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Rakesh Gupta Nichanametla Ramasubbaiah

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THÈSE

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**ESSAYS ON SOCIAL CAPITAL AND WELFARE
MEASUREMENTS**

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par

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le 17 juillet 2018

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L'UNIVERSITÉ PARIS 1 n'entend donner aucune approbation ou improbation aux opinions émises dans cette thèse. Ces opinions doivent être considérées comme propres à leur auteur.

To my parents

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Summary in French

Ces trois dernières décennies, de multiples recherches ont été menées sur le capital social afin de comprendre son fonctionnement, son importance sur l'être humain, son impact sur le bien-être de l'individu et son implication dans le bon fonctionnement de la société.

Il y a un consensus dans la littérature pour dire que le capital social est important à la fois pour l'individu et pour la société à laquelle il appartient. Plusieurs domaines de recherche ont étudié sous différents angles ce qu'est le capital social, comment le mesurer, son impact sur les capacités et le développement humain, et son rôle dynamique entre les individus [Durlauf and Fafchamps \(2005\)](#), [Guiso et al. \(2007\)](#) et [Algan and Cahuc \(2014\)](#).

Le capital social renvoie à des concepts théoriques comme la confiance, la cohésion sociale, les normes, les réseaux sociaux et l'évolution de chacun en collectivité.

Ces concepts ont été étudiés d'abord dans les sciences humaines et sociales puis dans le domaine des sciences économiques et ont permis d'aboutir à des résultats empiriques. Ces derniers suggèrent que le capital social, sous de multiples formes, a un effet positif sur les capacités et le développement humain. Il participe à la création d'une société basée sur des groupes, des associations et des institutions pour le bien être de chacun. Le résultat final démontre que le capital social contribue de manière significative au développement économique d'un pays. A ce titre, ces travaux contribuent à combler le « résidu » de Solow ([Solow \(1957\)](#)) dont on sait qu'il représente près de 60% des facteurs explicatifs de la croissance aux Etats-Unis durant les Trente Glorieuses. Comme l'avaient suggéré [Durlauf \(2002\)](#), le capital humain entre certainement pour une bonne part dans la partie explicative de la croissance que ne capturent ni le capital productif traditionnel, ni le travail. D'une certaine manière, l'étude du capital social vient corroborer, sous l'angle micro-économique, cette intuition.

Les premiers concepts théoriques ont été développés par les sciences humaines et sociales. Celles-ci ont encouragé les économistes à s'intéresser au versant empirique du concept de capital social dans les années 1990. Ont alors fait l'objet d'investigations croissantes les liens propres entre capital social, développement humain et développement économique. Les recherches publiées dans les années 2000 montrent qu'il existe plusieurs conditions et plusieurs chemins possibles pour établir un lien entre capital social et développement économique. Les différentes institutions en présence, l'histoire du pays, l'éventuelle colonisation, les incitations du gouvernement, et les politiques publiques sont autant de paramètres qui viennent l'affecter. Malgré toutes ces déterminations croisées, le résultat global de cette littérature est que le capital social a, en général, un effet

positif sur le développement humain et le développement économique.

De son côté, la théorie des capacités (*capabilities*) humaines développée par Amartya Sen (Sen (1979a), Sen (1989) et Sen (2001)) met en exergue des concepts essentiels pour l'économie du développement. Elle a été nuancée, critiquée et prolongée de bien des manières (Nussbaum (1988), Nussbaum (2003), Nussbaum (2002) et Nussbaum (2013)) Toutefois, cette approche est centrée sur l'individu et laisse de côté le versant collectif de la problématique du développement.

On soupçonne aisément qu'il existe une connexion et des interactions entre les capacités d'un individu et son capital social. L'interaction ou la connexion entre les deux théories sous-jacentes peut s'aborder d'un point de vue instrumental —l'un est alors au service de l'autre, ou bien tous deux sont supposés concourir, par exemple, à la croissance du PIB—, soit en supposant que ces deux théories sont inspirées d'une même idée sous des angles différents. Mais une chose est claire : l'importance et l'impact des réseaux sociaux sont ignorés dans l'approche des capacités par Amartya Sen.

Dans le même temps, les réseaux sociaux (dont l'étude connaît elle-même un essor majeur depuis les années 1990 (Castiglione et al., eds (2008), Dasgupta et al., eds (2000) et Ostrom (1994)), en manifestant l'implication des individus dans des groupements et des actions collectives, offrent un lien évident avec les capacités des individus aussi bien qu'avec leur capital social : quel capital social peut-on faire valoir si l'on est su ? Et quelle capacité vaut-il alors la peine de déployer ?

Cet aspect a été développé par Giraud et al. (2013), où est proposée une approche des capacités relationnelles qui prenne en compte le collectif et ses interactions.

Un autre déterminant ne doit pas être négligé dans le processus de développement : le bonheur (ou bien-être subjectif). L'un des intérêts majeurs du capital social n'est-il pas de contribuer au bien-être subjectif des individus ? Ce dernier n'est-il pas une mesure, parmi d'autres, du « développement » ? A quoi bon accumuler du capital social ou déployer des capacités, fussent-elles relationnelles, si cela n'ajoute rien au bonheur d'une personne ?

Dans la littérature, ces différents concepts —le capital social, les capacités (relationnelles), le bonheur, le développement— et les liens qui les unissent, ne sont pas suffisamment approfondis ou développés. Cette thèse propose de tester différentes réponses possibles à la question : quels sont les liens entre capital social, capacités relationnelles, bonheur et développement économique ?

Le premier chapitre un de cette thèse est consacré au prolongement et à l'approfondissement des résultats trouvés dans les années 1990 (Knack and Keefer (1997)), qui soutiennent que le capital social a un effet positif sur le développe-

ment économique. Plus spécifiquement, l'échantillon des pays étudiés sera élargi et analysé sous la forme d'un modèle de données de pseudo-panel. Notre conclusion principale est que le capital social est toujours pertinent et a un effet positif sur le développement économique tel qu'il est mesuré par le PIB, même lorsque l'on contrôle l'analyse économétrique par les caractères propres à chaque pays.

Dans le deuxième chapitre de cette thèse, nous proposons une axiomatique destinée à la construction d'un indicateur multidimensionnel de développement. Les idées qui président à cette axiomatique ont guidé la construction de l'indicateur des capacités relationnelles mais s'appliquent aussi bien à d'autres indicateurs multidimensionnels, et notamment à des indicateurs de pauvreté ou développement multidimensionnels. Nous montrons que l'axiomatique introduite ici permet de fournir des indicateurs continus et ordinaux, ce qui est primordial pour la mesure empirique de la pauvreté.

Puis, le troisième chapitre permet offre une mise à jour de l'indicateur des capacités relationnelles (RCI) introduit par [Giraud et al. \(2013\)](#), en vue d'obtenir un indicateur final qui soit à la fois continu et ordinal. Cette nouvelle version du RCI prend en compte l'axiomatique développée dans le deuxième chapitre, et élimine les inconvénients de l'approche d'agrégation liés aux seuils critiques des composantes d'un indicateur composite. Nous appliquons ce nouvel indicateur RCI 2.0 à un échantillon global représentatif au niveau national et nous en analysons les résultats.

Le dernier chapitre étudie l'effet du capital social, des capacités relationnelles et de la cohésion sociale (mesurée à partir des écarts sociaux) sur le bien-être subjectif. Dans ce chapitre, on étudie pour la première fois (à ma connaissance) l'application des célèbres mesures des écarts sociaux (indicateur de fractionalisation et indicateur de polarisation) dans le champ du capital social. Y sont notamment abordées la question de l'exclusion sociale subjective et du sentiment de discrimination des individus à travers le concept de l'identité. Nous explorons la manière dont ces notions sont reliées aux enjeux de cohésion sociale, du capital social et des capacités relationnelles.

Chapitre 1 Capital Social et développement : où en est-on ?

La première introduction du capital social dans le monde des sciences sociales remonte à [Loury \(1977\)](#), puis par [Olson \(1982\)](#), [Coleman \(1988\)](#) et [Putnam et al.](#)

(1993). Tous quatre s'attachent à définir le capital social mais focalisent leurs approches respectives sur différentes organisations sociales. Le capital social existant ou créé au sein de ces organisations sociales est censé produire des externalités positives pour les membres du groupe. Leurs définitions du capital social dépendent toutes de différents types de normes, de la confiance entre les membres du groupe et des valeurs des membres du groupe. C'est alors à travers les normes, la confiance et les valeurs que le capital social est supposé agir sur les processus de réseaux et les structures sociales qui, à leur tour, génèrent des bénéfices positifs pour leurs membres.

C'est dans les années 1990 que le capital social commence à être étudié de près dans le champ économique, et notamment la relation entre capital social et développement économique (Knack and Keefer (1997)). Différents outils de mesure du capital social sont alors élaborés, qui permettent d'expliquer une partie de l'observation de différents secteurs tels que la santé, la solidarité, le vote, les investissements dans les biens publics ou le développement économique (Durlauf and Fafchamps (2005)). Cet intérêt croissant pour le capital social dans le domaine des sciences économiques conduit à une évolution de sa définition et des manières de l'appréhender : par des monographies, d'une façon statistique, économétrique, etc. Le « capital social » englobe désormais plusieurs notions comme les normes, les réseaux ou la coopération, et plus largement les relations de l'individu avec la société (Castiglione et al., eds (2008) et Woolcock and Narayan (2000)). En résulte une certaine ambiguïté du concept lui-même. Dans la décennie suivante, Durlauf and Fafchamps (2005) synthétiseront les nombreuses questions et réflexions qui ont émergé autour du capital social. Il ressort que, parmi toutes les différentes définitions du capital social adoptées dans la littérature, la confiance généralisée entre les individus (« generalized trust ») émerge comme l'un des caractéristiques les plus souvent utilisées pour rendre compte, au moins partiellement, du développement économique et de la croissance.

