moreover, they live in the same locality in 40% of cases, or in a rural area one fourth of the time. More than 60% of transfers are monetary. 33% of donors and 44% of recipients are not in the nuclear family, thus presenting evidence for widespread networks of individual links. Finally, 38% of recipients are students or unemployed – evidence perhaps for transfers that are redistributive, in the short-run at least. Below are some graphs presenting some of this evidence.





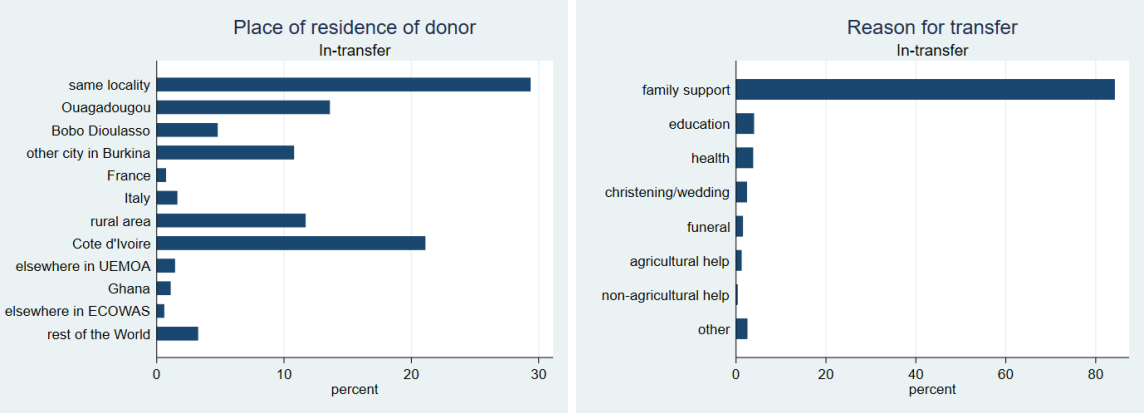


Figure 1.10 – Characteristics of transfers received: Benin

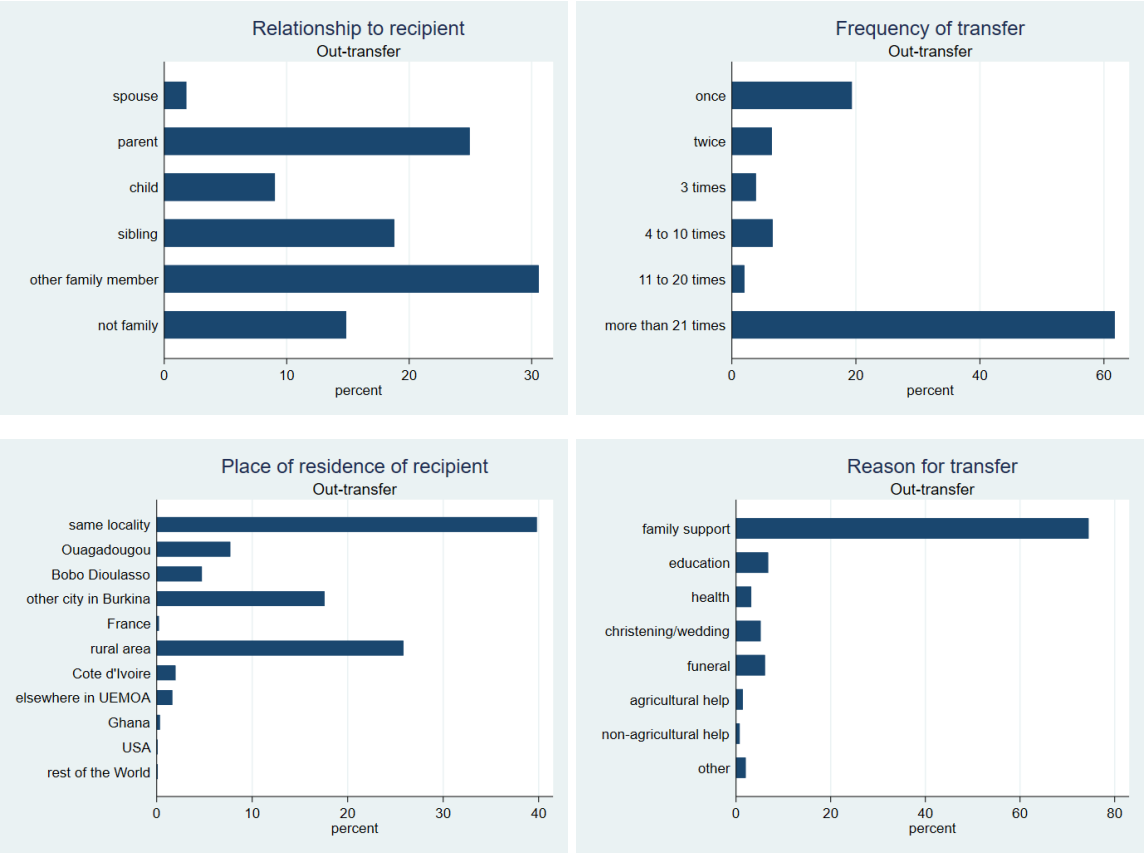


Figure 1.12 – Characteristics of transfers made: Benin

Ghana – 2009. While the questionnaire for Ghana does not explicitly ask whether transfers take place in exchange for services, they do ask how regular the transfers are. Half of the transfers are regular (i.e., on a yearly, monthly, weekly or even more regular basis). When considering amounts, more than two-thirds of the total stock of transfers is done on a regular basis. 83% of transfers are received from a relative and 89% made to a relative. 55% of transfers received are used for daily consumption, while 16% are for health purposes, and 7% are for education support. For transfers made, these numbers are respectively 56, 12 and 19. The three principal reasons for transfers are the same as for Benin. Again, funerals and other ceremonies represent less than 7% of the reasons for which transfers occur. Transfers mostly flow from urban areas in Ghana (in 70% of cases – among which 24% from the capital, Accra), even though 12% of the time they originate from the same town or village.

Only 17% originate from abroad. Finally, adding again to the evidence that transfers are not directly observable by the government is the fact that more than three fourths of transfers are made hand-to-hand.

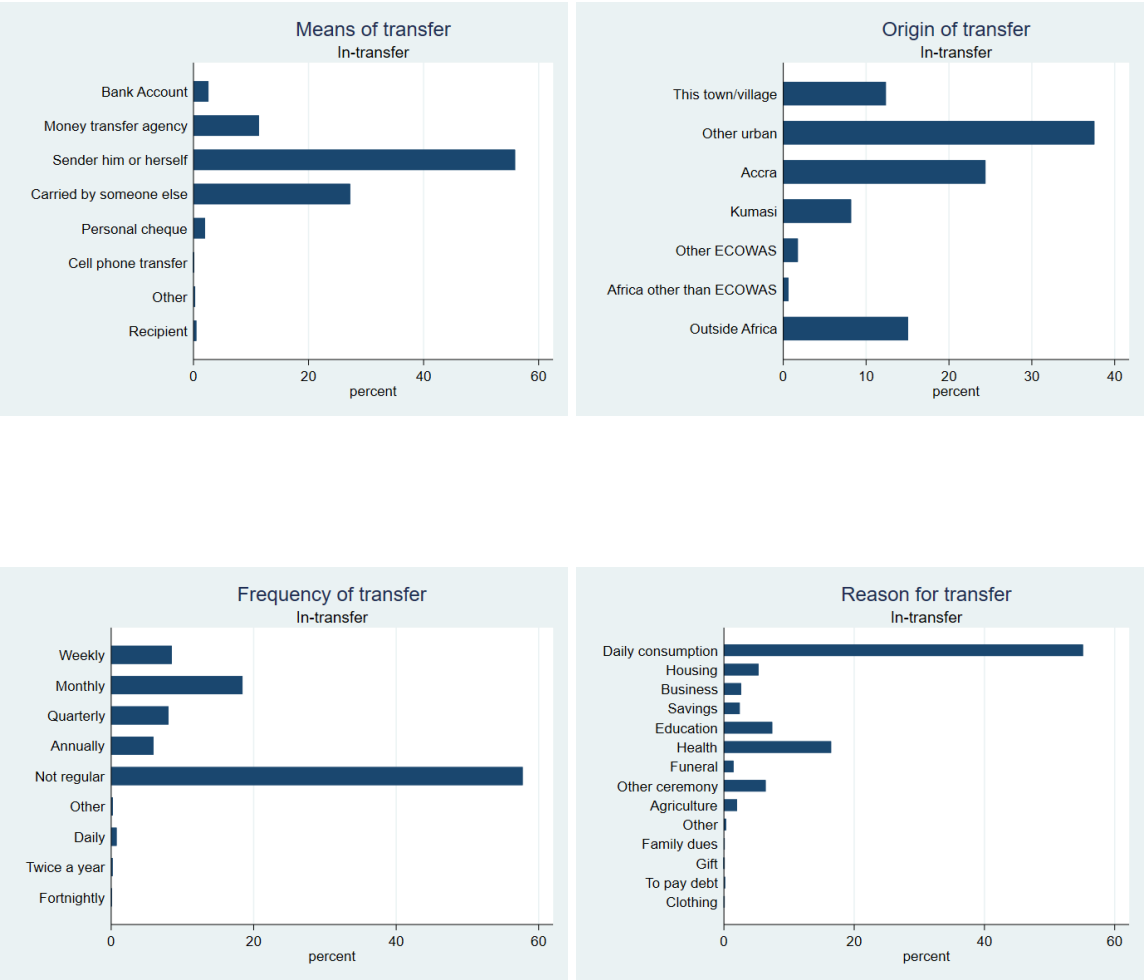
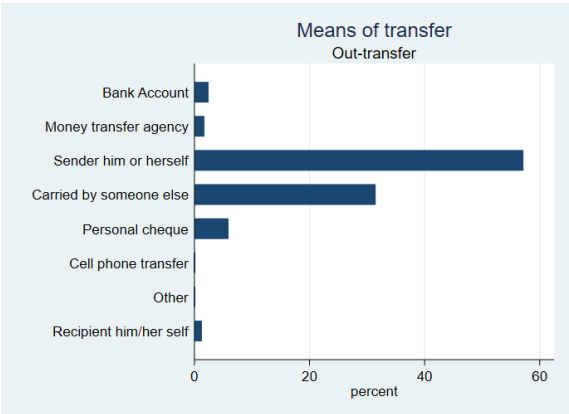


Figure 1.14 – Characteristics of transfers received: Ghana



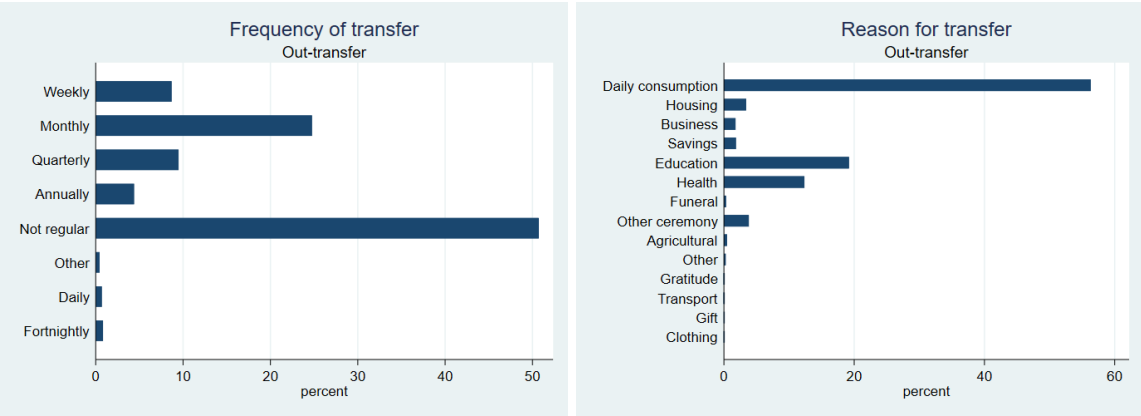
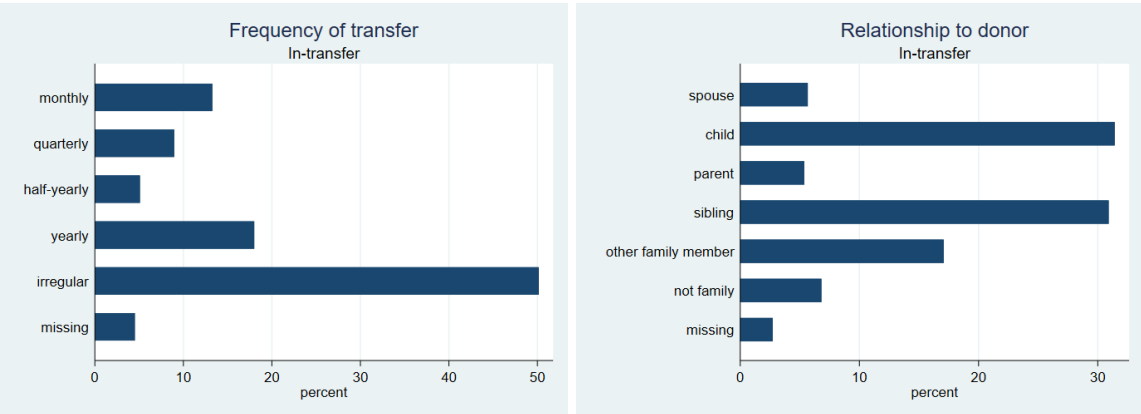


Figure 1.16 – Characteristics of transfers made: Ghana

Mali – 2014. The questionnaire for Mali also includes a question on the frequency of transfers. Again, an important share of transfers occur on a regular basis: 45% (respectively 38%) of transfers received (respectively made) are yearly, half-yearly, quarterly or monthly. Transfers mostly occur from children to parents but also between siblings – thus calling into question a model where a family head would be altruistic towards their family members, with no direct altruistic links between each other (if these transfers are made on a voluntary basis). Transfers to non-family members are rare, but transfers to or from non-nuclear-family members represent around 15% of transfers made or received. In around two-thirds of the cases, the donor lives in Mali. One fourth of transfers originate from Bamako (the capital), and 9% from the same locality. Transfers are generally made within Mali (in 91% of cases), and in 17% of cases to the same locality. Unless all transfers occurring outside of the household's locality are non-altruistically motivated,[42] these figures (along with those for Ghana) perhaps provide evidence that it may be difficult for a government to know group-belonging. Pointing in this direction again, 35% of donors and 65% of recipients never lived in the household they give to (resp. receive from). For the most part, recipients live in rural areas (65%), but donors are almost evenly distributed between rural and urban areas (resp. 47 and 53%). The principal reason for transfers is still ongoing support, but here, transfers related to education and health take on less or as much importance as transfers related to special events and agricultural help.



[42]Which would be contrary to the idea that it is easier to exert pressure on individuals who are closer geographically

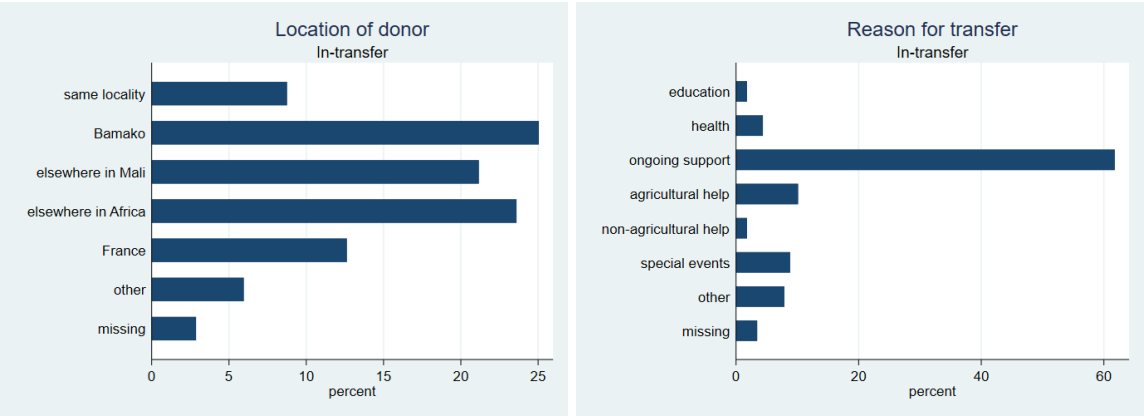


Figure 1.18 – Characteristics of transfers received: Mali

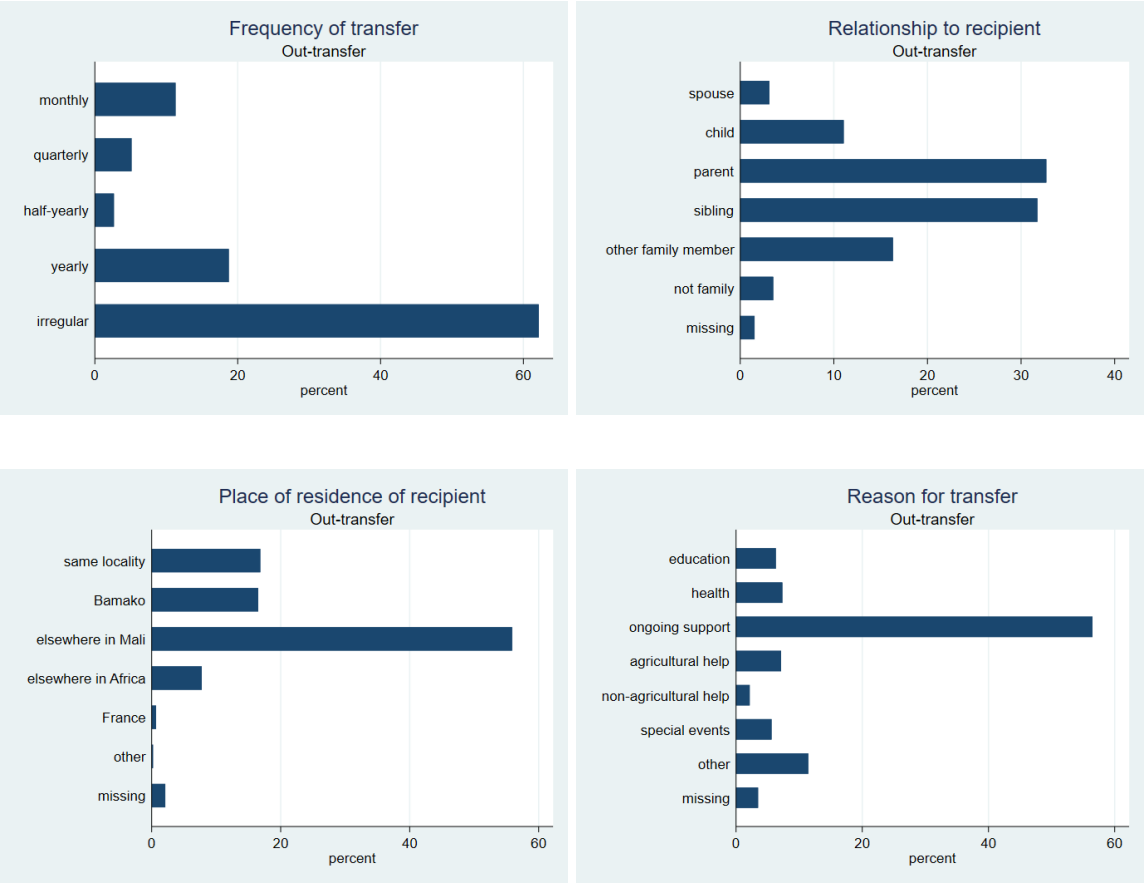


Figure 1.20 – Characteristics of transfers made: Mali

Niger – 2014. Here, family support and education might have been confounded, as one is the main reason for transfers made, while the other is the main reason for transfers received. A majority of donors have never lived in the household (55%). More than half of the transfers are monetary. Transfers flow in networks that seem quite wide: from children to parents, between siblings, but also between extended family members and between individuals who are not part of the same family (11% of donors are not family members, and 17% of receivers are not family members). Over half of donors are based in Niger, but recipients of transfers from Nigerien households

are primarily from the same locality (in 55% of cases); and hardly none live outside of Niger (only 5%).

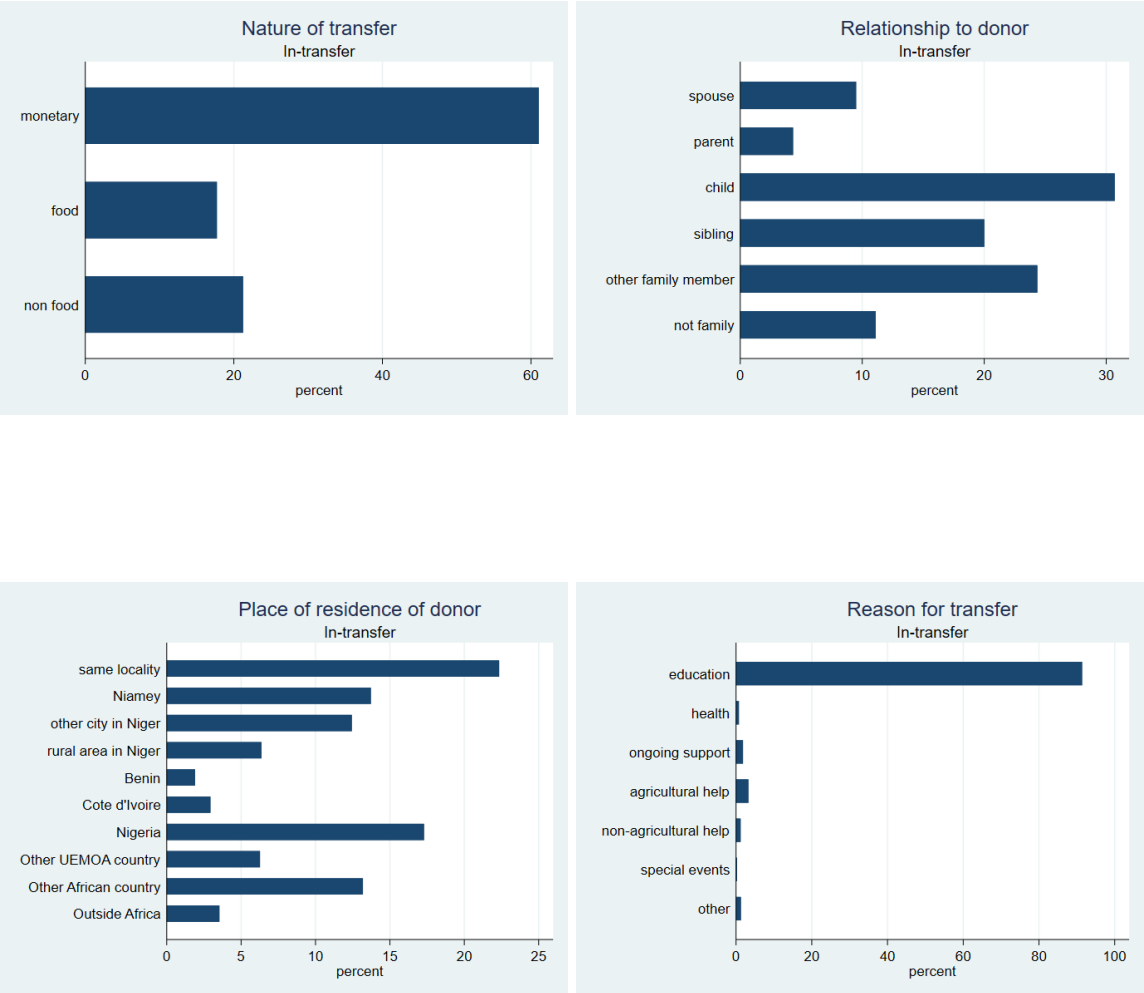
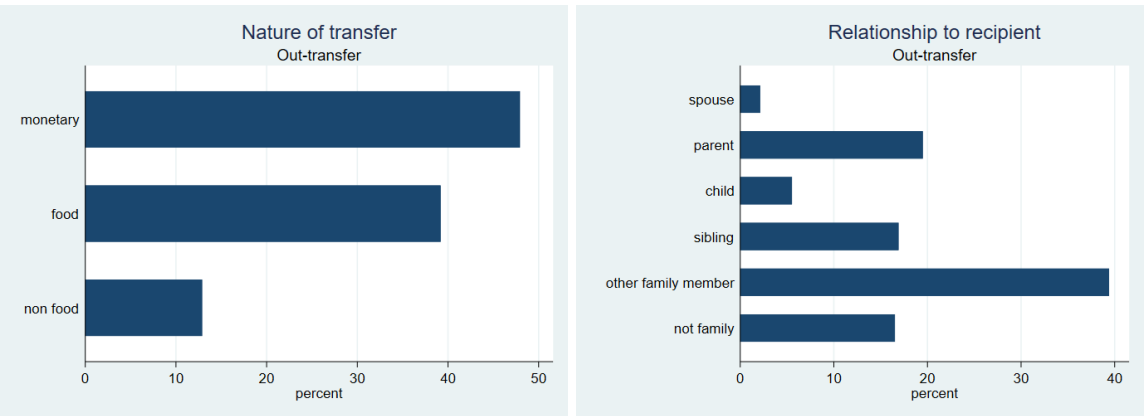


Figure 1.22 – Characteristics of transfers received: Niger



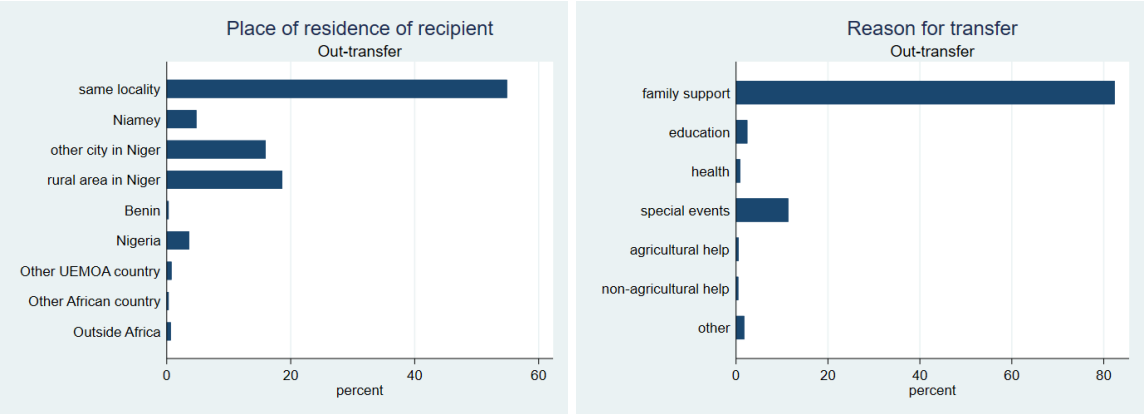


Figure 1.24 – Characteristics of transfers made: Niger

Tajikistan –2009. 68% of donor are based in Tajikistan itself (with the remaining being based in Russia, mostly). Again, most transfers flow from children to parents or between siblings – even though 8% of transfers originate from non-family members. Transfers are mostly received for daily consumption (71% of transfers received) – perhaps indicating regular transfers, but are given out in 38% of cases for weddings, funerals or medical expenses. Still, 39% of transfers made remain for daily consumption purposes.

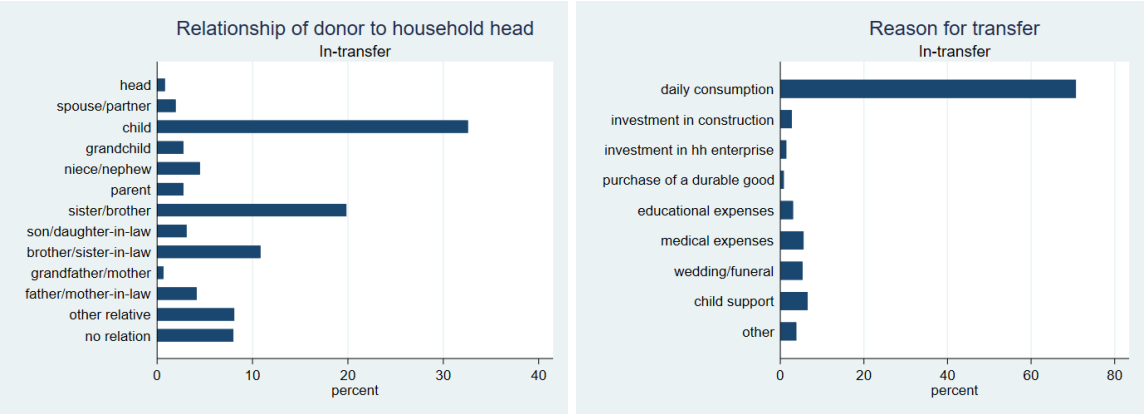


Figure 1.25 – Characteristics of transfers received: Tajikistan

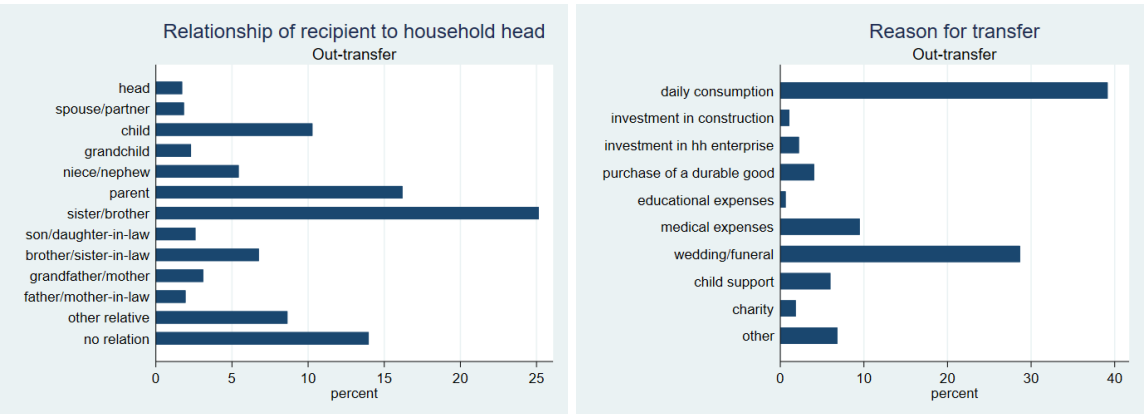
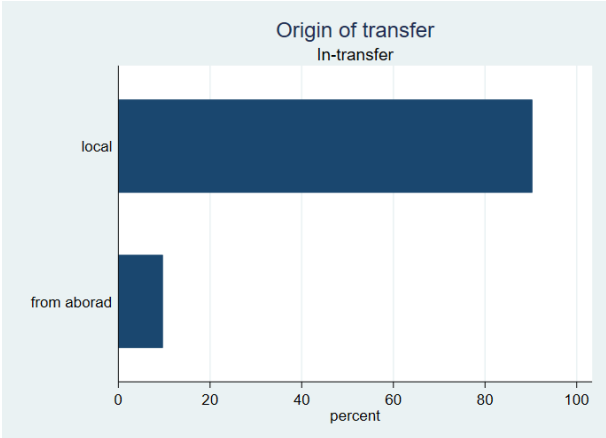
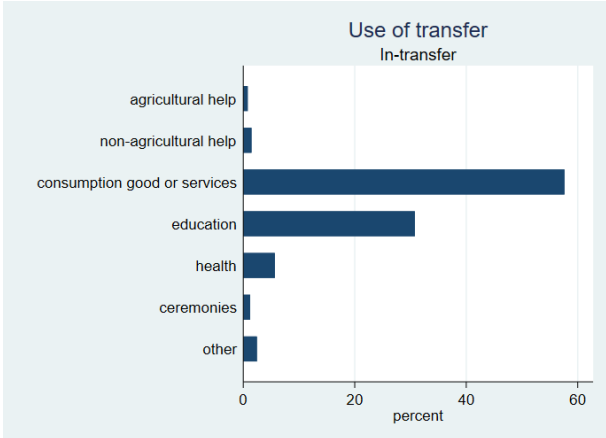


Figure 1.26 – Characteristics of transfers made: Tajikistan

Uganda – 2013 90% of donors are based in Uganda. Moreover, 58% of transfers are received for daily consumption, and 31% to pay for education expenses – again, a potential indication that transfers flow on a

regular basis.





Let us note in a general conclusion to this section that in all these examples, transfers do not only flow within the same village or locality. A large share of transfers originate from or are addressed to people who do not live in the same place. Thus, it might be hard for a government to know groups.

1.7.2 Appendix B: Simulations

This section is devoted to understanding how the indirect welfare effect can be rewritten in a more tractable way in other to run numerical simulations with different values of altruism α. Indeed, our term of interest – and for which we want a numerically applicable formula – is IW_0. At the end of the section we can also see how both the direct and indirect welfare effects add up and thus allow for a mathematical interpretation of the effects described in Section 1.4.2.

Numerically implementable formula. Let us start by defining ω_m^θ and ω_M^θ as the productivity levels in group of characteristics $\boldsymbol{\theta}$ to be such that, under the optimal tax schedule $T(.)$, individuals with productivity levels below ω_m^θ are receivers, and above ω_M^θ are donors.

For ease of notation, let us also introduce the following notation:

$Y(\omega) = y(\omega) - T(y(\omega)) - k\left(\frac{y}{\omega}\right)$.

Now:

$$IW_0 dy_0 = -\int_{\boldsymbol{\theta}\ s.t.\ \omega_0<\underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \frac{\mathrm{d}t}{\mathrm{d}\tau}\phi(\omega,\theta)h(\omega|\boldsymbol{\theta})g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta} - \int_{\boldsymbol{\theta}\ s.t.\ \omega_0\in[\underline{\omega}^\theta,\overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \frac{\mathrm{d}t}{\mathrm{d}\tau}\phi(\omega,\theta)h(\omega|\boldsymbol{\theta})g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta}.$$

Let us rewrite the two terms as follows:

First we know that in the first term where $\omega_0 < \underline{\omega}^\theta$, we have that $\omega_0 < \omega_m^\theta < \omega_M^\theta$.

Then, in the second term, ω_0's position with respect to ω_m^θ and ω_M^θ is important.
Let us recall that for receivers $t = Y - Q_m$ and for donors, $t = Y - Q_M$. Hence, with the perturbation described in the non-linear tax section, we have that:

- If $\omega_0 < \underline{\omega}^\theta$, then:
  - For receivers, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_m}{\mathrm{d}\tau}$.
  - For donors, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_M}{\mathrm{d}\tau}$.
- If $\omega_0 < \omega_m^\theta$, then:
  - For receivers with $\omega < \omega_0$ $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -\dfrac{\mathrm{d}Q_m}{\mathrm{d}\tau}$.
  - For receivers with $\omega \geq \omega_0$ $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_m}{\mathrm{d}\tau}$.
  - For donors, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_M}{\mathrm{d}\tau}$.
- If $\omega_0 \in [\omega_m^\theta, \omega_M^\theta]$, then:
  - For receivers, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -\dfrac{\mathrm{d}Q_m}{\mathrm{d}\tau}$.
  - For donors, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_M}{\mathrm{d}\tau}$.
- If $\omega_0 > \omega_M^\theta$, then:
  - For receivers, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -\dfrac{\mathrm{d}Q_m}{\mathrm{d}\tau}$.
  - For donors with $\omega < \omega_0$, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -\dfrac{\mathrm{d}Q_M}{\mathrm{d}\tau}$.
  - For donors with $\omega \geq \omega_0$, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau} = -dy_0 - \dfrac{\mathrm{d}Q_M}{\mathrm{d}\tau}$.

For any group with characteristics $\boldsymbol{\theta}$, if transfers take place, then we know that:

$$\int_{\omega_M^\theta}^{\overline{\omega}^\theta} \left(Y(\omega) - Q_M^\theta\right)\, h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega = \int_{\underline{\omega}^\theta}^{\omega_m^\theta} \left(Q_m^\theta - Y(\omega)\right)\, h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega.$$ [43]

We have the following four cases:

- If $\omega_0 < \underline{\omega}^\theta$, then the tax is increased by a small lump-sum amount on the whole group of type $\boldsymbol{\theta}$. Thus, taking the the derivative of our above equality with respect to τ implies that:

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} H(\omega_m^\theta|\theta) + \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}(1 - H(\omega_M^\theta|\theta)) = -dy_0[H(\omega_m^\theta|\theta) + 1 - H(\omega_M^\theta|\theta)]$$

- If $\omega_0 < \omega_m^\theta$ then some receivers only perceive a change in transfers, but none in taxes, and:

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} H(\omega_m^\theta|\theta) + \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}(1 - H(\omega_M^\theta|\theta)) = -dy_0[H(\omega_m^\theta|\theta) - H(\omega_0|\theta) + 1 - H(\omega_M^\theta|\theta)]$$

- If $\omega_0 \in [\omega_m^\theta, \omega_M^\theta]$, then, all donors have an increase in tax liability:

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} H(\omega_m^\theta|\theta) + \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}(1 - H(\omega_M^\theta|\theta)) = -dy_0[1 - H(\omega_M^\theta|\theta)]$$

- If $\omega_0 > \omega_M^\theta$ then only some donors have an increase in tax liability:

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} H(\omega_m^\theta|\theta) + \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}(1 - H(\omega_M^\theta|\theta)) = -dy_0[1 - H(\omega_0|\theta)]$$

[43] Where Q_M, Q_m, and ω_m, ω_M are defined at the optimal tax schedule.

This then gives formulas for both $\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau}$ and $\frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}$ by using $\frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}u''(Q_M^\theta) = \alpha\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau}u''(Q_m^\theta)$.

Define $D_m^\theta = H(\omega_m^\theta|\theta) + \frac{\alpha u''(Q_m^\theta)}{u''(Q_M^\theta)}(1 - H(\omega_M^\theta|\theta))$ and $D_M^\theta = \frac{u''(Q_M^\theta)}{\alpha u''(Q_m^\theta)}D_m^\theta$.

We may now derive a numerically implementable formula for IW_0.

$$
\begin{aligned}
IW_0 dy_0 = dy_0 \int_{\boldsymbol{\theta}\, s.t.\, \omega_0 < \underline{\omega}^\theta} \Bigg[& \left(1 - \frac{H(\omega_m^\theta|\theta) + 1 - H(\omega_M^\theta|\theta)}{D_m^\theta}\right) \int_{\underline{\omega}^\theta}^{\omega_m^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \\
& + \left(1 - \frac{H(\omega_m^\theta|\theta) + 1 - H(\omega_M^\theta|\theta)}{D_M^\theta}\right) \int_{\omega_M^\theta}^{\overline{\omega}^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \Bigg] g(\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta} \\
& + dy_0 \int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in [\underline{\omega}^\theta, \omega_m^\theta)} \Bigg[- \frac{H(\omega_m^\theta|\theta) - H(\omega_0|\theta) + 1 - H(\omega_M^\theta|\theta)}{D_m^\theta} \int_{\underline{\omega}^\theta}^{\omega_m^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta} \\
& + \int_{\omega_0}^{\omega_m^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta} + \left(1 - \frac{H(\omega_m^\theta|\theta) - H(\omega_0|\theta) + 1 - H(\omega^\theta|\theta)}{D_M^\theta}\right) \int_{\omega_M^\theta}^{\overline{\omega}^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \Bigg] g(\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta} \\
& + dy_0 \int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in [\omega_m^\theta, \omega_M^\theta]} \Bigg[- \frac{1 - H(\omega_M^\theta|\theta)}{D_m^\theta} \int_{\underline{\omega}^\theta}^{\omega_m^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta} \\
& + \left(1 - \frac{1 - H(\omega_M^\theta|\theta)}{D_M^\theta}\right) \int_{\omega_M^\theta}^{\overline{\omega}^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \Bigg] g(\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta} \\
& + dy_0 \int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in (\omega_M^\theta, \overline{\omega}^\theta]} \Bigg[- \frac{1 - H(\omega_0|\theta)}{D_m^\theta} \int_{\underline{\omega}^\theta}^{\omega_m^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \\
& - \frac{1 - H(\omega_0|\theta)}{D_M^\theta} \int_{\omega_M^\theta}^{\overline{\omega}^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega + \int_{\omega_0}^{\overline{\omega}^\theta} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\,\mathrm{d}\omega \Bigg] g(\boldsymbol{\theta})\,\mathrm{d}\boldsymbol{\theta}
\end{aligned}
$$

Note here that $\frac{1 - H(\omega_m^\theta|\theta)}{D_M^\theta} < 1$ and if $\omega_0 \in (\omega_M^\theta, \overline{\omega}^\theta]$, then $\frac{1 - H(\omega_0|\theta)}{D_M^\theta} < 1$.

The last step required to run the simulations is to determine $\overline{\phi} = \int_{\boldsymbol{\theta}} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \frac{\Phi'(v)\, u'}{\lambda} h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta}$.

In the standard Mirrlees (1971) (or Saez (2001)) model, in the absence of income effects, it is equal to 1. Here, its value has to be revised to adjust to the change in transfers.

In order to determine it, let us proceed as usual, i.e., by perturbing $\mathcal{L}$ at the optimum by a small uniform lump-sum increase in taxes τ. This does not impact productive effort decisions but it does impact transfer decisions.

$$
\mathcal{L}(\tau) = \int_{\boldsymbol{\theta}} \int_{\omega} \Phi\left(u\left(y(\omega) - T(y(\omega)) - \tau - t(\omega,\theta,\tau) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta}
$$

$$+\lambda \int_{\omega} (T(y(\omega)) + \tau)\, f(\omega)\, \mathrm{d}\omega.$$

Then, we must have $\left.\frac{\partial \mathcal{L}}{\partial \tau}\right|_{\tau=0} = 0.$

Thus:

$$\lambda = \int_{\boldsymbol{\theta}} \int_{\omega} \left(1 + \frac{\mathrm{d}t}{\mathrm{d}\tau}\right) \Phi'(v)\; u'\, h(\omega|\boldsymbol{\theta})\, g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$$

And $\overline{\phi} = 1 - \frac{1}{\lambda} \int_{\boldsymbol{\theta}} \int_{\omega} \frac{\mathrm{d}t}{\mathrm{d}\tau} \Phi'(v)\; u'\, h(\omega|\boldsymbol{\theta})\, g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$

$\frac{\mathrm{d}t}{\mathrm{d}\tau}$ is determined as above – when tax liability is increased lump-sum for the whole population. Thus,

$$\frac{1}{\lambda} \int_{\boldsymbol{\theta}} \int_{\omega} \frac{\mathrm{d}t}{\mathrm{d}\tau} \Phi'(v)\; u'\, h(\omega|\boldsymbol{\theta})\, g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} = \int_{\boldsymbol{\theta}} \Bigg[\left(1 - \frac{H(\omega_m^{\theta}|\theta) + 1 - H(\omega_M^{\theta}|\theta)}{D_m^{\theta}}\right) \int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega$$

$$+ \left(1 - \frac{H(\omega_m^{\theta}|\theta) + 1 - H(\omega_M^{\theta}|\theta)}{D_M^{\theta}}\right) \int_{\omega_M^{\theta}}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \Bigg] g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$$

Total welfare effect. Adding up the direct effect $DW_0 = -\int_{\boldsymbol{\theta}} \int_{\omega_0}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}$ and indirect welfare effect IW_0 gives us four different terms:

For individuals belonging to groups in $\overline{\mathcal{C}}_0$ the total welfare effect is:

$$W_0^1 = -\int_{\boldsymbol{\theta}\, s.t.\, \omega_0 < \underline{\omega}^{\theta}} \left[\delta_0 Q_m \int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega + \int_{\omega_m^{\theta}}^{\omega_M^{\theta}} \phi(\omega,\theta)\, h(\omega|\boldsymbol{\theta}) \mathrm{d}\omega + \delta_0 Q_M \int_{\omega_M^{\theta}}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \right] g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$$

For beneficiaries belonging to groups in $\mathcal{C}_0$ the total welfare effect is:

$$W_0^2 = -\int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in [\underline{\omega}^{\theta}, \omega_m^{\theta})} \left[\delta_0 Q_m \int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega + \int_{\omega_m^{\theta}}^{\omega_M^{\theta}} \phi(\omega,\theta)\, h(\omega|\boldsymbol{\theta}) \mathrm{d}\omega + \delta_0 Q_M \int_{\omega_M^{\theta}}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \right] g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$$

For neutral individuals belonging to groups in $\mathcal{C}_0$ the total welfare effect is:

$$W_0^3 = -\int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in [\omega_m^{\theta}, \omega_M^{\theta}]} \left[\delta_0 Q_m \int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega + \int_{\omega_0}^{\omega_M^{\theta}} \phi(\omega,\theta)\, h(\omega|\boldsymbol{\theta}) \mathrm{d}\omega + \delta_0 Q_M \int_{\omega_M^{\theta}}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \right] g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$$

For donors belonging to groups in $\mathcal{C}_0$ the total welfare effect is:

$$W_0^4 = -\int_{\boldsymbol{\theta}\, s.t.\, \omega_0 \in (\omega_M^{\theta}, \overline{\omega}^{\theta}]} \left[\delta_0 Q_m \int_{\underline{\omega}^{\theta}}^{\omega_m^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega + \delta_0 Q_M \int_{\omega_M^{\theta}}^{\overline{\omega}^{\theta}} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \right] g(\boldsymbol{\theta})\, \mathrm{d}\boldsymbol{\theta}$$

where $\delta_0 Q_m$ and $\delta_0 Q_M$ are the variations in Q_m and Q_M induced by an infinitesimal increase in all their components from $Y(\omega_0)$ onwards.

This enables to better understand the different effects taking place, and to highlight two kinds of effects: a multiplicative effect and an additive one.

Note first that the effect on donors and receivers is now weighted by the variation of their net consumption with respect to a small variation in all net incomes for skill levels greater than ω_0 (which is positive, so that we

are still in the presence of a welfare cost: $DW_0 + IW_0 < 0$).

1.7.3 Appendix C: Proofs

Proof of Proposition 1. This proof can be made in multiple steps.

(i) As in Arrow (1981), suppose that individual i makes a transfer to individual j, who in turn makes a transfer to individual k. Then, from (2) (first oder condition defining transfers),

$$u_c(c_i, y_i, \omega_i) = \alpha u_c(c_j, y_j, \omega_j) \quad \text{and} \quad u_c(c_j, y_j, \omega_j) = \alpha u_c(c_k, y_k, \omega_k)$$

Then: $u_c(c_i, y_i, \omega_i) = \alpha^2 u_c(c_k, y_k, \omega_k)$.
But from (2), we also have that $u_c(c_i, y_i, \omega_i) \geq \alpha u_c(c_k, y_k, \omega_k)$.
So that $\alpha \geq 1$, which is a contradiction.

(ii) Let us place ourselves in a group.

We show this for transfers from individuals of lower ability to individuals of higher ability.
Wlog, suppose that individual 1 is of ability ω_1 and individual 2 is of ability ω_2, such that $\omega_1 < \omega_2$ and that individual 1 makes a transfer to individual 2.
Then, from (i), 1 is a donor and 2 is a receiver (remember that an individual can never be both simultaneously).
Let S_1 be the set of individuals 1 makes transfers to, and S_2 the set of individuals who make transfers to 2.
Then from (2), $u'\left(c_1 - k\left(\frac{y_1}{\omega_1}\right)\right) = \alpha u'\left(c_2 - k\left(\frac{y_2}{\omega_2}\right)\right)$, so that $u'\left(c_1 - k\left(\frac{y_1}{\omega_1}\right)\right) < u'\left(c_2 - k\left(\frac{y_2}{\omega_2}\right)\right)$, and since u is concave, $c_1 - k\left(\frac{y_1}{\omega_1}\right) < c_2 - k\left(\frac{y_2}{\omega_2}\right)$.

So:

$$y_1 - t_{12} - \sum_{\substack{i \neq 2 \\ i \in U_1}} t_{1i} - k\left(\frac{y_1}{\omega_1}\right) > y_2 + t_{12} + \sum_{\substack{j \neq 2 \\ j \in U_2}} t_{j2} - k\left(\frac{y_2}{\omega_2}\right)$$

and

$$2t_{12} < \left(y_1 - k\left(\frac{y_1}{\omega_1}\right)\right) - \left(y_2 - k\left(\frac{y_2}{\omega_2}\right)\right) - \sum_{\substack{i \neq 2 \\ i \in U_1}} t_{1i} - \sum_{\substack{j \neq 2 \\ j \in U_2}} t_{j2} \quad (*)$$

Now from (1), we know that the incomes of all individuals of skill ω_2 are the same, and all incomes of individuals of ability ω_1 are the same. And that since $\omega_1 < \omega_2$, $y_2 > y_1$.

Suppose that $y_1 - k\left(\frac{y_1}{\omega_1}\right) > y_2 - k\left(\frac{y_2}{\omega_2}\right) \quad (**)$.

Now, since $\omega_2 > \omega_1$, $k\left(\frac{y_1}{\omega_1}\right) > k\left(\frac{y_2}{\omega_2}\right)$.

So $(**)$ implies that $y_1 - k\left(\frac{y_1}{\omega_2}\right) > y_2 - k\left(\frac{y_2}{\omega_2}\right) \quad (***)$.

Now the function $y \mapsto y - k\left(\frac{y}{\omega_2}\right)$ is increasing over $[0, y_2]$, since its derivative cancels at y_2 and since k is convex, so that $y_1 - k\left(\frac{y_1}{\omega_2}\right) \leq y_2 - k\left(\frac{y_2}{\omega_2}\right)$, and $(***)$, thus $(**)$ do not hold.

So that $(*)$ implies that $t_{12} \leq 0$, a contradiction.

The argument is even more straightforward with two individuals of same ability, since we know that they earn the same income.

We show (iii) and (iv) through the characterization of incomes and transfers.

Income. First, the first order condition defining the income of individual i stems from their optimization problem. It is such that $\frac{1}{\omega_i} k\left(\frac{y}{\omega_i}\right) = 1$. This implicitly defines optimal incomes $y_i = y^*(\omega_i)$.

Then, from the first order condition, and since k is decreasing in ω, $\omega \mapsto y^*(\omega) - k\left(\frac{y^*(\omega)}{\omega}\right)$ is increasing in ω. Indeed, from the envelope theorem, its derivative is equal to $\frac{y^*(\omega)}{\omega^2} k'\left(\frac{y^*(\omega)}{\omega}\right) > 0$.

Transfers. Second, let us turn to transfers. Let C be a group, and ω_m (resp. ω_M) the lowest (resp. highest) skill level in this group. And $y_m = y^*(\omega_m)$, $y_M = y^*(\omega_M)$.

Necessary and sufficient condition for transfers to take place.

Necessary condition. Suppose that within group C, $u'\left(y_M - k\left(\frac{y_M}{\omega_M}\right)\right) \geq \alpha u'\left(y_m - k\left(\frac{y_m}{\omega_m}\right)\right)$.

Now suppose that individual j makes a transfer to individual i. Then, from Corollary 1, $y_M \geq y_j > y_i \geq y_m$. Hence,

$$u'\left(y_j - k\left(\frac{y_j}{\omega_j}\right)\right) \geq u'\left(y_M - k\left(\frac{y_M}{\omega_M}\right)\right) \geq \alpha u'\left(y_m - k\left(\frac{y_m}{\omega_m}\right)\right) \geq \alpha u'\left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)$$

Denote by $t_j > 0$ the total sum of transfers made by j and by t_i the total sum of transfers received by i. Then, the first order condition tells us that

$$u'\left(y_j - t_j - k\left(\frac{y_j}{\omega_j}\right)\right) = \alpha u'\left(y_i + t_i - k\left(\frac{y_i}{\omega_i}\right)\right)$$

So that $u'\left(y_j - k\left(\frac{y_j}{\omega_j}\right)\right) < \alpha u'\left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)$, which is a contradiction.

Sufficient condition. Suppose that within group C, $u'\left(y_M - k\left(\frac{y_M}{\omega_M}\right)\right) < \alpha u'\left(y_m - k\left(\frac{y_m}{\omega_m}\right)\right)$.

Then, from the first order conditions of the individual problem, this cannot be an equilibrium without transfers. Let us determine the shape of transfers.

Thus, $u'\left(y_M - k\left(\frac{y_M}{\omega_M}\right)\right) < \alpha u'\left(y_m - k\left(\frac{y_m}{\omega_m}\right)\right)$ is a necessary and sufficient condition for transfers to take place in group C. Let us name this condition (T).

Characterization.

Step 1. We know from (i) that individuals are either beneficiaries, donors or neither.

Step 2. Let us show that the after transfer net consumption of all beneficiaries is the same whatever their skill level, and that of all donors is the same whatever their skill level.

Suppose individuals j and m are donors and give to a same individual i. Denote by t_j (resp. t_m) transfers made by j (resp. m), and by t_i transfers received by i. Then, the first order condition tells us that $u'\left(y_j - t_j - k\left(\frac{y_j}{\omega_j}\right)\right) = \alpha u'\left(y_i + t_i - k\left(\frac{y_i}{\omega_i}\right)\right) = u'\left(y_m - t_m - k\left(\frac{y_m}{\omega_j}\right)\right)$.
Hence, individuals j and m have the same consumption net of income.

Now suppose individual j gives to individuals i and m to l. Again, denote by t_j (resp. t_m) total transfers made by j (resp. by m), and by t_i (resp. t_l) total transfers received by i (resp. by l). Then, $u'\left(y_j - t_j - k\left(\frac{y_j}{\omega_j}\right)\right) \geq \alpha u'\left(y_l + t_l - k\left(\frac{y_l}{\omega_l}\right)\right) = u'\left(y_m + t_m - k\left(\frac{y_m}{\omega_m}\right)\right)$.
And in the same way, $u'\left(y_m - t_m - k\left(\frac{y_m}{\omega_m}\right)\right) \geq \alpha u'\left(y_i + t_i - k\left(\frac{y_i}{\omega_i}\right)\right) = u'\left(y_j + t_j - k\left(\frac{y_j}{\omega_j}\right)\right)$.
Hence, $u'\left(y_j - t_j - k\left(\frac{y_j}{\omega_j}\right)\right) = u'\left(y_m + t_m - k\left(\frac{y_m}{\omega_m}\right)\right)$.

So that donors all have the same net consumption.
In the same way, we can show that beneficiaries all have the same net consumption.

Step 3. Let D be the set of donors and B the set of beneficiaries. Then, we know all donors (resp. beneficiaries) have the same after transfer consumption net of cost of effort, which we may denote Q_M (resp. Q_m).
Let $i \in D$ make total transfers t_i. Then, $y_i - t_i - k\left(\frac{y_i}{\omega_i}\right) = Q_M$.
Let $j \in B$ receive total transfers t_j. Then, $y_j + t_j - k\left(\frac{y_j}{\omega_j}\right) = Q_m$.
By definition, $\sum_{i \in D} t_i = \sum_{j \in B} t_j$.
Hence, Q_m and Q_M satisfy the following equation:

$$\sum_{i \in D}\left(y_i - k\left(\frac{y_i}{\omega_i}\right) - Q_M\right) = \sum_{j \in B}\left(Q_m - \left(y_j - k\left(\frac{y_j}{\omega_j}\right)\right)\right)$$

Moreover, Q_M is such that $u'(Q_M) = \alpha u'(Q_m)$ (by the first order conditions, it is the relation satisfied by the marginal utility of a given donor to that of a given beneficiary they make a transfer to).
Moreover, since $t_i > 0$, $y_i - k\left(\frac{y_i}{\omega_i}\right) > Q_M$, and since $t_j > 0$, $y_j - k\left(\frac{y_j}{\omega_j}\right) < Q_m$.
Hence, if it exists, the equilibrium is such that:

$$\sum_{i \text{ s.t. } y_i - k\left(\frac{y_i}{\omega_i}\right) \geq Q_M}\left(y_i - k\left(\frac{y_i}{\omega_i}\right) - u'^{-1}(\alpha u'(Q_m))\right) = \sum_{j \text{ s.t. } y_j - k\left(\frac{y_j}{\omega_j}\right) \leq Q_m}\left(Q_m - \left(y_j - k\left(\frac{y_j}{\omega_j}\right)\right)\right) \tag{3}$$

Existence and uniqueness.

Step 4. Equation (3) has a solution in $(y_m - k\left(\frac{y_m}{\omega_m}\right), y_M - k\left(\frac{y_M}{\omega_M}\right))$.

Let $i = 1, ..., n$ be the individuals in a group C, ordered such that $\omega_1 \leq \omega_2 \leq ... \leq \omega_n$. And suppose that they satisfy condition (T) for transfers to take place, that is

$$u'\left(y_n - k\left(\frac{y_n}{\omega_n}\right)\right) < \alpha u'\left(y_1 - k\left(\frac{y_1}{\omega_1}\right)\right).$$

As in Arrow (1981), define the following function

$$^{+} : x \mapsto \begin{cases} x & \text{if} \quad x > 0 \\ 0 & \text{if} \quad x \leq 0 \end{cases}$$

This then allows us to define the following function

$$\Gamma_\alpha(x) = \sum_i \left(y_i - k\left(\frac{y_i}{\omega_i}\right) - u'^{-1}(\alpha u'(x)) \right)^+ - \sum_i \left(x - \left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)\right)^+$$

Γ_α's roots will then be solutions to (3).
Now, $x \mapsto \sum_i \left(x - \left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)\right)^+$ is increasing in x.
And since u is concave, $u'^{-1}(\alpha u'(.))$ is increasing.
So $x \mapsto \sum_i \left(y_i - k\left(\frac{y_i}{\omega_i}\right) - u'^{-1}(\alpha u'(x))\right)^+$ is decreasing in x.

Hence, Γ_α is decreasing over $\mathbb{R}$.

Moreover, $\sum_i \left((y_1 - k(y_1, \omega_1) - \left(y_i - k\left(\frac{y_i}{\omega_i}\right)\right)\right)^+ = 0$, so that $\Gamma_\alpha(y_1 - k\left(\frac{y_1}{\omega_1}\right)) \geq y_n - k\left(\frac{y_n}{\omega_n}\right) - u'^{-1}(\alpha u'(y_1 - k\left(\frac{y_1}{\omega_1}\right))) \geq 0$ from (T).

$\sum_i \left((y_i - k\left(\frac{y_i}{\omega_i}\right) - \left(y_n - k\left(\frac{y_n}{\omega_n}\right)\right)\right)^+ = 0$, so that $\Gamma_\alpha(u'^{-1}(\frac{1}{\alpha}u'(y_n - k\left(\frac{y_n}{\omega_n}\right)))) \leq u'^{-1}(\frac{1}{\alpha}u'(y_n - k\left(\frac{y_n}{\omega_n}\right))) - (y_1 - k\left(\frac{y_1}{\omega_1}\right)) < 0$ from (T).

Now, because $x \mapsto x$, $x \mapsto u'^{-1}(\alpha u'(x))$ and $^+$ are continuous, so is F.

Hence, from the intermediate value theorem, $\Gamma_\alpha(x) = 0$ has a unique solution, which is in $(y_1 - k\left(\frac{y_1}{\omega_1}\right), u'^{-1}(\frac{1}{\alpha}u'(y_n - k\left(\frac{y_n}{\omega_n}\right))))$.

Moreover, this solution is such that $Q_m > y_1 - k\left(\frac{y_1}{\omega_1}\right)$ and $Q_M < y_n - k\left(\frac{y_1}{\omega_1}\right)$

This equilibrium is a Nash Equilibrium: no individual has an incentive to deviate. Let us consider the three different types in a group C and consider their potential deviations.

First consider individuals i such that $y_i - k\left(\frac{y_i}{\omega_i}\right) \geq Q_M$. These individuals may deviate by giving less, or by giving to individuals whose net income is between Q_M and Q_m.
They may give $\varepsilon > 0$ ($\varepsilon \ll 1$) less to individuals with net income lower than Q_m, so that at the first order, this would result in a change of their utility:

$$\varepsilon(u'(Q_M) - \alpha u'(Q_m)) = 0.$$

This would also be the case if they decided to give $\varepsilon > 0$ less to individuals with net income lower than Q_m.
They may start giving $\varepsilon > 0$ to an individual j with net income between Q_m and Q_M, which would result in a change of their utility:

$$\varepsilon(-u'(Q_M) + \alpha u'(y_j + k\left(\frac{y_j}{\omega_j}\right))) < 0.$$

They may start giving $\varepsilon > 0$ to other individuals with net income greater than Q_M, and their change in utility would be:

$$\varepsilon(-u'(Q_M) + \alpha u'(Q_M)) < 0 < 0.$$

Hence, no individual with net income greater than Q_M has an incentive to deviate from this equilibrium.

We proceed in the same way for the other types of individuals: individuals with net income lower than Q_m may start giving to individuals with net income lower than Q_m, between Q_m and Q_M or above Q_M. And individuals with net income between Q_m and Q_M may do the same. It is straightforward to show that none of these deviations is profitable.

Comparative statics: inequality decreases with α. Let us show that Q_m increases with α and Q_M decreases with α.

Indeed: suppose $\alpha_1 > \alpha_2$. Then: $\forall x$, $u'^{-1}(\alpha_1 u'(x)) < u'^{-1}(\alpha_2 u'(x))$.

So that if $y_i - k\left(\frac{y_i}{\omega_i}\right) > u'^{-1}(\alpha_2 u'(x))$, then $y_i - k\left(\frac{y_i}{\omega_i}\right) > u'^{-1}(\alpha_1 u'(x))$.

So $\forall x$, $\sum_i \left((y_i - k\left(\frac{y_i}{\omega_i}\right) - u'^{-1}(\alpha_2 u'(x))\right)^+ \leq \sum_i \left((y_i - k\left(\frac{y_i}{\omega_i}\right) - u'^{-1}(\alpha_1 u'(x))\right)^+$.

That is, $\Gamma_{\alpha_1}(x) \geq \Gamma_{\alpha_2}(x)$.

And so $Q_m(\alpha_1) > Q_m(\alpha_2)$.

Hence, since net income does not depend on altruism, transfers received by individuals increase. And hence, the transfers made by at least one individual must increase. So Q_M decreases with α.

Proof of Application 1. We use the following specifications for our utility functions:

$$u\left(c - k\left(\frac{y}{\omega}\right)\right) \quad \text{such that} \quad u(x) = \frac{x^{1-\eta}}{1-\eta} \quad \text{and} \quad k\left(\frac{y}{\omega}\right) = \frac{\left(\frac{y}{\omega}\right)^{1+\frac{1}{\epsilon}}}{1+\frac{1}{\epsilon}}.$$

We know that from (1), it follows that $y_H = \omega_H^{1+\epsilon}$ and $y_L = \omega_L^{1+\epsilon}$.

In each group, we also know from Proposition 1 (iii) that an equilibrium is either one where all high skilled individuals make transfers to low skilled individuals or where no transfers take place.

Suppose we are in an equilibrium where no transfer takes place. Then by definition, this means that it is not worth deviating for any individual. The only deviation that could take place would be for a high skilled individual to make a transfer to a low skilled one (or to many low skilled individuals).
This would imply that the social utility of this high-skilled individual is increasing at $t = 0$.
That is

$$-u'\left(y_H - k\left(\frac{y_H}{\omega_H}\right)\right) + \alpha u'\left(y_L - k\left(\frac{y_L}{\omega_L}\right)\right) > 0$$

i.e. $\alpha^{1/\eta} > \left(\frac{\omega_L}{\omega_H}\right)^{1+\epsilon}$.

So if $\alpha^{1/\eta} \leq \left(\frac{\omega_L}{\omega_H}\right)^{1+\epsilon}$ then the no-transfer situation is a Nash equilibrium.

On the contrary, if $\alpha^{1/\eta} > \left(\frac{\omega_L}{\omega_H}\right)^{1+\epsilon}$ then we are in a situation in which all individuals of high types make the same total transfer t to individuals of low type. Individuals of low type receive $\frac{\pi}{1-\pi}t$ each.

Hence, if i is of high type,

$$c_i = c_H = y_H - t$$

And if j is of low type,

$$c_j = c_L = y_L + \frac{\pi}{1-\pi}t.$$

Transfers are then determined as the solution to

$$u'\left(y_H - t - k\left(\frac{y_H}{\omega_H}\right)\right) = \alpha u'\left(y_L + \frac{\pi}{1-\pi}t - k\left(\frac{y_L}{\omega_L}\right)\right)$$

Which gives us: $t = \frac{1}{1+\epsilon}\frac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}}{\alpha^{1/\eta} + \frac{\pi}{1-\pi}}$.

The gap in consumption levels in group C^π is then: $c_H - c_L = y_H - y_L - (t + \frac{\pi}{1-\pi}t) = y_H - y_L - \frac{1}{1-\pi}t$.

So that since y_L and y_H do not depend on π, $\frac{\partial}{\partial\pi}(c_H - c_L) = \frac{\partial}{\partial\pi}(-\frac{1}{1-\pi}t) > 0$.

The gap in consumption levels is higher in groups with higher proportions of high ability individuals.

Proof of Proposition 2. Let us restate the problem of the social planner.

The social planner seeks to maximize the following social welfare function with respect to τ and R:

$$\int_{\boldsymbol{\theta}}\int_{\omega} z(\omega,\boldsymbol{\theta})\Phi(u((1-\tau)y(\omega,\tau) - t(\omega,\boldsymbol{\theta},\tau,R) + R - k\left(\frac{y(\omega,\tau)}{\omega}\right))\, h(\omega|\boldsymbol{\theta})g(\boldsymbol{\theta})\,\mathrm{d}\omega\mathrm{d}\boldsymbol{\theta}$$

under the (government budget) constraint that

$$\tau\int_{\omega} y(\omega)\, f(\omega)\,\mathrm{d}\omega \geq R + B.$$

(At the optimum, the budget constraint is binding.)

And taking into account the game played between individuals.

Preliminary remarks.

As defined in the core of the text, $\mathcal{Y}(\tau) := \int_{\omega} y(\omega)\, f(\omega)\,\mathrm{d}\omega$ is the aggregate income, and enables us to define $e = \frac{(1-\tau)}{\mathcal{Y}}\frac{\mathrm{d}\mathcal{Y}}{\mathrm{d}(1-\tau)}$ the elasticity of aggregate earnings with respect to the net-of-tax rate and to rewrite R as a function of τ: $R(\tau) = \tau\mathcal{Y}(\tau) - B$.

It is immediately clear that both at $\tau = 0$ and $\tau = 1$, the demogrant $R = -B$. Moreover, its derivative is equal to $\mathcal{Y}(\tau) + \tau \frac{\mathrm{d}\mathcal{Y}}{\mathrm{d}\tau} = \mathcal{Y}(\tau) - \frac{\tau}{1-\tau} e(\tau)\mathcal{Y}(\tau)$. Hence, at $\tau = 0$ it is positive and it is negative at $\tau = 1$. Supposing that equation

$$\frac{\tau}{1-\tau} = \frac{1}{e(\tau)}$$

only has one solution (which we name $\overline{\tau}$ in the core of the text), then R's derivative cancels only once, and R is inverse U-shaped.

Here, $t(\omega, \boldsymbol{\theta}, \tau, R)$ represents net transfers, and is positive if individual $(\omega, \boldsymbol{\theta})$ makes transfers, negative if they receive transfers, and equal to zero if they are neither a donor nor a receiver – all of this, according to the government.

Game definition, existence and uniqueness of a solution.

If the government does not know the size of the groups and may only consider how a representative group of type $\boldsymbol{\theta}$ would behave, then it solves the game by extending the equilibrium solution to a continuum of individuals. Note that it is here that the fact that individuals' social utilities are still defined when the number of individuals in the groups becomes very large is important. This allows the government to extend the game to an arbitrarily large number and hence a continuum of individuals the problem stated in Section 1.3.

Thus, for each $\boldsymbol{\theta}$ and for all $\tau \in [0, 1)$, the government solves

$$\int_{\omega_M^\theta(x)}^{\overline{\omega}^\theta} \left((1-\tau) y(\omega, \tau) + R(\tau) - k\left(\frac{y(\omega,\tau)}{\omega}\right) - u'^{-1}(\alpha u'(x)) \right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega$$

$$= \int_{\underline{\omega}^\theta}^{\omega_m^\theta(x)} \left(x - \left((1-\tau) y(\omega) + R(\tau) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega$$

Note here that by the nature of the problem of the social planner, Q_m^θ and Q_M^θ will depend on $\boldsymbol{\theta}$ and will not be group-specific as such (they cannot depend on the realizations that happen in two groups C_1 and C_2 that have the same $\boldsymbol{\theta}$).

$\omega_M^\theta(x)$ and $\omega_m^\theta(x)$ are defined as follows

$$(1-\tau) y(\omega_M^\theta(x), \tau) + R(\tau) - k\left(\frac{y(\omega_M^\theta(x), \tau)}{\omega_M^\theta(x)}\right) = u'^{-1}(\alpha u'(x))$$

$$(1-\tau) y(\omega_m^\theta(x), \tau) + R(\tau) - k\left(\frac{y(\omega_m^\theta(x), \tau)}{\omega_m^\theta(x)}\right) = x$$

From the implicit function theorem, $x \mapsto \omega_M^\theta(x)$ and $x \mapsto \omega_m^\theta(x)$ are differentiable.

Let $\Gamma(x) = \Gamma_1(x) + \Gamma_2(x)$ where

$$\Gamma_1(x) := \int_{\omega_M^\theta(x)}^{\overline{\omega}^\theta} \left((1-\tau) y(\omega, \tau) + R(\tau) - k\left(\frac{y(\omega,\tau)}{\omega}\right) - u'^{-1}(\alpha u'(x)) \right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega$$

and $\Gamma_2(x) := \displaystyle\int_{\underline{\omega}^\theta}^{\omega_m^\theta(x)} \left(x - \left((1-\tau) y(\omega, \tau) + R(\tau) - k\left(\frac{y(\omega,\tau)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega.$

Then, Γ_1 and Γ_2 are continuous and Γ_1 is decreasing and Γ_2 is increasing.

Wlog, let us show this for Γ_1.

First, because ω_M and u are differentiable in x, so is Γ_1.

Then, by definition of $\omega_M^\theta(x)$, $\Gamma_1'(x) = -\int_{\omega_M^\theta(x)}^{\overline{\omega}^\theta} \alpha u''(x) u'^{-1\prime}(\alpha u'(x))\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega < 0$.

Hence Γ has a unique root $Q_m(\tau)$, and in the same way as shown in the proof for Proposition 1, it is between $y^*(\underline{\omega},\tau)(1-\tau) - k\left(\frac{y^*(\underline{\omega},\tau)}{\omega}\right)$ and $y^*(\overline{\omega},\tau)(1-\tau) - k\left(\frac{y^*(\overline{\omega},\tau)}{\omega}\right)$.

From the implicit function theorem, $\tau \mapsto Q_m(\tau)$ is differentiable.

Finally, we have that transfers made equal transfers received, so

$$\int_{\omega_M^\theta(\tau)}^{\overline{\omega}^\theta} \left((1-\tau)y(\omega,\tau) + R(\tau) - k\left(\frac{y(\omega,\tau)}{\omega}\right) - Q_M^\theta(\tau)\right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega$$

$$= \int_{\underline{\omega}^\theta}^{\omega_m^\theta(\tau)} \left(Q_m^\theta(\tau) - \left((1-\tau)y(\omega) + R(\tau) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega,$$

where again, $\omega_M^\theta(\tau)$ and $\omega_m^\theta(\tau)$ are defined as follows

$$(1-\tau)y(\omega_M^\theta(\tau),\tau) + R(\tau) - k\left(\frac{y(\omega_M^\theta(\tau),\tau)}{\omega_M^\theta(\tau)}\right) = u'^{-1}(\alpha u'(Q_m(\tau)))$$

$$(1-\tau)y(\omega_m^\theta(\tau),\tau) + R(\tau) - k\left(\frac{y(\omega_m^\theta(\tau),\tau)}{\omega_m^\theta(\tau)}\right) = Q_m(\tau).$$

So that, using the definition of $\omega_M^\theta(\tau)$ and $\omega_m^\theta(\tau)$ and the first order condition defining individuals' incomes,[44]

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} H(\omega_m^\theta(\tau)|\boldsymbol{\theta}) + \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau}\left(1 - H(\omega_M^\theta(\tau)|\boldsymbol{\theta})\right)$$
$$= -\left(\int_{\underline{\omega}^\theta}^{\omega_m^\theta(\tau)} y(\omega,\tau)h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega + \int_{\omega_M^\theta(\tau)}^{\overline{\omega}^\theta} y(\omega,\tau)h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega\right) + \frac{\partial R}{\partial \tau}\left(H(\omega_m^\theta(\tau)|\boldsymbol{\theta}) + 1 - H(\omega_M^\theta(\tau)|\boldsymbol{\theta})\right)$$

Optimal linear income tax rate.

Let us now derive the formula for the optimal linear income tax rate.

The first order condition to the problem of the Social Planner is the following:

$$\frac{\mathrm{d}SWF}{\mathrm{d}\tau} = 0.$$

[44] For all i, income y_i is such that: $1 - \tau = \frac{1}{\omega_i} k\left(\frac{y_i}{\omega_i}\right)$

Hence, using the envelope theorem, this implies that

$$\int_{\boldsymbol{\theta}} \int_{\omega} z(\omega, \boldsymbol{\theta}) \left(-y(\omega, \tau) - \frac{\mathrm{d}t}{\mathrm{d}\tau}(\omega, \boldsymbol{\theta}, \tau, R) + \frac{\partial R}{\partial \tau} \right) \Phi'(u) u' \, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta}) \, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} = 0.$$

Plugging in the following into the above

$$\frac{\partial R}{\partial \tau} = \tau \frac{\mathrm{d}\mathcal{Y}}{\mathrm{d}\tau} + \mathcal{Y} = -\frac{\tau}{1-\tau} e\mathcal{Y} + \mathcal{Y},$$

yields the optimal linear tax rate formula.

Proof of Lemma 1. Start from any linear tax (τ, R) such that private utilities are equal to

$$u\left((1-\tau) y(\omega, \tau) - t(\omega, \theta, \tau, R) + R - k\left(\frac{y(\omega, \tau)}{\omega} \right) \right)$$

Then, the final net consumption of donors $Q_M^\theta(\tau, R)$, the final net consumption of receivers $Q_m^\theta(\tau, R)$ and the skill levels of the last donor $\omega_M^\theta(\tau, R)$ or the last receiver $\omega_m^\theta(\tau, R)$ are the solutions of the following four equations:

(3) $u'(Q_M) = \alpha u'(Q_m)$

(4) $(1-\tau) y(\omega_M) + R - k\left(\frac{y(\omega_M)}{\omega_M} \right) = Q_M$

(5) $(1-\tau) y(\omega_m) + R - k\left(\frac{y(\omega_m)}{\omega_m} \right) = Q_m$

(6) $$\int_{\omega_M}^{\overline{\omega}^\theta} \left((1-\tau) y(\omega, \tau) + R - k\left(\frac{y(\omega, \tau)}{\omega} \right) - Q_M \right) h(\omega|\boldsymbol{\theta}) \, \mathrm{d}\omega$$

$$= \int_{\underline{\omega}^\theta}^{\omega_m} \left(Q_m - \left((1-\tau) y(\omega, \tau) + R - k\left(\frac{y(\omega, \tau)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}) \, \mathrm{d}\omega$$

First, let us show that if the utility function exhibits constant absolute risk aversion then

$$\frac{\alpha u''(Q_m)}{u''(Q_M)} = 1 \qquad (7a)$$

Indeed, then have that $\frac{u''(Q_M)}{u'(Q_M)} = \frac{u''(Q_m)}{u'(Q_m)}$.

So, using (3), we have that $\frac{\alpha u''(Q_m)}{u''(Q_M)} = \frac{\alpha u'(Q_m)}{u'(Q_M)} = 1$.

Now, if it exhibits decreasing absolute risk aversion then

$$\frac{\alpha u''(Q_m)}{u''(Q_M)} \geq 1 \qquad (7d)$$

Indeed, we know that: $Q_M > Q_m$, so $\frac{u''(Q_M)}{u'(Q_M)} > \frac{u''(Q_m)}{u'(Q_m)}$.

So, using (3), we have that $\frac{\alpha u''(Q_m)}{u''(Q_M)} > \frac{\alpha u'(Q_m)}{u'(Q_M)} = 1$.

And finally, in the same way, if it exhibits increasing absolute risk aversion, then

$$\frac{\alpha u''(Q_m)}{u''(Q_M)} \geq 1 \qquad (7i)$$

Let us study the variations of $Q_M^\theta(\tau, R)$, $Q_m^\theta(\tau, R)$, $\omega_M^\theta(\tau, R)$ and $\omega_m^\theta(\tau, R)$ with respect to R.

For ease of exposition, since we remain in the same group for the whole proof, we drop the θ superscript.

First, from (3), we have that

$$\frac{\partial Q_M}{\partial R} u''(Q_M) = \alpha \frac{\partial Q_m}{\partial R} u''(Q_m) \qquad (8)$$

Then, differentiating (6) with respect to R using Leibniz's rule, we have that

$$\frac{\partial Q_m}{\partial R} F(y_m) + \frac{\partial Q_M}{\partial R}(1 - F(y_M)) = F(y_m) + 1 - F(y_M) \qquad (9)$$

Now (8) tells us that $\frac{\partial Q_M}{\partial R}$ and $\frac{\partial Q_m}{\partial R}$ both have the same sign. And from (9) that they are both positive: indeed, the whole society gets richer, and so do the final consumption levels of donors and receivers.

Now, plugging in (8) into (9), we get that:

$$\frac{\partial Q_m}{\partial R} = \frac{F(y_m) + 1 - F(y_M)}{F(y_m) + \frac{\alpha u''(Q_m)}{u''(Q_M)}(1 - F(y_M))}$$

and

$$\frac{\partial Q_M}{\partial R} = \frac{F(y_m) + 1 - F(y_M)}{\frac{u''(Q_M)}{\alpha u''(Q_m)} F(y_m) + (1 - F(y_M))}.$$

Finally, differentiating (4) and (5) with respect to R, we have that

$$1 + \frac{y(\omega_M)}{\omega_M^2} \frac{\partial \omega_M}{\partial R} k'\left(\frac{y(\omega_M)}{\omega_M}\right) = \frac{\partial Q_M}{\partial R}$$

and

$$1 + \frac{y(\omega_m)}{\omega_m^2} \frac{\partial \omega_m}{\partial R} k'\left(\frac{y(\omega_m)}{\omega_m}\right) = \frac{\partial Q_m}{\partial R}$$

And since transfers received are equal to $t^B(\omega) = Q_m - \left((1-\tau)y(\omega,\tau) + R - k\left(\frac{y(\omega,\tau)}{\omega}\right)\right)$ and transfers made are equal to $t^D(\omega) = -Q_M + \left((1-\tau)y(\omega,\tau) + R - k\left(\frac{y(\omega,\tau)}{\omega}\right)\right)$, we have that

$$\frac{\partial t^B}{\partial R} = \frac{\partial Q_m}{\partial R} - 1$$

and

$$\frac{\partial t^D}{\partial R} = -\frac{\partial Q_M}{\partial R} + 1.$$

Let us first note that the derivative of transfers with respect to the lump sum R does not depend on the identity of individuals (both derivatives are independent of ω), and:

(i) If the utility function exhibits constant absolute risk aversion, then $\frac{\partial Q_m}{\partial R} = \frac{\partial Q_M}{\partial R} = 1$ and $\frac{\partial \omega_m}{\partial R} = \frac{\partial \omega_M}{\partial R} = 0$. The proportions of beneficiaries and of donors stay constant, and transfers stay the same.

(ii) If the utility function exhibits decreasing absolute risk aversion, then $\frac{\partial Q_m}{\partial R} \leq 1$, $\frac{\partial Q_M}{\partial R} \geq 1$, $\frac{\partial \omega_m}{\partial R} \leq 0$ and $\frac{\partial \omega_M}{\partial R} \geq 0$: both the proportions of beneficiaries and donors decrease. Transfers are crowded out by an increase in the lump-sum transfer made by the government on all individuals.

(iii) If the utility function exhibits decreasing absolute risk aversion, then $\frac{\partial Q_m}{\partial R} \geq 1$, $\frac{\partial Q_M}{\partial R} \leq 1$, $\frac{\partial \omega_m}{\partial R} \geq 0$ and $\frac{\partial \omega_M}{\partial R} \leq 0$: both the proportions of beneficiaries and donors increase. Transfers are crowded in by an increase in the lump-sum transfer made by the government on all individuals.