Je prendrai comme point de départ de ma propre relecture de cette abondante littérature la remarque selon laquelle certains bénéfices du capital social peuvent favoriser les membres d'un groupe et priver un autre groupe de ces mêmes bénéfices. Cette propriété est explicitée, par exemple, par la caractérisation des groupes associatifs du capital social conçue par Olson (1982) et Putnam et al. (1993). Plus précisément, Putnam se concentre sur des groupes associatifs horizontaux qui génèrent des valeurs partagées, de la solidarité (e.g., associations, ONGs, groupes religieux, etc.) et qui travaillent pour un intérêt partagé, pour la cohésion sociale et pour bon fonctionnement de la société. Selon Olson, toutefois, une telle vision du groupe, de nature essentiellement associative, n'est pas

suffisante pour atteindre un développement économique. D'après ce dernier, de tels groupes associatifs sont une condition nécessaire mais non suffisante pour soutenir la croissance. Sont également nécessaires des groupes qui servent des intérêts particuliers avec des incitations claires de la part de leurs membres (e.g., syndicats, partis politiques, associations professionnelles, lobbyistes).

La distinction des différents types de groupes associatifs opérée dans le célèbre travail de [Knack and Keefer \(1997\)](#) a permis de tester, d'une part, l'hypothèse de l'existence de groupes de type Olson et Putnam et, d'autre part, l'impact relatif de ces groupes sur la croissance d'un pays. Plus précisément, [Knack and Keefer \(1997\)](#) démontrent que la confiance entre les individus et les institutions formelles (dont on a vu qu'elle est l'une des caractéristiques les plus volontiers retenues du capital social) favorise la croissance et le développement économique d'un pays.

Leur étude utilise trois vagues de sondages des World Values Surveys (WVS) comme échantillon global, et ils procèdent à l'estimation de régressions multi-pays pour aboutir à trois résultats principaux. Premièrement, la confiance et l'engagement civique ont un effet positif et significatif sur le développement économique. Deuxièmement, l'appartenance à des groupes associatifs (de type Putnam) n'a pas d'impact sur la confiance ou l'engagement civique, ni sur le développement économique comme suggéré par [Putnam et al. \(1993\)](#). Troisièmement, la faible polarisation sociale et les institutions formelles comme par exemple, les tribunaux officiels, la justice indépendante, les associations industrielles, les agences d'évaluation du crédit parmi d'autres (qui empêchent l'Etat d'agir de manière arbitraire) facilitent la confiance et l'engagement civique. La publication de l'article de [Knack and Keefer \(1997\)](#), qui a connu un grand succès dans le milieu scientifique des sciences sociales, a pourtant obligé nombre de chercheurs à revérifier leur méthodologie et leurs résultats.

[Beugelsdijk et al. \(2004\)](#) et [Bjørnskov \(2007\)](#), parmi d'autres, n'en ont pas moins critiqué l'approche de Knack et Keefer pour son manque de rigueur méthodologique. Leurs critiques portaient, notamment, sur les tests de robustesse, sur leur inconsistance et sur les problèmes de petits échantillons. Plus récemment, [Algan and Cahuc \(2014\)](#) résume la plupart des travaux menés par des chercheurs sur la relation entre la confiance, les institutions et le développement économique, et confirment le rôle central joué par la confiance.

Le premier chapitre de cette thèse a pour objectif de revisiter la question des relations empiriques entre le capital social et le développement économique dans le prolongement de [Knack and Keefer \(1997\)](#). Compte tenu des défis méthodologiques que soulève cette question et des critiques dont ont fait l'objet les travaux susdits —notamment la spécification du modèle économétrique—, je

propose une stratégie empirique renouvelée afin de contourner ces difficultés. J'introduis un modèle de données de pseudo-panel sur trois décennies, ce qui permet de disposer d'une profondeur historique nettement supérieure à celle des études antérieures. Il s'agit d'une approche de *pseudo*-panel du fait de la fréquence irrégulière avec laquelle les données des pays ont pu être récoltées et parce que certains pays sont manquants dans les différentes vagues d'enquête de World Values Survey (WVS) utilisées dans mon étude.

Grace à cette base de données, j'ai pu vérifier l'existence du lien unissant la croissance d'un pays avec la confiance entre les individus, la qualité des institutions, le niveau du développement du pays (PIB/habitant), le niveau d'instruction de la population, le prix de l'investissement, la diversité ethnique dans le pays et les inégalités. J'ai également vérifié la relation des déterminants du niveau de confiance d'un individu envers les autres individus au sein d'un pays avec la série de variables connue dans la littérature comme le niveau de l'éducation de l'individu, l'âge, le genre, l'état civil, le statut d'emploi, la religion et d'autres. En outre, est confirmée l'importance des groupes associatifs de type Olson et Putnam dans la création de la confiance entre les individus et l'engagement civique.

Afin de tester l'existence de liens entre le développement économique, la confiance entre les individus et la qualité des institutions —l'une des questions principales de ce chapitre—, j'ai utilisé la spécification du modèle de forme réduite. Les trois équations qui en résultent (voir le chapitre pour les détails) permettent de mieux appréhender le lien de causalité entre le capital social et le développement économique. L'effet de la confiance sur la croissance est positif et statistiquement significatif. Le *R*-carré ajusté indique des limites supérieures par rapport aux résultats qui se trouvent dans la littérature. Par ailleurs, les effets ne sont pas biaisés par le groupement des pays par régions du monde —ce que j'ai testé en agrégeant l'erreur type du modèle. D'ailleurs, on observe également que les institutions sont positivement associés avec le développement économique. Bien évidemment nous devons garder à l'esprit que les mesures des institutions ont été largement critiqués dans la littérature.

Si l'on se tourne à présent vers les résultats de microrégressions de déterminants de la confiance au sein d'un individu, on remarque que les covariables standards d'un individu, comme l'âge, âge au carré, le fait d'être un homme, l'emploi, le niveau d'instruction, l'état civil, la religion, la religiosité ou avoir les enfants — conservent l'effet observé précédemment dans la littérature sur des échantillons plus anciens ou plus restreints.

Quant au test de robustesse et au test de validité du modèle, plusieurs spécifications et également différentes formes fonctionnelles ont été mises à l'épreuve. La

sensibilité des résultats aux variations de spécifications du modèle ou de formes fonctionnelles des variables est consistante et cohérente.

Dans ce chapitre précédent, les liens du capital social et du développement économique ont été examinés à travers des vecteurs comme la confiance, les groupes associatifs, et les institutions. Ce premier chapitre fournit donc une analyse macro visant à confirmer les relations unissant le capital social, le bien-être subjectif, la cohésion sociale et les relations sociales, et servira ainsi de base de départ pour les chapitres suivants. Dans la suite de mon travail, je traite ces sujets interconnectés d'une manière approfondie pour aboutir à des résultats empiriques avec des outils statistiques et microéconométriques plus fins.

***Chapitre 2* Mesure de Pauvreté Multidimensionnelle Cohérente**

Le deuxième chapitre de cette thèse propose une approche axiomatique d'une famille d'indicateurs multidimensionnels de pauvreté (ou de développement en général). Comme reconnu par [Villar et al. \(2010\)](#), un grand défi des indicateurs multidimensionnelles consiste à choisir les dimensions de réalisations, à définir les seuils de ces dimensions et à les agréger d'une manière cohérente. Ceci nécessite des compromis. L'approche axiomatique peut aider à expliciter ces compromis.

Les axiomatiques développées ici donnent lieu à un continuum d'indicateurs dont les points extrêmes sont les « Maximin » rawlsien et l'utilitarisme. En plus de satisfaire les fonctionnalités standards que l'on trouve dans la littérature, nous montrons que cette famille d'indicateurs est à la fois continue et ordinale. Cela signifie que les dimensions de réalisations (ou dépravations) ne dépendent pas de certaines spécifications *ad hoc* dans le choix de ses unités. En outre, la paramètre qui discrimine entre les différents indicateurs d'une même famille est lié à la décroissance du taux de substitution marginale entre composantes de l'indicateur multidimensionnel : plus le manque d'une dimension est élevé, plus la hausse correspondante de réalisation d'une autre dimension qui permet de compenser ce manque est elle-même élevée.

L'indicateur de moyenne géométrique peut être considéré comme une version logarithmique du point de vue « utilitariste ». Transposé dans le domaine des indicateurs multidimensionnels, le critère utilitariste revient alors à maximiser la moyenne géométrique pondérée uniformément —c'est justement la caractéristique utilitariste— sur les individus et les dimensions. Quand l'ensemble de poids relatifs qui affectent individus et dimensions n'est plus limité à la première diago-

nale de l'espace des pondérations mais couvre l'ensemble du simplexe unité, nous sommes conduits à la solution « Maximin » de Rawls. Elle correspond également à la situation d'incertitude Knightienne maximale, celle où l'on ne dispose d'aucune information *a priori* sur la répartition des individus et des dimensions de l'indicateur. Cette situation est évidemment réminiscente de la fameuse position originelle de Rawls, et du débat entre Rawls (qui en déduit que l'incertitude doit conduire au critère du Maximin) et Harsanyi (qui concluait, au contraire, à la nécessité d'adopter le critère utilitariste).

A notre connaissance, il s'agit de la première tentative visant à relier les théories de la justice et les mesures de la pauvreté. Nous nous inspirons de [Artzner et al. \(1999\)](#) où une version additive d'une axiomatisation similaire a été introduite pour mesurer le risque des queues de distribution d'un portefeuille financier (de telles mesures du risque sont appelées par leurs auteurs « cohérentes » et, par exemple, la célèbre VaR, Value at Risk, n'est pas cohérente). Par analogie, nous appelons donc « cohérent » un indicateur multidimensionnel qui appartient à notre famille.

Les indicateurs qui satisfont à notre axiomatique ont les propriétés suivantes, considérées comme désirables dans la littérature : chaque indicateur est continu ; ordinal ; il produit un critère de la « pauvreté relative » qui repose sur toute la population en question ; le taux de substitution marginale entre dimensions et individus est (plus ou moins) décroissant ; il est décomposable multiplicativement en sous-groupes de la population (et non pas multiplicativement additivement comme dans [Bourguignon and Chakravarty \(2003\)](#)) ; il vérifie le principe du transfert (l'amélioration de la dimension k de l'individu i compense la détérioration de la dimension k de l'individu j à condition que les deux individus gardent leurs positions relatives dans le collectif) ; et il vérifie le « principe de la population » (la duplication à l'identique de la population ne change pas la mesure de la pauvreté).

Dans ce chapitre, nous discutons l'intérêt d'agrèger des indicateurs multidimensionnels, ainsi que les avantages et les inconvénients de l'approche des mesures de *deprivation* par contraste avec les mesures de réalisation. Enfin, nous faisons le point sur les critiques de [Ravallion \(2012\)](#) adressées aux indicateurs multidimensionnels de développement « mashup indices » en détaillant la question du prix : le prix du marché, le prix implicite, le prix fictif et ses liens indirects avec les poids et méthodes de pondération et d'agrégation des indicateurs multidimensionnels de développement.

Le chapitre suivant va proposer une application de la méthode élaborée ici à un indicateur multidimensionnel de « capacité relationnelle » destiné à fournir

une mesure alternative du capital social.

Chapitre 3 L'Indicateur de Capacités Relationnelles 2.0

Ce chapitre s'inspire de l'article [Giraud et al. \(2013\)](#) qui fournit un indicateur de capacité relationnelle (*Relational Capability Index*, RCI). L'intuition initiale d'un tel indicateur est que la mesure de la qualité de nos relations sociales devrait faire partie intégrante de notre appréciation de l'impact développemental d'un projet ou d'une politique publique. Une infrastructure (un pont, un barrage, une centrale solaire...) qui ne favoriserait pas *in fine* la qualité des relations sociales entre ses bénéficiaires mériterait d'être questionnée. Ce chapitre met à jour l'indicateur de capacités relationnelles (RCI) présenté dans l'article de [Giraud et al. \(2013\)](#) et applique l'approche axiomatique détaillée dans le chapitre précédent pour en déduire une famille d'indicateurs multidimensionnels cohérents. Cette version de RCI, appelée RCI 2.0, prend en compte les critiques des indicateurs multidimensionnels que l'on détaillera dans les parties suivantes.

L'approche de capacités (*capabilities*) développée par Amartya Sen est essentielle à l'intelligence contemporaine du développement humain [Sen \(1979b\)](#), [Sen \(1985\)](#), [Sen \(1989\)](#), [Nussbaum \(2013\)](#) et [Renouard \(2011\)](#). Elle met l'accent sur l'enrichissement non-matériel des individus dans le sens du développement de leurs capacités afin d'atteindre leur propre bien-être. Mais cette approche est centrée sur l'individu, et laisse de côté la part collective de la problématique. En particulier, l'importance et l'impact des réseaux sociaux est ignorée dans l'approche des capacités.

Les réseaux sociaux, on l'a dit, sont devenus l'un des concepts majeurs de la théorie du capital social. [Giraud et al. \(2013\)](#) tente en quelque sorte une synthèse entre l'approche des capacités et le point de vue dégagé par la littérature sur les réseaux sociaux, essentiellement afin de proposer une version « collective » des capacités. Toutefois, l'une des caractéristiques centrales de l'interprétation du RCI que nous favorisons n'est pas immédiatement déductible de la littérature existante dédiée aux capacités, ainsi que des travaux autour du capital social. La théorie du capital social considère en effet les interactions sociales comme des instruments : elles restent dépourvues de valeur éthique intrinsèque puisque les relations sociales ne sont pas reconnues comme des réalisations ou encore comme un bien en soi, mais ne sont économiquement valorisées qu'en tant qu'elles contribuent (ou non) à la croissance du PIB. Ce présupposé est commun à l'ensemble des travaux d'Olson, Putnam ou Coleman auxquels il a été fait allusion dans le premier chapitre. Plus précisément, la théorie du capital social considère les re-

lations sociales comme un actif mobilisable « contre » d'autres individus dans un contexte de concurrence (sociale) généralisée. Notre approche consiste, au contraire, à promouvoir le renforcement des liens sociaux et de la cohésion sociale afin d'arriver à un environnement de confiance et de coopération des individus les uns envers les autres. Dans cette optique, la relation d'instrumentalisation peut même être inversée puisque la question peut se poser de savoir si la croissance du PIB contribue au « développement », mesuré, cette fois, et par exemple, par le RCI 2.0.

Notre approche met donc les liens sociaux au cœur de notre conception du développement humain¹. Qui plus est, le RCI et le RCI 2.0 s'efforce de reconnaître la diversité personnelle, les valeurs collectives et les fins spécifiques que tout individu peut librement assigner à son existence. Nous comprenons les capacités relationnelles comme un moyen dont la promotion permet de tendre vers des sociétés plus inclusives, en défendant l'idée que l'inclusion est indissociable de la cohésion sociale. Symétriquement, l'exclusion sociale est considérée ici comme une privation de capacité relationnelle et comme l'expression d'un échec du processus de développement.

Nous distinguons trois dimensions au sein du RCI : premièrement, être intégré dans les réseaux ; deuxièmement, être personnellement en relation avec d'autres (via des relations d'amitié, d'amour, de voisinage...) ; troisièmement, s'engager dans un projet collectif au sein d'une groupe. Bien sûr, le caractère multidimensionnel de l'indice pose inévitablement des problèmes méthodologiques d'agrégation. Je m'appuie alors sur le deuxième chapitre pour aborder ces questions et proposer une généralisation du RCI. Sa mesure empirique pose à son tour d'autres questions. Ainsi, la littérature empirique dédiée aux indicateurs de pauvreté peut se diviser notamment en deux catégories : les travaux normatifs qui, à l'instar d'[Alkire and Foster \(2011a\)](#) (« Multidimensional Poverty Index » (MPI)) agrège des seuils de pauvreté déterminés d'un point de vue normatif *versus* la littérature consacrée aux indicateurs multidimensionnels guidés par des données où les poids respectifs des dimensions sont générés de façon endogène par les données elles-mêmes.

Le RCI 2.0 s'appuie sur une agrégation à deux étages. Les trois dimensions sont agrégées au moyen d'une procédure cohérente (au sens du chapitre précédent) intermédiaire entre la somme géométrique et le Maximin rawlsien, ce qui traduit leur caractère plus ou moins faiblement substituable. En revanche, chaque

¹A ce titre, elle entre en consonance avec l'orientation stratégique adoptée récemment par l'Agence Française de Développement, dite « 100% lien social », qui consiste à faire en sorte que l'ensemble des projets soutenus par l'Agence aient des retombées positives en termes de qualité du tissu social.

dimension est elle-même constituée de plusieurs composantes, dont la moyenne est arithmétique, et donc substituables entre elles. Nous exploitons les données de « Gallup World Poll » de 2012 pour appliquer les méthodes susmentionnées de RCI 2.0 et pour illustrer empiriquement le point de vue capturé par le RCI 2.0. La richesse d'informations contenue dans l'enquête « Gallup World Poll » (2012) sur les dimensions sociales, culturelles, politiques et économiques au sein d'un pays et dans plupart des pays du monde permet une analyse comparative fine de la qualité du tissu social.

Au premier regard, l'un des résultats étonnants obtenus concerne les Etats-Unis et le Canada, qui prennent les deux premières places dans le classement des pays pour les meilleurs scores de capacité relationnelle. Cela s'explique par le fait les scores très élevés des deux composants de solidarité et, plus généralement, d'action collective (3ème dimension) rapport à la plupart des autres pays du monde. En revanche, dès que l'on neutralise l'effet de cette composante, les pays scandinaves et l'Autriche ont remplacé les Etats-Unis et le Canada pour la tête du classement.

Une analyse de l'indicateur au niveau régional nous montre qu'en Asie de Sud, le Sri Lanka est très bien placé (rang 22), occupant ainsi une place nettement meilleure que tous ses voisins. Par ailleurs, le Bangladesh (qui a un PIB par habitant égal à moins de moins de la moitié de celui de l'Inde) est légèrement mieux placé que l'Inde, et ces deux pays sont mieux que le Pakistan. Ces scores confirment l'analyse des politiques publiques déployée dans le livre de [Dreze and Sen \(2013\)](#) où la croissance et le développement du Sri Lanka et du Bangladesh sont décrites comme plus inclusives que celles de leurs voisins, comportant notamment des investissements significatifs dans l'éducation public, la santé primaire, et les mesures anti-pauvreté. Ces politiques gouvernementales ont-elles facilité les capacités relationnelles des individus du pays ? C'est tout l'intérêt du RCI 2.0 de permettre de poser ce type de question.

Quelques résultats aberrants exigent une interprétation qualitative, notamment pour la Russie (rang 107), le Nigéria (rang 25) et la Syrie (rang 45). Par exemple, pour la Russie, s'interroger sur la capacité d'un citoyen à « exprimer son avis à un représentant du gouvernement » —une composante de l'engagement civique— n'est pas une bonne manière d'appréhender sa capacité relationnelle vu les tensions politiques qui ont vu le jour dans ce pays au cours des dernières années. Pour le Nigéria, le score très élevé des composantes liées aux relations privées (2ème dimension du RCI 2.0) ne s'explique pas seulement par la prégnance de la « famille africaine » mais aussi par le fait que le clientélisme est très ancré dans ce pays. Ceci contribue aux bons résultats finals du Nigéria par rapport à

ses voisins. En d'autres termes, le RCI 2.0 est évidemment tributaire de la qualité des enquêtes sous-jacentes et nécessite, comme tout indicateur, une interprétation qualitative fine pour que les résultats qu'il permet d'obtenir acquièrent un sens.

Le principal atout du RCI 2.0, combiné aux données de « Gallup World Poll », est que ses résultats peuvent être désagrégés par genre, niveaux de revenus et régions nationales. J'analyse les différences des capacités relationnelles des individus en regardant l'écart de RCI 2.0 entre le revenu du quantile de revenu le plus élevé par rapport au quantile de revenu le plus faible. Le Zimbabwe, l'Afrique du Sud et le Myanmar figurent parmi les pays qui exhibent les plus grandes différences de capacités relationnelles entre riches et pauvres. Par contre, à part le Portugal, il n'existe aucun pays à revenu élevé présentant de grandes inégalités de RCI 2.0. Ceci s'explique par l'accès de la plupart des individus dans des pays à revenu élevé, à l'emploi, au transport public, aux soins de santé, à l'éducation et à la technologie informatique.

La désagrégation du RCI 2.0 par genre montre que, pour plus de 70 % de la population mondiale, on observe 10 % de décalage en termes de qualités relationnelle entre hommes et femmes à la défaveur des femmes. Seuls la Norvège et le Royaume-Uni figurent parmi les pays à revenu élevé bien classés en termes d'inégalité de capacités relationnelles par sexe (i.e., appartenant aux dix premiers rangs). A l'autre extrémité du spectre, le Yémen figure parmi les pays avec les plus faibles capacités relationnelles en moyenne et les plus grandes différences de RCI 2.0 entre hommes et femmes. L'Afghanistan figure également dans les pays où les inégalités de genre en termes de capacités relationnelles sont les plus grandes, mais le sort relationnel des femmes est plus enviable en Afghanistan qu'au Yémen.