Proof of Lemma 2. Start again from any linear tax (τ, R) such that private utilities are equal to

$$u\left((1-\tau)y(\omega,\tau) - t(\omega,\theta,\tau,R) + R - k\left(\frac{y(\omega,\tau)}{\omega}\right)\right)$$

Suppose that both the proportions of beneficiaries and of donors increase. Then

$$\frac{\partial \omega_M}{\partial \tau} < 0 \qquad \text{and} \qquad \frac{\partial \omega_M}{\partial \tau} > 0.$$

Differentiating (3), (4) and (5) with respect to τ we get:

$$\frac{\partial Q_M}{\partial \tau} u''(Q_M) = \alpha \frac{\partial Q_m}{\partial \tau} u''(Q_m) \qquad (10)$$

$$-y(\omega_M) + \frac{y(\omega_M)}{\omega_M^2}\frac{\partial \omega_M}{\partial \tau} k'\left(\frac{y(\omega_M)}{\omega_M}\right) = \frac{\partial Q_M}{\partial \tau} \qquad (11)$$

and

$$-y(\omega_m) + \frac{y(\omega_m)}{\omega_m^2}\frac{\partial \omega_m}{\partial \tau} k'\left(\frac{y(\omega_m)}{\omega_m}\right) = \frac{\partial Q_m}{\partial \tau} \qquad (12)$$

Plugging both (11) and (12) into (10), we get:

$$\left(-y(\omega_M) + \frac{y(\omega_M)}{\omega_M^2}\frac{\partial \omega_M}{\partial \tau} k'\left(\frac{y(\omega_M)}{\omega_M}\right)\right) u''(Q_M) = \alpha u''(Q_m)\left(-y(\omega_m) + \frac{y(\omega_m)}{\omega_m^2}\frac{\partial \omega_m}{\partial \tau} k'\left(\frac{y(\omega_m)}{\omega_m}\right)\right) \qquad (13)$$

So that,

$$-y(\omega_M)u''(Q_M) + \alpha y(\omega_m)u''(Q_m) = -\frac{y(\omega_M)}{\omega_M^2}\frac{\partial \omega_M}{\partial \tau} k'\left(\frac{y(\omega_M)}{\omega_M}\right) u''(Q_M) + \alpha u''(Q_m)\frac{y(\omega_m)}{\omega_m^2}\frac{\partial \omega_m}{\partial \tau} k'\left(\frac{y(\omega_m)}{\omega_m}\right)$$

And since we suppose that $\frac{\partial \omega_M}{\partial \tau} < 0$ and $\frac{\partial \omega_M}{\partial \tau} > 0$, we have that

$$-y(\omega_M)u''(Q_M) + \alpha y(\omega_m)u''(Q_m) < 0.$$

Hence,

$$\frac{\alpha u''(Q_m)}{u''(Q_M)} > \frac{y(\omega_M)}{y(\omega_m)}.$$

Now, we have that:

$$Q_m y(\omega_M) \geq Q_M y(\omega_m)$$

So using that $u'(Q_M) = \alpha u'(Q_m)$, we have

$$u'(Q_M)Q_m y(\omega_M) \geq \alpha u'(Q_m)Q_M y(\omega_m)$$

Hence: $\dfrac{\alpha y(\omega_m)}{y(\omega_M)} \leq \dfrac{u'(Q_M)/Q_M}{u'(Q_m)/Q_m}$.

Now, since u exhibits constant or increasing relative risk aversion, $x \mapsto \frac{xu''(x)}{u'(x)}$ is non-increasing.

So $\dfrac{Q_M u''(Q_M)}{u'(Q_M)} \leq \dfrac{Q_m u''(Q_m)}{u'(Q_m)}$.

Hence, $\dfrac{u'(Q_M)/Q_M}{u'(Q_m)/Q_m} \leq \dfrac{u''(Q_M)}{u''(Q_m)}$.

So, $\dfrac{\alpha y(\omega_m)}{y(\omega_M)} \leq \dfrac{u''(Q_M)}{u''(Q_m)}$, and $\dfrac{\alpha u''(Q_m)}{u''(Q_M)} \leq \dfrac{y(\omega_M)}{y(\omega_m)}$, which is a contradiction.

(In the same way, if $u''' < 0$, then $u''(Q_M) < u''(Q_m)$ so $\dfrac{\alpha u''(Q_m)}{u''(Q_M)} < 1 < \dfrac{y(\omega_M)}{y(\omega_m)}$).

So we must have that

$$\frac{\partial \omega_M}{\partial \tau} \geq 0 \qquad \text{or/and} \qquad \frac{\partial \omega_M}{\partial \tau} \leq 0.$$

So, using (11) and (12), we must have that

$$\frac{\partial Q_M}{\partial \tau} + y(\omega_M) \geq 0 \qquad \text{or/and} \qquad \frac{\partial Q_m}{\partial \tau} + y(\omega_m) \leq 0.$$

And so

$$\forall \omega \leq \omega_m, \quad \frac{\partial t^B}{\partial \tau}(\omega) = \frac{\partial Q_m}{\partial \tau} + y(\omega) \leq \frac{\partial Q_m}{\partial \tau} + y(\omega_m) \leq 0,$$

or/and

$$\forall \omega \geq \omega_M, \quad \frac{\partial t^D}{\partial \tau}(\omega) = -\frac{\partial Q_M}{\partial \tau} - y(\omega) \leq -\frac{\partial Q_M}{\partial \tau} - y(\omega_M) \leq 0.$$

So suppose that $\dfrac{\partial t^B}{\partial \tau}(\omega) \leq 0$ for all $\omega \leq \omega_m$, then $\displaystyle\int_{\underline{\omega}}^{\omega_m} \frac{\partial t^B}{\partial \tau}(\omega)\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \leq 0$, so $\displaystyle\int_{\omega_M}^{\overline{\omega}} \frac{\partial t^D}{\partial \tau}(\omega)\, h(\omega|\boldsymbol{\theta})\, \mathrm{d}\omega \leq 0$, and we have the same if $\dfrac{\partial t^D}{\partial \tau}(\omega) \leq 0$ for all $\omega \geq \omega_M$.

Hence, total transfers made and received are crowded-out by an increase in the marginal tax rate.

Sign of the derivative of transfers. We know that the effect of an increase in the tax rate on transfers is:

$$\frac{\mathrm{d}t^B}{\mathrm{d}\tau} = \frac{\partial t^B}{\partial \tau} + \frac{\partial R}{\partial \tau}\frac{\partial t^B}{\partial R} \quad \text{and} \quad \frac{\mathrm{d}t^D}{\mathrm{d}\tau} = \frac{\partial t^D}{\partial \tau} + \frac{\partial R}{\partial \tau}\frac{\partial t^D}{\partial R}$$

We are thus interested in the sign of $\dfrac{\partial R}{\partial \tau}$ at the optimum and show that at the optimum, $\dfrac{\partial R}{\partial \tau} > 0$.

Sign of $\dfrac{\partial R}{\partial \tau}$.

Let us first show that at the optimum, $\dfrac{\partial R}{\partial \tau} > 0$.

Suppose that at the optimum $\dfrac{\partial R}{\partial \tau} \leq 0$.

In that case, in groups where there are no transfers, individuals' utilities are of the form

$$u\left((1-\tau)y + R - k\left(\frac{y}{\omega}\right)\right).$$

Now, using the individuals' first order condition determining their labor supply, we have that at the optimum

$$\left(-y + \frac{\partial R}{\partial \tau}\right) u'\left((1-\tau)y + R - k\left(\frac{y}{\omega}\right)\right) < 0.$$

So that the government could decrease τ by an infinitesimal amount and increase individuals' utility levels.

In that case, in groups of characteristic $\boldsymbol{\theta}$ where according to the government transfers take place, using (4) we have that $\dfrac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau}$, $\dfrac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau} < 0$. Indeed, since $Q_m^\theta = u'^{-1}(\alpha u'(Q_M^\theta))$, both derivatives have the same sign. Then, donors have utility $u(Q_M^\theta)$, beneficiaries have utility $u(Q_m^\theta)$, and

$$\frac{\mathrm{d}Q_m^\theta}{\mathrm{d}\tau} u'(Q_m^\theta) < 0 \quad \text{and} \quad \frac{\mathrm{d}Q_M^\theta}{\mathrm{d}\tau} u'(Q_M^\theta) < 0.$$

The government could thus decrease τ by an infinitesimal amount and increase both donors' and beneficiaries' utility levels. Neutral individuals have utility $u\left((1-\tau)y + R - k\left(\frac{y}{\omega}\right)\right)$. With the same argument as above, the government could decrease τ by an infinitesimal amount and increase neutral individuals' utility levels.

Hence, it cannot be that at the optimum $\dfrac{\partial R}{\partial \tau} \leq 0$. □

Proof of Example 1 (Linear income tax.) Using the functional specifications defined above, our first order conditions defining the labor supply individuals choose imply that $y_H = (1-\tau)^\epsilon \omega_H^{1+\epsilon}$ and $y_L = (1-\tau)^\epsilon \omega_L^{1+\epsilon}$.

For ease of exposure, suppose that $B = 0$. In this case the tax is a purely redistributive one.

Then, $R(\tau) = \tau(1-\tau)^\epsilon \displaystyle\int_0^1 \left(\pi\omega_H^{1+\epsilon} + (1-\pi)\omega_L^{1+\epsilon}\right) f(\pi)\,\mathrm{d}\pi$,

which may also be rewritten $R(\tau) = \tau(1-\tau)^\epsilon(\mu_\pi \omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})$, where $\mu_\pi := \mathbb{E}(\pi)$.

Then, following a similar reasoning to that in the *laissez-faire* case, a Nash equilibrium with transfers takes place if and only if:

$$\tau < \frac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}}{(\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}) + (1-\alpha^{1/\eta})(1+\epsilon)(\mu_\pi\omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})}.$$

Let us note also that since $\tau \in [0,1]$ this is only possible if we have the same condition as under the *laissez-faire*; that is, $\alpha^{1/\eta} > \left(\dfrac{\omega_L}{\omega_H}\right)^{1+\epsilon}$. This remains a necessary condition.

Let us denote $\overline{\tau} = \dfrac{\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}}{(\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}) + (1-\alpha^{1/\eta})(1+\epsilon)(\mu_\pi\omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})}$.

Then we will have an equilibrium with transfers if $\tau^* < \overline{\tau}$, and a no-transfer equilibrium if $\tau^* \geq \overline{\tau}$.

Let us now show that at the optimum, $\dfrac{\partial R}{\partial \tau}(\tau^*) \geq 0$.

Suppose that $\tau^* \geq \overline{\tau}$.
Then, there are no transfers taking place, and

$$u\left((1-\tau)y_H + R(\tau) - k(\frac{y_H}{\omega_H}\right) = u\left(\frac{\omega_H^{1+\epsilon}}{1+\epsilon}(1-\tau)^{1+\epsilon} + R(\tau)\right)$$

and

$$u\left((1-\tau)y_L + R(\tau) - k(\frac{y_L}{\omega_L}\right) = u\left(\frac{\omega_L^{1+\epsilon}}{1+\epsilon}(1-\tau)^{1+\epsilon} + R(\tau)\right)$$

Then, $\dfrac{\partial R}{\partial \tau}(\tau^*) < 0$, since u is increasing and $\tau \mapsto (1-\tau)^{1+\epsilon}$ is decreasing in τ, the government could reduce the tax rate by a small increment, increase all individuals' utility levels as well as revenue – a contradiction.

Suppose now that there are transfers taking place, i.e., $\tau^* < \overline{\tau}$.
Then, transfers are defined by the following equation:

$$((1-\tau)y_H - t + R(\tau) - k\left(\frac{y_H}{\omega_H}\right))^{-\eta} \geq \alpha\left((1-\tau)y_L + \frac{\pi}{1-\pi}t + R(\tau) - k\left(\frac{y_L}{\omega_L}\right)\right)^{-\eta},$$

so that: $t = \dfrac{\frac{(1-\tau)^{1+\epsilon}}{1+\epsilon}(\alpha^{1/\eta}\omega_H^{1+\epsilon} - \omega_L^{1+\epsilon}) - R(\tau)(1-\alpha^{1/\eta})}{\alpha^{1/\eta} + \frac{\pi}{1-\pi}}$

And

$$u\left((1-\tau)y_H + R(\tau) - t - k\left(\frac{y_H}{\omega_H}\right)\right) = u\left(\frac{\frac{(1-\tau)^{1+\epsilon}}{1+\epsilon}(\pi\omega_H^{1+\epsilon} + (1-\pi)\omega_L^{1+\epsilon}) + R(\tau)}{\alpha^{1/\eta}(1-\pi) + \pi}\right)$$

and

$$u\left((1-\tau)y_L + R(\tau) + \frac{\pi}{1-\pi}t - k\left(\frac{y_L}{\omega_L}\right)\right) = u\left(\alpha^{1/\eta}\frac{\frac{(1-\tau)^{1+\epsilon}}{1+\epsilon}(\pi\omega_H^{1+\epsilon} + (1-\pi)\omega_L^{1+\epsilon}) + R(\tau)}{\alpha^{1/\eta}(1-\pi) + \pi}\right)$$

Then, with exactly the same arguments as above, it cannot be that at the optimum, $\dfrac{\mathrm{d}R}{\mathrm{d}\tau}(\tau^*) < 0$.

So at the optimum, $\dfrac{\mathrm{d}R}{\mathrm{d}\tau}(\tau^*) \geq 0$.

Hence, since $R(\tau) = \tau(1-\tau)^\epsilon(\mu_\pi\omega_H^{1+\epsilon} + (1-\mu_\pi)\omega_L^{1+\epsilon})$, this is equivalent to

$$\tau^* \leq \frac{1}{1+\epsilon}$$

This enables us, also, to know the sign of $\dfrac{\mathrm{d}t}{\mathrm{d}\tau}(\pi,\tau)$ at the optimum. Indeed, since at the optimum $\dfrac{\mathrm{d}R}{\mathrm{d}\tau}(\tau^*) \geq 0$, $\dfrac{\mathrm{d}t}{\mathrm{d}\tau}(\pi,\tau^*) < 0$.

Proof of Proposition 3. For ease of exposure we write the Lagrangian for the Social Planner's problem with no Pareto weights:[45]

$$\mathcal{L} = \int_{\boldsymbol{\theta}} \int_{\omega} \Phi\left(u\left(y - T(y) - t - k\left(\frac{y}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} + \lambda \int_{\omega} T(y(\omega))\, f(\omega)\, \mathrm{d}\omega.$$

Now introduce a small tax perturbation around y_0: the perturbed tax schedule is of the form:

$$T_\tau(y) = \begin{cases} T(y) & \text{if} \quad y \leq y_0 \\ T(y) + \tau(y - y_0) & \text{if} \quad y_0 \leq y \leq y_0 + dy_0 \\ T(y) + \tau dy_0 & \text{if} \quad y \geq y_0 + dy_0 \end{cases}$$

Let ω_0 be the productivity level corresponding to earning level y_0 under the tax schedule $T(.)$. Then, under the perturbed tax schedule, since there are no income effects, individuals with productivity ω_0 still earn y_0. Define $\omega_0 + d\omega_0$ the productivity level such that $y(\omega_0 + d\omega_0) = y_0 + dy_0$ under the perturbed tax schedule.

Then, $\mathcal{L}$ depends on τ and on λ. Let us rewrite it as follows: $\mathcal{L}(\tau, \lambda) = \mathcal{L}^A(\tau, \lambda) + \mathcal{L}^B(\tau, \lambda) + \mathcal{L}^C(\tau, \lambda)$, with:

$$\mathcal{L}^A = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 > \overline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega, \theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega))\right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

$$\mathcal{L}^B = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega, \theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega))\right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

$$\mathcal{L}^C = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 < \underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega, \theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega))\right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

Now we immediately have that $\dfrac{\partial \mathcal{L}^A}{\partial \tau} = 0$.

$\dfrac{\partial \mathcal{L}^C}{\partial \tau}$ will bring out the mechanical, as well as the direct and indirect welfare effects. As there are no income effects, there will be no behavioral term.

More specifically:[46]

$$\frac{\partial \mathcal{L}^C}{\partial \tau} = -\int_{\boldsymbol{\theta}\ s.t.\ \omega_0 < \underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \left(\frac{\mathrm{d}t}{\mathrm{d}\tau} + dy_0\right) \Phi'(v) \times u' \times h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} + \lambda \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 < \underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} dy_0\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

Finally, let us again separate $\mathcal{L}^B$ into three parts: $\mathcal{L}^B = \mathcal{L}^B_1 + \mathcal{L}^B_2 + \mathcal{L}^B_3$, where:

$$\mathcal{L}^B_1 = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\omega_0} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega, \theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega))\right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

$$\mathcal{L}^B_2 = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0}^{\omega_0 + d\omega_0} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega, \theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega))\right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

[45] This is straightforwardly with no loss of generality.

[46] For ease of notation we omit, when convenient, the dependence of y on ω and that of t on (ω, θ), and may also refer to u and $\Phi'(v)$ without any further specification.

$$\mathcal{L}_3^B = \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0 + d\omega_0}^{\overline{\omega}^\theta} \left[\Phi\left(u\left(y(\omega) - T_\tau(y(\omega)) - t(\omega,\theta) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) + \lambda T_\tau(y(\omega)) \right] h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$$

The agents in the first term only undergo the indirect welfare effect: their taxes are not raised so the government gathers no extra tax revenue on them, nor does it hurt them on a direct welfare point of view. Thus: $\dfrac{\partial \mathcal{L}_1^B}{\partial \tau} = -\displaystyle\int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\omega_0} \frac{\mathrm{d}t}{\mathrm{d}\tau} \times \Phi'(v) \times u' \times h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}.$

The agents in the third term will be similar to agents in term C:

$$\begin{aligned}\frac{\partial \mathcal{L}_3^B}{\partial \tau} = -\int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0 + d\omega_0}^{\overline{\omega}^\theta} \left(\frac{\mathrm{d}t}{\mathrm{d}\tau} + dy_0\right) \Phi'(v) \times u' \times h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} \\ + \lambda \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0 + d\omega_0}^{\overline{\omega}^\theta} dy_0\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta}\end{aligned}$$

Finally the term comprising the agents directly affected by the marginal tax increase will generate all four effects:

$$\begin{aligned}\frac{\partial \mathcal{L}_2^B}{\partial \tau} = -\int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0}^{\omega_0 + d\omega_0} \left(\frac{\mathrm{d}t}{\mathrm{d}\tau} + dy_0\right) \Phi'(v) \times u' \times h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} \\ + \lambda \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0}^{\omega_0 + d\omega_0} dy_0\, h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} \\ - \lambda \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\omega_0}^{\omega_0 + d\omega_0} \xi^c(\omega) \times y(\omega) \times \frac{T'(y(\omega))}{1 - T'(y(\omega))} h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta},\end{aligned}$$

which will tend to $-\lambda\, d\omega_0 \times e(y_0) \times y_0 \times \dfrac{T'(y_0)}{1 - T'(y_0)} \times f(\omega_0)$ for small τ and small dy_0 (and thus, small $d\omega_0$).

Let $f^*(y)$ be the density at y under a linearized $T(.)$ (as defined in Saez (2001)).

By definition of $f^*(y)$, $f^*(y_0)dy_0 = f(\omega_0)d\omega_0$, so that setting $\dfrac{\partial \mathcal{L}^A}{\partial \tau} + \dfrac{\partial \mathcal{L}^B}{\partial \tau} + \dfrac{\partial \mathcal{L}^C}{\partial \tau} = 0$, then yields the necessary condition on the marginal tax rate for the tax schedule to be optimal at y_0:

$$\frac{T'(y_0)}{1 - T'(y_0)} = \frac{1}{e(y_0)} \times \frac{1}{y_0\, f^*(y_0)} \times \left(\int_{y_0}^{\overline{y}} (1 - \phi(y)) f_y(y)\, \mathrm{d}y \ + \ IW_0 \right)$$

where $IW_0 = -\displaystyle\int_{\boldsymbol{\theta}\ s.t.\ \omega_0 < \underline{\omega}^\theta} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \frac{\mathrm{d}t}{\mathrm{d}\tau} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta} - \int_{\boldsymbol{\theta}\ s.t.\ \omega_0 \in [\underline{\omega}^\theta, \overline{\omega}^\theta]} \int_{\underline{\omega}^\theta}^{\overline{\omega}^\theta} \frac{\mathrm{d}t}{\mathrm{d}\tau} \phi(\omega,\theta) h(\omega|\boldsymbol{\theta}) g(\boldsymbol{\theta})\, \mathrm{d}\omega \mathrm{d}\boldsymbol{\theta},$

Sign of $\delta_0 Q_m - 1$ and $\delta_0 Q_M - 1$. Suppose utilities are CRRA.

u is then of the form: $u(x) = \dfrac{x^{1-\eta}}{1-\eta}$, so that $u'(Q_M) = \alpha u'(Q_m)$ implies $Q_M^{-\eta} = \alpha Q_m^{-\eta}$, i.e., $Q_m = \alpha^{\frac{1}{\eta}} Q_M$.

Then, $\dfrac{\alpha u''(Q_m)}{u''(Q_M)} = \alpha^{-\eta} > 1$.

$\omega_0 < \underline{\omega}^\theta$. From Appendix B, we know that if $\omega_0 < \underline{\omega}^\theta$ then $\delta_0 Q_m = \dfrac{F(\omega_m^\theta) + 1 - F(\omega_M^\theta)}{F(\omega_m^\theta) + \frac{\alpha u''(Q_m^\theta)}{u''(Q_M^\theta)}(1 - F(\omega_M^\theta))}$.

So since $\dfrac{\alpha u''(Q_m)}{u''(Q_M)} = \alpha^{-\eta} > 1$, $\delta_0 Q_m < 1$.

On the other hand, $\delta_0 Q_M = \dfrac{F(\omega_m^\theta) + 1 - F(\omega_M^\theta)}{F(\omega_m^\theta)\frac{u''(Q_M^\theta)}{\alpha u''(Q_m^\theta)} + 1 - F(\omega_M^\theta)}$.

And since $\dfrac{u''(Q_M)}{\alpha u''(Q_m)} = \alpha^{\eta} < 1$, $\delta_0 Q_M > 1$.

$\omega_0 \in [\underline{\omega}^\theta, \omega_m^\theta)$. Then $\delta_0 Q_m = \dfrac{F(\omega_m^\theta) - F(\omega_0) + 1 - F(\omega_M^\theta)}{F(\omega_m^\theta) + \frac{\alpha u''(Q_m^\theta)}{u''(Q_M^\theta)}(1 - F(\omega_M^\theta))}$, so that here also $\delta_0 Q_m < 1$.

The sign of $\delta_0 Q_M - 1$ is undetermined.

$\omega_0 \in (\omega_m^\theta, \omega_M^\theta)$. Then $\delta_0 Q_m = \dfrac{1 - F(\omega_M^\theta)}{F(\omega_m^\theta) + \frac{\alpha u''(Q_m^\theta)}{u''(Q_M^\theta)}(1 - F(\omega_M^\theta))}$, so that again $\delta_0 Q_m < 1$.

Here, we also have that $\delta_0 Q_M < 1$, since $\delta_0 Q_M = \dfrac{1 - F(\omega_M^\theta)}{F(\omega_m^\theta)\frac{u''(Q_M^\theta)}{\alpha u''(Q_m^\theta)} + 1 - F(\omega_M^\theta)}$.

$\omega_0 \in (\omega_m^\theta, \overline{\omega}^\theta]$. Then $\delta_0 Q_m = \dfrac{1 - F(\omega_0)}{F(\omega_m^\theta) + \frac{\alpha u''(Q_m^\theta)}{u''(Q_M^\theta)}(1 - F(\omega_M^\theta))}$ and $\delta_0 Q_M = \dfrac{1 - F(\omega_0)}{F(\omega_m^\theta)\frac{u''(Q_M^\theta)}{\alpha u''(Q_m^\theta)} + 1 - F(\omega_M^\theta)}$.

So that once again $\delta_0 Q_m < 1$ and $\delta_0 Q_M < 1$.

Note that in the two last cases, $\delta_0 Q_M < 1$ does not depend on the form of u. It holds for all functions u that are increasing and concave.

Proof of Proposition 4. Start with the following perturbation.

$$T_\tau(y) = \begin{cases} T(y) & \text{if} \quad y \le y_0 \\ T(y) + \tau(y - y_0) & \text{if} \quad y_0 \le y \le y_0 + dy_0 \\ T(y) + \tau dy_0 & \text{if} \quad y \ge y_0 + dy_0 \end{cases}$$

First take y_0 to be between $\underline{y}_2$ and $\overline{y}_2$, the incomes of individuals in group C_2 under T.

Then,

$$\begin{aligned}
\mathcal{L} = &\int_{\underline{\omega}^1}^{\overline{\omega}^1} \Phi\Bigg(v\Bigg(y(\omega,\tau^K) - T(y(\omega,\tau^K)) - \tau dy_0 - t^K\Big(y(\omega,\tau^K) - T(y(\omega,\tau^K)) - \tau dy_0\Big) \\
&-t(\omega,\boldsymbol{\theta}_1,\tau^K,y^K) - k\left(\frac{y(\omega,\tau^K)}{\omega}\right)\Bigg)\Bigg) h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega \\
&+\int_{\underline{\omega}^2}^{\omega_0} \Phi\left(v\left(y(\omega) - T(y(\omega)) + L^K - t(\omega,\boldsymbol{\theta}_2,L^K) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega \\
&+\int_{\omega_0}^{\omega_0+d\omega_0} \Phi\left(v\left(y(\omega) - T(y(\omega)) + L^K - \tau(y(\omega) - y_0) - t(\omega,\boldsymbol{\theta}_2,L^K) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega \\
&+\int_{\omega_0+d\omega_0}^{\overline{\omega}^2} \Phi\left(v\left(y(\omega) - T(y(\omega)) + L^K - \tau dy_0 - t(\omega,\boldsymbol{\theta}_2,L^K) - k\left(\frac{y(\omega)}{\omega}\right)\right)\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega \\
&+\lambda\int_{\underline{\omega}^1}^{\overline{\omega}^1} \left(T(y(\omega,\tau^K)) + \tau dy_0\right) h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega + \lambda\int_{\underline{\omega}^2}^{\omega_0} T(y(\omega))\, h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega \\
&+\lambda\int_{\omega_0}^{\omega_0+d\omega_0} \left(T(y(\omega)) + \tau(y - y_0)\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega + \lambda\int_{\omega_0+d\omega_0}^{\overline{\omega}^2} \left(T(y(\omega)) + \tau dy_0\right) h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega.
\end{aligned}$$

With $L^K = \int_{\underline{\omega}^1}^{\overline{\omega}^1} t^K \Big(y(\omega, \tau^K) - T(y(\omega, \tau^K)) - \tau dy_0 \Big) \, h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega.$

Then, using the envelope theorem, for $\tau \to 0$

$$
\begin{aligned}
\frac{d\mathcal{L}}{d\tau} = & \int_{\underline{\omega}^1}^{\omega'^K} \left(-dy_0 - \frac{dt}{d\tau} \right) \Phi'(v) \, u' \, h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega \\
& + \int_{\omega'^K}^{\overline{\omega}^1} \left(dy_0 \tau^K - dy_0 - \frac{dt}{d\tau} \right) \Phi'(v) \, u' \, h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega \\
& + \int_{\underline{\omega}^2}^{\omega_0} \left(\frac{dL^K}{d\tau} - \frac{dt}{d\tau} \right) \Phi'(v) \, u' \, h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega \\
& + \int_{\omega_0}^{\omega_0 + d\omega_0} \left(\frac{dL^K}{d\tau} - \frac{dt}{d\tau} - (y(\omega) - y_0) \right) \Phi'(v) \, u' \, h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega \\
& + \int_{\omega_0 + d\omega_0}^{\overline{\omega}^2} \left(\frac{dL^K}{d\tau} - \frac{dt}{d\tau} - dy_0 \right) \Phi'(v) \, u' \, h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega \\
& + \lambda \int_{\underline{\omega}^1}^{\overline{\omega}^1} dy_0 \, h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega \\
& + \lambda \int_{\omega_0}^{\omega_0 + d\omega_0} \left(\frac{\partial y}{\partial \tau} T'(y(\omega, \tau^K)) + (y - y_0) \right) h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega + \lambda \int_{\omega_0 + d\omega_0}^{\overline{\omega}^2} dy_0 \, h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega
\end{aligned}
$$

We have: $\dfrac{dL^K}{d\tau} = -dy_0 \tau^K \Big(H(\overline{\omega}^1|\boldsymbol{\theta}_1) - H(\omega'^K|\boldsymbol{\theta}_1) \Big).$

The solution is very similar if y_0 is between $\underline{y}_1$ and $y(\omega'^K)$, the incomes under T of individuals who are not extracted in group C_1.

The behavioural term, however, differs if y_0 is between $y(\omega'^K)$ and $\overline{y}_1$. Indeed, the double distortion then has to be taken into account in the behavioral term. Now, $-e(y_0) = \dfrac{\partial y}{\partial \tau} \dfrac{(1 - T'(y_0))(1 - \tau^K)}{y_0}$.

Proof of Proposition 5. First take y_0 to be between $\underline{y}_2$ and $\overline{y}_2$, the incomes of individuals in group C_2 under T.

Then,

$$
\begin{aligned}
\mathcal{L} = & \int_{\underline{\omega}^1}^{\omega'^K} \Phi \left(v \left(y(\omega, \tau^K) - T(y(\omega, \tau^K)) - \tau dy_0 - t(\omega, \boldsymbol{\theta}_1, \tau^K, \gamma^K, \overline{\omega}^2) - k \left(\frac{y(\omega, \tau^K)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega \\
& + \int_{\omega'^K}^{\overline{\omega}^1} \Phi \Bigg(v \Bigg(y(\omega, \tau^K) - T(y(\omega, \tau^K)) - \tau dy_0 - t(\omega, \boldsymbol{\theta}_1, \tau^K, \gamma^K, \overline{\omega}^2) \\
& - \tau^K \left[y(\omega, \tau^K) - T(y(\omega, \tau^K)) - \tau dy_0 - \gamma^K \left(y(\overline{\omega}^2) - T(y(\overline{\omega}^2)) - \tau dy_0 \right) \right] - k \left(\frac{y(\omega, \tau^K)}{\omega} \right) \Bigg) \Bigg) h(\omega|\boldsymbol{\theta}_1) \, \mathrm{d}\omega \\
& + \int_{\underline{\omega}^2}^{\omega_0} \Phi \left(v \left(y(\omega) - T(y(\omega)) + L^K - t(\omega, \boldsymbol{\theta}_2, L^K) - k \left(\frac{y(\omega)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega \\
& + \int_{\omega_0}^{\omega_0 + d\omega_0} \Phi \left(v \left(y(\omega) - T(y(\omega)) + L^K - \tau(y(\omega) - y_0) - t(\omega, \boldsymbol{\theta}_2, L^K) - k \left(\frac{y(\omega)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega \\
& + \int_{\omega_0 + d\omega_0}^{\overline{\omega}^2} \Phi \left(v \left(y(\omega) - T(y(\omega)) + L^K - \tau dy_0 - t(\omega, \boldsymbol{\theta}_2, L^K) - k \left(\frac{y(\omega)}{\omega} \right) \right) \right) h(\omega|\boldsymbol{\theta}_2) \, \mathrm{d}\omega
\end{aligned}
$$

$$+\lambda \int_{\underline{\omega}^1}^{\overline{\omega}^1} \left(T(y(\omega,\tau^K)) + \tau dy_0\right)\, h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega + \lambda \int_{\underline{\omega}^2}^{\omega_0} T(y(\omega,\tau^K))\, h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega$$
$$+\lambda \int_{\omega_0}^{\omega_0+d\omega_0} \left(T(y(\omega,\tau^K)) + \tau(y-y_0)\right)\, h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega + \lambda \int_{\omega_0+d\omega_0}^{\overline{\omega}^2} \left(T(y(\omega,\tau^K)) + \tau dy_0\right)\, h(\omega|\boldsymbol{\theta}_2)\,\mathrm{d}\omega.$$

With $L^K = \int_{\underline{\omega}^1}^{\overline{\omega}^1} t^K\Big(y(\omega,\tau^K) - T(y(\omega,\tau^K)) - \tau dy_0\Big)\, h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega.$

$\dfrac{d\mathcal{L}}{d\tau}$ will have the same form as above except that now the derivative of the second term is:

$$\int_{\omega'^K}^{\overline{\omega}^1} \left(dy_0\tau^K(1-\gamma^K) - dy_0 - \frac{dt}{d\tau}\right) \Phi'(v)\, u'\, h(\omega|\boldsymbol{\theta}_1)\,\mathrm{d}\omega$$

and $\dfrac{dL^K}{d\tau} = -dy_0(1-\gamma^K)\tau^K\Big(H(\overline{\omega}^1|\boldsymbol{\theta}_1) - H(\omega'^K|\boldsymbol{\theta}_1)\Big).$

So since $\gamma^K > 1$, signs are inverted: taxes decrease the gap between the highest skilled of the extracting group and the individuals to whom the kinship tax applies.

Chapter 2

On the Political Economy of the Income-Tax Threshold

This Chapter is co-written with Pierre C. Boyer (CREST, École Polytechnique).

Abstract. The income-tax threshold constitutes an important policy instrument in the tax systems of many modern democracies. Indeed, in many western countries, the proportion of the income-tax paying population has remained surprisingly stable in the past thirty years. We develop a conceptual framework to analyze the political forces affecting the income-tax threshold in non-linear tax systems. First, we study theoretically how reforms of a status quo tax schedule affecting marginal tax rates and the income-tax threshold can be politically feasible. Our main theoretical results show the relationship between the types of reforms considered and the identity of the decisive voters who make them politically feasible. Second, in order to study real-world reforms of the income-tax threshold we derive an empirically applicable formula, which we then apply to the case of France. Simulations of tax reforms reveal that an increase in the number of taxpayers from the status quo is hard to sustain politically and that the observed stability of the French taxpaying population around 50% is a by-product of political constraints.

Keywords: Political Competition; Tax Reforms; Income-tax threshold.
JEL classification: D72; D78; H21.

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2.1 Introduction

We study reforms of non-linear income tax systems with a focus on the income-tax threshold, that is, the income from which individuals have positive income-tax liability.[1] The income-tax threshold determines the proportion of the population paying the income tax. Starting from any non-linear income tax schedule, we characterize

[1] The income-tax threshold is sometimes also referred to as the tax exemption threshold.

reforms that affect this threshold and that are politically feasible, in the sense that they make a majority of taxpayers better-off. Our conceptual framework is used to show the relationship between the types of reforms affecting the income-tax threshold and the identity of the decisive voters for political feasibility. Second, we derive an empirically applicable formula to study real-world reforms of the income-tax threshold. We apply our formula to France where politicians effectively control the number of households with positive income-tax liability with a mechanism called *"décote"*. Simulations of tax reforms reveal that an increase of the number of taxpayers from the status quo is hard to sustain politically and that the observed stability of the French taxpaying population around 50% is a by-product of the political constraints.

Because the income-tax threshold determines the relative number of taxpayers in a population, it holds an important place in the public sphere and is the object of much public debate in modern democracies. The run-up to the 2012 US presidential elections provides a good example of this, when the Republican candidate, Mitt Romney, stated that "There are 47 percent of the people who will vote for the president [Mr. Obama] no matter what. [...] These are people who pay no income tax. Forty-seven percent of Americans pay no income tax."[2] Or again, when reading the French press, one may notice that it is an issue that is raised very frequently.[3]

The income-tax threshold is also explicitly discussed when parliaments debate the budgets. The French government budgetary report of 2016 states that one of its objectives is to exempt 50% of the population from paying the income tax with the rationales of increasing purchasing power of "poorer households" and of making the schedule more progressive.[4] And indeed, the proportion of the income-tax paying population has remained surprisingly stable in many western countries in the past thirty years. In France for instance the percentage of French tax units paying the income tax has been around 50% since 1986 (see Figure 2.1). And in the United Kingdom, George Osborne, Chancellor of the Exchequer from 2010-2016, stated that he wanted "a tax system where the lowest paid are lifted out of tax altogether, while the tax revenues [they] get from the richest increase." (Budget statement - March 2012). In the United Kingdom, the proportion of the income-tax paying population has been between 55 and 65 percent since 1990 (see Miller and Roantree (2017)).

We provide the first framework to understand the political feasibility of tax reforms affecting the income-tax threshold in non-linear income tax systems. To do so we develop a framework where non-linear tax schedules are dependent on the previous status quo and where, in order to reform a tax schedule, the legislator needs sufficient support from the voters. Voters, when deciding whether or not to support a reform, compare their indirect utility before and after the reform. The reforms we consider involve both a change of marginal tax rates in certain brackets and the use of a parameter to control the number of taxpayers. In practice, this parameter can be thought of as the personal allowance (as in the United Kingdom), the standard deduction[5] (as in the United States), or the "*décote*"-mechanism (as in France). Individuals who initially did not owe any income tax and owe a positive income tax after the reform incur a potential extra cost. We formalize this cost as similar to an extensive margin of becoming a taxpayer with positive liability. It can be thought as an administrative (monetary) cost of compliance to a positive tax liability or a psychological (utility) cost akin to phenomena whereby individuals' reactions are dependent on the zero reference point (see, for example, Shampanier, Mazar and Ariely (2007), and in the context of taxation Rees-Jones (2017) or Kirchler (2007)).

[2]In 2011, 46.4% of tax units in the United States did not pay any federal income tax, see Tax Policy Center results available at http://www.taxpolicycenter.org/model-estimates/tax-units-zero-or-negative-tax-liability/baseline-distribution-tax-units-no-tax.

[3]See, in the recent years examples of titles such as
"Impôt sur le revenu pour tous : l'idée explosive de la ministre Jacqueline Gourault", Le JDD, 24/02/2019.
"Qui paie encore l'impôt sur le revenu en France ?", Le Figaro, 15/10/2015.
"De moins en moins de Français paient l'impôt sur le revenu", Le Figaro 13/04/2016.
"Près de 6 Français sur 10 ne paient plus d'impôt sur le revenu", Les Echos 18/07/2017.
(https://www.lejdd.fr/Politique/impot-sur-le-revenu-pour-tous-lidee-explosive-de-la-ministre-jacqueline-gourault-3863186, as viewed on February 25, 2019; http://www.lefigaro.fr/economie/le-scan-eco/decryptage/2015/10/04/29002-20151004ARTFIG00050-qui-paie-encore-l-impot-sur-le-revenu-en-france.php, as viewed on January 26, 2018; http://www.lefigaro.fr/economie/le-scan-eco/dessous-chiffres/2016/04/13/29006-20160413ARTFIG00012-impot-sur-le-revenu-en-france-moins-d-un-foyer-sur-deux-est-imposable.php, as viewed on January 26, 2018; https://www.lesechos.fr/18/07/2017/lesechos.fr/030452872864_pres-de-6-francais-sur-10-ne-paient-plus-d-impot-sur-le-revenu.htm, as viewed on January 26, 2018).

[4]See the Projet de Loi Finances pour 2016 http://www.assemblee-nationale.fr/14/projets/pl3096.asp, as viewed on March 1, 2019 and the parliamentary debate on the income-tax threshold http://www.assemblee-nationale.fr/14/pdf/rapports/r3110-v1.pdf, as viewed on March 1, 2019.

[5]and personal exemption until the Tax Cuts and Jobs Act of 2017.

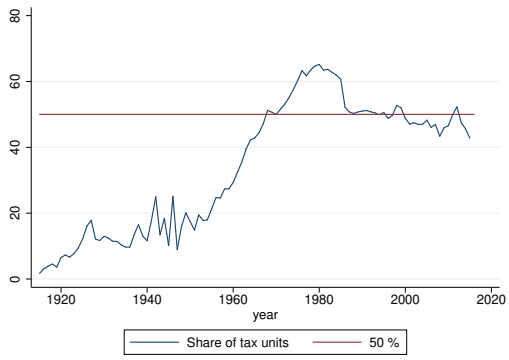


Figure 2.1 – Proportion of tax units paying the income tax in France since 1915
Sources: André and Guillot (2014) and *Cahiers Statistiques Direction Générale des Finances Publiques* since 2014.