Les inégalités relationnelles entre urbains et ruraux sont extrêmement hétéroclites. Au niveau mondial, on observe un décalage de 4% pour plus de 70% de la population globale entre les individus urbains/ruraux en faveur des urbains. En Argentine, en revanche, elles penchent en faveur des individus en zone rurales. Les Etats-Unis sont le seul pays à revenu élevé figurant parmi les dix premiers pays exhibant le moins de d'inégalité relationnelle entre urbains ruraux. D'autre part, le Bénin, le Burkina Faso, la Guinée, la République démocratique du Congo et Madagascar font partie des pays exhibant le RCI 2.0 le plus faible *et* la plus grande inégalité relationnelle urbain-rural en faveur des urbains.

J'ai également procédé à des vérifications de la robustesse des composantes et des dimensions au sein du RCI 2.0, selon la méthodologie appliquée par [Foster et al. \(2013\)](#). Le RCI 2.0 obtient de bons résultats de robustesse, analogues à ceux de l'Indice de Développement Humain (IDH) construit avec les base de données «

Gallup World Poll ». Les tests de dominance stochastique —First Order Stochastic Dominance (FOSD) et Second Order Stochastic Dominance (SOSD)— indiquent qu’il y a FOSD et SOSD pour la désagrégation du RCI 2.0 par les revenus des individus et par le genre, mais non par région où seul le FOSD se vérifie au niveau global. En revanche, les FOSD et SOSD sont vérifiées dans tous les pays du monde sur la distribution globale des inégalités relationnelles.

Au final, il appert que le RCI 2.0 est un indicateur robuste et fiable qui révèle de fortes inégalités difficilement capturées par d’autres indicateurs conventionnels, et qui permet une richesse d’analyse inédite sur la qualité des tissus sociaux dans le monde. Il me semble qu’il a vocation à devenir un indicateur complémentaire des indicateurs classiques que sont le PIB per capita, l’IDH et le MPI.

Chapitre 4 L’Influence de l’Exclusion Sociale et de la Polarisation Ethnique sur les Capacités Relationnelles et le Bien-Etre Subjectif

Le quatrième chapitre de cette thèse étudie le rôle de la polarisation ethnique pour expliquer, au-delà du conflit social et de la guerre civile, les différences de capacités relationnelles et de bien-être subjectif. Il s’inscrit dans la problématique plus vaste de la cohésion sociale et des déterminants du capital social (Lin et al., eds (2017)).

Putnam et al. (1993) a remarqué que la cohésion sociale, l’harmonie politique et la bonne gouvernance sont une précondition d’un engagement civique florissant de la population et de la vie associative au sein de la société civile. Olson (1982) note dans son travail que la cohésion sociale est nécessaire pour améliorer la croissance économique. L’article de Putnam and Goss (2002) étudie différents types de la cohésion sociale : les réseaux affectifs (« *bonding networks* ») —qui mettent en relation des individus similaires partageant les mêmes centres d’intérêt— et les réseaux relationnels (« *bridging networks* ») : qui mettent en relation des individus aux centres d’intérêt divergents. Ces réseaux facilitent la création d’associations formelles et informelles qui déterminent la qualité des institutions d’une société. Le premier chapitre avait mis l’accent sur la qualité des institutions comme déterminant de la croissance ; le présent chapitre s’attache à la cohésion sociale comme déterminant de cette qualité institutionnelle.

L’exclusion sociale peut se comprendre comme le résultat d’un manque de cohésion sociale. Elle fait l’objet d’études approfondies dans la littérature sur la migration et les minorités (Bhagwati and Hamada (1974), Beine et al. (2008) et

Nikolova and Graham (2015) parmi d'autres), les divisions sociales et ethniques (Lanski (1966) parmi les premiers), la psychologie (Maslow (1943), Keyes (1998) et Stillman et al. (2009) parmi d'autres) et le bien-être subjectif (Diener (2000), Veenhoven (2004), Clark and Senik, eds (2014) et Graham (2005)).

L'objectif principal de ce chapitre consiste à mesurer l'impact de l'exclusion sociale sur les capacités relationnelles (RCI 2.0), et le bien-être subjectif par les mesures de divisions sociales que l'on retrouve très couramment dans la littérature pour étudier le conflit social ainsi que les guerres civiles. La majorité de travaux de recherche dédiés à la division sociale conclut que la diversité ethnique a des effets adverses au sens large (Fearon (2003), Montalvo and Reynal-Querol (2002), Esteban and Ray (2008) et Alesina et al. (2016)). Inversement, Habyarimana et al. (2007) et Gisselquist et al. (2016)) montrent que la diversité ethnique de la population est bénéfique à l'ensemble du corps social. J'examine ces questions à frais nouveaux au chapitre 4.

Ces concepts différents mais imbriqués les uns dans les autres (et unis par des relations fortement endogènes au sens statistique) sont démêlés grâce à la spécification du modèle économétrique développé dans le chapitre 4. Malgré tout, l'endogénéité irréductible ne permet pas une analyse en termes de causalité dans le modèle multipays : les individus (subjectivement) moins heureux ou bien possédant des capacités relationnelles réduites, sont davantage susceptibles de se déclarer victimes d'exclusion sociale mais la réciproque est tout aussi vraie. J'essaye de contourner la difficulté de plusieurs façons en testant plusieurs hypothèses, formulées dans la littérature. Ainsi, l'exclusion sociale s'explique par une mesure de la division sociale capturée par la segmentation et la polarisation. Ces deux mesures sont certainement les plus étudiées au sein de la littérature dévolue à l'examen de la division sociale (McDoom and Gisselquist (2015) et Gisselquist et al. (2016)).

Ces deux mesures de divisions sociales quantifient la probabilité que deux individus tirés au hasard d'un échantillon appartiennent à des groupes ethniques différents. La différence entre ces deux mesures est la suivante : la segmentation (ou balkanisation) n'est pas impactée par la taille du groupe ethnique auquel appartient l'individu, tandis que la mesure de la polarisation dépend de ladite taille. Ces mesures de divisions sociales ont été appliquées, au-delà du conflit social et de la guerre civile, à la fourniture de biens publics et également à la croissance économique (Esteban and Ray (2011), Huber and Suryanarayan (2016), Easterly and Levine (1997) et Easterly (2007)).

Autrement dit, l'indice de segmentation peut être considéré comme une mesure de la diversité ethnique au sein d'un pays. D'autre part, l'indice de polarisation,

parce qu'il prend en considération la taille des groupements par ethnicité, peut être considéré comme une mesure de la concentration du corps social en composantes distinctes (« polarisées »). Pour résumer, l'idée principale de ce chapitre consiste à vérifier si la perception de l'exclusion sociale d'un individu a un impact sur ses capacités relationnelles et/ou se bien-être subjectif. En outre, j'examine si la perception de l'exclusion sociale d'un individu peut être expliquée par les divisions ethniques au sein d'un pays.

Afin de tester mes hypothèses, j'utilise la base de données de Latinobarometro qui regroupe le sondage mené dans 18 pays d'Amérique Latine tous les ans depuis 1995. J'ai choisi les vagues d'enquête de 2001 (le désenchantement) et de 2009 (la discrimination) où se trouvent des questions sur l'exclusion sociale. Concernant le modèle économétrique, j'adopte les régressions multipays des micro-données à effets fixes (« *cross-country fixed effects model* »). Cela permet de contrôler les effets différentiels découlant des circonstances propres à chaque pays, mais qui ne changent pas dans le temps au sein d'un même pays (la culture, la religion etc.). Cela peut affecter les variables d'intérêt que sont l'exclusion sociale, les groupements ethniques, les capacités relationnelles et le bien-être subjectif.

La base de données exhibe respectivement 11,44 et 7,81 % de la population qui déclarent être Indigènes et Noirs en 2001 en Amérique Latine : ce sont également les deux plus petites proportions de groupes ethniques de la population. En 2009, la taille de ces deux groupes a diminué à hauteur d'environ 3 %. Les deux plus grands groupes ethniques —qui ont également vu croître leurs proportions dans la population de 2001 à 2009— sont les Métisses et les Mulâtres (supérieurs à 27 % chacune en 2001 et 2009). Les individus qui appartiennent aux groupes ethniques Noirs et Indigènes se déclarent victimes d'une plus grande exclusion sociale en 2001 et 2009. Ces statistiques sont vérifiées également dans d'autres travaux de recherche (Eversole et al., eds (2005) et Costa et al. (2015)). En particulier, au Brésil et au Mexique, les Noirs déclarent subir davantage l'exclusion sociale que d'autres groupes ethniques. De la même façon, dans les pays Andins (l'Équateur, le Bolivie, et le Pérou), les Indigènes sont le groupe ethnique qui déclare le plus souvent subir l'exclusion sociale.

Evidemment, l'intention de migrer a été sérieusement examinée par les individus qui déclarent subir une forme d'exclusion sociale, et ce, bien plus souvent que pour les individus n'ayant pas déclaré subir d'exclusion sociale. Étrangement, pour ces mêmes individus victimes d'exclusion, la migration à l'étranger est préférée à la migration d'une zone rurale à une zone urbaine. On peut sans doute en déduire que ces individus perçoivent l'exclusion sociale comme un processus ancré même dans les zones urbaines, quand bien même les villes et

leurs banlieues offrent vraisemblablement plus d'opportunités économiques que la campagne.

Les résultats obtenus avec la base de données latino-américaine que j'étudie recourent largement l'analyse d'Easterlin ([Easterlin \(1974\)](#) et [Easterlin et al. \(2010\)](#)) : la croissance et l'amélioration des revenus de tous les groupes ethniques en Amérique Latine ne favorisent pas l'amélioration du bien-être de la même façon.