Our main theoretical results show the relationship between the types of reforms affecting the income-tax threshold and the identity of the decisive voters who make them politically feasible. In a first set of results we find that the median income is the decisive individual for the political feasibility of reforms in two main instances. Firstly, when the median income is below the income-tax threshold before and after a reform. In this case, as long as the revenue generated by the reform is positive, the number of non-taxpayers is sufficiently large to support the reform: this can be thought of as a tyranny of the majority formed by non-taxpayers. Secondly when reforms push taxpayers out of the income tax (thus raising the income-tax threshold). We show the surprising fact that the median type being a taxpayer does not necessarily trigger an opposition to tax reforms that decrease the number of taxpayers. This is a new force that may explain why we observe low shares of income taxpayers.

Our second set of results considers the political feasibility of reforms that are not supported by the median income. For example, a reform that increases the number of taxpayers below the median type and raises marginal tax rates for all taxpayers might leave the median type out of the supporting coalition if she incurs a large disutility cost. As a second example, a reform that decreases marginal tax rates for all taxpayers and lowers the income tax threshold becomes politically feasible when there exists a coalition between low and high income individuals against middle income individuals.

In the second part of the chapter we first derive a formula based on sufficient statistics for the evaluation of the change of revenue associated to income-tax threshold reforms. We then apply it to show how French politicians use a mechanism, the "*décote*" to effectively control the number of households with positive income tax liability, and how it interacts with reforms of the statutory tax rates. First, we show how politicians effectively adjusted the income-tax threshold over time. Our analysis of the relationship between the share of households with positive income tax liability and the choice of the "*décote*" provides evidence in favor of the political mechanisms highlighted in our theory. Second, we run simulations of tax reforms that reveal that an increase of the number of taxpayers from the status quo is hard to sustain politically and that the observed stability of the taxpaying population around 50% is a by-product of political constraints.

This chapter proceeds as follows. Section 2.2 discusses related literature. Section 2.3 presents the formal framework. Section 2.4 contains our theoretical results. Section 2.5 first presents an empirically applicable formula for income-tax threshold reforms and illustrates the mechanisms identified in our theoretical framework in France. The last section contains concluding remarks. All proofs are in the Appendix.

2.2 Related literature

Our analysis is constructed within the optimal income taxation framework developed by Mirrlees (1971). We use the tax perturbation method when analyzing reforms of the tax system.[6] The decision-making process, however, does not rely on the maximization of a social welfare function, but is embedded in a political economy framework: we look at reforms through the lens of political feasibility.[7] A reform takes place if it is supported by a majority of voters. In this respect, it is important to bear in mind Roberts (1977)'s intuition for such a decision rule: "[if] political parties make choices so as to maximize the likelihood of being elected then it is possible to view the chosen options as being determined, albeit indirectly, by a voting process. The point is not whether choices in the public domain are made through a voting mechanism but whether choice procedures mirror some voting mechanism." Two of the founding articles in this literature, Roberts (1977) and Meltzer and Richard (1981), rely on lump-sum redistribution of tax proceeds, an assumption we do not challenge in our framework. Both restrict their analysis to linear tax schedules whereas we consider arbitrary non-linear tax systems. Under this restriction, Roberts (1977) shows a median voter theorem when individuals' incomes are ranked according to their ability and independently of the tax schedule, and Meltzer and Richard (1981) find that the lower the median income with respect to the mean income, the higher the rate of taxation. In their model, the extension of the franchise is accompanied by a larger size of government.[8]

We build on the framework of Bierbrauer et al. (2020), where non-linear tax schedules are dependent on the previous status quo and where in order to reform a tax schedule, the legislator needs sufficient support from the voters.[9] Voters, when deciding whether or not to support a reform, compare their indirect utility before and after the reform. In this setup, they show that the political feasibility of reforms that satisfy some monotonicity property[10] can be assessed by looking at whether the median income individual would support such a reform.[11] The focus on the conditions under which a status quo tax policy admits reforms that are politically feasible distinguishes their work from papers that explicitly analyze political competition as a strategic game and then characterize equilibrium tax policies.[12] The non-linearity of the tax schedule provides us with a novel tool to consider the income-tax threshold. Contrary to linear taxation, it is now possible that some individuals have no tax liability independently from the revenue generated by taxation. Bierbrauer et al. (2020) show that the income-tax threshold per se does not play a role for political feasibility of reforms: only the difference in the net of tax obtained before and after the reform is determinant. In such an environment, the position of the individuals with respect to the income-tax threshold does not matter when evaluating the benefit of the reform. Hence, their setup does not capture the observed political game in modern democracies around the share of the taxpaying population. We extend their analysis by introducing the income-tax threshold as an additional instrument for the decision-maker as well as a potential extra cost that is incurred by individuals who initially did not owe any

[6] See, for instance, Piketty (1997), Saez (2001), Golosov et al. (2014), Jacquet and Lehmann (2017), or Kleven (2018). For recent surveys see Piketty and Saez (2013) and Salanié (2011).

[7] Saez and Stantcheva (2016) study generalized welfare functions with weights that need not be consistent with the maximization of a utilitarian social welfare function. The generalized weights may as well reflect alternative, non-utilitarian value judgments or political economy forces.

[8] Acemoglu, Naidu, Restrepo and Robinson (2015) surveys the empirical relevance of these conclusions.

[9] A classical idea in public finance is that the theory of optimal taxation should be complemented by a theory of tax reforms with a focus on incremental changes that apply to a given status quo (see Feldstein (1976) or Weymark (1981)). Guesnerie (1995) surveys this literature and contains an analysis of tax reforms that emphasizes political economy forces formalized as a requirement of coalition-proofness. Our approach contributes to this earlier literature by combining results from social choice theory on the applicability of median voter theorems with the perturbation approach to the analysis of non-linear tax systems.

[10] A reform is monotonic if the change is either larger or smaller the higher the incomes. Bierbrauer et al. (2020) document that a large majority of income tax reforms in OECD countries since 2000 are (strictly) monotonic and they also show that this is the case for a longer time horizon for France, Germany, the United Kingdom, and the United States.

[11] They complement results by Rothstein (1990; 1991) and Gans and Smart (1996).

[12] Examples include Acemoglu, Golosov and Tsyvinski (2008; 2010) who relate dynamic problems of optimal taxation to problems of political agency as in Barro (1973) and Ferejohn (1986); Farhi, Sleet, Werning and Yeltekin (2012) and Scheuer and Wolitzky (2016) who study optimal capital taxation subject to the constraints from probabilistic voting as in Lindbeck and Weibull (1987); Battaglini and Coate (2008) who study optimal taxation and debt financing in a federal system using the model of legislative bargaining due to Baron and Ferejohn (1989); Röell (2012) and Brett and Weymark (2017; 2016) who characterize the non-linear income tax schedule that the median voter would pick if she could dictate tax policy; Bierbrauer and Boyer (2016) who study Downsian competition with a policy space that includes non-linear tax schedules and possibilities for pork-barrel spending as in Myerson (1993).

income tax and owe a positive income tax after the reform. Our theoretical results show that this extension enables to capture the trade-off that politicians face when increasing or decreasing the share of taxpayers in the population.

There is an interesting relationship between the choice of the income-tax threshold and the choice of the tax base. Our results complement the insights from the normative literature (see, e.g., Wilson (1989), Slemrod and Kopczuk (2002), Kopczuk (2005) and Gordon and Kopczuk (2014)) by developing a political economy analysis for the base of the income tax with a focus on the income-tax threshold. Ilzetzki (2018) studies the political feasibility of reforms affecting the tax base and linear tax rates in a general equilibrium setup. Interestingly, he shows that politically feasible base-broadening tax reforms are more likely to occur when there is a major overhaul of the tax system.

The income-tax threshold has, to our knowledge, been considered through two other perspectives. On the one hand, as a salient kink point generating bunching (see Kleven (2016)), thus also providing the means to estimating the elasticity of taxable income for low income earners (see Saez (2010) and Lardeux (2017)). On the other hand, as a factor varying through time and reflecting State capacity. Besley and Persson (2009; 2010; 2011; 2014) extensively study the role of State capacity in raising taxes (see also Acemoglu and Robinson (2000), and Aidt and Jensen (2009), on the introduction of income tax in Europe, North America, Japan and Oceania). Jensen (2016) studies the evolution of the income-tax threshold in developed and developing countries. He shows that as employment share rose in countries (or states), third-party reporting helped lower this threshold. This is in resonance with the model and evidence in Kleven, Kreiner and Saez (2016).

We consider the political economy of tax reforms affecting the exemption threshold, and show that frictions might appear, that create some form of inertia around this threashold. Our framework applies to developed countries, where third party reporting and administrative hassles are not as big hurdles to tax collection as in many developing countries, and where the share of employees has been relatively stable in the past decades. We introduce the possibility for individuals to incur a psychological cost when their tax liability under the reform becomes positive.

2.3 The model

There is a continuum of individuals of measure 1. Individuals are confronted with a predetermined income tax schedule T_0 that assigns a tax payment $T_0(y)$ to every level of pre-tax income $y \in \mathbb{R}_+$. Under the initial tax system, individuals receive a lump-sum transfer equal to $c_0 \geq 0$. We assume that T_0 is differentiable everywhere, so that marginal tax rates are well-defined for all levels of income.

We define the income-tax threshold $y_0^E \in \mathbb{R}_+$ to be such that

$$T_0(y) \begin{cases} = 0 & \text{for} \quad y \leq y_0^E; \\ > 0 & \text{for} \quad y > y_0^E. \end{cases}$$

Threshold reforms. A reform induces a new tax schedule T_1 that is derived from T_0 so that, for any level of pre-tax income y, $T_1(y) = T_0(y) + \tau\, h(y)$, where $\tau > 0$ is a scalar, used as a scaling factor, and h is a differentiable function (that may be weakly positive or negative). The new income-tax threshold y_1^E is such that

$$T_1(y) \begin{cases} = 0 & \text{for} \quad y \leq y_1^E; \\ > 0 & \text{for} \quad y > y_1^E. \end{cases}$$

A threshold-reform is a triplet $\left(\tau, h, y_1^E\right)$. We focus on reforms for which $y - T_1(y)$ is non-decreasing. The reform induces a change in tax revenue denoted by $\Delta^R(\tau, h)$, that is redistributed lump-sum in the population (so it is added to c_0 for each individual).

Preferences. Individuals have a utility function u that is increasing in private goods consumption, or after-tax income, c, and decreasing in earnings or pre-tax income y. Utility also depends on a measure of the individual's productive ability ω. The set of possible abilities is denoted by $\Omega = [\underline{\omega}, \overline{\omega}]$ and is a compact subset of $\mathbb{R}_+$.

We allow for the possibility that the individuals who start paying taxes on their income after the reform – i.e. under T_1 – and who were not paying any taxes under T_0 incur an extra cost. This cost appears as an extensive margin of becoming a taxpayers.[13] It can be thought as an administrative (monetary) cost of compliance to the new positive tax-payments if we specify the utility function to be quasi-linear or a psychological (utility) cost akin to phenomena whereby individuals' reactions are dependent on the zero reference point (see, for example, Shampanier et al. (2007), Rees-Jones (2017), or Kirchler (2007)). The disutility of starting to pay taxes could also be thought of as a hassle cost (see Aghion, Akcigit, Lequien and Stantcheva (2017)). This cost is indexed by a parameter χ that is distributed in the population. Costs belong to the compact subset of $\mathbb{R}_+$, $\mathcal{X} = [\underline{\chi}, \overline{\chi}]$. We refer to the couple (ω, χ) as the individual's type. It is not observable by the government. The utility that an individuals with type (ω,χ) derives from c and y is denoted by $U(c, y, \omega, \chi)$. The distribution of types in the population is represented by a joint cumulative distribution function $F(\omega, \chi)$ with joint density $f(\omega, \chi)$. We also introduce cumulative distribution functions $G(\omega)$, $K(\chi)$ and density functions $g(\omega)$, $k(\chi)$ for ω and χ respectively.

Under the status quo, the utility function of individual (ω, χ) is such that

$$U(c, y, \omega, \chi) = u\left(c_0 + y - T_0(y), y, \omega\right).$$

In the case of a reform, the utility function of individual (ω, χ) is of the form

$$U(c, y, \omega, \chi) = u\left(c_0 + e + y - T_0(y) - \tau h(y), y, \omega\right) - \chi \tau h(y) \mathbb{1}\{\mathcal{N}\}.$$

where $\mathbb{1}\{\cdot\}$ is the indicator function and $\mathcal{N}$ is the event "individual (ω, χ)'s income y under T_0 was such that they were not paying taxes and if they chose the same income y under T_1, they would now be paying taxes". Alternative specification of the cost could be adopted, what is important for our approach is that the total utility cost reflects the intensity of the "treatment" to the reform, i.e. χ is multiplied by the amount of tax the individual starts to pay.[14]

Spence-Mirrlees single crossing property. We assume that $-\frac{u_y(c,y,\omega)}{u_c(c,y,\omega)}$, the marginal rate of substitution between labour and consumption is decreasing in the individual's skills, i.e. for any pair (c, y) and any ω, ω' with $\omega' > \omega$,

$$-\frac{u_y(c, y, \omega')}{u_c(c, y, \omega')} \leq -\frac{u_y(c, y, \omega)}{u_c(c, y, \omega)}.$$

We assume that leisure is a non-inferior good. If individuals experience an increase in an exogenous source of income e, they do not become more eager to work. Formally, this means that $-\frac{u_y(c+e,y,\omega)}{u_c(c+e,y,\omega)}$ is non-decreasing in e.

We also assume that an individual's marginal utility $u_c(c, y, \omega)$ is both non-increasing in c and non-increasing in ω, i.e. $u_{cc}(c, y, \omega) \leq 0$ and $u_{c\omega}(c, y, \omega) \leq 0$.

[13] This formulation is in line with the literature incorporating an extensive margin of labor supply decision in an optimal income tax setup (see, Saez (2002), Choné and Laroque (2010), or Jacquet, Lehmann and Van der Linden (2013)).

[14] We take the cost we describe to be positive and do not take into account identity and group belonging effects which might cause this cost to be negative in the event that it might make voters feel like they "belong to the group who pays a tax on income" (see Shayo (2009)). Indeed, in this context, given that it is only one kind of tax (albeit the most salient one) that they are not paying, these effects might not be relevant.

To describe the implications of reforms for measures of revenue and political support it proves useful to introduce the following optimization problems.
If the status quo T_0 is maintained, individual (ω, χ) chooses y so as to maximize

$$u\left(c_0 + y - T_0(y), y, \omega\right).$$

We assume that this optimization problem has, for each ω, a unique solution that we denote by $y^*(0, 0, \omega, \chi)$. It is constant across χ's for a given ω. Thus, we may also write $y^*(0, 0, \omega, \chi) = \tilde{y}^0(\omega)$. The corresponding indirect utility function is denoted by $V(0, 0, \omega, \chi)$ (and is also constant across χ's for a given ω). We write $\tilde{u}_c^0(\omega)$ for the marginal utility of consumption that a type (ω, χ)-individual realizes in this case.
If a reform (τ, h) is carried out, individual (ω, χ) chooses y so as to maximize

$$u\left(c_0 + e + y - T_0(y) - \tau h(y), y, \omega\right) - \chi \tau h(y) \mathbb{1} \left\{ \begin{array}{c} \tau h(\tilde{y}^0(\omega)) > 0 \\ T_0(\tilde{y}^0(\omega)) = 0 \end{array} \right\},$$

where e is a source of income that is exogenous from the individual's perspective. We assume that this optimization problem has, for each type (ω, χ), a unique solution that we denote by $y^*(e, \tau, \omega, \chi) = \tilde{y}^1(\omega, \chi))$. The corresponding indirect utility function is denoted by $V(e, \tau, \omega, \chi)$. We write $\tilde{u}_c^1(\omega, \chi)$ for the marginal utility of consumption that a type (ω, χ)-individual realizes after the reform. We define $e = \Delta^R(\tau, h)$.[15]

We assume that there is no bunching under T_0, so that we can write $\tilde{y}^0(\omega)$ and its inverse $\tilde{\omega}^0(y)$.[16] We write ω_0^E for the type corresponding to y_0^E under the status quo. Let ω^M be the median of the distribution of skills. We write $y^{0M} := \tilde{y}^0(\omega^M)$, and refer to this individual as the median income individual or the median type. Finally, we write $\omega_1^E := \tilde{\omega}^0(y_1^E)$ for the type corresponding to y_1^E under the status quo.
Armed with this notation we can express the reform-induced change in tax revenue as

$$\Delta^R(\tau, h) = \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} \{T_1(y^*(\Delta^R(\tau, h), \tau, \omega, \chi)) - T_0(y^*(0, 0, \omega, \chi))\} f(\omega, \chi)\, d\omega\, d\chi\,.$$

The reform-induced change in indirect utility for a type ω individual is given by

$$\Delta^V(\omega, \chi \mid \tau, h) := V(\Delta^R(\tau, h), \tau, \omega, \chi) - V(0, 0, \omega, \chi)\,.$$

Political support for reforms. Political support for the reform is measured by the mass of individuals who are made better-off if the initial tax schedule T_0 is replaced by T_1 (we consider individuals have equal weights in the decision-making process),

$$S(\tau, h) := \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} \mathbb{1}\{\Delta^V(\omega, \chi \mid \tau, h) > 0\} f(\omega, \chi)\, d\omega\, d\chi\,.$$

A reform (τ, h) is said to be supported by a majority of the population if $S(\tau, h) \geq \frac{1}{2}$.

Monotonic reforms. A tax reform (τ, h, y_1^E) is said to be monotonic if $T_1(.) - T_0(.) = \tau\, h(.)$, or more simply, $h(.)$ is monotonic over $\mathbb{R}_+$. Given a cross-section distribution of incomes, we say that a reform is piece-wise monotonic if h is a monotonic function for incomes above (or below) some given income. In our empirical application we check that the reforms studied satisfy these monotonicity properties.

[15] Formally, we should write $y^*(0, T_0, \omega, \chi)$, $y^*(e, T_0 + \tau h, \omega, \chi)$ and $\Delta^R(T_0 + \tau h)$. Thus, when taking the derivative with respect to τ when τ tends to zero in the rest of the chapter, we are actually taking the Gâteaux derivative in the direction h. All the results would remain the same.

[16] Allowing individuals to bunch under the status quo would not change our results, see Bierbrauer et al. (2020).

Small reforms. As typically done in the literature we consider small reforms, i.e. reforms such that τ is close to zero.[17] An individual (ω, χ) benefits from a small reform (τ, h) if $\Delta^V(\omega, \chi \mid \tau, h) > 0$. At the first order, this is equivalent to

$$\tau \Delta^V_\tau(\omega, \chi \mid 0, h) > 0,$$

where

$$\Delta^V_\tau(\omega, \chi \mid \tau, h) := \frac{d}{d\tau} V(\Delta^R(\tau, h), \tau, \omega, \chi).$$

Benchmark: no costs of becoming a taxpayer. We first present the benchmark case where there are no costs of becoming a taxpayer.

Proposition 5 *Suppose that $\mathcal{X} = \{0\}$. Let h be a monotonic function. The following statements are equivalent:*

1. *The median skill individuals ω^M benefit from a small reform.*
2. *There is a majority of voters who benefit from a small reform.*

The proof of Proposition 5 follows from Bierbrauer and Boyer (2020, Theorem 1). We present here an intuition for the proof: The first step is to find, for all individual types, the value of interest, $\Delta^V_\tau(\omega \mid 0, h)$, which is

$$\Delta^V_\tau(\omega \mid 0, h) = \big(\Delta^R_\tau(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}^0_c(\omega).$$

Intuitively, if entering the income tax does not generate extra disutility, the trade-off for the voter is between her extra tax liability that may have to increase (or decrease) versus the revenue generated by the reform. Hence, a voter may be willing to support a reform that increases her taxes if the amount that will be redistributed to her is greater than this extra payment.

Moreover, Mirrlees' single crossing property implies that $\tilde{y}^0(.)$ is increasing in individuals' abilities ω. Hence, if a reform is supported by an individual of type $\hat{\omega}$, then, if it is increasing, all types below $\hat{\omega}$ will support it as well, and if it is decreasing, all types above $\hat{\omega}$ will support it as well. That is, the ranking of incomes due to the single crossing property translates into a ranking of benefits from the reform according to the individuals' types ω. This is the mechanism that gives rise to the median voter result.

Proposition 5 shows that the income-tax threshold *per se* does not play a role for political feasibility of reforms: only the difference in the net of tax obtained before and after the reform is determinant. In such an environment, the position of the individuals with respect to the income-tax threshold does not matter when evaluating the benefit of the reform. Hence, the benchmark case does not capture the observed political game in modern democracies around the share of the taxpaying population.

2.4 Political economy of the income-tax threshold

From now onward, we suppose that $\chi > 0$ for at least a subset of the population and therefore getting the support of voters who become taxpayers after a reform is harder. Then for all $(\omega, \chi) \in \Omega \times \mathcal{X}$,

$$\Delta^V_\tau(\omega, \chi \mid 0, h) = \big(\Delta^R_\tau(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}^0_c(\omega) - \chi h(\tilde{y}^0(\omega))\mathbb{1}\left\{ \begin{array}{c} \tau h(\tilde{y}^0(\omega)) > 0 \\ T_0(\tilde{y}^0(\omega)) = 0 \end{array} \right\}.$$

2.4.1 Income-tax threshold reforms and median voter results

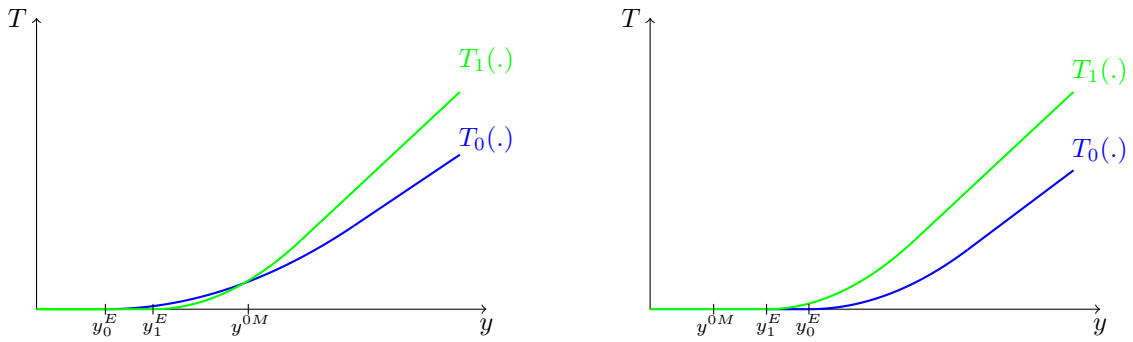
The following proposition describes the reforms for which the legislator can do without the support of voters who become taxpayers after the reforms. It is articulated around the position of y^E_1 with respect to the initial

[17] For extension to large reforms and the limitation when voters have two dimensions of heterogeneity, see Bierbrauer et al. (2020).

income-tax threshold y_0^E and the initial income of the individuals with median type y^{0M}.

Proposition 6 *Let $y_1^E \geq min\{y_0^E, y^{0M}\}$.*
I. *Suppose h is decreasing from $max\{y_0^E, y_1^E\}$ onward. A reform (τ, h, y_1^E) is supported by a majority of the population if and only if the median skill individual ω^M benefits from it.*

II. *Suppose h is increasing from $max\{y_0^E, y_1^E\}$ onward. A reform (τ, h, y_1^E) is supported by a majority of the population if and only if the median skill individual ω^M benefits from it.*



(a) $y_0^E \leq y_1^E \leq y^{0M}$ (b) $y_0^E \geq y_1^E > y^{0M}$

Figure 2.2 – Illustration of Proposition 6 II.

Proposition 6 identifies a class of reforms (τ, h, y_1^E) for which the median voter is the decisive type. The intuition is as follows.
If $y_0^E > y^{0M}$, then $y^{0M} \leq y_1^E \leq y_0^E$ means that the reform either lowers the threshold above the median income individual or leaves it as is. If $y_1^E > y_0^E$, it might even raise the threshold. As long as the revenue generated is positive, the reform is politically feasible. In our majority rule context, the fact that in the case where the threshold is lowered, some individuals may incur an extra psychological cost not does matter to the legislator, as a majority of voters supports the reform anyway.
If $y_0^E < y^{0M}$, then $y_0^E \leq y_1^E$ means that the reform either leaves the income tax threshold as is, or raises it. No-one incurs a cost of entering the tax schedule, the ranking of benefits still depends on the ranking of types, and it is the net benefit of the median voter that is taken into account.

Proposition 6 presents threshold reforms for which the political feasibility hinges on the median voter support. First, for reforms that raise the income-tax threshold, thus lifting taxpayers out of the income tax, the decisive voter is the median type, see, e.g., Figure 2.2 (left panel). If marginal tax rates are raised for taxpayers above the median type, it is possible that the median voter's extra tax burden is null and that the revenue raised is positive. In this case, the median type will support the reform. Hence, her being a taxpayer does not necessarily trigger an opposition for a decrease of the number of taxpayers sharing the total tax burden. This is a force that may explain why we observe low shares of income taxpayers.

Second, the political feasibility of a reform such that the median income is below the income-tax threshold before and after a reform, is governed by the median income individual's consent, see Figure 2.2 (right panel). Interestingly, this result does not depend on the intensity of the disutility cost incurred by the individuals who become taxpayers because enough voters remain below the new tax threshold. This case can be described as the tyranny of the majority: poor individuals support tax increases borne by richer individuals as long as they increase revenue.

2.4.2 Income-tax threshold reforms and non-median voter results

A reform that lowers the income tax threshold below the median type might increase tax rates or might decrease tax rates for the tax paying population. We show that these reforms may meet with more frictions. In particular, they tamper with the ranking of beneficiaries according to their initial income (or equivalently, their ability). We present the following results by separating the reforms that increase or decrease the marginal tax rates.

Reforms increasing marginal tax rates. The fact that some individuals may face an extra cost of entering the income tax schedule might now have an impact on the identity of the decisive voter, which we formalize in the following proposition, where tax rates are increased for all status quo tax paying individuals.

Proposition 7 *Let $y_1^E < min\{y_0^E, y^{0M}\}$. Suppose that h is non-decreasing. A reform (τ, h, y_1^E) is supported by a majority of the population if and only if the individuals in $[0, \omega_1^E]$ benefit from it and there exists an α in $[0, G(\omega_0^E) - G(\omega_1^E)]$ such that*

α individuals in $(\omega_1^E, \omega_0^E]$ benefit from it

and either $\alpha + G(\omega_1^E) \geq \frac{1}{2}$ or the individuals with skill $\hat{\omega}_\alpha \geq \omega_0^E$ such that $G(\omega_1^E) + [G(\hat{\omega}_\alpha) - G(\omega_0^E)] + \alpha = \frac{1}{2}$, benefit from it.

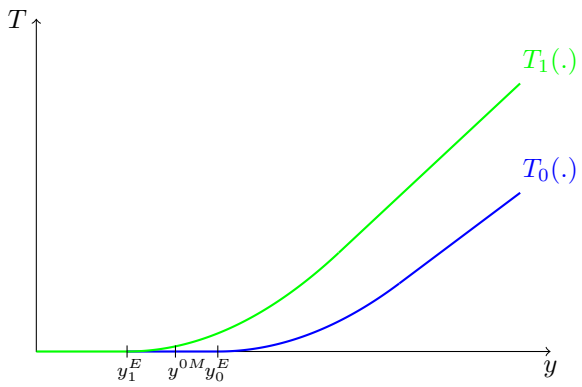


Figure 2.3 – $y_1^E < min\{y_0^E, y^{0M}\}$

Proposition 7 looks at reforms that monotonically increase marginal tax rates. It finds that the extra cost individuals would pay by crossing (at equal income) the income tax threshold eliminates the monotonicity in ranking the beneficiaries from a reform according to their type ω. Now, the political feasibility of such a reform might require compensating some individuals above the median, which, since h is non-decreasing may be more demanding than compensating the median income individual (remember that the trade-off is between $\Delta^R(\tau, h)$ and $h(\tilde{y}^0(\omega))$).

Reforms that raise the number of taxpayers below the median type and raise marginal tax rates for all taxpayers (see Figure 2.3) imply that the median type is not necessarily the type with the highest burden from the tax increase in the first half of the population: individuals below the median who become taxpayers suffer, on top of their tax liability, an extra disutility cost. A supporting coalition for such reforms thus needs to gather the support of the non-taxpayers (the individuals in $[0, \omega_1^E]$), the individuals who start paying taxes and have a low χ and, if necessary, individuals who were already taxpayers. In particular, the median type might be left out of the coalition if she was not a taxpayer and incurs a large disutility cost.

Reforms decreasing marginal tax rates. In the following proposition, we characterize the conditions for which a reform that lowers the income tax threshold while lowering tax rates for the status quo tax-paying population is politically feasible. In this case, the main factor that might contradict the median voter result is the fact that the reform cannot be monotonous everywhere anymore.

Proposition 8 *Let $y_1^E < min\{y_0^E, y^{0M}\}$. Suppose that h is non-increasing from y_0^E onward.*

I. The median type is* not *a taxpayer under the status quo. *Suppose that $y_0^E \geq y^{0M}$. A reform (τ, h, y_1^E) is supported by a majority of the population if and only if the individuals in $[0, \omega_1^E]$ benefit from it and there exists an α in $[0, G(\omega_0^E) - G(\omega_1^E)]$ such that*
α individuals in $(\omega_1^E, \omega_0^E]$ benefit from it
and either $\alpha + G(\omega_1^E) \geq \frac{1}{2}$ or the individuals with skill $\hat{\omega}_\alpha \geq \omega_0^E$ such that $G(\omega_1^E) + [1 - G(\hat{\omega}_\alpha)] + \alpha = \frac{1}{2}$, benefit from it.

II. The median type is a taxpayer under the status quo. *Suppose that $y_0^E < y^{0M}$.*

(a) When $\Delta_\tau^R(0, h) > 0$, a reform (τ, h, y_1^E) is supported by a majority of the population if and only if there exists an α in $[0, G(\omega_0^E) - G(\omega_1^E)]$ such that:
α individuals in $(\omega_1^E, \omega_0^E]$ benefit from it
and the individuals with skill $\hat{\omega}_\alpha \geq \omega_0^E$ such that $G(\omega_1^E) + [1 - G(\hat{\omega}_\alpha)] + \alpha = \frac{1}{2}$, benefit from it.

(b) When $\Delta_\tau^R(0, h) \leq 0$, a reform (τ, h, y_1^E) is supported by a majority of the population if and only if the median skill individuals ω^M benefit from it.

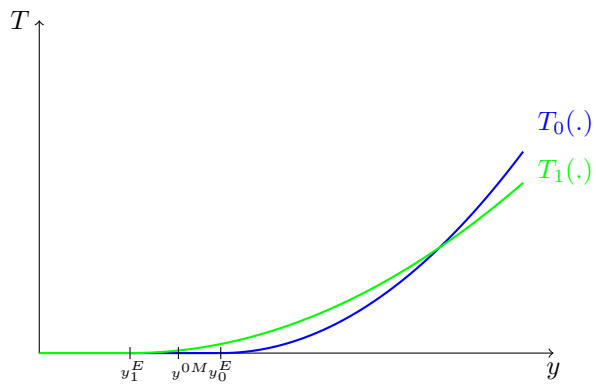


Figure 2.4 – $y_1^E < min\{y_0^E, y^{0M}\}$

Part I of Proposition 8 shows that now, for example, a reform that has positive revenue and where the lower skilled individuals who still do not pay taxes and the higher skilled individuals who pay lower taxes constitute half of the voters would be politically feasible. This suggests that lowering the income-tax threshold may be politically feasible with a coalition between the poorer and the richer part of the population against the middle class. This result is reminiscent of the "ends against the middle" phenomenon in Epple and Romano (1996).

In Part II (a) of Proposition 8, the revenue generated by the reform is positive and the coalition supporting the reform has the same composition than in Part I. This is true even if the median type is a taxpayer under the status quo, which enriches the cases where the median type is not in the supporting coalition. However, when the revenue generated by the reform is negative as in Part II (b) of Proposition 8, the median type regains her position as a decisive voter. Intuitively, the reform favors disproportionately individuals with higher income. Hence, when the median voter benefits from it, a winning coalition will be gathered.

2.5 Empirical analysis

We first develop an empirically applicable formula based on sufficient statics to diagnose the political feasibility of income tax-threshold reforms. Second, we introduce the institutional details in France on the *décote*-mechanism

that effectively control the the number of households with positive income tax liability. Finally, we apply our formula to the French tax systems using administrative tax data to identify the political feasibility of future tax reforms.

2.5.1 Empirically applicable formula for income-tax threshold reforms

We first derive the formula based on sufficient statistics for the evaluation of the change of revenue associated to income tax-threshold reforms.

Proposition 9 *The change of revenue associated to an income-tax threshold reform is given by*

$$\Delta_\tau^R(0,h) = \frac{1}{1-I_0}\Big[-\int_{\omega_0^E}^{\overline{\omega}} \big(\eta^0(\omega)h(\tilde{y}^0(\omega)) + \tilde{y}^0(\omega)\epsilon^0(\omega)h'(\tilde{y}^0(\omega))\big)\frac{T_0'(\tilde{y}^0(\omega))}{1-T_0'(\tilde{y}^0(\omega))}g(\omega)d\omega$$

$$+\int_{\omega_1^E}^{\overline{\omega}} h(\tilde{y}^0(\omega))g(\omega)d\omega\Big], \tag{2.1}$$

with

$$I_0 = \int_{\omega_0^E}^{\overline{\omega}} \eta^0(\omega)\frac{T_0'(\tilde{y}^0(\omega))}{1-T_0'(\tilde{y}^0(\omega))}g(\omega)d\omega,$$

and $\eta^0(\omega) = (1-T_0'(\tilde{y}^0(\omega)))y_e^*(0,0,\omega)$ *the income effect parameter for individuals with type* ω *and* $\epsilon^0(\omega)$ *the compensated elasticity of earnings with respect to the net-of-tax rate for individuals with type* $\omega \geq \omega_0^E$.

The proof of Proposition 9 is relegated to the appendix.

The second term in $\Delta_\tau^R(0,h)$ represents the mechanical effect of the change in income-tax liability and the first term translates behavioral responses: $\eta^0(\omega)h(\tilde{y}^0(\omega))$ the income effects and $\tilde{y}^0(\omega)\epsilon^0(\omega)h'(\tilde{y}^0(\omega))$ the substitution effects. Since $T_0'(\tilde{y}^0(\omega)) = 0$ for $\omega \leq \omega_0^E$, the behavioural effects of individuals who have positive tax liability after the reform when they did not before (i.e., individuals with $\omega \in [\omega_1^E, \omega_0^E]$ if $\omega_1^E < \omega_0^E$) do not affect the revenue generated.
The main parameters to take into account when considering the revenue generated by the reform are thus h, ω_0^E and ω_1^E, the distribution of skills and the behavioral responses.

We know that $\epsilon^0(\omega) \geq 0$ and that if leisure is a normal good, then $\eta^0(\omega) \leq 0$.

The Corollary below presents a simplified version of Equation (2.1) when there are no-income effects so that the utility function is quasi-linear in private goods consumption and the costs of productive effort are iso-elastic $\epsilon^0(y) = \epsilon$ for all y.

Corollary 1 *Suppose that* $u(c,y,\omega) = c - \left(\frac{y}{\omega}\right)^{\frac{1}{1+\epsilon}}$. *Then, the change of revenue associated to an income-tax threshold reform is given by*

$$\Delta_\tau^R(0,h) = \Big[-\int_{y_0^E}^{\overline{y}} y\epsilon h'(y)\frac{T_0'(y)}{1-T_0'(y)}\varphi(y)dy + \int_{y_1^E}^{\overline{y}} h(y)\varphi(y)dy\Big], \tag{2.2}$$

with ϵ *the elasticity of earnings with respect to the net-of-tax rate for individuals under the status-quo tax schedule and* $\varphi(.)$ *the density function of incomes under the status quo.*

We have shown that reforms that lower the income-tax threshold below the median and that monotonically increase marginal tax rates for the tax-paying population potentially need to benefit an individual with higher

income than the median one, which is thus harder to achieve, as their extra tax liability might be higher ($h(y) \geq h(y^M)$ for $y \geq y^M$). Moreover, since h is non-decreasing, the behavioral effects negatively affect the revenue generated from the reform, thus making the condition that the extra tax liability of the decisive voter is higher than the revenue generated even harder to achieve. This might help explain why such income-tax threshold reforms might meet with high political frictions.

Reforms that lower the income tax threshold below the median and that monotonically decrease marginal tax rates for the status-quo tax-paying population require closer examination, depending on the sign of h. If h is always non-negative and decreasing, then, firstly, the revenue generated should be positive. And secondly, there should be enough of the population that benefits from it. The behavioral effects, in this case, positively affect the revenue generated. And since the behavioral responses of the population that did not previously owe any income-tax have no impact, only their extra-tax liability is taken into account. So the more such individuals there are, the higher the revenue generated. At the same time, the harder it is to find a coalition between rich and poor. On the other hand, a reform that generates a negative revenue and reduces tax-liability for the median voter (i.e. $h(y) < 0$ for $y \geq y^M$) possibly has a negative mechanical revenue effect. In order for the revenue generated not to be too small, the income-tax threshold might have to be moved very low.

In the following section we examine how this threshold has been dealt with in practice and what frictions might have been met. For the simulations below, we will approximate the French status quo tax schedule by

$$T_0(y) = \begin{cases} 0 & \text{for} \quad y \leq \lambda_0^{1/\rho_0} := y_0^E; \\ \\ y - \lambda_0 y^{1-\rho_0} & \text{for} \quad y > \lambda_0^{1/\rho_0} := y_0^E \ ; \end{cases}$$

and focus on reforms within the class of tax schedules that have a constant rate of progressivity (see, Heathcote, Storesletten and Violante (forthcoming)). The after-reform schedule will be such that

$$T_1(y) = \begin{cases} 0 & \text{for} \quad y \leq \lambda_1^{1/\rho_1} := y_1^E; \\ \\ y - \lambda_1 y^{1-\rho_1} & \text{for} \quad y > \lambda_1^{1/\rho_1} := y_1^E \ . \end{cases}$$

This has several advantages: first, a constant rate of progressivity tax schedule approximates well the current status quo in France and is also used to approximate tax schedules in other modern democracies. Second, it will be easy to compute the change in revenue following the reform using Equation (2.2). Finally, the tax reforms will have the following form

$$T_1(y) - T_0(y) = \begin{cases} 0 & \text{for} \quad y \leq \min\{y_0^E, y_1^E\}; \\ \\ \lambda_1 y^{1-\rho_1} - \lambda_0 y^{1-\rho_0} & \text{for} \quad y > \min\{y_0^E, y_1^E\} \ . \end{cases}$$

Notice that $T_1(y)$ and $T_0(y)$ are monotonic for all y, hence $T_1(y) - T_0(y)$ is also monotonic for $y \in [0, \max\{y_0^E, y_1^E\}]$. For $y \geq \max\{y_0^E, y_1^E\}$, we have that $T_1(y) - T_0(y)$ is monotonically increasing (resp. decreasing) for $y > \hat{y} := \left(\frac{\lambda_1(1-\rho_1)}{\lambda_0(1-\rho_0)}\right)^{\frac{1}{\rho_1-\rho_0}}$ when $\rho_1 > \rho_0$ (resp. $\rho_1 < \rho_0$).

2.5.2 Institutional details: the *décote*-mechanism in France

In France the income-tax threshold is controlled by the *décote*-mechanism. The *décote*-mechanism was introduced in France in 1981, with the aim of reducing taxes for lower income individuals. One reason that was stated was to enhance their purchasing power.