Les travaux de [Graham and Nikolova \(2013\)](#) et [Clark et al. \(2015\)](#) montrent que la population (dans 140 pays du monde et au Japon respectivement) se sent moins heureuse, restreinte par des capacités (au sens traditionnel d'A. Sen) réduites, et déclare jouir d'un bien-être plus faible. Ceci est provoqué, d'après ces auteurs, par la frustration des attentes des individus. L'analyse du chapitre 4 confirme que les individus qui déclarent subir l'exclusion sociale dans les pays d'Amérique Latine sont en moyenne plus enclins à déclarer qu'ils n'ont pas confiance en leur avenir économique et qu'ils ont également une plus faible confiance dans les institutions, le Parlement, l'administration publique et la police.

Les propriétés des covariables standards de mon modèle microéconométrique concordent avec les résultats de la littérature sur le bien-être subjectif et les capacités humaines ([Diener et al. \(1999\)](#)).

Si, à présent, on s'intéresse aux déterminants possibles du bien-être subjectif (SWB) et du RCI 2.0, l'âge apparaît comme suivant une courbe en U en fonction du SWB et du RCI. Le niveau de scolarité est positivement associé avec le SWB et le RCI en 2001. Par contre, en 2009, le niveau de scolarité en années de scolarité continue montre une relation concave et croissante avec le SWB et RCI. Cela étend les résultats obtenus par [Clark et al. \(2015\)](#) dans deux directions : d'une part, j'étudie l'Amérique Latine au lieu de l'Europe, d'autre part, je considère non seulement le SWB mais aussi le RCI. Par ailleurs, le chapitre 4 montre qu'être un homme en Amérique Latine induit en moyenne des indices de SWB et de RCI supérieur à celui d'une femme. Ce résultat confirme l'exception que constitue le continent latino-américain par rapport au reste du monde —où, partout, les femmes sont en général mieux socialisées que les hommes [Graham and Chattopadhyay \(2013\)](#). L'état civil d'un individu exerce également une influence sur le SWB et le RCI : les individus mariés ont généralement de meilleurs scores que les célibataires, lesquels sont eux-mêmes plutôt mieux scolarisés que les personnes divorcées/séparées/veuves. La religion (ou plus précisément, la religiosité) est liée positivement au SWB et au RCI. Quant à l'exclusion sociale, elle affecte fortement le SWB et le RCI, aussi bien en 2001 qu'en 2009. Les individus qui déclarent être exclus sont généralement défavorisés en termes de SWB et de RCI. Cette relation est confirmée dans toutes les spécifications du modèle économétrique que j'ai

utilisé.

Fait plus intéressant encore, les indices de divisions sociales — segmentation et polarisation— entraînent une augmentation de l'impact négatif de l'exclusion sociale sur le SWB. L'indice de segmentation exerce une influence moins forte sur l'exclusion sociale que la polarisation.

Avec le RCI, compte tenu du fait qu'il s'agit un indicateur composite, les résultats sont ambigus. En tentant la même spécification du modèle avec chacune des trois dimensions du RCI, les résultats deviennent intéressants et peuvent s'interpréter à nouveau. Les deux premières dimensions du RCI — l'intégration aux réseaux et les relations personnelles — sont négativement affectées par la polarisation (et non pas par la segmentation). En revanche, l'engagement civique attaché à la troisième dimension du RCI est positivement affecté par la polarisation. Ce qui pourrait sembler contre-intuitif s'explique aisément quand on remarque que l'exclusion sociale provoque une hausse des composantes du RCI 2.0 liées l'engagement politique (manifestations, vote etc.).

Enfin, il convient de relever que la polarisation ne provoque pas seulement l'exclusion sociale des Noirs et des Indigènes mais aussi celle de tous les groupes ethniques identifiés.

Pour conclure, ce travail de thèse est à considérer comme une première étape destinée à mieux comprendre certains tenants et aboutissants de la socialisation des individus dans différents contextes sociaux. Il appert que la qualité des relations sociales dans lesquelles nous sommes engagés peut être mesurée (notamment via le RCI 2.0) ; elle peut donc devenir un objectif de politique publique. Or elle ne s'identifie pas avec la recherche de la croissance du PIB quand bien même elle participe certainement du capital social et, à ce titre, contribue à la croissance d'un pays. En outre, la segmentation d'une société et sa polarisation, du fait des inégalités de revenu, de genre, entre urbains et ruraux mais aussi entre groupes ethniques, alimente la perception de l'exclusion sociale par celles et ceux qui en pâtissent. Non seulement, cela ne contribue probablement pas à la croissance mais, à coup sûr, cela réduit la capacité relationnelle des personnes. Le phénomène, loin de se réduire, semble plutôt s'aggraver sur un continent comme l'Amérique Latine. Ce diagnostic est à comprendre, je crois, dans le panorama plus vaste d'un « âge de la colère » grandissant, tel qu'il est formulé par un observateur comme [Mishra \(2017\)](#). Selon lui, les promesses non tenues d'égalité et de prospérité partagée propagées par la globalisation des Lumières européennes provoqueraient un ressentiment diffus, analogue à celui qu'éprouvèrent les populations européennes du dix-neuvième siècle, victimes de la Révolution industrielle. La frustration induite par le creusement des inégal-

ités de revenus, de genre, entre urbains et ruraux ou des inégalités ethniques ne saurait s'interpréter simplement comme le reflet d'une forme ou d'une autre de jalousie. Elle exprime le refus de la désocialisation induite par une globalisation devenue trop inégalitaire.

Introduction

Welfare economics in a behavioral world is gaining increasing traction for research in economics and social sciences at large. Especially the last three decades, ever more research efforts have been directed to understand welfare better.

Social capital has been one of the prime candidates and now a domain of research. Research is undertaken to understand its importance, how it operates, and what impact it has on the well-being of an individual and the health of a society.

There is a broad consensus in the literature which that social capital is important for an individual and the society the individual is a part of. Several disciplines of research are studying through different lenses of what is social capital, how to measure it, its effect on the capabilities and human development, and its dynamic role between individuals.

Social capital includes theoretical concepts such as trust, social cohesion, norms, social networks/interconnectedness, and how these concepts interact with each other. These concepts originated in humanities and social sciences, and economics, in particular, has allowed generating empirical evidence.

The results so far in economics illustrate that social capital, in its different forms, has a positive effect on capabilities and human development. It is doing so through helping to create a society based on norms, groups, associations, and institutions aimed towards serving each and every individual. One of the studied outcomes of this form of social organization enabled through social capital helps promote the economic growth of a country for instance.

This had generated and encouraged economists to contribute to evidence for these questions related to social capital. This took the shape of exploring/establishing the channels and links between social capital, human and economic development. The bulk of the empirical work attempt to clarify the different conditions and links between social capital and economic development. These include the type and quality of institutions, history of a country, colonial legacies, government incentives and incentive systems, in general, have emerged as possible explanations.

The capabilities approach developed by Amartya Sen highlights the fundamental role of economic development that focuses on the improving individual capabilities and expanding choice sets of each individual. However, this capability approach is individual-centric and inadvertently leaves out the shared or the collective nature of an individual's existence.

There clearly exists a link between the capability approach and the social capital theory. The interaction between the two concepts could be instrumental in nature, or by the fact that the theories of these two different concepts are inspired

by the same idea approached through different lenses. But, one thing is clear: the social networks/interconnectedness is not addressed in the capability approach of Sen. At the same time, the social networks embody the mobilization of individuals in groups, association, and civic action.

This aspect is developed by Giraud et al. (2013), called the relational capability approach. This approach values the social networks and their interaction of individuals.

Another major research domain that cannot be neglected in the economic or human development evaluation is happiness (or more commonly referred to as, subjective well-being). The concept of subject well-being is closely related to the social capital domain as I explore in this dissertation.

In the literature, the concepts of social capital, relational capabilities, subjective well-being and especially the linkages between them are not well explored or explicitly studied which is the primary motivation for this dissertation. However, these major concepts in welfare economics consistently are examined to constitute the metrics of evaluation (causes, channels or outcomes) of development.

The first chapter revisits the results of social capital and its positive effects on economic performance. More precisely, in this chapter, the sample is enlarged to have a global representative sample, and especially, a pseudo-panel estimation method is applied. This is not tested in the literature according to my knowledge. The aim is to verify the earlier empirical evidence suggesting social capital has positive effects on country's economic performance and to test the hypothesis of social capital and economic performance with a global sample of panel data.

In the second chapter, I turn my attention towards developing an axiomatic approach for a coherent multidimensional development index. This serves as a basis for the relational capabilities construct and updates the original Relational Capability Index (RCI). More importantly, this chapter addresses the critics of other multidimensional indexes (HDI and MPI for instance) and serves as a guide to follow for constructing and/or aggregating a coherent multidimensional development index. The purpose being, the resulting index from the family of coherent indexes are ordinal and continuous which is vital for cardinal measures of poverty.

In the third chapter, I demonstrate the updated RCI, RCI 2.0, following the application from chapter two which is continuous and ordinal at the same time (facilitated by the choice of variables which is dependent on the aggregated country level information). I study and explore the cross-country scores, ranks and choice of weights (or lack) thereof when I apply these to global representative data from Gallup World Poll.

The last chapter focuses is a micro-study on the effect of social capital and social cohesion (measures as social divisions) on relational capabilities and subjective well-being. I extend the application of social divisions' measures (fractionalization and polarization) to study its role in social cohesion (social exclusion - disenfranchisement and discrimination), and how (if any) that may affect an individual's welfare (notably, social capital, relational capabilities and subjective well-being).

With these four chapters in this dissertation, I attempt to show compelling doorways connecting the different fields of welfare measurements covered in this dissertation - social capital, subjective well-being and relational capabilities. The secondary objective is to argue for the expanded dashboard of different lenses of welfare and not to provide evidence or rank one concept over which I hope is clear from my work.

The rest of the dissertation is organized as follows: the four different chapters start with an abstract of the chapter; followed by the chapter which roughly introduces the literature and the evidence, proceeding to the empirical methods applied and data utilized and then discusses the results. We conclude by summing up the insights and results of the different chapters.

CHAPTER 1

Economic Development: Is Social Capital Persistent?

1 Introduction

This chapter, on the one hand, goes a step closer to demonstrate the *causality* of social capital on economic performance. On the other hand, I confirm a continued role of social capital effects on economic performance in this chapter by utilizing a much larger sample, spanning three decades and increasing the scope of countries.

This chapter is unique in the sense that it contributes to revisiting questions of economic performance, social capital, and institutions with a clearly better and updated data from the last 28 years building upon existing empirical evidence. I employ a pseudo-panel estimation method with fixed effects in this study. My sample includes *both* the World Values Survey and European Values Study dating back to the 1980s.