It aims to set back to zero the income tax owed by households below a certain threshold and to decrease the

tax liability of some households above. This enables to keep the income tax schedule progressive as it is, while not losing the revenue that would be mechanically (i.e., not taking behavioral responses into account) lost if the effective tax threshold was defined as the statutory one.

For example, in year 2017 for 2016 incomes, for a single individuals with no children, the statutory income tax schedule is as reported in Table 2.1.[18]

Table 2.1 – Statutory marginal tax rates and brackets

Lower threshold	Marginal tax rate
0 €	0.0%
9710 €	14%
26,818 €	30%
71,898 €	41%
152,260 €	45%

Source: Institut des Politiques Publiques.

Now the décote-mechanism has two parameters:[19] a threshold S and a rate $\alpha > 1$. Individuals calculate the income tax T they owe with Table 2.1 and then calculate $T' = \alpha T - S$. If this is below zero, then they owe a zero income tax. If it is above zero, then they owe $min\{T, T'\}$.
In 2017, $S = 1165$ and $\alpha = 7/4$. This implies that the effective income tax threshold is at 14,465 €, and that the income tax is reduced for incomes until 20,805 € (and that between 14,465 € and 20,805 €, the marginal tax rate is multiplied by α).
For a single taxpayer with no children this then induces the marginal tax rates and brackets in Table 2.2.

Table 2.2 – Marginal tax rates and brackets with the décote-mechanism

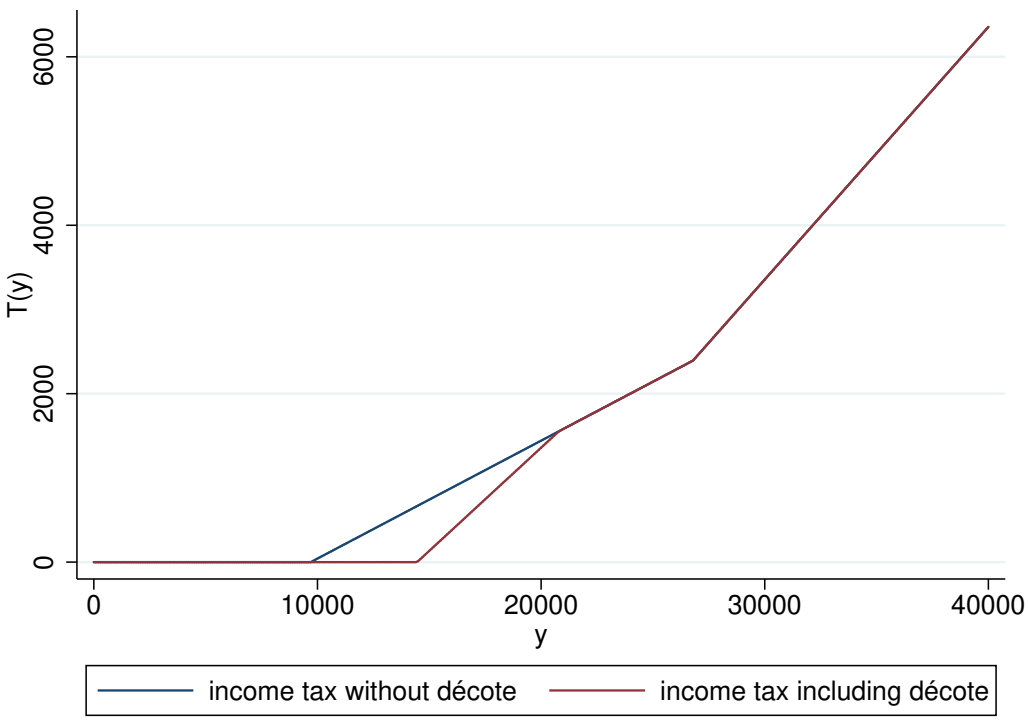
Lower threshold	Marginal tax rate
0 €	0.00%
14,465 €	24.5%
20,805 €	14.0%
26,818 €	30.0%
71,898 €	41.0%
152,260 €	45.0%

Source: Institut des Politiques Publiques.

Below is an illustration of the effect of the décote-mechanism on the statutory income tax schedule for year 2017.

[18] The complete table for the period 2002-2014 is in Appendix 1.7.3.
[19] The complete table for the period 2002-2014 is in Appendix 1.7.3.

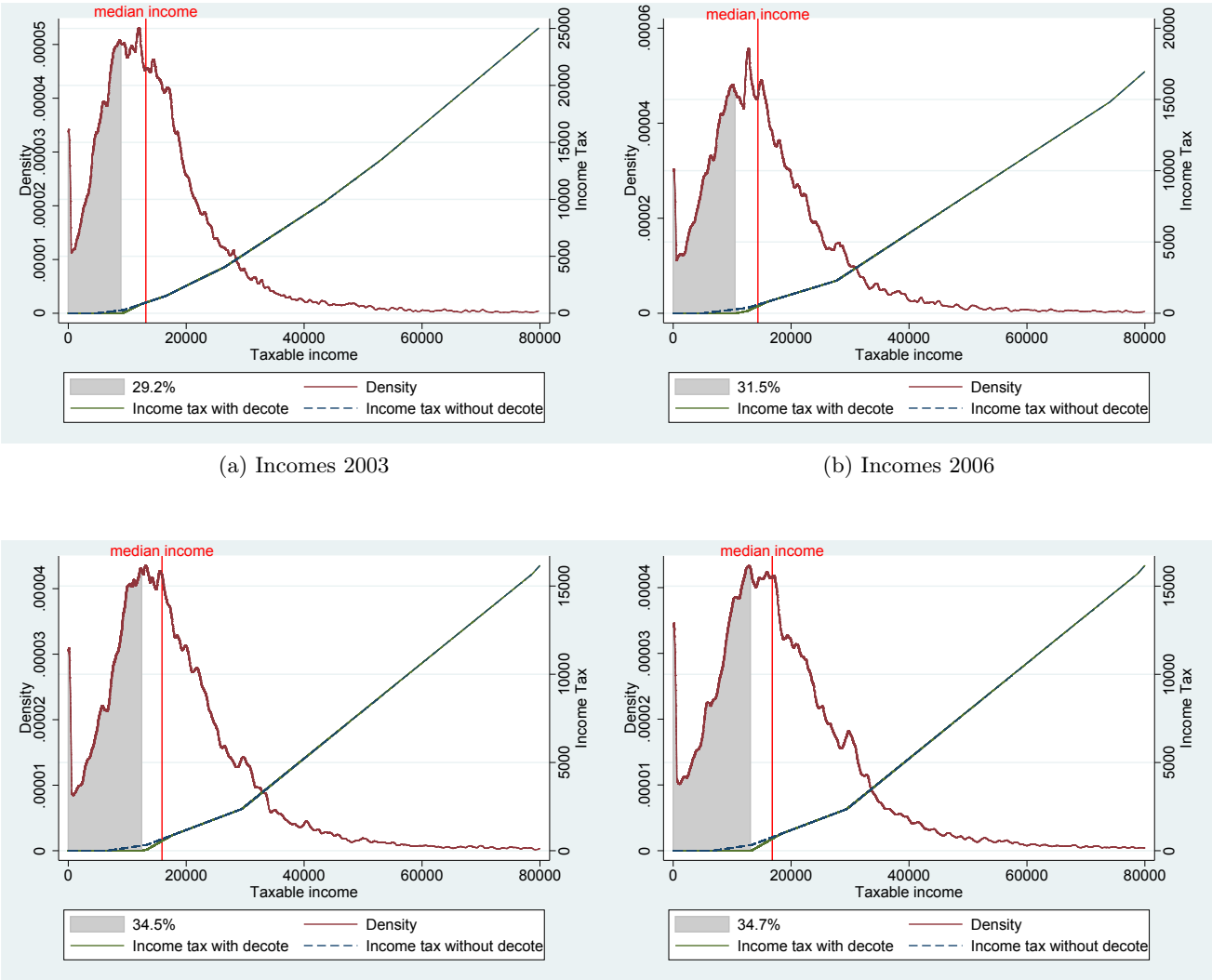
Figure 2.5 – Income tax schedule 2017 with and without the décote-mechanism



The following figures (for years 2003, 2006, 2010 and 2012) show how the mass of individuals and taxpayers is located with respect to the income-tax threshold.[20]

[20] Additional years since 2002 may be found in Appendix 1.7.3.

Figure 2.6 – Tax schedules 2004-2013 with and without the décote-mechanism and distribution of taxable incomes



(a) Incomes 2003 (b) Incomes 2006

(c) Incomes 2010 (d) Incomes 2012

Source: Authors' own calculations using the *Enquêtes Revenus Fiscaux et Sociaux* (ERFS) 2002-2014.
These figures show the distribution of taxable incomes for a representative sample of the French population using a kernel density estimate (purple line). They are combined with the tax schedules faced by the individuals the following year. The tax schedules are shown with and without the décote-mechanism (respectively the green line and the dashed blue line). The area in gray represents the percentage of the population with no tax liability. The red line represents the median type's income.

In the time period between 2002 and 2015, France was governed by both left and right wing governments. From 2002 to 2010, the income tax was lowered every year (with more or less important decreases: the most important ones took place in 2003, 2004 and 2007). In 2011 and 2013, reforms increasing tax liability for richer individuals took place. Throughout this period, however, as can be seen in the figures constituting Figure 2.6 the décote-mechanism was always adjusted so as to lift a considerable percentage of the population from out of the income tax, and the distance between the income-tax threshold and the median has been decreasing. This is in line with the results of Proposition 6: reforms that increase or decrease marginal tax rates for taxpayers may be carried out, but it is politically easier for the legislator to do so if they do not move the income-tax threshold by much or they raise it.

2.5.3 Simulations: on the stability of the taxpaying population

We now use our theory to discuss potential reforms that would increase the number of French households subject to positive income taxes. As discussed in the introduction, the taxpaying population has been relatively constant around 50% for the past thirty years and, at the same time, there are heated public debates every year about the number of taxpayers. As we show below, reforms that would decrease the income-tax threshold and are politically feasible are rare, suggesting that the potential for generic reforms that would increase the number of taxpayers is small. The stability of the taxpaying population seems to be grounded in political reality.

To reach this conclusion we perform the following exercise: we fit the 2013 French tax schedule by a constant rate of progressivity tax function. Then, we simulate potential reforms within this class. For each reform we compute the revenue implication of the reform using Equation (2.2) with the 2013 French income distribution, which we compute from administrative data (the administrative data *POTE* are accessed through the Secure Access Data Center (CASD) infrastructure).

Parameter constellation. Under the assumption that the French tax schedule follows the specification of Heathcote et al. (forthcoming) with an income tax threshold, we find for the 2013 French income tax schedule: $\lambda_0 = \lambda_{2013FR} = 4.095$ and $\rho_0 = \rho_{2013FR} = 0.1495$, so $y_0^E = \lambda_0^{1/\rho_0} = 12455$. These parameters define our status quo.

The possible reforms are couples $\{\rho_1, \lambda_1\}$ that have to satisfy some properties. First, the income-tax threshold cannot be below 61 euros, which is the minimum income tax the administration collects ("seuil de recouvrement"). We also consider that an income-tax threshold above 50000 euros of taxable income seems unreasonable given the current status quo. Hence, for any couple $\{\rho_1, \lambda_1\}$ it has to be the case that $50000 \geq y_E^1 = \lambda_1^{1/\rho_1} \geq 61$. We will thus study the constellation: $\rho_1 \in [0.1, 0.5]$ and $\lambda_1 \in [1.5, 12]$. Interestingly, the assumptions on the monotonicity of $T_1(y) - T_0(y)$ made in Propositions 2-4 are always satisfied for these constellations of parameters. We use a step value of 0.01 for ρ and 0.1 for λ. We take different distributions for χ.

Given the income distribution in France in 2013, the median income individual is above the status-quo income-tax threshold. We simulate reforms that are characterized in Propositions 3 and 4 (Part II) and correspond to reforms that decrease the income-tax threshold. For each reform we then see if it is possible to get the required coalition.

Results. There are 104753 possible reforms lowering the threshold and increasing marginal tax rates (corresponding to reforms in Proposition 3) and there are 2011 possible reforms lowering the threshold and decreasing marginal tax rates (corresponding to the Part II of Proposition 4).

For a normal distribution of χ with mean 1 and standard error 0.5, but truncated at 0 and 2, we find the following: out of the 104753 possible reforms that increase the marginal tax rates (Proposition 3), 9921 gather a sufficient coalition. And 5 out of the 2011 possible reforms that decrease marginal tax rates (Proposition 4) gather the required coalition.

As robustness we perform the same simulation for a normal distribution of χ with mean close to 0 and standard error 0.5, but truncated at 0 and 1, mimicking a population with low cost of becoming a taxpayer. We find that our results are similar in this case.

2.6 Concluding remarks

This chapter develops a conceptual framework to study the political forces affecting the income-tax threshold in a non-linear tax system. First, we show how reforms affecting the income tax threshold can be politically feasible. Second, we present evidence showing how French politicians use the *décote*-mechanism to effectively control the number of households with positive income taxes and how it interacts with reforms of the statutory rates.

2.7 Appendix

2.7.1 Appendix A: Proofs

Proof of Proposition 1. If $\mathcal{X} = \{0\}$, then Δ^V does not depend on χ, and we have:

$$\Delta^V_\tau(\omega \mid 0, h) = \big(\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega))\big)\tilde{u}^0_c(\omega).$$

Indeed, if h does not introduce any kink in the new schedule, the optimal revenue may be characterized by a first-order condition. Then, by the envelope theorem

$$\frac{d}{d\tau}V(\Delta^R(\tau,h),\tau,\omega) = \big((\Delta^R_\tau(\tau,h) - h(y^*(\Delta^R(\tau,h),\tau,\omega))\big)\tilde{u}^1_c(\omega).$$

So that when τ tends to 0, $\Delta^V_\tau(\omega \mid 0, h) = \big(\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega))\big)\tilde{u}^0_c(\omega)$.
If h introduces an upward jump at some point of T_1', then individuals might bunch at some point y^B. For these individuals,

$$\frac{d}{d\tau}V(\Delta^R(\tau,h),\tau,\omega) = \frac{d}{d\tau}u(c_0 + \Delta^R(\tau,h) + y^B - T_0(y^B) - \tau h(y^B), y^B, \omega)$$

$$\frac{d}{d\tau}V(\Delta^R(\tau,h),\tau,\omega) = \big((\Delta^R_\tau(\tau,h) - h(y^B)\big)u_c(c_0 + \Delta^R(\tau,h) + y^B - T_0(y^B) - \tau h(y^B), y^B, \omega)$$

Since there is no bunching under the status quo, at $\tau = 0$, this is only valid for $\tilde{\omega}^0(y^B)$.

Without loss of generality, suppose that h is non-decreasing and $\tau > 0$.
Now, if the median voter benefits from the reform, then $\Delta^V_\tau(\omega^M \mid 0, h) > 0$.
So $\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega^M)) > 0$,
which implies that $\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega)) > 0$ for all $\omega \leq \omega^M$ since h is non-decreasing and $\tilde{y}^0$ is increasing.
Now, if the median voter does not benefits from the reform, then $\Delta^V_\tau(\omega^M \mid 0, h) \leq 0$
So $\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega^M)) \leq 0$,
which implies that $\Delta^R_\tau(0,h) - h(\tilde{y}^0(\omega)) \leq 0$ for all $\omega \geq \omega^M$ since h is non-decreasing and $\tilde{y}^0$ is increasing.

Reminder: $\tilde{y}^0(.)$ is decreasing.
By definition, $\tilde{y}^0(.)$ satisfies the following (first and second order) conditions:

- (FOC): $(1 - T_0'(y))u_c + u_y = 0$
- (SOC): $B := -T_0''(y)u_c + (1 - T_0'(y))^2 u_{cc} + 2(1 - T_0'(y))u_{cy} + u_{yy} < 0$

By differentiating (FOC) with respect to ω, we get, for all $\omega \in \Omega$:

$$\begin{aligned}
\tilde{y}^0(\omega) \times B &= (1 - T_0'(\tilde{y}^0(\omega))\tilde{u}^0_{c\omega}(\omega) + \tilde{u}^0_{y\omega}(\omega) \\
&= -\frac{\tilde{u}^0_y(\omega)}{\tilde{u}^0_c(\omega)}\tilde{u}^0_{c\omega}(\omega) + \tilde{u}^0_{y\omega}(\omega) \leq 0 \\
&\leq 0 \qquad \text{by the Mirrlees single crossing property.}
\end{aligned}$$

So from (SOC), $\tilde{y}^0(\omega) \geq 0$ for all ω.

Proof of Proposition 2. $\tau > 0$. Suppose h is non-decreasing and $y_1^E \geq min(y_0^E, y^{0M})$.
Either $y_0^E \leq y^{0M}$ or $y_0^E > y^{0M}$.
If $y_0^E \leq y^{0M}$ then $y_1^E \geq y_0^E$.
$y_1^E \geq y_0^E$, so $\forall(\omega, \chi) \in \Omega \times \mathcal{X}$,

$$\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega)$$

So as in the proof of Proposition 1, if the median voter benefits from the reform, all the individuals with skills between $\underline{\omega}$ and ω^M benefit from it.
If the median voter does not benefit from the reform, none of the individuals with skills above ω^M benefit from it.
If $y_0^E > y^{0M}$ then $y_1^E \geq y^{0M}$.
Now, for all individuals with $\omega \leq \omega^M$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \Delta_\tau^R(0, h)\tilde{u}_c^0(\omega)$,
so if the median voter benefits from the reform then $\Delta_\tau^R(0, h) > 0$ and all individuals with $\omega \leq \omega^M$ benefit from the reform.
If the median voter does not benefit from the reform, then $\Delta_\tau^R(0, h) \leq 0$ and no-one in the population benefits from the reform.

Proof of Proposition 3. $\tau > 0$. Suppose h is non-decreasing and $y_1^E < min\{y_0^E, y^{0M}\}$.
Now, individuals may be separated into three categories:

- $\forall\, \omega \in [\underline{\omega}, \omega_1^E]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \Delta_\tau^R(0, h)\tilde{u}_c^0(\omega)$
- $\forall\, \omega \in (\omega_1^E, \omega_0^E]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega) - \chi h(\tilde{y}^0(\omega))$
- $\forall\, \omega \in (\omega_0^E, \overline{\omega}]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega)$

Sufficient condition.
Suppose a proportion $\alpha \in [0, G(\omega_0^E) - G(\omega_1^E)]$ of individuals in $(\omega_1^E, \omega_0^E]$ benefit from the reform.
If $\alpha + G(\omega_1^E) \geq \frac{1}{2}$, then the reform is politically feasible.
If not, and if the individuals with skill $\hat{\omega}_\alpha \geq \omega_0^E$, such that $G(\omega_1^E) + [G(\hat{\omega}_\alpha) - G(\omega_0^E)] + \alpha = \frac{1}{2}$ benefit from it, then so do the individuals with skills in $(\omega_0^E, \hat{\omega}_\alpha]$.
Indeed, $\forall\, \omega \in (\omega_0^E, \overline{\omega}]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega)$.
So if $\hat{\omega}_\alpha$ benefits from the reform, then $\Delta_\tau^R(0, h) > h(\tilde{y}^0(\hat{\omega}_\alpha))$.
So since $h(\tilde{y}^0(.))$ is non-decreasing, $\forall\, \omega \in (\omega_0^E, \hat{\omega}_\alpha]$, $\Delta_\tau^R(0, h) > h(\tilde{y}^0(\omega))$.
So all individuals with skills in $[\underline{\omega}, \omega_1^E]$ and all individuals with skills in $[\omega_0^E, \hat{\omega}_\alpha]$ benefit from the reform.
Hence, a proportion $G(\omega_1^E) + [G(\hat{\omega}_\alpha) - G(\omega_0^E)] + \alpha = \frac{1}{2}$ of the population benefits from the reform.

Necessary condition.
Suppose that for all $\alpha \in [0, G(\omega_0^E) - G(\omega_1^E)]$, $\alpha + G(\omega_1^E) < \frac{1}{2}$ and the individuals with skill $\hat{\omega}_\alpha \geq \omega_0^E$, such that $G(\omega_1^E) + [G(\hat{\omega}_\alpha) - G(\omega_0^E)] + \alpha = \frac{1}{2}$ do not benefit from the reform.
Suppose that there exists an $\omega > \hat{\omega}_\alpha$ such that $\Delta_\tau^V(\omega, \chi \mid 0, h) > 0$.
Then, since $h(\tilde{y}^0(.))$ is non-decreasing, $\Delta_\tau^V(\hat{\omega}_\alpha, \chi \mid 0, h) > 0$, which is a contradiction.
Hence, the reform is supported by strictly less than $G(\omega_1^E) + [G(\hat{\omega}_\alpha) - G(\omega_0^E)] + \alpha = \frac{1}{2}$ of the population.

Proof of Proposition 4. $\tau > 0$. Suppose h is non-increasing and $y_1^E < min\{y_0^E, y^{0M}\}$.
Individuals may be separated into three categories:

- $\forall\, \omega \in [\underline{\omega}, \omega_1^E]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \Delta_\tau^R(0, h)\tilde{u}_c^0(\omega)$
- $\forall\, \omega \in (\omega_1^E, \omega_0^E]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega) - \chi h(\tilde{y}^0(\omega))$
- $\forall\, \omega \in (\omega_0^E, \overline{\omega}]$, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \big(\Delta_\tau^R(0, h) - h(\tilde{y}^0(\omega))\big)\tilde{u}_c^0(\omega)$

If $y_0^E \geq y^{0M}$ (i.e., the median type is not a taxpayer under the status quo), then the proof is very similar to that of Proposition 3. (Except that now, if the reform benefits some $\hat{\omega} \geq \omega_0^E$, then it benefits all $\omega \geq \hat{\omega}$.)
If $y_0^E < y^{0M}$, then either we are in a case where the revenue generated is positive, and the prrof goes as above. Or else, the revenue generated is negative. In this case, it is not possible to form a coalition with the lower skilled individuals, as they do not benefit from the reform: for them, $\Delta_\tau^V(\omega, \chi \mid 0, h) = \Delta_\tau^R(0, h)\tilde{u}_c^0(\omega) < 0$. In this case, the individuals who start paying the income tax, i.e., for whom $\omega \in (\omega_1^E, \omega_0^E]$, have a h positive, so that their change in indirect utility cannot be positive. Hence, for it to be politically feasible, such a reform must be supported by individuals in $(\omega_0^E, \overline{\omega}]$. The median type individual belongs to this group. In the same spirit as in the proof of Proposition 1, the reform is politically feasible if and only if the median type individual benefits from it.

Proposition 9: Change in tax revenue.

$$\Delta^R(\tau, h) = \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} \{T_1(y^*(\Delta^R(\tau, h), \tau, \omega, \chi)) - T_0(y^*(0, 0, \omega, \chi))\} f(\omega, \chi)\, d\omega d\chi$$

Hence,

$$\begin{aligned}
\Delta_\tau^R(\tau, h) &= \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} \frac{d}{d\tau}\big(T_0(y^*(\Delta^R(\tau, h), \tau, \omega, \chi)) + \tau h(y^*(\Delta^R(\tau, h), \tau, \omega, \chi))\big) f(\omega, \chi)\, d\omega d\chi \\
&= \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} \big(\Delta_\tau^R(\tau, h) y_e^*(\Delta^R(\tau, h), \tau, \omega, \chi) + y_\tau^*(\Delta^R(\tau, h), \tau, \omega, \chi)\big) T_1'(\tilde{y}^1(\omega, \chi)) f(\omega, \chi)\, d\omega d\chi \\
&\quad + \int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} h(\tilde{y}^1(\omega, \chi)) f(\omega, \chi)\, d\omega d\chi
\end{aligned}$$

So when τ is equal to zero,

$$\Delta_\tau^R(0, h) = \frac{1}{1 - I_0}\Big[\int_{\underline{\omega}}^{\overline{\omega}} \int_{\underline{\chi}}^{\overline{\chi}} y_\tau^*(0, 0, \omega, \chi) T_0'(\tilde{y}^0(\omega)) f(\omega, \chi) d\omega d\chi + \int_{\underline{\omega}}^{\overline{\omega}} h(\tilde{y}^0(\omega)) g(\omega) d\omega\Big],$$

with

$$I_0 = \int_{\underline{\omega}}^{\overline{\omega}} y_e^*(0, 0, \omega, \chi) T_0'(\tilde{y}^0(\omega)) f(\omega, \chi) d\omega d\chi.$$

Differentiating the first order condition to the individuals' optimization problem after the reform and taking the limit when τ tends to zero gives:

$$y_e(0, 0, \omega, \chi) = -\frac{[1 - T_0'(\tilde{y}^0(\omega))]\tilde{u}_{cc}^0 + \tilde{u}_{cy}^0}{B},$$

and

$$y_\tau(0, 0, \omega, \chi) = h(\tilde{y}^0(\omega)) \frac{[1 - T_0'(\tilde{y}^0(\omega))]\tilde{u}_{cc}^0 + \tilde{u}_{cy}^0}{B} + h'(\tilde{y}^0(\omega)) \frac{\tilde{u}_c^0 + \chi \mathbb{1}\{\mathcal{N}\}}{B},$$

with

$$B = [1 - T_0'(\tilde{y}^0(\omega))]^2 \tilde{u}_{cc}^0 - T''(\tilde{y}^0(\omega)) \tilde{u}_c^0 + 2(1 - T_0'(\tilde{y}^0(\omega))) \tilde{u}_{cy}^0 + \tilde{u}_{yy}^0$$

which we know is negative from the second order condition to the individuals' optimization problem.

The income effect does not depend on χ, and is $\eta^0(\omega) = (1 - T_0'(\tilde{y}^0(\omega))) y_e(0, 0, \omega, \chi)$, and, along the lines of Jacquet and Lehmann (2017) and Golosov et al. (2014), the compensated elasticity of taxable income for individuals with ability $\omega > \omega_0^E$, $\epsilon^0(\omega)$, is equal to $y_\tau(0, 0, \omega, \chi)$ for a reform such that $h(y) = -y + \tilde{y}^0(\omega)$ (i.e., a reform that changes the marginal tax rate for individuals with ability ω while maintaining their income-tax liability as in the status quo), i.e. is equal to $\frac{\tilde{u}_c^0}{B}$.

So that for $\omega > \omega_0^E$,

$$y_e^*(0,0,\omega,\chi) = \frac{1}{1 - T_0'(\tilde{y}^0(\omega))}\eta^0(\omega),$$

and

$$y_\tau^*(0,0,\omega,\chi) = -h(\tilde{y}^0(\omega))\frac{1}{1 - T_0'(\tilde{y}^0(\omega))}\eta^0(\omega) - h'(\tilde{y}^0(\omega))\frac{\tilde{y}^0(\omega)}{1 - T_0'(\tilde{y}^0(\omega))}\epsilon^0(\omega)$$

Finally, since $T(y) = T'(y) = 0$ for all $y \leq \tilde{y}^0(\omega)$,

$$\Delta_\tau^R(0,h) = \frac{1}{1 - I_0}\Big[- \int_{\omega_0^E}^{\overline{\omega}} \big(\eta^0(\omega)h(\tilde{y}^0(\omega)) + \tilde{y}^0(\omega)\epsilon^0(\omega)h'(\tilde{y}^0(\omega))\big)\frac{T_0'(\tilde{y}^0(\omega))}{1 - T_0'(\tilde{y}^0(\omega))}g(\omega)d\omega$$
$$+ \int_{\underline{\omega}}^{\overline{\omega}} h(\tilde{y}^0(\omega))g(\omega)d\omega\Big],$$

with

$$I_0 = \int_{\omega_0^E}^{\overline{\omega}} \eta^0(\omega)\frac{T_0'(\tilde{y}^0(\omega))}{1 - T_0'(\tilde{y}^0(\omega))}g(\omega)d\omega.$$

2.7.2 Appendix B: Empirical analysis

Table 2.3 – French income tax schedule 2002-2015

Year		Bracket thresholds (in euros)							Marginal tax rates (%)						
Tax	Income	Th1	Th2	Th3	Th4	Th5	Th6	Th7	mtr1	mtr2	mtr3	mtr4	mtr5	mtr6	mtr7
2015	2014	0	9,690	26,764	71,754	151,956			0	14	30	41	45		
2014	2013	0	6,011	11,991	26,631	71,397	151,200		0	5.5	14	30	41	45	
2013	2012	0	5,963	11,896	26,420	70,830	150,000		0	5.5	14	30	41	45	
2012	2011	0	5,963	11,896	26,420	70,830			0	5.5	14	30	41		
2011	2010	0	5,963	11,896	26,420	70,830			0	5.5	14	30	41		
2010	2009	0	5,875	11,720	26,030	69,783			0	5.5	14	30	40		
2009	2008	0	5,852	11,673	25,926	69,505			0	5.5	14	30	40		
2008	2007	0	5,687	11,344	25,195	67,546			0	5.5	14	30	40		
2007	2006	0	5,614	11,198	24,872	66,679			0	5.5	14	30	40		
2006	2005	0	4,412	8,677	15,274	24,731	40,241	49,624	0	6.83	19.14	28.26	37.38	42.62	48.09
2005	2004	0	4,334	8,524	15,004	24,294	39,529	48,747	0	6.83	19.14	28.26	37.38	42.62	48.09
2004	2003	0	4,262	8,382	14,753	23,888	38,868	47,932	0	6.83	19.14	28.26	37.38	42.62	48.09
2003	2002	0	4,191	8,242	14,506	23,489	38,218	47,131	0	7.05	19.74	29.14	38.54	43.94	49.58

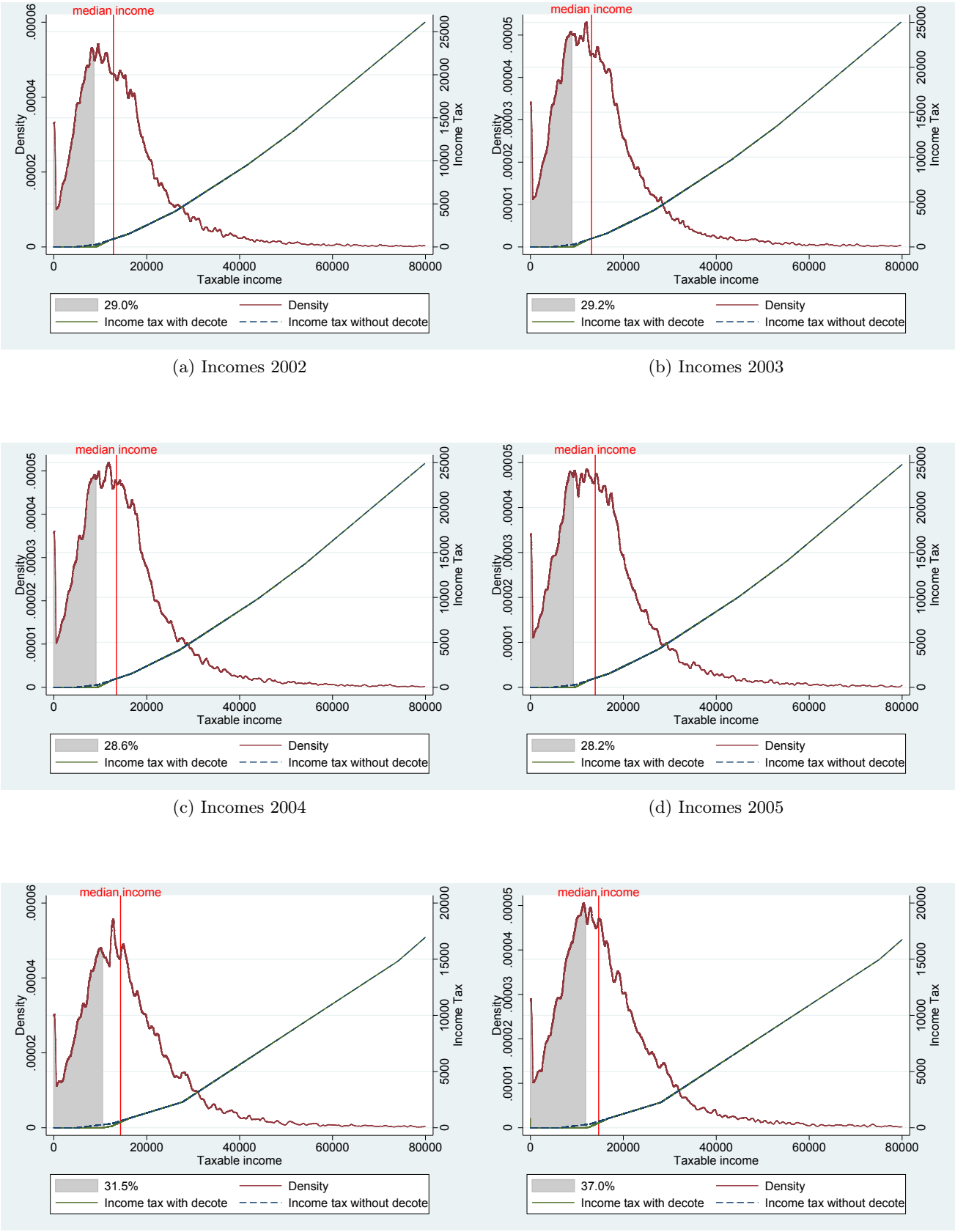
Note: Th stands for Threshold and mtr for marginal tax rate.
Source: Institut des Politiques Publiques.

Table 2.4 – "*Décote*" parameters 2002-2015

Income year	S		α
	Singles	Couples	
2015	1165	1870	7/4
2014	1135	1920	2
2013	508		3/2
2012	480		3/2
2011	439		3/2
2010	439		3/2
2009	433		3/2
2008	431		3/2
2007	419		3/2
2006	414		3/2
2005	407		3/2
2004	400		3/2
2003	393		3/2
2003	386		3/2

Source: Institut des Politiques Publiques.

Figure 2.7 – Tax schedules 2003-2008 with and without "décote" and distribution of taxable incomes



(a) Incomes 2002

(b) Incomes 2003

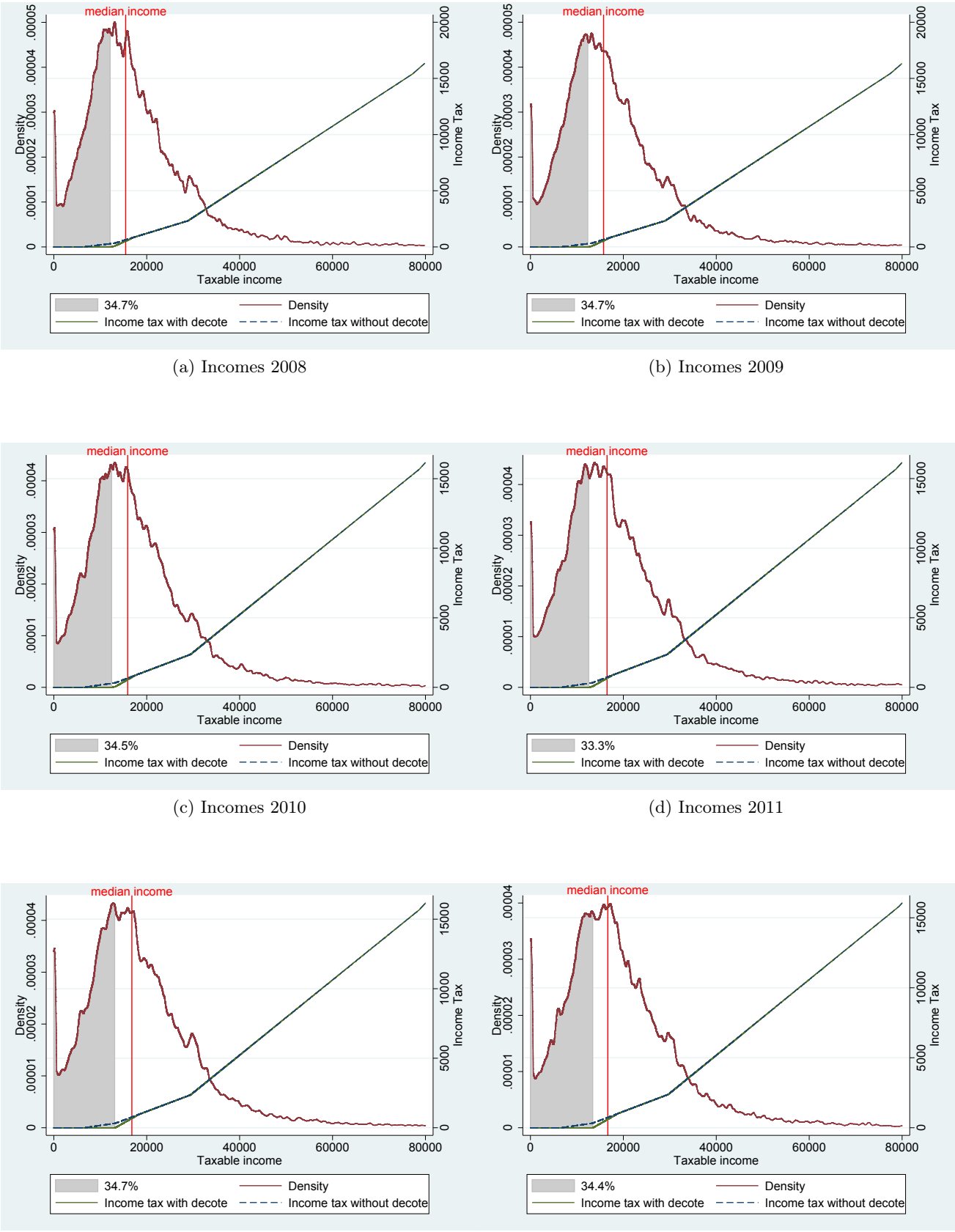
(c) Incomes 2004

(d) Incomes 2005

(e) Incomes 2006

(f) Incomes 2007

Figure 2.8 – Tax schedules 2009-2014 with and without "décote" and distribution of taxable incomes



(a) Incomes 2008

(b) Incomes 2009

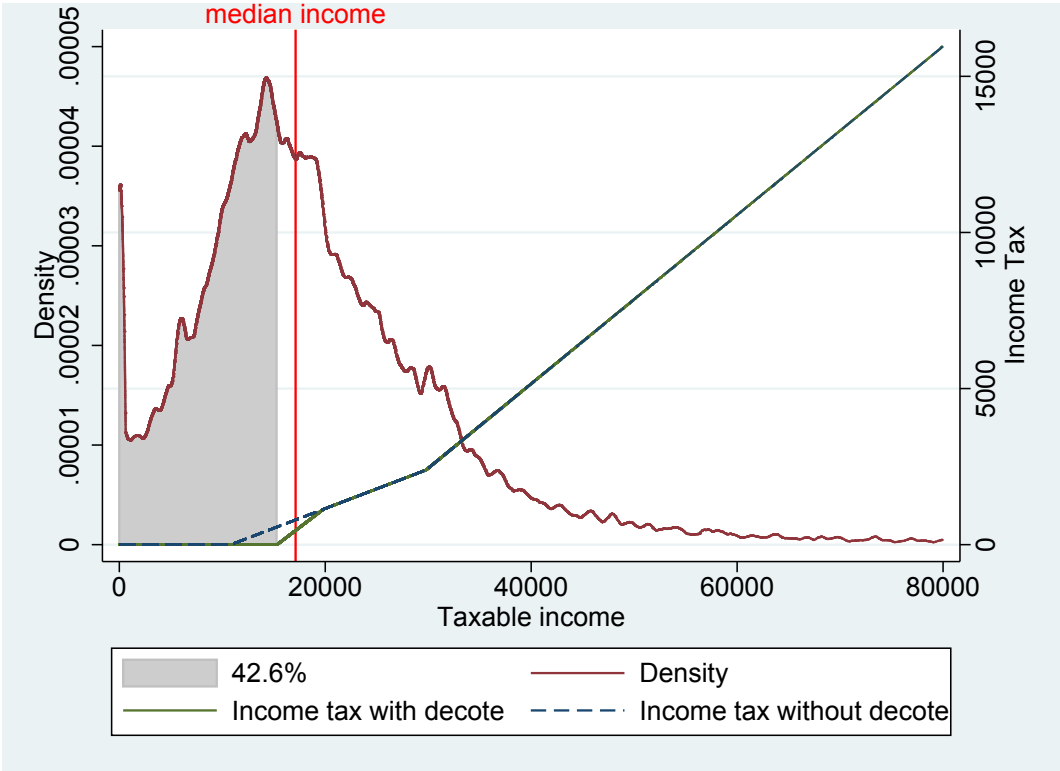
(c) Incomes 2010

(d) Incomes 2011

(e) Incomes 2012

(f) Incomes 2013

Figure 2.9 – Income tax schedule 2015 with and without "décote" and distribution of taxable incomes



Description of the *POTE* database. The POTE database is a French cross-section data-set available for years 1994-2016. It contains data for a representative sample of the French population (500,000 tax units) on their fiscal declarations.

Chapter 3

Intégration Européenne et Politiques du Marché du Travail

Ce chapitre a été écrit avec Sebastian Blesse (ZEW Mannheim), Pierre C. Boyer (CREST, École Polytechnique), Friedrich Heinemann (ZEW Mannheim) et Eckhard Janeba (University of Mannheim).

Abstract (français). Cet article présente les résultats d'une enquête menée auprès des parlementaires français et allemands sur l'opportunité d'une intégration européenne dans les domaines liés au marché du travail. En particulier, l'avis de parlementaires est recueilli sur l'intérêt d'une plus grande intervention de l'Union Européenne dans la règlementation du marché du travail et la politique salariale dans les États membres. Ils ont également exprimé leur opinion sur la création d'une assurance chômage européenne commune, ou sur la nécessité de rendre le marché du travail plus flexible. Après une présentation descriptive des réponses, nous montrons que pour la majorité des questions nos résultats font état d'un clivage partisan gauche/droite plus marqué qu'une différence France/Allemagne.

Mots-clés : Intégration européenne ; enquête ; parlementaires nationaux français et allemands ; politiques du marché du travail.

Abstract (English). This paper presents the results of a survey on the future of European integration conducted in the national parliaments of both France and Germany. In particular, we collected the opinions of members of national parliaments on more involvement of the European Union in labor market policies of Member States. We also asked them about their views on the creation of a common unemployment insurance and whether more flexibility is needed in national labor markets. After reporting descriptive and summary statistics, we show that for the majority of questions the answers reflect more of an ideological (left/right) division rather than a French/German one.

Keywords: European integration; survey; French and German members of national parliament; labor market policies.

Codes de classification JEL : F15 ; J40 ; J60 ; J80 ; C83.

3.1 Introduction

Depuis le rejet du traité constitutionnel en France et aux Pays-Bas en 2005, la construction européenne a été remise en cause par une série de crises. La décision du Royaume-Uni de quitter l'Union Européenne (UE) en juin 2016 en est le dernier épisode. Ces crises ont mis au premier plan la nécessité d'un débat sur les compétences

à allouer à l'échelon européen. Les suggestions de réformes sont nombreuses, allant de stratégies visant à une union fédéraliste conférant plus de compétences politiques au niveau européen à des stratégies de désintégration, donnant plus d'autonomie au niveau national[1].

La recherche de légitimité pour les décisions de l'UE ou de la zone euro est souvent associée à une nécessité de consensus large et d'une implication plus forte des parlements nationaux[2]. Ainsi, nous avons recueilli l'opinion de parlementaires français de l'Assemblée nationale et du Sénat, et de parlementaires allemands du Bundestag sur l'élargissement des compétences de l'UE. Contrairement aux analyses régulières faites sur les préférences en matière d'intégration des citoyens européens (cf. les différentes vagues de l'Eurobaromètre depuis 1974), un manque de données persiste sur l'opinion des responsables politiques face à une évolution du projet européen. L'analyse économétrique des réponses présentée dans cet article contribue donc à enrichir les grands débats contemporains sur l'intégration européenne.

Un consensus des parlementaires des deux côtés du Rhin ne garantit certainement pas l'acceptation de propositions d'intégration par le reste des membres de l'UE. Cependant, étant donné l'importance historique de ces deux nations dans le processus d'intégration européenne et la difficulté d'obtenir une majorité qualifiée au Conseil de l'Union Européenne sans l'aval d'au moins un des deux pays, il est probable que des réformes soutenues ni par le parlement français ni par le parlement allemand auraient peu de chances d'être adoptées. Nous voyons donc un consensus franco-allemand comme une condition nécessaire pour la faisabilité de réformes liées à l'intégration européenne.

Notre enquête recueille l'avis de parlementaires sur plusieurs questions liées à l'intégration européenne à travers une série de questions spécifiques sur les instruments et options pour y parvenir. Elle a été menée entre avril et juillet 2016. Nous présentons dans cet article les résultats des questions se rattachant à la thématique du marché du travail[3].

Les politiques liées au marché du travail sont un volet essentiel dans la politique des États membres et elles sont soumises à une attente de résultats forte des citoyens vis-à-vis de leurs représentants (les citoyens placent régulièrement l'emploi parmi leurs préoccupations essentielles de la vie quotidienne). De plus, dans un sondage Eurobaromètre spécial du Parlement européen en avril 2016, les citoyens européens placent la lutte contre le chômage parmi les domaines où ils souhaitent que l'UE intervienne davantage. Des réformes dans ce domaine sont régulièrement faites (cf. Turrini et al. (2015)) mais elles restent dans le giron des États membres et soulèvent de vives critiques[4]. La perception des parlementaires sur l'opportunité d'allouer plus de compétences à l'UE dans ce domaine est donc particulièrement intéressante.

Les parlementaires ont pu exprimer leur approbation ou leur opposition (échelle des réponses de -4 à 4, 0 étant libellé comme *Indifférent*) sur une dizaine de propositions ou questions que nous leur avons soumises. Nous considérons les quatre questions directement liées au marché du travail :

1. Marché du travail : "L'UE pourrait donner des directives contraignantes aux États membres relatives au marché du travail (par exemple sur les modalités de la protection des salariés contre les licenciements ou sur les clauses du contrat de travail à durée déterminée)".

[1] Pour une analyse coûts/bénéfices de l'intégration fédérale dans la littérature académique voir par exemple Alesina, Angeloni et Shuknech (2005). Cette littérature est inspirée de la littérature de fédéralisme fiscal, cf. Oates (1999).

[2] Voir Rosanvallon (2013) pour une histoire et une théorie de la légitimité démocratique, et Hennette, Piketty, Sacriste et Vauchez (2017) pour une proposition récente pour une implication plus forte des parlements nationaux dans la zone euro.

[3] Un résumé non-technique présentant les résultats de l'enquête peut être trouvé dans une note de politique du ZEW, cf. Blesse, Boyer, Heinemann et Janeba Blesse, Boyer, Heinemann and Janeba (2016).

[4] Voir par exemple Saint-Paul (1996; 2002) et Boeri, Conde-Ruiz et Galasso (2012) pour une économie politique des réformes du marché du travail. Voir également le manuel de Cahuc, Carcillo et Zylberberg (2015) pour une revue des problématiques liées au marché du travail.

2. Politique salariale : "L'UE pourrait avoir des droits d'intervention plus importants dans les politiques salariales des États membres (par exemple sur le niveau du salaire minimum légal)".

3. Assurance chômage européenne : "Pour pallier une éventuelle récession de certains États membres dans la zone euro il faudrait créer une assurance chômage commune européenne".

4. Marché du travail plus flexible : "Une croissance plus forte dans la zone euro requiert que les États comptabilisant un nombre important de chômeurs de longue durée rendent plus flexible leur marché du travail (par exemple en assouplissant les conditions de licenciement ou en baissant le niveau du salaire minimum)".

Notre analyse utilise un modèle Probit ordonné[5]. De façon générale, nos résultats montrent un non-alignement des préférences exprimées sur l'intégration européenne entre les membres des partis de droite et de gauche. Ce clivage gauche/droite est souvent plus marqué que la différence France/Allemagne.

Pour les deux premières questions, nous obtenons un effet significatif pour la nationalité et l'appartenance politique. Les deux effets sont tels que la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente avec le fait d'être français d'une part et d'appartenir à un parti de gauche d'autre part. Cependant les effets des deux variables sont du même ordre de grandeur pour la première question alors que la nationalité a un plus fort effet que l'affiliation politique pour la politique salariale.

L'introduction d'une assurance chômage commune européenne est une piste pour introduire un mécanisme de partage des risques affectant les pays membres en cas de chocs touchant différemment les pays en temps de crises (Voir Dolls, Fuest, Neumann et Peichl (*à paraître*)). Notre analyse montre que la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente avec le fait d'être français d'une part et d'appartenir à un parti de gauche d'autre part. Les effets ne sont pas du même ordre de grandeur : le clivage politique est beaucoup plus fort que celui lié la nationalité.

Enfin, les réformes structurelles visant à plus de flexibilité du marché du travail représentent typiquement une politique d'offre. Cette question révèle un clivage exclusivement partisan : la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente fortement avec le fait d'appartenir à un parti de droite. Une forte polarisation gauche/droite est donc observée alors que la nationalité du parlementaire ne joue pas un rôle significatif dans les réponses à cette question.

Les exemples proposés à la fin de nos questions aux parlementaires peuvent faire ressortir un caractère partisan dans les réponses apportées. Des divergences droite/gauche pouvaient donc, dans une certaine mesure, être attendues. Cependant, leur ampleur ne l'était pas nécessairement et il nous paraît d'autant plus intéressant de trouver des convergences entre la France et l'Allemagne sur certaines d'entre-elles.

La section suivante présente les données. Puis, nous analysons les résultats du modèle Probit ordonné. Dans la section 3.4, nous procédons à des tests de robustesse. La dernière section conclut l'analyse économétrique.

3.2 Les données

Nos données proviennent d'une enquête menée par l'École Polytechnique, le ZEW (Centre pour la Recherche Européenne en Économie, *Zentrums für Europäische Wirtschaftsforschung*) et l'Université de Mannheim.

Description de l'enquête. Les questionnaires ont été envoyés par courrier en France et en Allemagne à la fin du mois d'avril 2016. Les trois pages du questionnaire, accompagnées d'une lettre explicative, ont été envoyées au même moment à l'adresse principale de chaque parlementaire, depuis Palaiseau pour les parlementaires

[5]Les résultats obtenus sont robustes lorsque l'on change de modèle ou que l'on considère d'autres variables, voir la section 3.4.

français (Assemblée Nationale et Sénat) et depuis Mannheim pour les parlementaires allemands (Bundestag)[6]. Les questionnaires, en français et en allemand, ont le même contenu. Quatre possibilités ont été offertes aux parlementaires pour y répondre (courrier, courriel, fax ou en ligne). Des courriels de relance ont été envoyés quelques semaines plus tard à ceux qui n'avaient pas encore répondu et qui n'avaient pas explicitement indiqué ne pas vouloir participer à l'enquête. Enfin, des relances téléphoniques ont eu lieu en juin et juillet pour les parlementaires restants. Les questionnaires remplis ont été reçus entre la fin du mois d'avril et la mi-juillet 2016.

Afin de pouvoir utiliser les caractéristiques individuelles des parlementaires (parti politique, âge, sexe, etc.), nous avons décidé que l'enquête ne serait pas anonyme. Cependant, pour encourager les parlementaires à exprimer sans biais leurs préférences, la confidentialité des réponses personnelles leur a été garantie.

Le questionnaire se divise en trois parties : la répartition des missions et compétences en Europe, le pacte budgétaire européen, et la politique monétaire et des finances dans la zone euro. Les réponses possibles à l'enquête s'échelonnent selon une échelle de Likert entre -4 (*Pas d'accord*) et +4 (*D'accord*). Le 0 a été libellé comme *Indifférent*[7].

Sur les 1552 questionnaires envoyés, 232 ont été complétés (le taux de réponse est donc de 14,95%). Le taux de réponses est de 14,21% pour les parlementaires français (15,27% pour les sénateurs et sénatrices et 13,57% pour les député-e-s) et de 16,03% pour les parlementaires allemands. Sur les 232 parlementaires ayant répondu, 101 sont allemands (sur 630) et 131 sont français (sur 922).

Afin de faciliter une comparaison franco-allemande, nous avons classifié les partis nationaux selon l'affiliation de leurs membres au Parlement Européen. Ainsi les partis LR (Les Républicains) et CDU/CSU (Union chrétienne-démocrate d'Allemagne et Union chrétienne-sociale de Bavière) sont membres du groupe PPE (Parti populaire européen) ; les partis membres du groupe S&D (Alliance progressiste des socialistes et démocrates) sont le PS (Parti Socialiste), le PRG (Parti Radical de Gauche) et le SPD (Parti social-démocrate d'Allemagne). Le parti UDI (Union des Démocrates et Indépendants) est membre du groupe ALDE (Alliance des libéraux et des démocrates pour l'Europe) ; Bündnis 90/Die Grünen et EELV (Europe écologie-les Verts) sont membres du groupe des Verts/Alliance libre européenne ; Die Linke, le groupe Gauche démocrate et républicaine et le PC (Parti Communiste) sont membres du groupe GUE/NGL (Gauche unitaire européenne/Gauche verte nordique) et le FN (Front national) est membre du groupe ENL (Europe des nations et des libertés). Vingt-trois parlementaires ne correspondent à aucun de ces groupes.

[6] Le questionnaire n'a pas été envoyé aux membres du Bundesrat car cette chambre inclut seulement une minorité des représentants des gouvernements des Länder allemands.

[7] Voir Blesse et al. (2017) pour plus de détails sur la forme de l'enquête.

Table 3.1 – Participation par parti politique

Parti	Réponse	Pas de réponse	Total
PPE	88	562	650
	(13,5 %)	(86,5 %)	
S&D	110	506	616
	(17,9 %)	(82,1 %)	
Autres	34	252	286
	(11,9 %)	(88,1 %)	
Total	232	1320	1552
	(14,9%)	(85,1%)	

La catégorie "Autres" est composée des membres affiliés aux groupes ALDE (total de 72), Verts/ALE (total de 90), GUE/NGL (total de 98) et ENL (total de 3), et non classifiés (23 au total). Étant donné leurs nombres ainsi que leurs taux de réponses, nous avons décidé de les grouper afin de préserver la confidentialité des réponses exprimées.

Certaines caractéristiques individuelles ont également été prises en compte : il s'agit de l'âge, du sexe, du nombre d'années au parlement, de l'obtention ou non du baccalauréat, de la poursuite ou non d'études supérieures (voir l'Annexe A pour plus de détails). Nous avons également des données sur leur participation à la Commission des Finances ou à celle des Affaires Européennes. Le nombre de réponses dans les différents groupes (voir Table 1) et notre engagement à garantir la confidentialité des réponses impliquent que nous présentons ici les résultats des parlementaires rattachés aux groupes PPE et S&D[8].

La Table 1 ainsi que la Table 9 (dans l'Annexe B) mettent en avant de manière descriptive des taux de réponses différant selon la nationalité, l'appartenance politique et les caractéristiques individuelles mentionnées ci-dessus.
Dans la section 3.3.1 nous estimerons la décision de participation à l'enquête en fonction de ces caractéristiques et la section 3.4 s'attachera à contrôler pour d'éventuels effets de sélection.

Marché du travail et intégration européenne : Statistiques descriptives. Nous présentons dans cet article les réponses aux quatre questions relatives au marché du travail exposées dans l'introduction. Nous commençons par faire une analyse descriptive de la distribution des réponses par parti politique puis par nationalité.

La proposition d'introduire des directives contraignantes relatives au marché du travail des membres de l'UE trouve un fort appui dans le groupe S&D, et peu de soutien dans le groupe PPE qui est en grande partie fortement contre, même si l'on en trouve une proportion non-négligeable qui l'appuie légèrement. Les questions concernant la politique salariale et la flexibilité du marché du travail présentent des opinions très divergentes avec les membres des partis S&D et PPE répartis de part et d'autre de la distribution des réponses. Cette divergence S&D et PPE se retrouve dans les réponses à la question d'une assurance chômage européenne, avec une très forte concentration (près de 40%) de membres du groupe PPE qui y sont très opposés.

En considérant les réponses à travers le filtre de la nationalité nous observons que la proposition concernant le marché du travail semble assez clivante, les parlementaires allemands y étant plus opposés que les parlementaires français. Les proportions sont cependant similaires pour les parlementaires avec de faibles préférences dans un sens ou dans l'autre. La proposition selon laquelle les politiques salariales des États membres pourraient être davantage intégrées trouve un fort soutien de la part des parlementaires français, et une forte opposition de la part des parlementaires allemands. La création d'une assurance chômage commune européenne rencontre une

[8]Notons que cela conduira certainement à une sous-estimation du facteur politique dans notre analyse, renforçant ainsi nos résultats sur les clivages partisans que nous trouvons en nous restreignant aux groupes PPE et S&D.

forte opposition de la part des parlementaires allemands. Les réponses à la question relative à un marché du travail plus flexible semblent montrer un certain consensus entre les parlementaires des deux pays.

FIGURE 3.1 – Distribution des réponses par parti politique (en pourcentage)

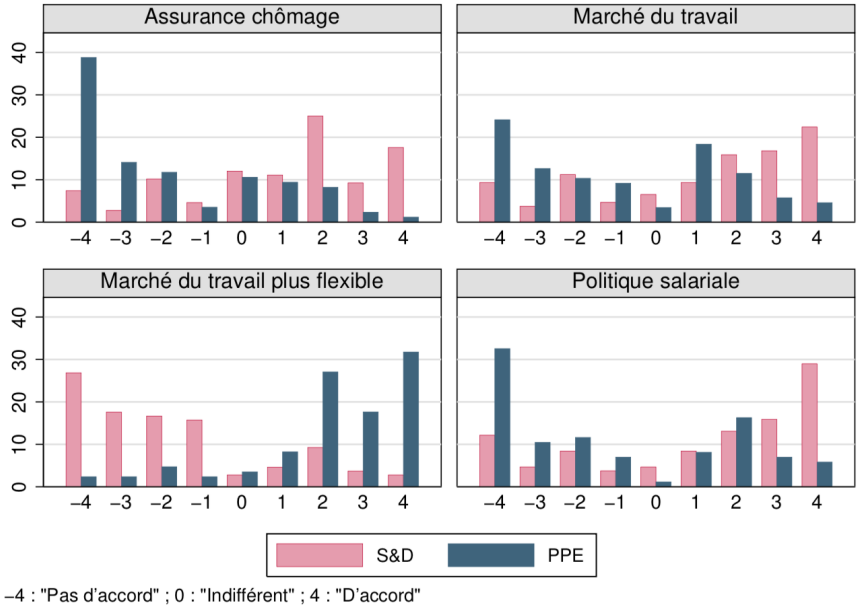
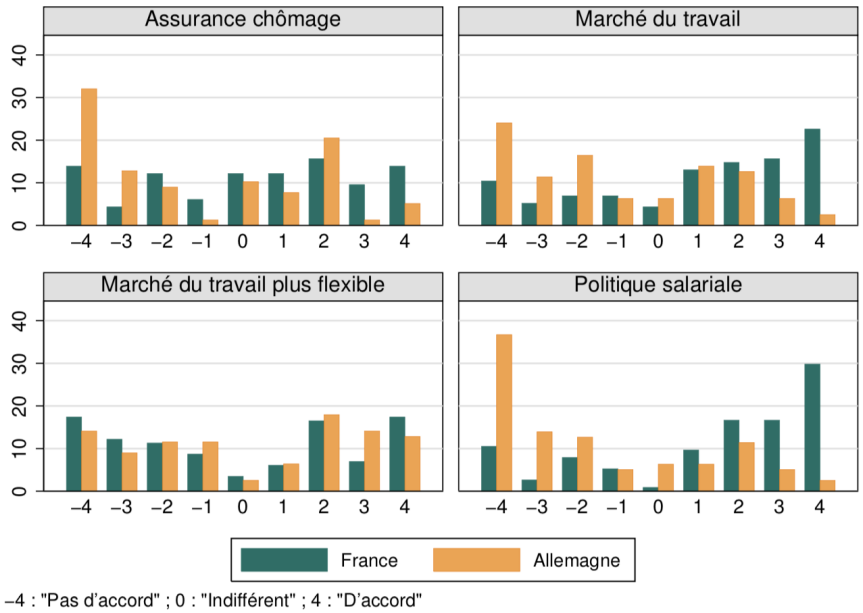


FIGURE 3.2 – Distribution des réponses par nationalité (en pourcentage)



3.3 Analyse économétrique

Le but de cette analyse économétrique n'est pas d'établir de lien de causalité entre une idéologie politique et/ou une nationalité et une opinion sur l'intégration européenne. Nous cherchons, tout en contrôlant par les caractéristiques individuelles des parlementaires, à mettre en lumière, dans le contexte actuel, des terrains d'entente entre les deux pays ainsi qu'à déterminer les domaines où les clivages idéologiques sont les moins élevés.

Nous avons commencé par comparer les différences statistiquement significatives entre les réponses données par

les parlementaires français et allemands puis par les groupes S&D et PPE. Afin d'analyser les données obtenues et de contrôler par des facteurs individuels, nous avons utilisé un modèle Probit ordonné.

3.3.1 Déterminants de la participation

Nous commençons par déterminer les facteurs de participation en estimant un modèle Probit binaire, où la variable dépendante est égale à 1 si le/la parlementaire a répondu, 0 si il/elle n'a pas répondu à l'enquête.
Nous utilisons les variables explicatives mentionnées dans la section 3.2 :

- $Fr = 1$ si le/la parlementaire est français(e), 0 si il/elle est allemand(e) ;
- $S\&D = 1$ si le/la parlementaire appartient au groupe S&D, 0 pour le groupe PPE.
- $Femme = 1$ si c'est une femme, 0 si c'est un homme ;
- Age l'âge du/de la parlementaire ;
- $Annees$ le nombre d'années passées au parlement ;
- $Bac = 1$ si il/elle a obtenu son baccalauréat (*Abitur* en Allemagne) ;
- $Etudes = 1$ si il/elle a poursuivi des études supérieures.

Les résultats présentés dans la Table 2 ci-dessous révèlent un effet positif et significatif à un niveau de 95% pour l'affiliation politique (effet marginal moyen de 5% : *ceteris paribus*, un/une parlementaire du groupe S&D a en moyenne une probabilité de 5% supérieure à un/une parlementaire du groupe PPE d'avoir répondu à l'enquête) : les parlementaires membres du groupe S&D ont donc proportionnellement plus répondu à notre enquête.

Pour les autres variables nous ne trouvons pas d'effet significatif ou un effet significatif mais très faible. En particulier, l'âge a un effet faiblement positif et significatif à un niveau de 99% (effet marginal moyen de 0,4%) et le nombre d'années passées au parlement a un effet faiblement négatif et significatif à un niveau de 90% (effet marginal moyen de 0,3%).

Table 3.2 – Déterminants de la participation : Effets marginaux moyens

	Participation
Fr	-0.039
	(0.024)
S&D	0.051**
	(0.022)
Femme	-0.033
	(0.023)
Age	0.004***
	(0.001)
Annees	-0.003*
	(0.002)
Bac	0.061
	(0.043)
Etudes	-0.026
	(0.051)
Observations	1 185

Les écarts-types sont données entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

Dans la section 3.4.1, nous prenons en compte les éventuels effets de sélection en utilisant un modèle de sélection de Heckman.

3.3.2 Méthode d'estimation : Le modèle Probit ordonné

Nous analysons maintenant les réponses obtenues.

Nous utilisons un modèle Probit ordonné, avec Y_i la variable indiquant la réponse à l'une des questions et Y_i^* la variable latente associée à Y_i telle que

$$Y_i^* = \beta_1 Fr_i + \beta_2 SD_i + \boldsymbol{\gamma Z}_i + \epsilon_i,$$

avec $\epsilon \sim \mathcal{N}(0,1)$, $i \in \{1\ ,..., \mathrm{N}\}$, N étant le nombre de parlementaires ayant répondu à cette question donnée.

Les composantes de $\boldsymbol{X}$ (variables explicatives) sont les mêmes que dans la section 3.3.1 :

Variables principales : *Fr* et *S&D*.

Variables de contrôle ($\boldsymbol{Z}$) : *Femme*, *Age*, *Annees*, *Bac* et *Etudes*.

Les coefficients $\boldsymbol{\beta}$ et $\boldsymbol{\gamma}$ ne pouvant que donner le signe de l'effet de la variable associée sur la variable dépendante, nous présentons plutôt les effets marginaux moyens (moyenne des effets d'un changement marginal de la k-ième composante de $\boldsymbol{X}$ sur la probabilité que $Y = j$).

3.3.3 Résultats des estimations

Nous présentons maintenant les résultats des différentes questions.

1. Marché du travail : "L'UE pourrait donner des directives contraignantes aux États membres relatives au marché du travail". Nous trouvons un effet significatif (à un niveau de 99%) pour la nationalité et l'appartenance politique. Les deux effets sont positifs : la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente avec le fait d'être français d'une part et d'appartenir au groupe S&D d'autre part. Les effets sont du même ordre de grandeur pour les deux variables. Le nombre d'années passées au parlement a également un léger effet négatif et significatif à un niveau de 95%.

Les effets marginaux moyens pour chaque réponse possible sont donnés dans le tableau et le graphe ci-dessous[9] :

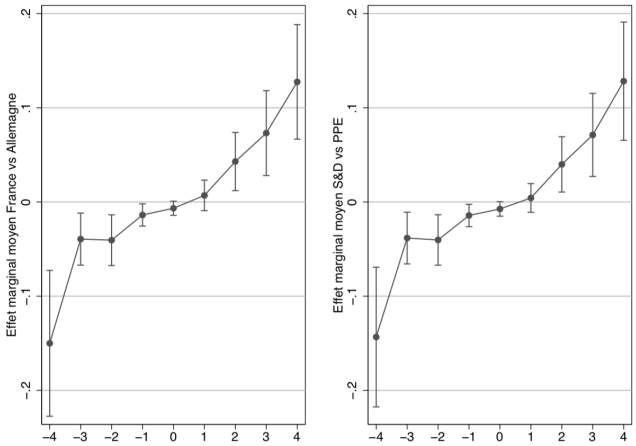
Table 3.3 – Marché du travail : Effets marginaux moyens

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
Fr	-0.1500***	-0.0390***	-0.0400***	-0.0140**	-0.0066*	0.0069	0.0420***	0.0720***	0.1300***
	(0.0400)	(0.0140)	(0.0140)	(0.0060)	(0.0038)	(0.0082)	(0.0160)	(0.0230)	(0.0310)
S&D	-0.1400***	-0.0380***	-0.0400***	-0.0140**	-0.0073*	0.0044	0.0400***	0.0710***	0.1300***
	(0.0380)	(0.0140)	(0.0140)	(0.0060)	(0.0039)	(0.0078)	(0.0150)	(0.0220)	(0.0320)
Femme	-0.0049	-0.0012	-0.0013	-0.0005	-0.0003	-0.0000	0.0011	0.0022	0.0049
	(0.0400)	(0.0098)	(0.0110)	(0.0040)	(0.0023)	(0.0004)	(0.0087)	(0.0180)	(0.0410)
Age	-0.0030*	-0.0008	-0.0008	-0.0003	-0.0002	-0.0001	0.0006*	0.0014	0.0032
	(0.0018)	(0.0005)	(0.0006)	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0008)	(0.0021)
Annees	0.0059**	0.0014**	0.0015**	0.0006*	0.0003*	0.0000	-0.0013**	-0.0026**	-0.0058**
	(0.0023)	(0.0007)	(0.0007)	(0.0003)	(0.0002)	(0.0003)	(0.0006)	(0.0011)	(0.0023)
Bac	0.0820	0.0220	0.0260	0.0110	0.0074	0.0081	-0.0120**	-0.0360	-0.1100
	(0.0640)	(0.0200)	(0.0250)	(0.0120)	(0.0092)	(0.0150)	(0.0053)	(0.0260)	(0.1200)
Etudes	-0.1600	-0.0300*	-0.0260**	-0.0066*	-0.0012	0.0160	0.0420	0.0630*	0.1100**
	(0.1100)	(0.0170)	(0.0110)	(0.0034)	(0.0039)	(0.0190)	(0.0310)	(0.0370)	(0.0500)

Observations : 183
Les écarts-types sont donnés entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

[9] Nous pouvons par exemple interpréter le premier chiffre dans la table de la façon suivante : *ceteris paribus*, en moyenne, la probabilité qu'un/une parlementaire français(e) ne soit pas d'accord avec cette proposition (coche la case "-4") est de 15% plus basse que pour un/une parlementaire allemand(e).

FIGURE 3.3 – Marché du travail : Effets marginaux moyens avec intervalles de confiance à 95%



-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

2. Politique salariale : "l'UE pourrait avoir des droits d'intervention plus importants dans les politiques salariales des États membres". Nous trouvons un effet significatif (à un niveau de 99%) pour la nationalité et l'appartenance politique. Les deux effets sont positifs : la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente avec le fait d'être français d'une part et d'appartenir au groupe S&D d'autre part. Les effets ne sont pas du même ordre de grandeur : la nationalité a un effet plus fort que l'affiliation politique.

L'âge (respectivement le nombre d'années au parlement) a un faible effet positif (resp. négatif) significatif à un niveau de 95% (resp. 99%). En ce qui concerne les études, avoir le baccalauréat (resp. avoir poursuivi des études supérieures) diminue (resp. augmente) la probabilité d'être plus en faveur de cette proposition. Ces facteurs ont tous deux un effet significatif à un niveau de 95%.

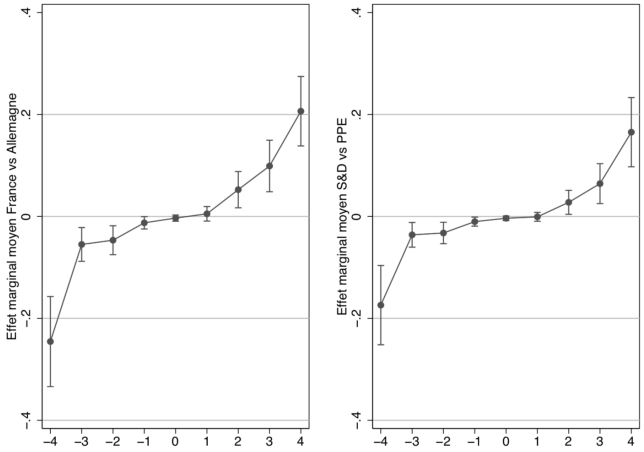
Les effets marginaux moyens pour chaque réponse possible sont donnés dans le tableau et le graphe ci-dessous :

TABLE 3.4 – Politique salariale : Effets marginaux moyens

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
Fr	-0.2400***	-0.0550***	-0.0460***	-0.0120**	-0.0032	0.0053	0.0520***	0.0970***	0.2000***
	(0.0450)	(0.0170)	(0.0140)	(0.0061)	(0.0031)	(0.0072)	(0.0180)	(0.0250)	(0.0350)
S&D	-0.1700***	-0.0370***	-0.0320***	-0.0099**	-0.0033	0.0000	0.0280**	0.0640***	0.1600***
	(0.0400)	(0.0120)	(0.0110)	(0.0045)	(0.0023)	(0.0045)	(0.0120)	(0.0200)	(0.0340)
Femme	0.0004	0.0001	0.0001	0.0000	0.0000	0.0000	-0.0000	-0.0001	-0.0004
	(0.0420)	(0.0081)	(0.0075)	(0.0025)	(0.0010)	(0.0008)	(0.0047)	(0.0130)	(0.0440)
Age	-0.0047***	-0.0010**	-0.0010**	-0.0004*	-0.0002	-0.0003	0.0003	0.0014**	0.0059**
	(0.0017)	(0.0005)	(0.0005)	(0.0002)	(0.0001)	(0.0002)	(0.0003)	(0.0006)	(0.0024)
Annees	0.0074***	0.0014**	0.0013**	0.0005**	0.0002	0.0001	-0.0008**	-0.0023***	-0.0078***
	(0.0024)	(0.0006)	(0.0005)	(0.0002)	(0.0001)	(0.0002)	(0.0004)	(0.0009)	(0.0025)
Bac	0.1600***	0.0370**	0.0400*	0.0170	0.0088	0.0170	0.0078	-0.0290**	-0.2600*
	(0.0550)	(0.0170)	(0.0210)	(0.0110)	(0.0066)	(0.0140)	(0.0190)	(0.0120)	(0.1400)
Etudes	-0.2700**	-0.0300***	-0.0170**	0.0001	0.0029	0.0150	0.0520*	0.0780**	0.1700***
	(0.1300)	(0.0100)	(0.0083)	(0.0070)	(0.0051)	(0.0150)	(0.0310)	(0.0330)	(0.0510)

Observations : 182
Les écarts-types sont donnés entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

FIGURE 3.4 – Politique salariale : Effets marginaux moyens avec intervalles de confiance à 95%



-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

3. Assurance chômage européenne : "Pour pallier une éventuelle récession de certains États membres dans la zone euro il faudrait créer une assurance chômage commune européenne". Nous trouvons un effet significatif pour la nationalité (à un niveau de 95%) et l'appartenance politique (à un niveau de 99%). Les deux effets sont positifs : la probabilité d'être plus en faveur de la proposition indiquée augmente *ceteris paribus* avec le fait d'être français d'une part et d'appartenir au groupe S&D d'autre part. Les effets ne sont pas du même ordre de grandeur : le clivage politique est beaucoup plus fort que la nationalité. De plus, lorsque nous faisons un Probit binaire nous ne trouvons pas d'effet significatif pour la nationalité (voir la section 3.4.1 et Annexe B).

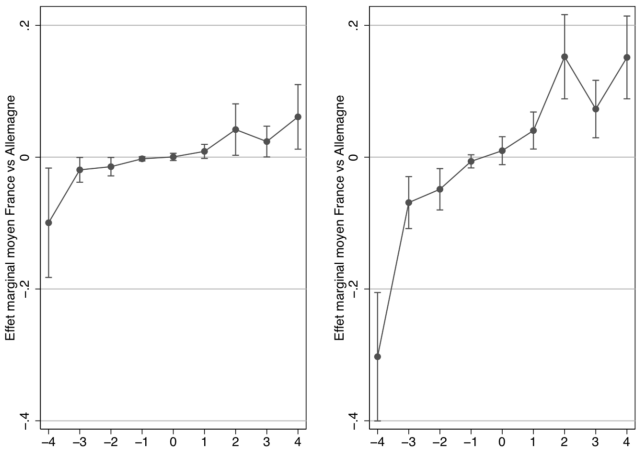
Les effets marginaux moyens pour chaque réponse possible sont donnés dans le tableau et le graphe ci-dessous :

TABLE 3.5 – Assurance chômage européenne : Effets marginaux moyens

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
Fr	-0.0970**	-0.0190**	-0.0140**	-0.0024	0.0003	0.0085	0.0410**	0.0230*	0.0600**
	(0.0420)	(0.0096)	(0.0071)	(0.0016)	(0.0027)	(0.0054)	(0.0200)	(0.0120)	(0.0250)
S&D	-0.3000***	-0.0690***	-0.0480***	-0.0062	0.0100	0.0400***	0.1500***	0.0730***	0.1500***
	(0.0500)	(0.0200)	(0.0160)	(0.0051)	(0.0110)	(0.0140)	(0.0320)	(0.0220)	(0.0320)
Femme	0.0360	0.0065	0.0049	0.0009	-0.0000	-0.0028	-0.0140	-0.0084	-0.0230
	(0.0500)	(0.0085)	(0.0061)	(0.0010)	(0.0011)	(0.0044)	(0.0200)	(0.0110)	(0.0300)
Age	-0.0026	-0.0005	-0.0004	-0.0001	-0.0000	0.0002	0.0010	0.0006	0.0019
	(0.0021)	(0.0005)	(0.0004)	(0.0001)	(0.0001)	(0.0001)	(0.0008)	(0.0006)	(0.0017)
Annees	0.0017	0.0003	0.0003	0.0001	0.0000	-0.0001	-0.0007	-0.0004	-0.0012
	(0.0027)	(0.0005)	(0.0004)	(0.0001)	(0.0001)	(0.0002)	(0.0011)	(0.0007)	(0.0018)
Bac	0.1200	0.0280	0.0250	0.0064	0.0081	-0.0020	-0.0390*	-0.0300	-0.1100
	(0.0800)	(0.0240)	(0.0250)	(0.0075)	(0.0130)	(0.0061)	(0.0200)	(0.0220)	(0.1100)
Etudes	-0.1600	-0.0230*	-0.0130**	-0.0004	0.0075	0.0180	0.0640	0.0320	0.0770*
	(0.1300)	(0.0130)	(0.0053)	(0.0029)	(0.0120)	(0.0180)	(0.0480)	(0.0220)	(0.0440)

Observations : 182
Les écarts-types sont donnés entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

FIGURE 3.5 – Assurance chômage européenne : Effets marginaux moyens avec intervalles de confiance à 95%



-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

4. Marché du travail plus flexible : "Une croissance plus forte dans la zone euro requiert que les États comptabilisant un nombre important de chômeurs de longue durée rendent plus flexible leur marché du travail". Cette question révèle un clivage exclusivement partisan : le seul effet significatif (à un niveau de 99%) se retrouve dans l'appartenance politique. Les effets sont très importants par rapport aux questions précédentes : la probabilité d'être plus en faveur de la proposition indiquée *ceteris paribus* augmente fortement avec le fait d'appartenir au groupe PPE.

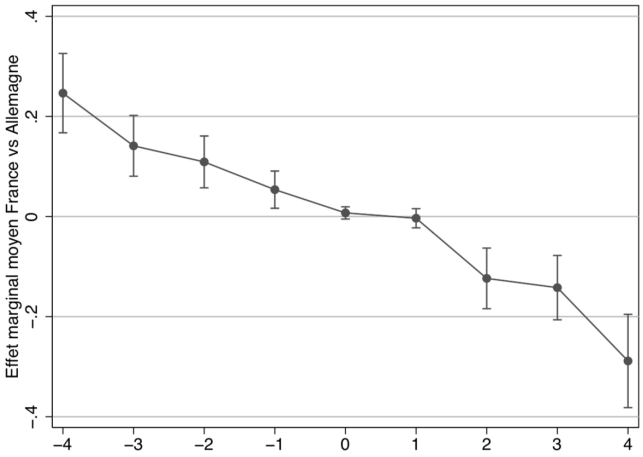
Les effets marginaux moyens pour chaque réponse possible sont donnés dans le tableau et le graphe ci-dessous :

TABLE 3.6 – Marché du travail plus flexible : Effets marginaux moyens

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
Fr	0.0008	0.0002	0.0001	0.0000	0.0000	-0.0000	-0.0002	-0.0002	-0.0007
	(0.0330)	(0.0100)	(0.0052)	(0.0011)	(0.0003)	(0.0012)	(0.0084)	(0.0095)	(0.0310)
S&D	0.2500***	0.1400***	0.1100***	0.0540***	0.0072	-0.0034	-0.1200***	-0.1400***	-0.2900***
	(0.0400)	(0.0310)	(0.0260)	(0.0190)	(0.0062)	(0.0098)	(0.0310)	(0.0330)	(0.0480)
Femme	-0.0029	-0.0009	-0.0005	-0.0001	0.0000	0.0001	0.0007	0.0008	0.0026
	(0.0400)	(0.0120)	(0.0063)	(0.0013)	(0.0003)	(0.0014)	(0.0100)	(0.0110)	(0.0370)
Age	-0.0012	-0.0005	-0.0003	-0.0002	-0.0000	-0.0000	0.0001	0.0003	0.0018
	(0.0017)	(0.0006)	(0.0004)	(0.0002)	(0.0000)	(0.0001)	(0.0004)	(0.0005)	(0.0020)
Annees	-0.0011	-0.0003	-0.0002	-0.0000	0.0000	0.0000	0.0003	0.0003	0.0010
	(0.0023)	(0.0007)	(0.0004)	(0.0001)	(0.0000)	(0.0001)	(0.0006)	(0.0007)	(0.0021)
Bac	0.0360	0.0120	0.0066	0.0019	-0.0001	-0.0010	-0.0086	-0.0100	-0.0360
	(0.0800)	(0.0300)	(0.0180)	(0.0064)	(0.0005)	(0.0016)	(0.0180)	(0.0230)	(0.0910)
Etudes	-0.0740	-0.0190	-0.0078	-0.0003	0.0011	0.0033	0.0190	0.0200	0.0570
	(0.0940)	(0.0190)	(0.0071)	(0.0025)	(0.0019)	(0.0049)	(0.0250)	(0.0240)	(0.0620)

Observations : 182
Les écarts-types sont donnés entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

FIGURE 3.6 – Marché du travail plus flexible : Effets marginaux moyens avec intervalles de confiance à 95%



-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

-4 : "Pas d'accord" ; 0 : "Indifférent" ; 4 : "D'accord"

3.4 Tests de robustesse

Nous procédons à quatre tests de robustesse. Ces analyses présentent des résultats en accord avec les conclusions de notre analyse principale. Les résultats principaux sont donnés dans cette section (voir l'Annexe B pour plus de détails).