My results are twofold: Firstly, to confirm that trust has a significant positive effect on growth. And more importantly, they have a significant effect on growth for growth at 7 and 10 years following a period of trust measure. Secondly, associational activities - another measure in the overarching definitions of social capital, along with institutions, inequality, and education are consistently significant determinants of trust.

Economic performance, defined here as growth in Gross Domestic Product (GDP), is an important component of economic development. As researchers have sought to describe the various factors contributing to economic growth, social capital (in all its forms) has come under scrutiny. The seminal work of [Knack and Keefer \(1997\)](#) is one of the most cited articles using social capital to explain economic growth. They attempted to quantify social capital by evoking those ideas as theorized by [Putnam et al. \(1993\)](#) and [Olson \(1982\)](#). In a nutshell, they present strong evidence of the relationship between interpersonal trust, norms of civic cooperation and economic performance (as measured by GDP growth); and their respective determinants - fractionalization, polarization, and institutions besides the standard correlates of income, education and inequality. They also allow for the conflicting definitions of social capital in terms of associational activities as put forth by [Putnam et al. \(1993\)](#) and [Olson \(1982\)](#) in their analysis of investigating the relationship with economic performance. Ever since their paper, empirical investigation of social capital has attracted great attention; social capital has gone to become all-encompassing and elusive by the day, to notions of civic behavior, social norms, networks or cooperation and social cohesion. A significant amount of micro empirical evidence has sought to strengthen the foundations for

these theories and legitimize what is reflected in their macro counterparts.¹ And the most prominent measure of social capital, “*Interpersonal Trust*” has undergone several tests.²

I am interested in exploring the persistence of “*Interpersonal Trust*”, or rather simply, “*generalized trust*”³⁴ - does this continue to have a positive effect on economic development? In particular, I believe to bring ourselves closer through this chapter to the causal relationship of trust on economic development by calibrating the variables, and to show that this is a cross-national global phenomenon by significantly increasing the sample size and time - without even having to control for region-specific effects.⁵

This important work of [Knack and Keefer \(1997\)](#) has been met with a fair share of criticisms. Questions on robustness, inconsistencies, and small sample problems have been raised.⁶ The most recent work of [Algan and Cahuc \(2014\)](#) provides an excellent summary of the entire literature on social capital and economic development. On the other hand, the earlier work of [Durlauf and Fafchamps \(2005\)](#) has potently expressed the pitfalls of the social capital research, not the least to denounce the powerful insights this branch of research has provided us. These and many other works in this domain of research should serve as a basis for understanding this present chapter and the entire social capital research in general.

My preliminary results with my data encompassing more recent, enhanced and comprehensive information led us to continue in the similar direction as [Knack and Keefer \(1997\)](#) with a fine-tuned empirical strategy. Interpersonal trust continues to emerge as one of the significant variables over time and space. In my opinion, interpersonal trust is important in itself and a principal actor of social cohesion in a society which contributes to having far-reaching effects on efficient and better functioning of societies. The paper by [Giraud et al. \(2012\)](#) is one of the important motivations to undertake this study. Their approach puts social networks central to the conception of human development and at the same time, acknowledges the diversity of personal and collective values and their specific

¹ [Casey and Christ \(2005\)](#), [Helliwell \(2007\)](#), [Woolcock and Narayan \(2000\)](#), [Scheepers et al. \(2002\)](#) and several others.

² [Delhey et al. \(2011\)](#), [Dasgupta \(2009\)](#), [Reeskens \(2013\)](#) and [Robbins \(2012\)](#) among the recent ones.

³ Question asked in the surveys: “*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*”

⁴ To quote [Rothstein and Stolle \(2008\)](#), “... (These) attitudes of trust are generalized when they go beyond specific personal settings in which the partner to be cooperated with is already known.”

⁵ [Guiso et al. \(2007\)](#) for a historical approach to the question of social capital (a very long-term approach of Putnam’s ideas) and economic development.

⁶ [Beugelsdijk et al. \(2004\)](#) and [Bjørnskov \(2007\)](#) among others discuss these problems at length.

ends - which I believe to be ingrained in Sen's capability approach (Sen (1976) and Sen (2009)) and insofar as complementing Rawlsian maximin view (Rawls (1971)). The three dimensions of the relational capabilities they distinguish are given below:

1. To be integrated into networks;
2. To have specific attachments to others, including friendship and love;
3. To commit to a project within a group: which aims at serving a common good or a social interest, to take part in decision-making in a political society.

The third dimension mentioned above of the Relational Capability Indicator (RCI) has a civic commitment dimension which is of special interest to this chapter since I empirically explore the works of Olson and Putnam alongside the RCI. This civic dimension of the RCI is composed of the following five components:⁷

1. Membership: Active membership in a group (religious, trade-unions and/or business associations)
2. Collective action: Participation in political actions
3. Vote: Voting behavior of the agent
4. Solidarity: Active membership in a common interest group
5. Trust in others: Trust in unknown people

As I embark to explore the extent of the inter-linkages between social capital, institutions, and economic performance I present some evidence found so far in the literature which undeniably highlights the gaps despite some groundbreaking findings. Among the questions that I explore in this chapter, the principal one is the following: does the trust measure of social capital (or simply, generalized trust) continue to be persistent in having positive effects on economic performance? I do so by exploiting all the survey waves available till date from the World Values Survey and European Values Study, aggregated from over 430,000 nationally representative observations. This translates into 292 countries-surveys sample starting from 1980 up until 2009.

The importance of social capital and its relationship to economic performance and its trends is not new to political science, although the last twenty years have seen a significant interest that is to be found in the literature using measurable variables implemented to empirically test this effect inspired from sociology, political science, and (behavioral) economics. This trend has its origins in the seminal

⁷ A full table of RCI dimensions and components is to be found in the appendix.

work of Robert Putnam in his book by (Putnam et al., 1993), where Putnam used a comparison of societies in the North and South of Italy. In this early definition, social capital was identified with those "... features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions" (page 167). The natural experiment from 1970 where the highly centralized Italian government devolved power to the newly created regional governments, was used by Putnam to analyze how two regions with essentially identical institutions can have such different political and economic outcomes.

What he finds is that the North outperforms the South of Italy in their collective action outcomes, which he refers to as Northern Italy having higher levels of civic engagement or civic-mindedness. He continues to claim that this distinction of civic engagement or civic-mindedness between the North and the South of Italy determines the economic performance, more than political institutions which are a result of the process of democracy as proposed by most of the growth literature.

The role of associational activities in economic performance at a predefined observed group level has garnered much contention over the past decades. Contrary to this prevalent view of Putnam, Olson's seminal work - Olson (1982), that has received its due attention, is of the opinion that Putnam style horizontal associations with the shared values of solidarity and the common good are not sufficient to promote growth. A group which works for shared interests helps resolve collective action problems, and this group relies on a system of selective incentives to tackle the problem of free-riding (as monitoring in larger groups tends to be harder). Olson claims that after a certain point, these (special interest) same groups may get more difficult and act as special interest groups lobbying for preferential policies. According to him, in certain situations, this behavior will naturally render the economic growth to fizzle, since they divert the scarce economic resources away from technological advances and other growth-enhancing activities. However, in Heckelman (2007)'s review of Olson's book, he suggests that there is only partial support of Olson's theory - which Olson himself has repeatedly acknowledged to his critics, as they are meant to illustrate certain specific aspects of his general theory.⁸⁹

The following were the questions included in the World Values Survey and the European Values Study in the last two survey waves. Although World Value Survey does better in asking respondents to measure the density/intensity of

⁸ To quote from his article [pg. 28], "...In general, the theory of institutional sclerosis has often been used by other scholars to successfully explain experiences throughout history, but only rarely has it come out unscathed."

⁹ The other significant works on social capital of Bourdieu and Coleman are out of the scope of this chapter.

their involvements in the associational groups, this is excluded in the European Values Study. Hence, in the interest of consistency, I leave out the intensity of participation in groups in my analysis. I follow a simple aggregation method of the average number of associational groups' membership in each country. The following are the questions available in the surveys:

- (a) Member: Belong to social welfare service for elderly
- (b) Member: Belong to religious organization (*P-GROUP*)
- (c) Member: Belong to education, arts, music or cultural activities (*P-GROUP*)
- (d) Member: Belong to labor unions (*O-GROUP*)
- (e) Member: Belong to political parties (*O-GROUP*)
- (f) Member: Belong to local political actions
- (g) Member: Belong to human rights
- (h) Member: Belong to conservation, the environment, ecology, animal rights
- (i) Member: Belong to professional associations (*O-GROUP*)
- (j) Member: Belong to youth work (*P-GROUP*)
- (k) Member: Belong to sports or recreation (*potential P-GROUP*)
- (l) Member: Belong to women's group (*potential O-GROUP*)
- (m) Member: Belong to peace movement (*potential P-GROUP*)
- (n) Member: Belong to organization concerned with health
- (o) Member: Belong to consumer groups
- (p) Member: Belong to other groups¹⁰

To quote from Knack and Keefer (1997, p. 1273), "I explored this possibility further by attempting to differentiate "Putnamian" from "Olsonian" groups. Groups b, c, and k from the above list were identified as those groups least likely to act as "distributional coalitions" but which involve social interactions that can build trust and cooperative habits. Groups d, e, and j were deemed most representative of groups with redistributive goals."

My "group" measure includes the additional questions (those that are potentially Putnamian and Olsonian groups), whereas my *O-GROUPS* and *P-GROUPS* are constructed in the same fashion to include the same groups as presented in the chapter by Knack and Keefer (1997).¹¹

¹⁰ Questions (l)-(q) are new additions to the World Values Survey and European Values Study.

¹¹ Membership profiles (country averages) for my 2000 and 2008 samples are found in the appendix.

There is another major strand of research which considers [interpersonal] trust as an output of social capital.¹² This measure of [interpersonal] trust has been extensively empirically tested and beginning to be applied as a standard determinant of economic growth in the literature.¹³

It is worth noting that research on the questions of trust has developed somewhat more independent of social capital research categorized by academic disciplines. What has been established is that more “trusting” societies are countries that have grown faster in the recent decades as opposed to other comparable countries.¹⁴ I do not attempt to question the already existing evidence in the literature on the (direct) positive effects of social capital on economic performance. What has also been established is the important role of “good” institutions on economic performance of societies or countries - I do not attempt to contest that either.¹⁵ Given this background, and thanks to the latest available data which includes information, I propose to make precise the causality in terms of the variables in an accounting sense, i.e., a given level of trust at a given point of time may cause economic development (growth) for 7 and 10 years or even more.

To condense the econometric specification difficulties, I can categorize them into two broad categories: First, the reverse causality between trust at one period of time (here, survey wave) and economic development (here, growth) experienced at the same time.¹⁶ This is controlled for in a simple, yet seemingly powerful way (refer to the paragraph above, and more detailed explanation in the Methodology section). Second, the omitted variable bias which affects both trust and economic development (through the error term of the regression equation) remains to be verified in my specification since these can most often be controlled for observing historical variations that affect trust behaviors, commonly referred to as “natural experiments”, or through an extraneous exogenous instrument through an instrumental variable identification.

However, I recognize how unreliable the measures of institutional quality

¹² I also test for the sensitivity of different measures of trust - “trust in neighborhood”, “trust in foreigners”, “trust in people outside the neighborhood”, etc. My forthcoming paper using Gallup data allows for better use of this information allowing for disaggregation by education, gender, and income levels to mention a few.

¹³ Cf. Knack (2003), Beugelsdijk et al. (2004), Beugelsdijk (2006), Bjørnskov (2007), Berggren et al. (2008) among others.

¹⁴ See Whiteley (2000), Zak and Knack (2001), and Beugelsdijk et al. (2004) which address this question more directly in comparison to other papers on social capital in the literature.

¹⁵ Bjørnskov (2012) in their paper present various transmission channels - where “good” institutions and education emerge as significant channels of trust’s influence on economic performance.

¹⁶ This paper of Algan and Cahuc (2010) has accounted for initial trust (to make precise - origin country’s trust of an immigrant in the US) or as they call it, *inherited trust* of a person. It could also be the (shared) values of a population that creates the trust among people within a population - refer to Uslaner (2002) and Tabellini (2007).

are.¹⁷ I demonstrate these difficulties by using different measures and to show how sensitive these measures are to the model specification and on the point estimates of the regressions. The same argument applies to geographical factors, environmental factors, social norms and culture which more often is intangible and sometimes impossible to quantify.

2 Data

I have used data from several sources like the Integrated Values Survey (merging World Values Survey (WVS) and European Values Study (EVS)) which has the five World Values Survey and the four European Values Study, Penn World Table 7.1 and 9.0 (PWT), World Bank World Development Indicators (WDI), UNU-WIDER World Income Inequality Database (WIID), *Ethnologue*, Fractionalization and Polarization indicators of [Alesina et al. \(2003\)](#) and their disaggregated measures of Esteban and Ray's ("*frac_fear*"), Barro-Lee data of educational attainment and enrollment estimates (BL), UN-UIS UNESCO Statistics (UIS) for alternative educational enrollment/attainment data, World Bank - World Governance Indicators data (WGI), Freedom House (FH), Heritage Foundation (HF), International Country Risk Guide (ICRG), Economic Freedom Network, and the Central Intelligence Agency - The World Factbook (CIA) as well for the Gini coefficient estimates.

Table 1.1: Table of number of countries, years and sources

Wave	Countries	Survey years	Ref. year	Surveys
1	26	1981-84	1980	WVS
2	37	1989-93	1990	WVS+EVS
3	52	1994-98	1995	WVS+EVS
4	72	1999-04	2000	WVS+EVS
5	58	2005-09	2005	WVS
6	47	2008-09	2005	EVS
	292			

Note: The Integrated Values Survey (WVS and EVS) has 292 countries-surveys observations in total. Some of the countries that repeated in both surveys have been eliminated (and with similar scores like Sweden and Turkey around the 2000 survey waves).

¹⁷ [Oman and Arndt \(2006\)](#), [Arndt \(2008\)](#), [Langbein and Knack \(2008\)](#) and [Razafindrakoto and Roubaud \(2010\)](#) provide a detailed discussion on problems facing a variety of institutional quality variables.

2.1 Variables of interest

Following are the variables information implemented in my regressions:¹⁸

Growth: 7 and 10 years annualized average GDP growth following the period of the values survey. This is obtained from the Penn World Table 9.0 version.

Trust: Average of trust levels within a country which is computed as a percentage of trusting population in a country. The question used for this, “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? Possible answers: 1. Most people can be trusted 0. You can never be too careful when dealing with others”

GDP per capita: GDP per capita PPP (constant 2005 International USD) using chain series - for the years pertaining to the reference year of the survey wave. This is sourced from Penn World Table 9.0. To normalize, I use the natural log transformation.^{19,20}

Education: Average total schooling years of the 25-year old population of a country for the survey reference year is taken for my education variable among several measures available.²¹ This is sourced from the Barro-Lee data. As an alternative, I have also used the latest “Index of Human Capital” from the Penn World Table 9.0 (based on Barro-Lee’s educational attainment and Psacharopoulos’ returns to education).

Price level of investment: Investment goods prices, PPP-adjusted (constant 2005 International USD) for the years pertaining to the survey year of the respective country. This is also sourced from the Penn World Table 9.0. This is now called the “price of capital formation” in the latest version of Penn World Table.

Population: Population data also retrieved from Penn World Table 9.0. I use the natural log transformation in my analysis.

Civic: Respondents of the survey chose a number from 1 (never justifiable) to 10 (always justifiable). I reversed these scales in the interest of consistency and comparability which are to be found in all the four survey waves of WVS and EVS,²² so that larger values indicate greater cooperation, and summed values over the four items to create a scale (CIVIC) with a 40-point maximum. The following are the four questions:

1. “Claiming government benefits to which you are not entitled”

¹⁸ Detailed descriptive statistics of all variables are found in the appendix.

¹⁹ This is fairly standard in the empirical literature.

²⁰ PPP - purchasing power parity.

²¹ This, I believe is better than using the educational attainment statistics for 20 years prior to the survey year since this 25-year old population composes the active working population in a country.

²² I have ignored two additional questions from the EVS - “Paying cash for services to avoid taxes” and “Joyriding”.

2. "Avoiding a fare on public transport"
3. "Cheating on taxes if you have the chance"
4. "Someone accepting a bribe in the course of their duties"²³

GROUPS: The average of the memberships that are binary coded for the questions (a)-(r) aforementioned in the "Introduction" section and aggregated as a cross-country average (1 = Belong; 0 = not mentioned).

Putnamian groups: Indicator constructed as an average of memberships within a country for the following groups - *belong to religious organization, belong to education, arts, music or cultural activities, and belong to youth work.*

Olsonian groups: Indicator constructed as an average of memberships within a country for the following groups - *belong to labor unions, belong to political parties, and belong to professional associations.*²⁴

Inequality (Gini coefficients): The Gini coefficient estimates are sourced from the PovcalNet.²⁵ Whenever necessary, the imputed/interpolated Gini coefficient is used; and not for countries where data is missing with a gap of long periods of time (say, over 5 years).²⁶

Ethnicity: A range of indicators have been used to represent different identities of individuals from *Ethnologue* database - ethnic, linguistic, religion and ethno-linguistic indicators; Esteban and Ray data "*frac_fear*" indicator; and data from Fearon and Laitin (2003) - ELF(1), ELF(6), ELF(15), POL(1), POL(6) and POL(15) for different levels of aggregation of ethnolinguistic fractionalization and polarization respectively. My primary variable of interest among the alternatives available is sourced from [Alesina et al. \(2003\)](#), which is a measure of "*the probability that two random citizens of a given country belong to the same ethnic group*".

Institutions -

World Governance Indicators: "Rule of Law" - 2.5 (weak) to 2.5 (strong) is used.²⁷

Economic Freedom in the World: Sourced from the Economic Freedom Network (on a scale of 1 to 10).

²³ The following question has been discontinued as found in the earlier survey waves of WVS and EVS - "*failing to report damage you've done accidentally to a parked vehicle.*"

²⁴ I present all the variables used here. However, my analysis on correlations of associational behavior and trust/growth/institutions is not the focus of this chapter since these questions are not found in all the survey waves of WVS and EVS.

²⁵ "PovcalNet: the online tool for poverty measurement developed by the Development Research Group of the World Bank" <http://iresearch.worldbank.org/PovcalNet/>.

²⁶ I test alternative Gini coefficient estimates from World Bank - WDI, CIA - The World Factbook and the UNU - WIID, in the interest of checking for the sensitivity of measures and different distributional definitions used.

²⁷ Cf. [Kaufmann et al. \(2011\)](#).

ICRG: Data titled “International Country Risk Guide (ICRG)” from the PRS Group is used. Their information goes back to 1980s including over 140 countries.

Freedom House: “Rule of Law” and “Functioning of the Government” as a measure of institutional quality used. Their most prominent “Polity2” data has also been used for country scores to test for the sensitivity of the measures used.

Heritage Foundation: Property rights protection composite scores of countries used alternatively as well.

3 Methodology

At the outset, as has been largely accepted, I concur that the channels of trust among people (or social capital in general) is instrumental for economic development *via* certain means (for example, institutions). Trusting people cooperate towards various ends - (co)providing public goods, facilitating interaction as efficient economic agents, formal/informal solidarity activities via organizations or institutions and even redistribute among a society or population.²⁸

In this section, I will discuss the three specifications which make the core of my chapter. First and foremost, as mentioned earlier, is the testing of the persistence of “Interpersonal Trust” as a measure of social capital, and whether it continues to play an important role in economic development. More specifically, as the existing empirical literature suggests that trust is a *more or less* positive and statistically significant factor in affecting growth; there is a certain correlation between trust and economic growth. I wanted to test if generalized trust continues to have the same positive (significant) effect on economic development, and I also test if the same effect holds over time, that is to say when several periods taken together. Empirical evidence is aplenty and has tested a diverse set of hypotheses, in different levels of analysis - micro, meso and macro.

Simply put, the uniqueness of my chapter in testing generalized trust effects on economic development lies in the following:

- Testing the persistence of trust effects on economic performance over three decades with the largest available sample.
- Come closer to the causal relationship between trust and economic performance.