3.4.1 Modèle de sélection de Heckman

Nous contrôlons ici pour un éventuel biais de sélection dû au fait que la participation à l'enquête s'est faite sur la base du volontariat. En effet, en dehors de questions de temps ou de manque de compétences sur les questions européennes, il est possible que l'absence de réponse révèle une opinion non exprimée sur ces questions. Dans ce cas, l'échantillon que nous utilisons ne serait pas représentatif des opinions des parlementaires.

Nous utilisons comme variable instrumentale le fait de participer ou non à la Commission des Affaires Européennes et à celle des Finances. Cette variable binaire a un effet positif et significativement différent de zéro sur la participation à l'enquête. Elle n'en a cependant pas sur les réponses données. Nous procédons ensuite à l'estimation d'un modèle Probit binaire avec comme première étape le modèle de sélection de Heckman (voir Heckman (1979)).

Nous trouvons des résultats alignés avec ceux donnés dans la section suivante (3.4.2, Probit binaire) avec pour exception la question portant sur le marché du travail, qui met en avant une différence significative entre les groupes S&D et PPE, mais à 90% seulement. Cela suggère qu'il y a un biais de sélection pour cette question, pour laquelle les parlementaires les plus modérés de part et d'autre du spectre politique n'auraient pas participé.

3.4.2 Probit binaire

Nous construisons une variable binaire qui prend pour valeur 1 si le/la parlementaire est d'accord ou indifférent(e) et 0 si il/elle n'est pas d'accord avec la proposition. Cela permet une comparaison entre opposition forte et préférence faible pour chaque question en plus d'un test de robustesse.

Les résultats obtenus (voir Table 12) confirment ceux que nous avons trouvé dans la section précédente, à

l'exception de la question concernant une assurance chômage européenne commune où l'on ne trouve plus d'effet significatif pour la nationalité. Cela est cependant cohérent avec le faible effet estimé dans le modèle Probit ordonné. Les effets relatifs sont également conformes à nos résultats.

Ces résultats tendent à confirmer deux potentiels terrains d'entente franco-allemand mis en lumière dans l'analyse préliminaire : la flexibilité du marché du travail et une assurance chômage européenne commune.

3.4.3 Définitions plus larges des partis

Nous prenons ici une définition plus large de l'appartenance politique en définissant comme "gauche large" un groupe comprenant les groupes S&D, Verts/ALE et GUE/NGL, et comme "centre droit large" un groupe comprenant les groupes PPE, ALDE et ENL.

Les résultats sont alignés avec ceux trouvés dans l'analyse principale, avec des ordres de grandeur très similaires.

3.4.4 Par nationalité et par parti

Ce test consiste à estimer le modèle Probit ordonné :
- en France puis en Allemagne (c'est-à-dire à considérer l'effet de l'appartenance politique dans chaque pays séparément)
- au sein du groupe S&D puis du groupe PPE (c'est-à-dire à considérer l'effet de la nationalité dans chaque groupe séparément).

Chacune des questions fait ressortir une division idéologique pour la France et pour l'Allemagne.

De même, on trouve un effet significatif de la nationalité dans les groupes S&D et PPE pour les questions relatives au marché du travail et à la politique salariale, et seulement dans le groupe PPE pour la question relative à l'assurance chômage européenne. Sur la flexibilité du marché du travail, nous n'obtenons pas d'effet de la nationalité.

3.4.5 Hétéroscédasticité

En prenant en compte une potentielle hétéroscédasticité induite par les variables liées à la nationalité et à l'appartenance politique, nous trouvons des effets allant dans le même sens que dans le modèle estimé sous hypothèse d'homoscédasticité. De même, la seule question pour laquelle la nationalité n'a pas d'effet significativement différent de zéro est celle portant sur la flexibilité du marché du travail.

3.5 Conclusion

Cet article présente les résultats de la première enquête réalisée auprès des parlementaires français et allemands sur l'avenir du projet européen dans le domaine du marché du travail. Nous montrons comment les réponses des parlementaires reflètent de potentiels terrains d'entente entre les deux pays, au-delà de clivages partisans.

Nos résultats, confirmés par plusieurs tests de robustesse, dont un test de sélection d'Heckman, montrent que la création d'une assurance chômage européenne et la flexibilité du marché du travail révèlent un clivage gauche/droite plutôt que français/allemand. Les questions de directives contraignantes dans le marché du travail et de la politique salariale ne trouvent d'alignement ni des pays ni des partis. La première, cependant, fait ressortir un clivage partisan de moindre ampleur que dans le reste des questions. Ces résultats entrent en résonance avec ceux d'Alesina, Tabellini et Trebbi (2017), où les auteurs se concentrent sur un échantillon de pays de l'Union

Européenne et trouvent une hétérogénéité culturelle parfois plus large au sein des pays qu'entre les pays.

Enfin, il ressort du fort clivage droite/gauche sur certaines questions que l'euroscepticisme observé dans plusieurs discours politiques, pourrait dans certains cas relever d'une position idéologique plutôt que d'une opinion tranchée contre l'intégration européenne elle-même.

3.6 Annexes

3.6.1 Annexe A : Caractéristiques individuelles

Échantillon total

Table 3.7 – Nationalités et groupes politiques

France	59,4%
Allemagne	40,6%
Groupe S&D	39,7%
Groupe PPE	41,9%
Autres	18,4%

Table 3.8 – Caractéristiques des parlementaires

(a) Par nationalité

	France (922)	Allemagne (630)
Groupe S&D	45,9%	30,6%
Groupe PPE	36,9%	49,2%
Autres	17,2%	20,2%
Femmes	25,8%	36,7%
Baccalauréat	88,5%	82,6%
Études supérieures	83,7%	77,9%
Âge (moyenne)	60,2	52,8
Nombre d'années au parlement (moyenne)	9,9	9

(b) Par groupe politique

	S&D (616)	PPE (650)	Autres (286)
Parlementaires français	68,7%	52,3%	55,6%
Parlementaires allemands	31,3%	47,7%	44,4%
Femmes	36,4%	20%	39,5%
Baccalauréat	84,9%	85,9%	88,5%
Études supérieures	81,3%	81,6%	80,4%
Âge (moyenne)	57,9	57,3	55,4
Nombre d'années au parlement (moyenne)	8,9	10,7	8,5

Participants et non-participants

Table 3.9 – Caractéristiques des parlementaires

	Participants (232)	Non-participants (1320)
Parlementaires français	56,4%	59,9%
Parlementaires allemands	43,6%	40,1%
Groupe S&D	47,4%	38,3%
Groupe PPE	37,9%	42,6%
Autres	14,7%	19,1%
Femmes	27,2%	30,8%
Baccalauréat	88,3%	85,5%
Études supérieures	82,3%	81,1%
Âge (moyenne)	58,9	56,9
Nombre d'années au parlement (moyenne)	9	9,7

Parlementaires ayant répondu

Table 3.10 – Par nationalité

(a) Composition politique, sexe et études

	France (131)	Allemagne (101)
Groupe S&D	54,2%	38,6%
Groupe PPE	35,9%	40,6%
Autres	9,9%	20,8%
Femmes	21,4%	34,7%
Baccalauréat	91,7%	84,2%
Études supérieures	90,1%	72,7%

(b) Âge

	Minimum	Maximum	Moyenne
France	35	76	61
Allemagne	33	81	56
Total	33	81	59

(c) Nombre d'années au parlement

	Minimum	Maximum	Moyenne
France	1	35	9
Allemagne	1	40	9
Total	1	40	9

Table 3.11 – Par groupe politique

(a) Composition nationale, sexe et études

	S&D (110)	PPE (88)	Autres (34)
Parlementaires français	64,5%	53,4%	38,2%
Parlementaires allemands	35,5%	46,6%	61,8%
Femmes	31,8%	18,2%	35,3%
Baccalauréat	87,6%	88,1%	90,9%
Études supérieures	85,6%	79,5%	78,8%

(b) Âge

	Minimum	Maximum	Moyenne
S&D	35	76	59
PPE	33	81	60
Autres	43	73	57
Total	33	81	59

(c) Nombre d'années au parlement

	Minimum	Maximum	Moyenne
S&D	1	36	8
PPE	1	40	11
Autres	1	17	7,5
Total	1	40	9

3.6.2 Annexe B : Robustesse

Modèle de sélection de Heckman

1. Marché du travail :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 90% de l'appartenance politique.
2. Politique salariale :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
3. Assurance chômage européenne :
   - Pas d'effet statistiquement significatif de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
4. Marché du travail plus flexible :
   - Pas d'effet statistiquement significatif de la nationalité.
   - Effet négatif et significatif à 99% de l'appartenance politique.

Probit binaire

Les résultats obtenus sont donnés dans la table d'effets marginaux moyens ci-dessous.

Table 3.12 – Probit binaire : Effets marginaux moyens

	Marché du travail	Politique salariale	Assurance chômage	Flexibilité du marché du travail
Fr	0.250***	0.330***	0.110	0.024
	(0.074)	(0.071)	(0.073)	(0.062)
S&D	0.180**	0.250***	0.400***	-0.640***
	(0.072)	(0.069)	(0.073)	(0.058)
Femme	0.140*	0.093	-0.040	0.017
	(0.080)	(0.077)	(0.085)	(0.074)
Age	0.006	0.011***	0.001	0.000
	(0.004)	(0.003)	(0.004)	(0.004)
Annees	-0.011**	-0.012***	-0.003	-0.001
	(0.005)	(0.004)	(0.005)	(0.004)
Bac	-0.250**	-0.250*	-0.110	-0.035
	(0.120)	(0.130)	(0.180)	(0.170)
Etudes	0.320**	0.270*	0.140	0.088
	(0.160)	(0.160)	(0.180)	(0.150)
Observations	183	182	182	182

Les écarts-types sont donnés entre parenthèses
*** p<0.01, ** p<0.05, * p<0.1

1. Marché du travail :
   - Effet positif et significatif à 99% de la nationalité : *ceteris paribus*, un/une parlementaire français(e) a en moyenne une probabilité de 25% supérieure à un/une parlementaire allemand(e) d'être en faveur ou indifférent(e) à cette proposition.
   - Effet positif et significatif à 95% de l'appartenance politique : *ceteris paribus*, un/une parlementaire du groupe S&D a en moyenne une probabilité de 18% supérieure à un/une parlementaire du groupe PPE d'être en faveur ou indifférent(e) à cette proposition.
2. Politique salariale :
   - Effet positif et significatif à 99% de la nationalité : *ceteris paribus*, un/une parlementaire français(e) a en moyenne une probabilité de 33% supérieure à un/une parlementaire allemand(e) d'être en faveur ou indifférent(e) à cette proposition.

- Effet positif et significatif à 99% de l'appartenance politique : *ceteris paribus*, un/une parlementaire du groupe S&D a en moyenne une probabilité de 25% supérieure à un/une parlementaire du groupe PPE d'être en faveur ou indifférent(e) à cette proposition.

3. Assurance chômage européenne :
   - Effet positif et significatif à 99% de l'appartenance politique : *ceteris paribus*, un/une parlementaire du groupe S&D a en moyenne une probabilité de 40% supérieure à un/une parlementaire du groupe PPE d'être pour ou indifférent à cette proposition
4. Marché du travail plus flexible :
   - Effet négatif et significatif à 99% de l'appartenance politique : *ceteris paribus*, un/une parlementaire du groupe PPE a en moyenne une probabilité de 64% supérieure à un/une parlementaire du groupe S&D d'être en faveur ou indifférent(e) à cette proposition

Définition plus large des partis

Nous trouvons les résultats suivants. Les tables sont disponibles sur demande.

1. Marché du travail :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
2. Politique salariale :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
3. Assurance chômage européenne :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
4. Marché du travail plus flexible :
   - Effet négatif et significatif à 99% de l'appartenance politique.

Par nationalité et par parti

Nous trouvons les résultats suivants. Les tables sont disponibles sur demande.

1. Marché du travail :
   - Effets positifs et significatifs à un niveau de 99% de l'appartenance politique en France et en Allemagne.
   - Effets positifs et significatifs à un niveau de 99% de la nationalité dans les groupes S&D et PPE.
2. Politique salariale :
   - Effets positifs et significatifs à un niveau de 99% de l'appartenance politique en France et en Allemagne.
   - Effets positifs et significatifs à un niveau de 99% de la nationalité dans les groupes S&D et PPE.
3. Assurance chômage européenne :
   - Effets positifs et significatifs à un niveau de 99% de l'appartenance politique en France et en Allemagne.
   - Effet positif et significatif à un niveau de 95% de la nationalité dans le groupe PPE. Pas d'effet significatif dans le groupe S&D.
4. Marché du travail plus flexible :
   - Effets négatifs et significatifs à un niveau de 99% de l'appartenance politique en France et en Allemagne.
   - Pas d'effet significatif, ni dans le groupe S&D ni dans le groupe PPE.

Hétéroscédasticité

Nous supposons ici une variance exponentielle et nous obtenons les résultats suivants (les tables sont disponibles sur demande) :

1. Marché du travail :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
2. Politique salariale :
   - Effet positif et significatif à 99% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
3. Assurance chômage européenne :
   - Effet positif et significatif à 95% de la nationalité.
   - Effet positif et significatif à 99% de l'appartenance politique.
4. Marché du travail plus flexible :
   - Effet négatif et significatif à 99% de l'appartenance politique.

Chapter 4

European Integration and Economic and Monetary Union Reforms

This Chapter was written with Sebastian Blesse (ZEW Mannheim), Pierre Boyer (CREST, École Polytechnique), Friedrich Heinemann (ZEW Mannheim) and Eckhard Janeba (University of Mannheim).

Abstract. We analyze data from an author-conducted survey of members of the French and German parliaments on European Monetary Union reform preferences. We consider three potential drivers of preferences: nationality, ideology, and personal character- istics. For European Monetary Union policies like Eurobonds, the Fiscal Compact, and the European Central Bank asset purchase program we find a robust difference between parliamentarians of both countries if they belong to the same party family and controlling for individual characteristics. Based on our estimates, however, we predict agreement between German left-wingers and French conservatives even for ideological differences that are smaller than the current difference between the left and the right European party families. Our findings suggest that deeply-rooted national differences do not impose a prohibitive obstacle to a German-French parliamentary consensus on European Monetary Union policies.

Keywords: Comparative politics, European Monetary Union reforms, elite survey, members of national parliament, policy preferences.
JEL classification: E60; E62; F15; H60.

4.1 Introduction

Since the outbreak of the euro area debt crisis in 2010, numerous reforms have been undertaken to complete the institutional design of the euro area.[1] Nevertheless, there is still the perception that the European Monetary Union (EMU) resembles a 'half-built house' (Bergsten (2012)) and that more reforms may be required. The space of possible reforms is constrained by the need to reach a consensus among EMU members in general, and between France and Germany in particular. From the start of the European integration process, Germany and France have been seen as the 'engine' of integration (Krotz and Schild (2013)). This holds in particular for monetary integration steps such as the European Monetary System as of 1979, the EMU 20 years later (Marsh (2011)), and during the management of the euro crisis between 2010 and 2012 (Degner and Leuffen (2019); Schoeller (2018)). From this perspective, a Franco-German agree- ment can be regarded as necessary (albeit not sufficient)

[1] Fiscal and macroeconomic governance rules have been refined with a reformed Stability and Growth Pact (SGP; Buti and Carnot (2012); Hodson (2013)) and the new Fiscal Compact (Creel, Hubert and Saraceno (2012)). The European Central Bank has effectively stepped into the role of a lender of last resort through different asset purchasing programs (Drudi, Durré and Mongelli (2012)). A banking union has been set up with the establishment of a European Banking Resolution Mechanism (Howarth and Quaglia (2014).

condition for any further EMU reform. It is thus interesting to explore the extent of disagreements between the French and the German, as well as their underlying causes.

The role of different economic policy traditions has received attention as a potential reform obstacle. Alesina et al. (2017) show that the heterogeneity of general norms (including the value of hard work or obedience) between Northern and Southern Europe has increased over the last decades despite more economic integration. Guiso, Herrera and Morelli (2016) argue that cultural clashes aggravated the Greek crisis. In this vein, politicians might be unable to agree on crisis manage- ment because certain policy reforms may run against deeply rooted norms and beliefs. On France and Germany, authors like Dyson (1999) and Brunnermeier, James and Landau (2016) diagnose a 'Rhine-Divide', a fundamental difference in economic policy approaches between both countries. Compared to France, German 'ordo- liberalism' stresses the importance of rules over discretion and principles of liability over solidarity. Liquidity constraints tend to be seen as an outcome of fundamental insolvency in Germany, whereas in France they are often viewed as part of self-enforcing bad equilibria. Consistent with these assessments, French policy prescriptions are often more Keynesian and demand-oriented, whereas German approaches tend to emphasize the need for austerity and structural reforms in order to deal with such crises.

Against that background, our analysis empirically assesses the French–German cleavage in EMU-related reform preferences by the members of national parliaments in both countries. We exploit an author-designed survey, which we simultaneously conducted in 2016 among the German Bundestag and the two French parliamentary chambers. Policy preferences of these parliamentarians are important since several national parliaments in the euro area including the German one are veto players on EMU reforms. While recent euro area reform decisions, such as the establishment of the European Stability Mechanism (ESM) or the Fiscal Compact, have been initiated by national governments, they are often con- strained by the consent of national parliaments according to national constitutions;[2] hence, a systematic dissent between the German and French parliaments would make future EMU reforms less likely.

We contribute to the understanding of a possible divide between French and German parliamentarians on EMU reform issues. Our analysis disentangles three different drivers of EMU-related reform preferences: (a) nationality; (b) political leaning related to party family ideology; and (c) personal characteristics of members of parliament (MPs). The first one—nationality—relates to the Rhine-Divide hypothesis, i.e. a French–German dissent that is deeply rooted in economic policy traditions of both countries. At the same time, the importance of nationality for EMU reform preferences may also relate to MPs' economic self-interest for their respective country.

The relative importance of (a) versus (b) and (c) matters for assessing the future chances of a parliamentary consent between both countries. If party ideology and/ or personal characteristics (age, gender, education, etc.) are the dominant drivers, the reform space from a parliamentary perspective will change with future election outcomes. By contrast, even changing parliamentary majorities matter little if heterogeneity of reform preferences is primarily determined by nationality. In this case, the Rhine-Divide constitutes a prohibitive obstacle to EMU reforms, if it extends from parliaments to governments and other institutions which are involved in reform decision making.

A further contribution lies in the analysis of various types of euro area reform options. These cover appropriate national growth policies (more flexible labor markets, higher investment spending), policy proposals triggered by the euro crisis (European Central Bank (ECB) asset purchases, Fiscal Compact), and EMU reform options in the current debate (tax centralization, European unemployment insurance and Eurobonds). We show that inter-party family differences are important for national economic policies, such as labor market deregulation or

[2] According to Maatsch (2015), the power of parliaments relative to their governments was cut back during the crisis, for example through fast-track procedures. The author shows that this occurred mainly in Southern Europe. In contrast, the influence of the Bundestag through its veto power has even increased due to rulings by the German Federal Constitutional Court (see below).

investment spending, and nationality is not, while for EMU reform options both matter.[3]

The results confirm key qualitative observations of Brunnermeier et al. (2016) for EMU reform options. German MPs tend to be more supportive than their French colleagues towards fiscal rules and more critical on activist ECB policies, tax centralization, European unemployment insurance (EUI) and debt collectivization through Eurobonds. These differences are significant for French and German parliamentarians even with similar personal characteristics and within the same party family. However, for all these EMU topics, the impact of the ideological variables is empirically more important.

For all EMU topics, the direction of the French dummy is identical to the direction of the dummy indicating a left party. This implies the largest polarization between German parliamentarians from the right and their French colleagues from the left. Conversely, according to our estimates, the Rhine-Divide is closed for all EMU reform options if a German left-winger would have to find an agreement with a French conservative. Even though a significant difference in the economic thinking of German and French parliamentarians exists, the gap is not so large that it would make a parliamentary consent on EMU reforms impossible.

Our analysis complements recent work by political scientists, as summarized by Frieden and Walter (2019), which describes work on the measurement of govern- ments' ideal points and bargaining strategies in the context of Euro zone institutional design. The relative importance of nationality versus ideology has been studied extensively for members of the European Parliament (e.g. Hix (2001); Hix, Noury and Roland (2006); Hix and Noury (2011); Scully, Hix and Farrell (2012)). These studies also point to a stronger role of ideology, relative to nationality, as a factor explaining political positions and voting. Results for the European Parliament cannot be assumed to readily hold for national parliaments, where a European mission and socialization are absent. But it is interesting to note that even for members of the European Parliament, nationality seems to be of strong importance for issues with significant and asymmetric consequences for member states as shown by Hix and Noury (2011) for budgetary votes, by Heinemann, Mohl and Osterloh (2009) for tax preferences, and by Aspinwall (2002) for foreign policy.

In the next section, we describe the institutional setting and survey details. After a descriptive look at both the country and party dimension of MP preferences in Germany and France, in section 4.3 we describe our econometric analysis and provide its results in section 4.3.1. Section 5 concludes. In the Appendices are a series of robustness checks.

4.2 Survey description

4.2.1 Institutional setup and survey details

The national legislative chambers in Germany and France differ in various aspects. The German Bundestag has a mixed-member proportional voting system: 299 MPs are directly elected (first vote) and 299 are indirectly elected from party lists (second vote).[4] The German MPs in our survey were elected in late 2013 for four years in office.

The legislative branch in France is divided into two chambers: the Assemblée Nationale and the Sénat as the lower and the upper house, respectively. Whereas MPs in the Assemblée Nationale are elected by majority decisions (starting in our sample in 2012 for the term ending in 2017), members of the Sénat are indirectly elected by elected officials of various tiers of government including the Assemblée. Half of the senators are elected every

[3] In Blesse, Boyer, Heinemann, Janeba and Raj (2017), we have analyzed four questions from the same survey that relate exclusively to labor market issues.

[4] In Germany excess mandates are created when the number of second vote seats exceeds the number of first vote seats. In the 2013–2017 legislative period the total number of seats was 630.

three years for a six-year term, the last election preceding our survey being September 2014.

National parliaments in Germany and France differed by the degree of involvement in controversial legislation during the euro crisis. Whereas the German government had major policy measures approved by the Bundestag, France relied, as in other cases of controversial legislation, on a strong executive. The French government used constitutional powers and issued decree laws. Eventually the French executive did involve its national MPs in the decision on rescue policies, such as the European Financial Stability Facility (EFSF), ESM, and the Fiscal Compact. However, it did so by using a fast-track procedure, which limited the parliamentary debates to one. For the Bundestag, the German Federal Constitutional Court, in its decision on the ESM and Fiscal Compact, has reemphasized the parliament's veto power on all euro-related reforms that have potential budgetary implications.[5]

Our survey of the French and German parliaments is a result of a collaboration of researchers from Germany (ZEW Mannheim and the University of Mannheim) and France (École Polytechnique-CREST). The questionnaires for the French and German MPs were formulated in French and German, respectively, but had the same content and wording. The survey contained a cover letter and a three-page survey, and was sent out in late April 2016 from Palaiseau for the French parliament, and from Mannheim for the Bundestag. The initial contact was through regular mail to the main office of the MPs. Politicians could respond either by mail, email, fax, or via a customized online-survey tool. Completed surveys were received between late April and mid-July 2016.

The survey was not anonymized in order to analyze the determinants of participation as well as the elicited beliefs of the MPs. The confidentiality of the individual answers was guaranteed, however. Hence, replication material for the figures below is provided, but not the full data set. Individual characteristics of MPs, such as party membership, country of origin, as well as age, gender, education or length of parliament membership, were collected from public sources. We randomized the ordering of questions in each question bloc in order to avoid biased responses due to possible framing effects.

In total, we received 232 completed questionnaires from the overall population of 1552 national MPs in Germany and France (response rate: 14.95%). German MPs (16.03%) were slightly more responsive than their French counterparts (14.21%). The response rates were somewhat lower than previous surveys of the Bundestag (Heinemann and Janeba (2011); Heß, von Scheve, Schupp and Wagner (2013)), but slightly higher for French MPs (Deschouwer and Depauw (2014)).

The Appendix provides an overview of the participation rates across countries of origin and across ideologies. We classify MPs according to their political grouping in the European Parliament. In Germany, there is a clear correspondence between an individual party and a parliamentary group. By contrast, the French bicameral system lacks such congruence. MPs from political parties self-select in various ways into existing blocs or parliamentary groups. The Appendix also documents the relation between parties on the one hand and national and European Parliamentary groups on the other hand. We use the respective fraction membership in the European Parliament as the measure of the left-right position. Our baseline estimates consider MPs from the fractions of both Socialists and Democrats (S&D), Greens/European Free Alliance (Greens/EFA) as well as Confederal Group of the European United Left/Nordic Green Left (GUE/ NGL) as left-leaning MPs, which we compare to the conservatives of the European People's Party group (EPP), the Europe of Nations and Freedom (ENF) and the Liberals, the Alliance of Liberals and Democrats for Europe (ALDE). Thus, our key measure of ideological distance refers to the distance between the two major party families in the European Parliament.[6]

[5]The strong executive in France implies that views of French parliamentarians are perhaps less conclusive for the assessment of Franco-German agreement on euro area reforms. This does not invalidate our research agenda, however, as we are primarily interested in the drivers that facilitate or hinder an agreement across countries.

[6]Recently, right-wing populist parties have enjoyed a growing vote share across several Western democracies. In our data set, there are not enough observations to analyze right- wing populist views on EMU policies. The German Alternative für Deutschland (AFD) was not present in the Bundestag in 2016 and the Front National held only a few seats in the Assemblée.

In Blesse et al. (2017), we conducted a non-response analysis on the basis of a probit model in order to predict survey participation. The analysis confirms higher response rates of German and S&D (or more generally left-wing party) members, and shows the importance of several individual characteristics. To reduce the role of sample selection, we include all available MP characteristics in our econometric analysis below.

4.2.2 Questionnaire design and empirical hypotheses

Our survey covers important topics of the EMU reform debate. We address both the national dimension—policies that may improve the working of a common currency through higher economic growth and more economic convergence— and the European dimension, relating to (reforms of) EMU policies and institutions directly. All questions were answered on a discrete answer scale from +4 to þ4, where þ4 indicated 'Agree' and +4 'Disagree' ('Desirable' and 'Undesirable' in case of question 4 on the Fiscal Compact).

National growth policies. The wording of all questions reflects the requirement that respondents unfamiliar with economic terminology should be able to grasp the main issue at stake. For that purpose, we chose 'flexible labor markets' as a typical supply-side prescription and clarified the term through examples of dismissal protection and minimum wages. Question 2 refers to investment, which has a supply- side dimension as well because better public infrastructure makes firms more productive (e.g. Haughwout (2002)). More recently, higher public investment has often been strongly supported by left-of-center politicians and economists, as part of a demand-side policy. In this sense, Question 2 is less clearly identified as a supply side policy as compared to Question 1.

Question 1 (Q1): Flexible labor markets

For higher economic growth of the EMU it is essential that especially countries with permanently high levels of unemployment make their labor markets more flexible (e.g. via an easing of dismissal protection regulations or a decrease of the statutory minimum wage).

Disagree				*Undecided*				*Agree*
☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

Question 2 (Q2): Higher investment

For higher economic growth of the EMU it is essential that its member states increase their investment expenditures.

Disagree				*Undecided*				*Agree*
☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

EMU institutions and policies. Question 3 covers the role of the ECB's interventions in the market for euro area government bonds since the economic and financial crisis. In order to avoid complex wording, we dropped the distinction between different bond purchasing programs, such as the Securities Market Program of 2010, the Outright Monetary Transactions program (set up in 2012 but never activated), and the quantitative easing (QE) programs since 2015.

Question 3 (Q3): Asset purchase program of ECB

The European Central Bank has taken a strongly active position in recent years by purchasing sovereign bonds of euro countries. This strongly active position of the ECB should continue.

Disagree				*Undecided*				*Agree*
☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

One recurring topic in the EMU reform debate is a possible restriction of national fiscal autonomy and transfer

of power to the level of the Eurozone. The European Commission's recent reflection paper on the deepening of the European Union (EU) via a European Treasury and a European Finance Minister (Commission (2017)) underlines the relevance of the debate. Questions 4 and 5 cover two different aspects of fiscal autonomy: deficit limits and voting in the European Council on taxes.

Question 4 asks whether it is desirable for MPs that their country complies with the Fiscal Compact, which imposes a limit on each country's general government structural deficit since 2013. Question 5, by contrast, relates to the decision rule at the EU level on tax matters. Under the status quo, any tax legislation at the EU level must pass with unanimity. So far, certain aspects of value added tax (VAT) taxation have been agreed upon, but not yet for direct taxation (Bénassy-Quéré, Trannoy and Wolff (2014)). Question 5 asks about an end to national veto power in EU tax legislation matters by moving from unanimity to majority voting (Wasserfallen (2014)). We use corporate tax caps and floors as possible areas of application for majority voting.

Question 4 (Q4): Fiscal Compact

The Fiscal Compact that was signed by 25 EU member states in 2012 commits the contracting parties like France and Germany to limit the general government deficit (cyclically adjusted) at 0.5 % of Gross Domestic Product.

Do you think it is desirable that [Germany/France] complies with the obligations of the Fiscal Compact?

Non desirable *Undecided* *Desirable*

☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

Question 5 (Q5): Tax policy

The European council should be able to vote on taxes with a qualified majority (e.g. binding caps or floors for corporate taxes).

Disagree *Undecided* *Agree*

☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

Question 6 shifts attention to a new fiscal instrument: a fiscal capacity for the euro area through a EUI. Variants of EUI have been discussed in the literature (Andor (2014); Dolls, Fuest, Neumann and Peichl (2018); Dullien (2014)). A common feature of all variants is that at least a part of unemployment benefits is (directly or indirectly) financed from a common European pool of resources. The purpose of a common insurance is to stabilize euro economies hit by an asymmetric shock. We refer to EUI in our question because it appears less abstract compared to other type of stabilization capacities such as stabilization funds or contingent reinsurance mechanisms (see Dolls et al. (2018) for details).

Question 6 (Q6): European unemployment insurance

A common European unemployment insurance should be introduced to absorb recessions in individual member states of the EMU.

Disagree *Undecided* *Agree*

☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

Finally, Question 7 addresses the role of a new joint financing instrument in the form of Eurobonds. Eurobonds with joint liability of euro members are a far reaching financial innovation compared to similar but less known instruments (such as the 'blue/red bond' proposal by Delpla and Von Weizsäcker (2010); or the 'European Safe Bonds' by Brunnermeier et al. (2016)).

Question 7 (Q7): Eurobonds

All euro countries are jointly liable for Eurobonds and all euro countries pay the same interest. The EMU should issue Eurobonds.

Disagree				*Undecided*				*Agree*
☐ -4	☐ -3	☐ -2	☐ -1	☐ 0	☐ +1	☐ +2	☐ +3	☐ +4

Based on existing literature, we can hypothesize how nationality and ideology should influence the preferences of policy makers. For the national dimension, Brunnermeier et al. (2016: 380) summarize systematic differences in economic policy traditions between both countries: first, the German tradition of a federal system requires binding rules, whereas France has a tradition of centralized decision making in combination with higher flexibility. We expect stronger German support for the Fiscal Compact than in France and larger German skepticism towards centralized tax setting. Second, German thinking tends to stress the principle of liability, whereas the French tradition emphasizes solidarity. This should lead to stronger French support both for Eurobonds with their joint liability and for a united EUI. Third, German economic policy strategies stress the importance of incentives and structural reforms, whereas the French perspective is more critical on austerity and more supportive towards monetary and fiscal stimulus. This should be reflected in French support for an activist role of the ECB and more French enthusiasm for higher investment spending. Conversely, more flexible labor markets should be a priority of the German side.

On ideology, the predictions are straightforward assuming the usual left-right disputes on the role of solidarity and market flexibility, on the appropriate size of government, and the importance of activist macro-policies. E.g. Hix (2001) and Hix et al. (2006) show the importance of political ideology on a classical left-right scale in European policy issues by analyzing roll-call votes in the European Parliament. While we focus on European reform preferences of national MPs, we expect ideological divides to work in a similar fashion. We expect politicians from the left to favor, relative to the right, more investment spending, a more active ECB, more centralized European tax policies and more solidarity and insurance. Compared to conservative politicians, we expect left-wing parliamentarians to be more critical on labor market flexibility.

For our third dimension, the personal characteristics of MPs, we do not have any strong theoretical expectations. However, existing evidence suggests that personal characteristics of individual MPs are important drivers of legislative performance and policy preferences (e.g. for the European level, see Heinemann et al. (2009); for national MPs in France and Germany, see Gavoille (2018) and Heinemann and Janeba (2011), respectively). Similarly, relating to appointments in governments, Hallerberg and Wehner (2018) analyze when economists become policy makers across a large set of countries. Accordingly, we include personal characteristics of individual MPs such as education, age or parliamentary experience in our empirical analysis. To the extent that individual characteristics are important, they represent a less persistent barrier for political action—as they may change with elections—than national cleavages between countries, which may be rooted in long-lived traditions in economic policy and social norms (Brunnermeier et al. (2016)).

4.3 Econometric analysis

Model and variables We analyze the relevance of the three dimensions covered—nationality, ideology, and personal characteristics—for preferences of national MPs on EMU issues. With the following econometric tests, we disentangle the three dimensions and assess their relative importance. For our baseline model we use an ordered probit estimation with policy preferences for national or EMU policies across -4 (disagree, undesirable) to $+4$ (agree, desirable) scale as dependent variables.

The nationality dummy takes the value of one when parliamentarians come from either of the two French chambers (and zero for German MPs). For political ideology, the baseline builds on the dichotomy of left-leaning versus

conservative party family affiliation in the European Parliament as classified above. The Appendix explores the effects of alternative measures for ideological differences among MPs. The dummy Left takes the value 1 if a politician comes from a party belonging to the left party spectrum. The non-anonymous survey allows us to cover individual characteristics such as gender and age, parliamentary experience (number of years as an MP), education (upper secondary education: 'baccalauréat'/'Abitur', and tertiary education: university degree), and expertise in economic and financial matters through membership in certain committees (finance or EU affairs).[7] We do not have clear expectations regarding the effects of each of these personal characteristics. Yet we can compare their estimated effects relative to the respective effects of nationality and ideology across policies. Moreover, these factors may also be related to the decision of participation in our survey. Including individual variables serves to limit selection bias, since some of these characteristics determine individual response probability.

4.3.1 Results

This section illustrates the average marginal effects of our variables of interest on strong policy support, i.e. the effect of nationality, ideology and individual factors on the likelihood of eliciting +4 responses for the respective question. Further results and robustness checks are reported in the Appendix.

The first two columns of Table 4.1 show the results for preferences on national growth enhancing policies and illustrate the average marginal effects for the top response category (+4). Columns 1 and 2 report the results for MP preferences on flexible labor markets and more national investments, respectively. The results confirm a strong role of party family affiliation for preferences on national growth policies in line with the predictions. *Ceteris paribus*, an MP from the left has, on average, a 29.8% point lower probability to opt for flexible labor markets than a conservative MP. For the 'higher national investments' policy the ideological divide is slightly less pronounced with, on average, a 23.4% point higher probability of support from the left. Nationality is much less important as a determinant of preferences. No response category shows statistical significance at conventional levels for nationality of MPs either for the flexible labor markets or higher national investment statements. Also, the marginal effect is much smaller than for party ideology, which is in contrast to our expectation that French policy makers would express higher support for more national investment and less sup- port for flexible labor markets than German politicians. Individual characteristics of MPs do not seem to play a significant role for national policy preferences.

[7] See the Appendix for descriptive statistics.

Table 4.1 – National growth policies and EMU institutions and policies, average marginal effect for (+4), baseline

	National growth policies		EMU institutions and reforms				
	(1) Flexible labor markets	(2) Higher investment	(3) ECB asset purchase	(4) Fiscal Compact	(5) Tax policy	(6) EUI	(7) Eurobonds
France	0.01	0.08	0.13***	-0.11***	0.09**	0.08***	0.19***
	(0.03)	(0.05)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
Left	-0.30***	0.23***	0.182***	-0.492***	0.171***	0.156***	0.262***
	(0.0)	(0.05)	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
Female	-0.00	-0.11**	-0.06**	0.03	-0.06	-0.03	-0.08***
	(0.03)	(0.05)	(0.03)	(0.05)	(0.05)	(0.03)	(0.03)
Age	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as MP	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper secondary	-0.10	0.00	0.04	0.05	-0.08	-0.01	0.11**
	(0.08)	(0.12)	(0.05)	(0.10)	(0.12)	(0.07)	(0.05)
University degree	0.09**	0.02	0.01	-0.02	0.14**	0.00	-0.13*
	(0.04)	(0.10)	(0.05)	(0.09)	(0.07)	(0.06)	(0.07)
Economics committee	-0.00	-0.06	0.05	0.09	0.03	-0.06**	0.00
	(0.05)	(0.08)	(0.06)	(0.08)	(0.08)	(0.03)	(0.05)
Finance committee	0.05	0.15*	-0.01	0.08	0.12*	0.01	0.03
	(0.04)	(0.08)	(0.03)	(0.06)	(0.07)	(0.04)	(0.04)
EU affairs committee	0.12**	0.00	-0.01	0.08	0.15*	-0.05*	-0.07*
	(0.05)	(0.08)	(0.04)	(0.07)	(0.08)	(0.03)	(0.04)
N	214	213	213	202	215	214	212

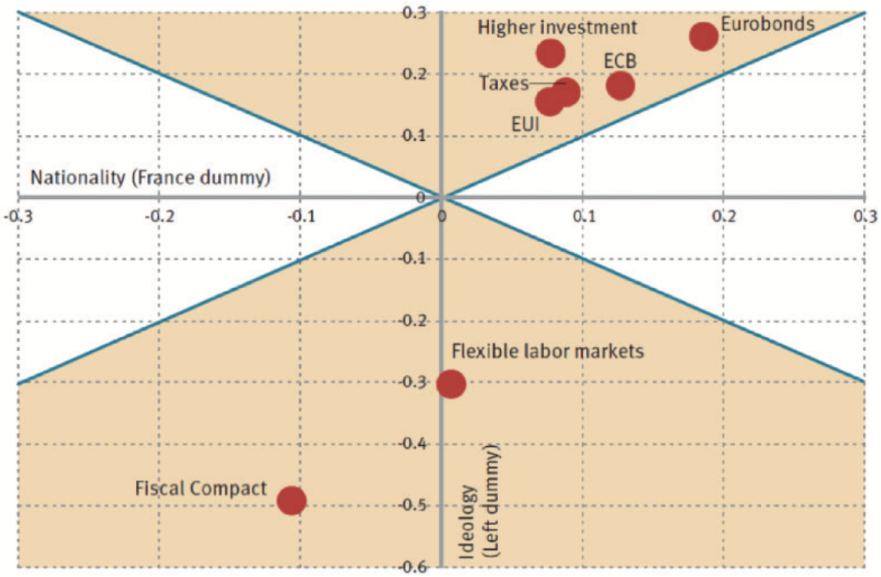
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for EMU policies).

We now turn to policies at the European and Eurozone levels (Table 4.1, columns 3–7). Like for national policies, party affiliation plays a major role in explaining the heterogeneity in EMU-related policy preferences. Left MPs are more supportive of ECB interventions than conservatives. On limiting national autonomy, the effects of ideology are strongly asymmetric: relative to the political right, the left favors majority voting on tax issues at the European level and is heavily opposed to fiscal constraints; *ceteris paribus*, left-leaning politicians are, on average, 49.2% points less likely to strongly support compliance with the Fiscal Compact. Far reaching stabilization (EUI) and mutual guarantees (Eurobonds) within Europe are particularly popular among the left MPs in both countries. Contrary to national policy preferences, the role of differing national views is more pronounced for EMU issues. The results indicate a statistically distinct impact of nationality in all EMU-related policy areas, which exists independent of the significant ideological cleavage. In columns 3 to 7 the sign of the estimated coefficient for the French dummy is always identical to the one for the Left dummy. Compared to German politicians, the French respondents are more supportive of asset purchases by the ECB, debt mutualization through Eurobonds, and stabilization through a EUI scheme even if they belong to the same party family as German representatives. Conversely, French politicians are more skeptical about fiscal constraints as implemented in the Fiscal Compact. French MPs, however, are more supportive of majority voting on tax issues at the European level. Again, a few significant findings for individual characteristics rather point to spurious results and speak against a robust effect of individual features on EMU reform attitudes among national MPs.

A first insight on the relative importance of the nationality, ideology and personal characteristics dimensions

is that observable heterogeneity is driven much more by the first and second dimension and less by the third one. A second message is that national growth policy preferences largely follow a familiar ideological pattern: politicians on the left stress the potential of more spending and those on the right the need for structural reforms—without an additional specific explanatory power of nationality. For EMU-related policy preferences, the picture is different: regression results show that nationality has a genuine impact on preference formation in addition to party-family affiliation. This is our third main finding.

Figure 4.1 – Scatter plot: marginal effects ideology and nationality

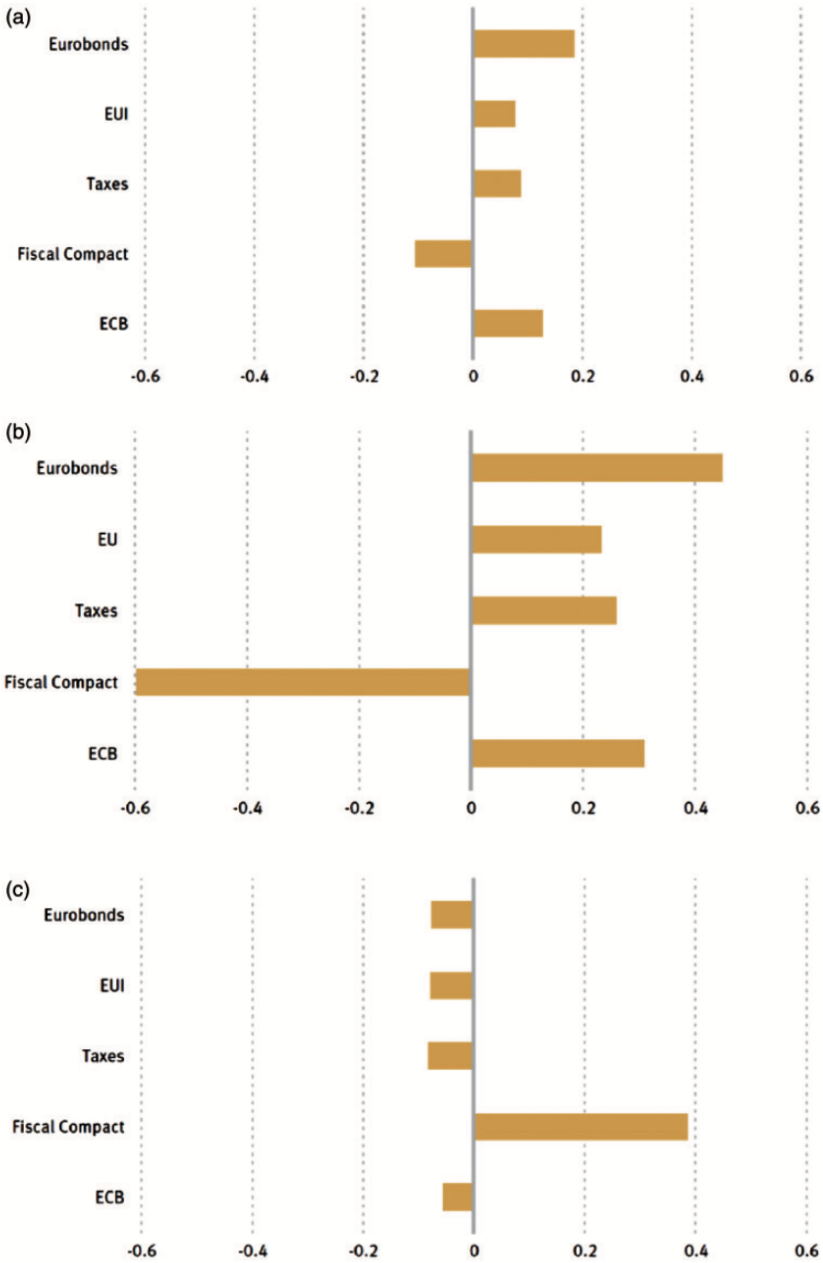


This figure plots the magnitude of estimated coefficients of party ideology and nationality on all survey questions taken from Table 4.1. The marginal effects for the France and the Left dummy are marked on the x- and the y-axis, respectively. The plot does not take statistical significance into account. The shaded area identifies the range where the marginal effect of ideology exceeds that of nationality.

In the next step, we look at the relative importance of ideology and nationality for EMU policy preferences in more detail. Figure 4.1 provides a scatter plot of the estimated marginal effects for both the national dummy (France) and the ideological dummy (left) from Table 4.1 together with the 45° lines where the absolute size of marginal effects of ideology and nationality is identical. Our regression results suggest that ideology matters more than nationality: positions within the shaded area indicate that the impact of ideology exceeds that of the national dummy for all included national and EMU-related reform issues.

Since, for EMU issues, the sign of the estimated France dummy always corresponds to that of the left party family, EMU preferences tend to be most polarized between a German conservative and a French MP from the left. Conversely, given our estimates in Table 4.1, a French conservative is more aligned to a German policy maker from the left, since the nationality and ideology effects counteract each other in this comparison.

Figure 4.2 – Predicted French–German difference in probability for different ideological combinations



Based on estimated coefficients for answer category +4.

The model predicts the difference between a French and German MP in the probability to choose the top answer category (+4) for the different ideological combinations. [8] Figure 4.2 shows the predicted differences for EMU positions for all three possible ideological pairs (same ideology, French right/German left and French left/German

[8] The subsequent analysis of the predicted differences in probability comparing a French to a German MP is based on the following table, where $\hat{\beta}_N$ and $\hat{\beta}_I$ are the model's estimated marginal effects for the national dummy (France) and the ideological dummy (Left):

	French Left	French Right
German Left	$\hat{\beta}_N$	$\hat{\beta}_N - \hat{\beta}_I$
German Right	$\hat{\beta}_N + \hat{\beta}_I$	$\hat{\beta}_N$

right). As described, the French–German difference is largest if a French left-winger compares to a German MP from a conservative party. Differences are much smaller for same-ideology couples and for a comparison of a French conservative with a German left-winger. For the latter, the two marginal effects work in opposite directions. Since the ideology effect is always larger than the national effect, the signs in Figure 4.2(c) are opposite to the one in Figure 4.2(a).[9]

Hence, an agreement of a French and a German parliamentarian on EMU reform issues is most likely for a couple of a French conservative and a German left-winger, for whom the ideological distance is somewhat smaller than the full distance between the left and right party family (as measured by our Left dummy).

To be more precise, we calculate the parameter s that indicates the necessary ideological distance between a French conservative and a German left-winger— relative to the full distance between the right and left party family—that would lead to full agreement (see Figure 4.18 in Appendix D).[10] The resulting policy issue-specific s ranges from 0.22 in case of the Fiscal Compact to 0.71 for Eurobonds. This means, for example, that for a French–German couple of parliamentarians (conditional on similar observable personal characteristics) the model predicts identical views on Eurobonds if the German's ideology is to the left of the French parliamentarian with an ideological distance amounting to 71% of the overall distance between the left and the right European party families. Remarkably, for all issues, the s-value is below 1 and hence smaller than the full ideological distance between the left and right party family (i.e. the full effect of our Left dummy).

The robustness checks reported in the Appendix provide robust evidence on the statistical significance of left-leaning ideology as well as national interests as relevant factors for the preferred design of the EMU. The magnitudes of effects consistently demonstrate that ideology matters more than nationality.

4.4 Concluding remarks

We find strong support for the role of party families and the relevance of nationality in the formation of EMU policy preferences of members of national parliaments in France and Germany. Individual characteristics tend to play only a minor and non-robust role. French policy makers and those from left-wing parties are significantly more in favor of Eurozone competencies such as Eurobonds, a EUI scheme, and the ECB's asset purchase program. They also support more investment at the national level. Regarding more flexible labor markets and higher investments at the national level, only the party position is significant—not the nationality of parliamentarians. In our view, the most interesting finding is that quantitatively the party-family effect appears to dominate the nationality effect across all issues covered. Inter-party family differences concerning desirable features of the Eurozone are quantitatively more important and more robust than national differences between the French and the Germans.

Our elite survey of national MPs sheds new light on the Rhine-Divide hypothesis and recent evidence that European heterogeneity in cultural beliefs and values may be an impediment to significant EMU reforms (Alesina et al. (2017); Brunnermeier et al. (2016); Guiso et al. (2016)). Our comparison of French and German decision makers confirms those views according to which there is a national imprint on EMU reform preferences. The findings correspond to the narrative that Germans stress liability and rules, whereas the French support solidarity and active macro-policies. However, compared to nationality the impact of ideology is stronger across all policy and reform issues. This implies that the EMU is not doomed to an ever-lasting French–German disagreement even if the national narratives do not converge. Our empirical model predicts agreement on EMU reforms for a

[9] In Figure 4.2, the sign of the calculated coefficient for the Fiscal Compact is opposite to the one for all other policy issues. This by itself is immaterial, and is simply the result of how the survey question was phrased. In case of the Fiscal Compact, the +4 answer tends to be favored by Germans from the right, whereas for all other questions the þ4 answer category is liked by French policy makers on the left. What matters is the absolute size of the bars in Figure 4.2.

[10] The parameter s is derived from the following condition: $\hat{\beta}_N - s \times \hat{\beta}_I = 0 \Rightarrow s = \hat{\beta}_N / \hat{\beta}_I$

specific combination of political majorities in both countries, i.e. German left-wingers negotiating with French conservatives. The simulation predicts full agreement even for an ideological distance between German leftists and French conservatives that is smaller than the current distance between the left and right European party families. Thus, our findings reject the view that deeply-rooted national differences are a prohibitive obstacle to a German–French consensus. Election results could possibly pave the way towards a consensus.

Our analysis is agnostic about the underlying causes and channels for the French–German divide. First, we are unable to decide to which extent the heterogeneity between parliamentarians of the two Member States mirrors national voter preferences or rather national expert elites.De Ville and Berckvens (2015) find German experts to have an outlier position on EMU reforms with their skepticism on developing a fiscal and social union in Europe. Second, although our findings are consistent with the cultural Rhine-Divide hypothesis of Brunnermeier et al. (2016), our survey cannot prove that the alleged differences in EMU positions are a consequence of different economic policy traditions and culture. One possible alternative explanation is that national self-interest drives the results of the country dummy. This might be the case if, say, German parliamentarians saw their country as a loser and French colleagues saw their country as a winner of more solidarity and joint liability in the Euro area. In this sense, the French–German dummy could also reflect a dispute on the distribution of the adjustment burden between 'deficit countries' and 'surplus countries' (Copelovitch, Frieden and Walter (2016)).

4.5 Appendix

This Appendix is composed of four parts. Appendix A provides country- and party-specific survey response rates, the European party group classifications of national parties in France and Germany, and summary statistics for the regression variables. Appendix B includes full regression results for all answer categories ("-4" to "+4") across the seven survey questions and completes the results presented in Table 4.1 which only presents the results for the maximum support answer category "+4". Appendix C lists a series of robustness checks to the baseline regression in the main text. Appendix D depicts the issue-specific s that is described in the main part of the chapter and represents the required ideological distance between a French conservative and a German left- winger for which our estimated model predicts full agreement.

4.5.1 Appendix A: Additional tables

Table 4.2 – Characteristics of MPs: response vs. non-response

	Response	No response	Total
Country			
France	131	791	922
Germany	101	529	630
Party membership by EP fraction			
European People's Party Group (EPP)	88	562	650
Progressive Alliance of Socialists and Democrats (S&D)	110	506	616
Alliance of Liberals and Democrats for Europe (ALDE)	9	63	72
European United Left–Nordic Green Left (GUE/NGL)	12	86	98
Greens–European Free Alliance (Greens/EFA)	12	78	90
Others	1	25	26
National parliament group (GER/FRA)			
Greens (Bündnis 90/DIE GRÜNEN)[a]	9	54	63
Christian-Democrats (CDU/CSU)[a]	41	269	310
The Left (DIE LINKE)[a]	12	52	64
Social-Democrats (SPD)[a]	39	154	193
The Republicans (LR)[b]	47	292	339
Socialist Party (PS)[b]	67	330	397
Other French MPs[b]	17	169	186

Note: Country of origin indicated by a - Germany; b - France. To ensure confidentiality we show only the respective response results from single parliamentary groups if at least 3 party members answered the survey. "Others" in the panel party membership by EP groups includes individual MPs with no EP group affiliation and the Europe of Nations and Freedom (ENF). The group of "Other French MPs" includes MPs with no group affiliation, members of the European Democratic and Social Rally group (RDSE), the Communist Party (PCF), Radical, Republicain, Democratic and Progressist, (RRDP), the Union of Democrats and Independents (UDI), the French Greens (Écologistes) as well as the Democratic and Republican Left Group.

Table 4.3 – Allocation of national parties and parliamentary groups to European parliament groups

Party	**Country**	**Chamber**	**National fractional group**	**European Parliament group (EP group)**
CDU/CSU	Germany	Bundestag	CDU/CSU	APP
Grüne	Germany	Bundestag	Grüne	Greens/EFA
Die Linke	Germany	Bundestag	Die Linke	GUE/NGL
SPD	Germany	Bundestag	SPD	S&D
LR, UDI	France	Assemblée	LR	EPP
PS, MRC, DVG	France	Assemblée	PS	S&D
PRG, DVG	France	Assemblée	RRDP	S&D
UDI	France	Assemblée	UDI	ALDE
EELV	France	Assemblée	Écologiste	Greens/EFA
LR	France	Senate	LR	EPP
PS	France	Senate	PS	S&D
PRG	France	Senate	RDSE	S&D
UDI, AC, MoDem	France	Senate	UDI	ALDE
EELV, DVG	France	Senate	Écologiste	Greens/EFA

The national parties refer to CDU (Christian Democratic Union of Germany), CSU (Christian Social Union in Bavaria), Grüne (Alliance 90/ the Greens), Die Linke (The Left), SPD (Social Democratic Party of Germany), LR (The Republicans), UDI (Union of Democrats and Independents), PS (Socialist Party), MRC (Citizen and Republican Movement), DVG (Miscellaneous left), PRG (Radical Party of the Left), EELV (Europe Ecology – The Greens), AC (Centrist Alliance), MoDem (Democratic Movement), EELV (Europe Ecology – The Greens). Additionally, RRDP (Radical, Republican, Democratic and Progressive) and RDSE (European Democratic and Social Rally group) national fractions of parliaments. EP groups are referred to in Table 4.1.

Table 4.4 – Summary statistics of individual controls and alternative party definitions

	N	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
France	232	0.565	0.497	0	1
Left	231	0.580	0.495	0	1
Female	232	0.272	0.446	0	1
Age	232	58.871	10.091	33	81
Years as MP	232	9.030	7.295	1	40
Upper secondary	222	0.883	0.322	0	1
University degree	220	0.823	0.383	0	1
Economics committee	232	0.078	0.268	0	1
Finance committee	232	0.147	0.354	0	1
EU affairs committee	232	0.116	0.321	0	1
Assemblée	232	0.336	9.473	0	1
Sénat	232	0.228	0.421	0	1
S&D	198	0.556	0.498	0	1
Left-right scale	219	4.924	1.832	1.231	7.667
Incumbent party	231	0.654	0.477	0	1

4.5.2 Appendix B: Baseline estimates with all categories

Figure 4.3 – Flexible labor markets, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.01	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.01
	(0.03)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.03)
Left	0.28***	0.15***	0.11***	0.05***	0.01	-0.01	-0.14***	-0.14***	-0.30***
	(0.04)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.03)	(0.04)
Female	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.04)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.03)
Age	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	0.10*	0.03	0.02	0.00	-0.00	-0.00**	-0.02*	-0.02	-0.10
secondary	(0.06)	(0.03)	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.08)
University	-0.15*	-0.02**	-0.00	0.01	0.00	0.01	0.04	0.03*	0.09**
degree	(0.09)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.02)	(0.04)
Economics	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
committee	(0.06)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.05)
Finance	-0.06	-0.02	-0.01	-0.00	0.00	0.00	0.01	0.01	0.05
committee	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.04)
EU affairs	-0.11***	-0.04**	-0.02	-0.01	0.00	0.00*	0.03***	0.03**	0.12**
committee	(0.03)	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.05)
N	214	214	214	214	214	214	214	214	214

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

Figure 4.4 – Higher investment, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.00	-0.00	-0.00	-0.01	-0.02	-0.02	-0.03	0.01	0.08
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.05)
Left	-0.02	-0.01	-0.01	-0.03**	-0.06***	-0.07***	-0.09***	0.05***	0.23***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)
Female	0.01	0.00	0.01	0.02	0.03*	0.03*	0.04**	-0.02	-0.11**
	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.05)
Age	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00
secondary	(0.01)	(0.00)	(0.01)	(0.02)	(0.03)	(0.03)	(0.04)	(0.02)	(0.12)
University	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	0.00	0.02
degree	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.03)	(0.04)	(0.02)	(0.10)
Economics	0.01	0.00	0.00	0.01	0.02	0.02	0.02	-0.01	-0.06
committee	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.08)
Finance	-0.01	-0.00	-0.01	-0.01*	-0.03**	-0.04*	-0.06*	0.00	0.15*
committee	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.08)
EU affairs	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.02	0.00	0.04
committee	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.02)	(0.03)	(0.01)	(0.08)
N	213	213	213	213	213	213	213	213	213

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

Figure 4.5 – ECB asset purchase, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.09***	-0.04***	-0.03***	-0.04***	-0.03***	-0.01*	0.05***	0.07***	0.13***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)
Left	-0.16***	-0.07***	-0.06***	-0.08***	-0.05***	-0.01	0.12***	0.13***	0.18***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.03)	(0.03)
Female	0.05**	0.02**	0.02**	0.02**	0.01**	0.00	-0.03**	-0.03**	-0.06**
	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.03)
Age	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	-0.03	-0.01	-0.01	-0.01	-0.01	-0.00	0.02	0.02	0.04
secondary	(0.05)	(0.02)	(0.01)	(0.02)	(0.01)	(0.00)	(0.03)	(0.03)	(0.05)
University	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.01
degree	(0.04)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.03)	(0.05)
Economics	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.02	0.05
committee	(0.03)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.06)
Finance	0.01	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.01
committee	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.03)
EU affairs	0.01	0.00	0.00	0.00	0.00	0.00	-0.00	-0.01	-0.01
committee	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.02)	(0.02)	(0.04)
N	213	213	213	213	213	213	213	213	213

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

Figure 4.6 – Fiscal compact, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	0.04**	0.02**	0.02**	0.01**	0.01*	0.01*	0.00	-0.01**	-0.11***
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.04)
Left	0.10***	0.08***	0.09***	0.07***	0.06***	0.10***	0.08***	-0.08***	-0.49***
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.05)
Female	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	-0.00	0.00	0.03
	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.05)
Age	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	-0.02	-0.01	-0.01	-0.01	-0.00	-0.01	0.00	0.01	0.05
secondary	(0.05)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.10)
University	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.02
degree	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.09)
Economics	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.00	0.01	0.09
committee	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.08)
Finance	-0.03	-0.02	-0.02	-0.01	-0.01	-0.01	-0.00	0.01	0.08
committee	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.06)
EU affairs	-0.02	-0.02	-0.02	-0.01	-0.01	-0.01	-0.00	0.01	0.08
committee	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.07)
N	202	202	202	202	202	202	202	202	202

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p< 0.1

Figure 4.7 – Tax policy, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.07**	-0.02*	-0.01*	-0.00	-0.00*	-0.01	0.01	0.02*	0.09**
	(0.03)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.04)
Left	-0.14***	-0.04***	-0.03***	-0.01**	-0.01**	-0.01**	0.02*	0.04***	0.17***
	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.04)
Female	0.05	0.01	0.01	0.00	0.00	0.00	-0.01	-0.01	-0.06
	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.05)
Age	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	0.05	0.01	0.01	0.00	0.00	0.01	-0.00	-0.01	-0.08
secondary	(0.07)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.12)
University	-0.15	-0.03*	-0.02**	-0.01*	-0.01**	-0.00	0.03	0.04	0.14**
degree	(0.10)	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	(0.03)	(0.03)	(0.07)
Economics	-0.02	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.01	0.03
committee	(0.06)	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.02)	(0.08)
Finance	-0.07**	-0.02*	-0.02*	-0.01	-0.01	-0.01	-0.00	0.02**	0.12*
committee	(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.07)
EU affairs	-0.08**	-0.03*	-0.02*	-0.01	-0.01	-0.01	-0.00	0.02**	0.15*
Committee	(0.04)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.08)
N	215	215	215	215	215	215	215	215	215

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

Figure 4.8 – European unemployment insurance, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.11***	-0.02**	-0.02**	-0.00*	-0.00	0.01*	0.04***	0.03**	0.08***
	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.03)
Left	-0.30***	-0.06***	-0.05***	-0.01	0.01	0.04***	0.14***	0.08***	0.16***
	(0.05)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)	(0.03)
Female	0.04	0.01	0.01	0.00	0.00	-0.00	-0.01	-0.01	-0.03
	(0.04)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.03)
Age	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
MP	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper	0.02	0.00	0.00	0.00	0.00	-0.00	-0.01	-0.00	-0.01
secondary	(0.09)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.03)	(0.03)	(0.07)
University	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00	0.00
degree	(0.08)	(0.02)	(0.01)	(0.00)	(0.00)	(0.01)	(0.03)	(0.02)	(0.06)
Economics	0.13	0.02*	0.01**	0.00	-0.00	-0.01	-0.05	-0.03*	-0.06**
committee	(0.08)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.03)	(0.02)	(0.03)
Finance	-0.02	-0.00	-0.00	-0.00	-0.00	0.00	0.01	0.01	0.01
committee	(0.05)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.04)
EU affairs	0.10	0.02*	0.01**	0.00	-0.00	-0.01	-0.04	-0.03	-0.05*
committee	(0.07)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.03)	(0.02)	(0.03)
N	214	214	214	214	214	214	214	214	214

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

Figure 4.9 – Eurobonds, ordered probit, all response categories

	(-4)	(-3)	(-2)	(-1)	(0)	(1)	(2)	(3)	(4)
France	-0.18***	-0.02**	-0.02***	-0.02***	-0.02***	-0.01**	0.03**	0.07***	0.19***
	(0.03)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.03)
Left	-0.33***	-0.06***	-0.06***	-0.05***	-0.05***	0.00	0.11***	0.16***	0.26***
	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.03)
Female	0.09**	0.01**	0.01**	0.01**	0.01**	0.00	-0.01*	-0.03**	-0.08***
	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.03)
Age	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Years as MP	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Upper secondary	-0.15*	-0.02*	-0.01**	-0.01**	-0.01***	0.00	0.03	0.05*	0.11**
	(0.09)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.03)	(0.03)	(0.05)
University degree	0.09**	0.01*	0.01*	0.01	0.02	0.01	-0.01	-0.03**	-0.13*
	(0.04)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.07)
Economics committee	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	0.00
	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)	(0.01)	(0.02)	(0.05)
Finance committee	-0.03	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.01	0.03
	(0.03)	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.04)
EU affairs committee	0.08	0.01	0.01	0.01	0.01**	0.00	-0.01	-0.03	-0.07*
	(0.05)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.04)
N	212	212	212	212	212	212	212	212	212

Standard errors in parentheses
*** p < 0.01, ** p < 0.05, * p < 0.1

4.5.3 Appendix C: Robustness and Extensions

In the following, we apply several sensitivity tests to investigate the validity of our findings on the strong and independent effects of party ideology as well as cross-border differences in policy preferences. In particular, we consider the following robustness checks.

First, we check whether the effects of French nationality are driven by either of the two chambers in France.

Second, we take a different view on our ideology variable by restricting our sample on left (S&D) versus conservatives (EPP) in the European Parliament. Hence, we lose observations by cutting other parties from our sample but we yield an intuitive comparison for the left- right comparison of party ideology across country borders.

Third, we implement a continuous measure of general party ideology from the left-right scale based on national party membership of MPs. We use the well-known Chapel Hill Expert Surveys (Polk, Rovny, Bakker, Edwards, Hooghe, Jolly, Koedam, Kostelka, Marks, Schumacher, Steenbergen, Vachudova and Zilovic (2017)) for both German and French parties. The left-right scale from this source is based on an interval ranging from 0 (extreme left) and 5 (center party) to 10 (extreme right) of the one-dimensional political spectrum.

Fourth, we investigate whether members of incumbent parties have different policy preferences than the respective opposition parties, perhaps because the incumbent government passed legislation related to our policy issues (such as the introduction of the Fiscal Compact).[11] We define the incumbent dummy variable as 1 if a politician's party was part of the government coalition in her country in April 2016 (in Germany: Christian Democrats CDU/CSU and Social Democrats; France: Parti Socialiste, Parti radical de gauche and Parti écologiste) and as zero otherwise.

In the following tables, we do not report the results for individual characteristics, but still control for them to reduce selection into non-response and omitted variable bias.

Panel (a) in both Tables 4.10 and 4.11 provide the baseline estimates in the main part of the chapter. Tables 4.10 and 4.11 show that our results are not driven by a single chamber in France (Panel b). Hence, there is no Assemblée Nationale or Sénat position, but rather a French view on national and EMU policies. A more precise but less comprehensive

[11] Heinemann, Janeba, Schröder and Streif (2016) find strong incumbency effects in a survey among members of German state parliaments addressing the issue of compliance with a national fiscal rule. See also Maatsch (2016) for an analysis of incumbency cleavages based on plenary debates.

definition of the European Parliament groups to which MPs' national parties are affiliated does not yield very different results either for the ideological variable – neither in magnitude nor in terms of significance (Panel c). The country variable effects remain constant except for two policy fields. While we do not find significant effects of nationality in the area of tax policy decision making anymore, we do find significant positive effects of MP national origin on national investments now.

When we use a continuous measure of the ideological position, we see qualitatively very similar effects (Panel d). Note that the left-right scale proxies left positions with more negative and conservative positions with more positive values. Hence, we would expect the signs of the ideology variable to take opposite signs compared to the baseline. This is exactly what we find. However, the finer classification of parties on the left-right spectrum changes the estimated effects of the country dummy. The importance of the country dummy tends to increase under the new measure. Nationality of the MP reaches statistical significance at the 5% level in both questions relating to national growth policies. The national contrast becomes even stronger for the five questions relating to EMU. Here the absolute size of all average marginal effects for the estimated country dummy increases. Nationality is statistically significant at the 1% level for all EMU policies and reform preference questions. Finally, MPs of incumbent parties tend to speak against flexible labor markets (Panel e), but significantly support active monetary and fiscal policies at the Eurozone level (ECB asset purchase programs, EUI and Eurobonds).

Figure 4.10 – National growth policies, average marginal effects for (+4), ordered probit model, alternative definitions of origin and ideology

	Flexible labor markets	Higher investment
Panel (a): Baseline results		
France	0.01	0.08
	(0.03)	(0.05)
Left	-0.30***	0.23***
	(0.0)	(0.05)
N	214	213
Panel (b): Chamber split France		
Assemblée	-0.01	0.08
	(0.03)	(0.06)
Sénat	0.05	0.07
	(0.04)	(0.07)
Left	-0.29***	0.23***
	(0.04)	(0.05)
N	214	213
Panel (c): Alternative definition of EP groups		
France	0.00	0.11**
	(0.03)	(0.05)
S&D	-0.29***	0.24***
	(0.05)	(0.05)
N	182	181
Panel (d): Continuous definition of left-right scale		
France	-0.06**	0.12**
	(0.03)	(0.05)
Left-right scale	0.08***	-0.06***
	(0.01)	(0.01)
N	203	202
Panel (e): Member of incumbent party		
France	-0.00	0.08
	(0.03)	(0.05)
Incumbent party	-0.10**	0.02
	(0.04)	(0.05)
N	214	213

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Regressions include the full set of individual variables as controls (not reported). Assemblée Nationale and Sénat are measured as dummy variables for an individual MP being member of the Assemblée or respectively the Sénat. The variable S&D is a dummy that is 1 when an individual MP is member of the S&D group and 0 when the MP is member of the EPP group. "Left-right scale" refers to a continuous measurement of ideology based on party membership of MPs drawn from Chapel Hill Expert Surveys (Polk et al. (2017)). The left-right scale is based on an interval ranging from 0 (extreme left) to 5 (center party) to 10 (extreme right). The dummy incumbent is 1 if a politician's party was part of the government coalition in her country in April 2016 (in Germany: Christian Democrats CDU/CSU and Social Democrats; France: Parti Socialiste, Parti radical de gauche and Parti écologiste).

Figure 4.11 – EMU institutions and polices, average marginal effects for (+4), ordered probit model, alternative definitions of origin and ideology

	ECB asset purchase	Fiscal Compact	Tax policy	EUI	Eurobonds
Panel (a): Baseline results					
France	0.13***	-0.11***	0.09**	0.08***	0.19***
	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
Left	0.18***	-0.49***	0.17***	0.16***	0.26***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
N	213	202	215	214	212
Panel (b): Chamber split France					
Assemblée	0.17***	-0.11**	0.06	0.07**	0.17***
	(0.04)	(0.04)	(0.05)	(0.03)	(0.04)
Senat	0.12**	-0.10*	0.16**	0.14***	0.29***
	(0.05)	(0.05)	(0.07)	(0.05)	(0.05)
Left	0.18***	-0.49***	0.18***	0.16***	0.27***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
N	213	202	215	214	212
Panel (c): Alternative definition of EP groups					
France	0.13***	-0.18***	0.06	0.06**	0.17***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
S&D	0.17***	-0.44***	0.19***	0.15***	0.26***
	(0.03)	(0.06)	(0.04)	(0.03)	(0.04)
N	181	172	183	182	180
Panel (d): Continuous definition of left-right scale					
France	0.18***	-0.20***	0.12***	0.12***	0.24***
	(0.03)	(0.04)	(0.05)	(0.03)	(0.03)
Left-right scale	-0.05***	0.12***	-0.05***	-0.05***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N	202	191	204	203	201
Panel (e): Member of incumbent party					
France	0.13***	-0.10*	0.08*	0.08***	0.17***
	(0.03)	(0.06)	(0.05)	(0.03)	(0.04)
Incumbent party	0.08***	-0.01	-0.03	0.05*	0.06*
	(0.03)	(0.06)	(0.05)	(0.03)	(0.03)
N	213	202	215	214	212

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Regressions include the full set of individual variables as controls (not reported). Assemblée Nationale and Sénat are measured as dummy variables for an individual MP being member of the Assemblée or respectively the Sénat. The variable S&D is a dummy that is 1 when an individual MP is member of the S&D group and 0 when the MP is member of the EPP group. "Left-right scale" refers to a continuous measurement of ideology based on party membership of MPs drawn from Chapel Hill Expert Surveys (Polk et al. (2017)). The left-right scale is based on an interval ranging from 0 (extreme left) to 5 (center party) to 10 (extreme right). The dummy incumbent is 1 if a politician's party was part of the government coalition in her country in April 2016 (in Germany: Christian Democrats CDU/CSU and Social Democrats; France: Parti Socialiste, Parti radical de gauche and Parti écologiste).

Figure 4.12 – National growth policies, average marginal effects for (+4), ordered logit model

	Flexible labor markets	Higher investment
France	0.00	0.09*
	(0.03)	(0.05)
Left	-0.29***	0.23***
	(0.05)	(0.05)
N	214	213

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Full set of individual variables as controls are included in the regression but not reported.

Figure 4.13 – EMU institutions and policies, average marginal effects for (+4), ordered logit model

	ECB asset purchase	Fiscal compact	Tax policy	EUI	Eurobonds
France	0.13***	-0.10**	0.08**	0.07***	0.18***
	(0.03)	(0.04)	(0.04)	(0.02)	(0.03)
Left	0.18***	-0.49***	0.17***	0.14***	0.25***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
N	213	202	215	214	212

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Full set of individual variables as controls are included in the regression but not reported.

Figure 4.14 – Support for national growth policy priorities, binary probit model

	Flexible labor markets	Higher investment
France	0.01	0.04
	(0.05)	(0.04)
Left	-0.66***	0.15***
	(0.05)	(0.05)
N	214	213

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Full set of individual variables as controls are included in the regression but not reported.

Figure 4.15 – Support for EMU institutions and policies, binary probit model

	ECB asset purchase	Fiscal compact	Tax policy	EUI	Eurobonds
France	0.30***	-0.06	0.05	0.12*	0.30***
	(0.06)	(0.06)	(0.07)	(0.07)	(0.06)
Left	0.40***	-0.44***	0.22***	0.41***	0.55***
	(0.06)	(0.05)	(0.07)	(0.06)	(0.05)
N	213	202	215	214	212

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies). Full set of individual variables as controls are included in the regression but not reported.

We now turn to results for different estimation procedures. First, we replace the ordered probit specification by an ordered logit estimation (Tables 4.12 and 4.13). All results remain qualitatively unchanged compared to the ordered probit specification. Second, we also apply a binary probit after collapsing answers from the supportive categories (+1) to (+4) into the outcome 1, while all other answers (rejecting and neutral positions) are coded as 0. Results are shown in Tables 4.14 and 4.15. The strong impact of the ideological dimension remains robust for the national and EMU policy preferences of national MPs. The country dummy is significant only in some cases, namely for ECB purchases, EUI and Eurobonds. The sign and magnitude of the estimated marginal effects remain qualitatively the same.

Figure 4.16 – National growth policy priorities, average marginal effect for (+4) for ordered probit without individual characteristics controls

	Flexible labor markets	Higher investment
France	0.02	0.13***
	(0.02)	(0.05)
Left	-0.31***	0.21***
	(0.04)	(0.0)
N	226	225

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies).

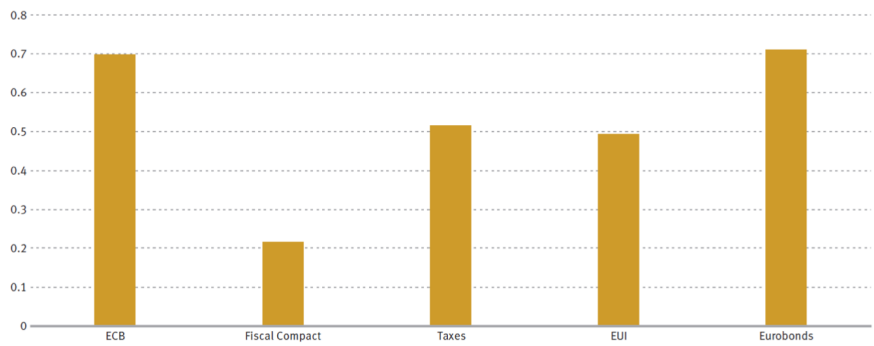
Figure 4.17 – EMU institutions and policies priorities, average marginal effect for (+4) for ordered probit without individual characteristics controls

	ECB asset purchase	Fiscal Compact	Tax policy	EUI	Eurobonds
France	0.14***	-0.10***	0.13***	0.09***	0.19***
	(0.03)	(0.04)	(0.04)	(0.02)	(0.03)
Left	0.18***	-0.48***	0.17***	0.15***	0.26***
	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
N	225	214	227	226	224

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.
Note: Marginal effects are calculated for answer class +4 (strongest support for national policies).

4.5.4 Appendix D: Additional figure

Figure 4.18 – Issue-specific s – required ideological distance between French conservative and German left-winger leading to prediction of full agreement



Notes: s is calculated as $\hat{\beta}_N/\hat{\beta}_I$ and indicates the necessary ideological distance between a French conservative and a German left-winger – relative to the full distance between the right and left party family – that would lead to full agreement.

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ECOLE DOCTORALE

Titre : Essais en Économie Publique et en Économie Politique

Mots clés : économie publique, économie politique, taxation, réseaux, intégration européenne.

Résumé : Cette thèse s'inscrit dans les domaines de l'économie publique et de l'économie politique. Comme son nom l'indique, l'économie publique s'intéresse au secteur public et traite de la conception ainsi que des effets des politiques publiques – tout particulièrement de la fiscalité, la redistribution et la fourniture de biens publics. L'économie politique, d'autre part, cherche à comprendre les implications de la politique sur l'économie. Les deux coexistent en tant que disciplines à part entière mais se complémentent également. En effet, une grande partie du champ de l'économie politique concerne l'un des principaux objets d'étude de l'économie publique : la redistribution. L'économie publique, quant à elle, repose traditionnellement sur l'existence d'un gouvernement bienveillant adoptant des politiques qui maximisent le *bien-être* de la société. Inclure des considérations politiques en examinant l'interaction entre les institutions démocratiques d'une part et des individus et décideurs publics intéressés d'autre part enrichit évidemment considérablement ces analyses. Ceci permet à la fois de déterminer quelles politiques publiques seraient réalistes politiquement dans des contextes donnés et d'expliquer pourquoi certaines politiques seraient plus répandues que d'autres. À une époque où les économistes sont de plus en plus appelés à conseiller les décideurs publics, il semble dès lors crucial de comprendre quelles politiques gagneraient l'approbation d'une majorité électorale.

Cette thèse s'articule autour de deux axes. Le premier axe présente des contributions à la théorie de l'impôt sur le revenu, en adoptant une perspective de réseaux et une perspective d'économie politique. Au sein de ce premier axe, le premier chapitre examine la conception de l'impôt sur le revenu dans le cadre de transferts redistributifs entre membres d'une même famille, d'un village ou d'une communauté. Le second chapitre traite de l'économie politique des réformes fiscales et cherche à expliquer la part substantielle de la population exemptée de l'impôt sur le revenu dans de nombreux pays développés. Le deuxième axe se compose de deux chapitres et présente une contribution au domaine de l'économie politique, via l'étude de l'opinion des décideurs publics sur des sujets de politiques publiques liés à l'intégration européenne.

Title: Essays in Public Economics and Political Economy

Keywords: public economics, political economy, taxation, networks, european integration.

Abstract: This thesis lies in the fields of Public Economics and Political Economy. As its name might suggest, Public Economics concerns the economics of the public sector; it deals with the design and effects of public policies – with a focus on taxation, redistribution, and the provision of public goods. Political Economy, on the other hand, seeks to understand the implications of politics for economic outcomes. Both exist as separate fields, but also complement each other. And indeed, a large part of Political Economy is concerned with one of the main objects of Public Economics: redistribution. Conversely, Public Economics traditionally relies on the existence of a benevolent government which decides to enact policies that maximize the *well-being* of its society. Adding political considerations to these analyses by examining the interplay between democratic institutions and self-interested individuals and politicians, enriches them considerably – helping both to inform which policies would be politically feasible in a given context, and to explain why it might be that certain policies are more prevalent than others. In a day and age where economists are increasingly mobilized in designing policies, understanding which policies would gain the approval of an electoral majority is of significant importance.

The thesis is articulated around two axes. The first axis presents contributions to the study of income taxation, by adopting both network and political economy perspectives. Chapter 1 considers the design of income taxes in the presence of private monetary transfers between members of the same family, village or community. Chapter 2 is about the political economy of tax reforms, and focuses on the share of the population that does not pay income tax. The second axis contains two chapters and presents a contribution to the field of political economy by bringing to light the opinion of decision-makers on important topics pertaining to European integration.

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