²⁸ Anirudh, Uphoff and Esman (1997) in their book, and Uphoff’s work through the 1970s until late 1990s was inadvertent documenting of context-specific social capital where its latent dominant aspect being *existing* or *created* trust. There are two takeaways from their work for this chapter: Firstly, trust manifests in a plethora of forms and is very context specific. Secondly, trust is not only a predisposition to cooperate and participate in efficient economic activities but also a force of conflict resolution derived from incentives to cooperate based on trust.

This is executed, not in the sense of repeated cross-section regressions, but, in the sense of taking all the available data together - pseudo panel data estimation model utilizing the *unbalanced* multiple cross-section data - which is the first time according to my knowledge. And my hypothesis being is the generalized trust persistent? A longitudinal analysis is not possible since I do not observe same countries included in the values surveys over different survey waves.²⁹ A repeated cross-section is helpful, but not sufficient - it loses its utility since some of the variables' significance changes drastically over survey waves and sources (WVS, EVS, European Social Survey, Global Barometer Surveys etc.).³⁰ Hence, a better approach is to pool all these seemingly similar databases together; and to have wave fixed effects to control for the aforementioned problems. However, we go a step further in constructing a pseudo-panel data to estimate the effects of trust on economic performance.³¹

How do I come close to a *causal relationship* between social capital (generalized trust) and economic development (GDP growth)? It is quite simple: I construct the growth variables of 7 and 10 years annualized average which follows the generalized trust measures from survey years (reference years). For instance, a trust score (country average) at time t is regressed on average annualized growth variables at $t+k$ ($k = 7, 10$). By doing so, I also ensure that the growth regressed on trust doesn't overlap for countries-surveys combination;³² and of course, by construction, trust "*causes*" future periods of growth.

Equation 1:³³

²⁹ Moreover, they are not deemed to be representative for each particular survey wave. See Berggren et al. (2008) and Beugelsdijk et al. (2004)

³⁰ Find the discussion in Bjørnskov (2007). The sample of countries varies largely over time to include countries that have made the surveys representative over recent years/waves (at least starting late 1990s) as demonstrated in this chapter. Figure 1 confirms that the 30+ countries added in the latest wave of WVS and EVS combined don't induce sampling bias of low-trust or high-trust profile countries. This is contrary to other papers' claim.

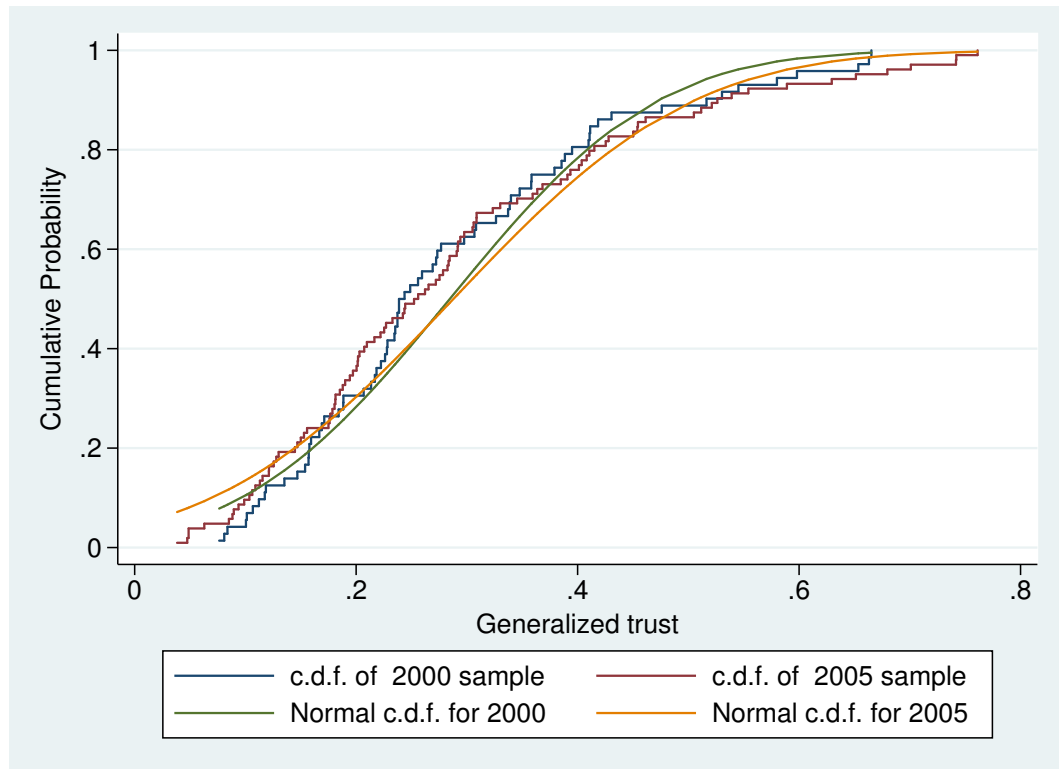
Most importantly, they also demonstrate that generalized trust measure is stable over time, and hence countries are *path dependent* per se, along with their initial trust levels. This also implies that the trust values are stationary - all the variation is random - another argument against longitudinal analysis. But, crucial to this is doing away with data points which I find commonly in the literature by using average values for countries where more than one trust values are found, and this reduces the sample size drastically.

³¹ Wave fixed effects to control for our unbalanced sample since I cover all the survey waves. This is important since most of the countries included in the earlier waves were developed economies. Gradually, more and more poor and developing countries have been included in the WVS and EVS surveys (and as mentioned earlier, have induced sample bias especially in the third and fourth survey waves).

³² For example, Argentina, Finland, Germany, Hungary, Mexico, South Africa, South Korea, Spain, Sweden, United Kingdom and the United States are found in all the five survey waves.

³³ Additional controls of institutions, ethnicity and inequality were tested without results changing much. Interactions terms were also used.

Figure 1.1: CDF of Generalized Trust of all countries in our 2000 and 2005 reference year's samples



Average cross-country interpersonal trust levels. *Summary tables found in the appendix.* The (Interpersonal) trust levels globally seems unchanged, although there were some “gainers” and “losers”.

Most importantly, there is no sample enlargement induced bias created between these two waves. Refer to the appendix for the chart on the longitudinal changes in the trust levels across countries.

$$\begin{aligned}
 \text{Growth}(g_{i,t+k}) = & \alpha_i + \beta_1 \text{trust}_{i,t} + \beta_2 \ln(\text{gdp per capita})_{i,t} + \beta_3 \text{price level of investment}_{i,t} \\
 & + \beta_4 \text{education}_{i,t} + \beta_5 \text{ethnic diversity}_{i,t} + \beta_6 \ln(\text{population})_{i,t} \\
 & + \beta_7 \text{inequality}_{i,t} + \beta_8 \text{institutions}_{i,t} + \epsilon_{i,t}
 \end{aligned}$$

where $i = 1, \dots, N$ is the country index, $t = 1, \dots, T$ is the time index, α_i is the time-invariant intercept ($\alpha_{i,t} = \alpha_i$ for all t)

Secondly, I also test a few standard variables expected to affect institutions. Generalized trust is, of course, the prime candidate, which is expected to channelize to create various types of institutions.³⁴ And thirdly, trust which is formed from various types of cultural norms,³⁵ individual backgrounds and environmental factors, tangible or otherwise is our third set of regressions where I attempt to find the determinants of trust at the individual level from personal characteristics

³⁴ Roughly speaking: Social capital \rightarrow Institutions \rightarrow Economic development

³⁵ See [Tabellini \(2010\)](#) and [Guiso et al. \(2004\)](#) for examples from Europe and within Italy.

Table 1.2: Descriptive statistics of the variables used in pseudo-panel regressions

variable	N	mean	p25	p50	p75	sd	min	max
growth7	240	3.98	1.69	3.64	5.89	3.23	-5.62	14.59
growth10	240	4.13	2.12	3.72	5.46	3.18	-3.28	16.45
Trust	298	0.30	0.19	0.27	0.39	0.15	0.04	0.76
Education	253	8.62	7.23	9.05	10.20	2.44	1.16	13.19
ln(GDP per capita)	256	9.14	8.69	9.30	9.88	1.01	5.47	10.75
GDP per capita	282	18875.75	7118.16	13844.73	30033.61	14646.52	225.48	87845.73

Table 1.3: Descriptive statistics of the variables used in pseudo-panel regressions

variable	N	mean	p25	p50	p75	sd	min	max
Economic Freedom	259	6.70	6.02	6.92	7.54	1.15	3.03	9.03
Rule of Law	165	0.42	-0.43	0.37	1.32	1.00	-1.77	1.98
Property Rights	211	58.06	35.00	50.00	90.00	24.23	10.00	95.00
Trust	298	0.30	0.19	0.27	0.39	0.15	0.04	0.76
ln(GDP per capita)	282	9.44	8.87	9.54	10.31	1.04	5.42	11.38
ln(Population)	282	9.74	8.54	9.68	10.96	1.63	5.43	14.08
Education	253	8.62	7.23	9.05	10.20	2.44	1.16	13.19
Inequality (Gini)	278	35.49	29.70	33.15	40.30	9.07	17.80	67.40
Ethnic Fractionalization	285	0.32	0.12	0.27	0.51	0.22	0.00	0.93

and demographics which our data allows us to explore.³⁶

Equation 2:

$$Institutions(I_{i,t+k}) = \alpha_i + \beta_1 trust_{i,t} + \beta_2 X_{i,t} + \epsilon_{i,t}$$

where $i = 1, \dots, N$ is the country index, $t = 1, \dots, T$ is the time index, α_i is the time-invariant intercept ($\alpha_{i,t} = \alpha_i$ for all t), and $X =$ GDP per capita, Population, Education, Ethnic diversity and Inequality among others.

Equation 3 (Ordered logit regression micro-estimates):

$$Pr(Trust(t_{i,j}) = 1 | X) = \alpha_i + \beta_1 X_{i,j} + \epsilon_{i,t}$$

where $i = 1, \dots, N$ refers to the individual, $j = 1, \dots, J$ is the country the respective individual belongs to, and $X =$ Age, Age squared, Married, Children, Sex, Education levels, Employment, Subjective income, Habitat size and Spiritual denomination.

³⁶ In equations 1 and 2, i refers to countries, but i refers to the individual in equation 3. t refers to the year or the survey waves (reference years) in all equations. Lastly, in equation 3, j refers to the countries.

Figure 1.2: Average Trust Levels in Countries (1980-2010)

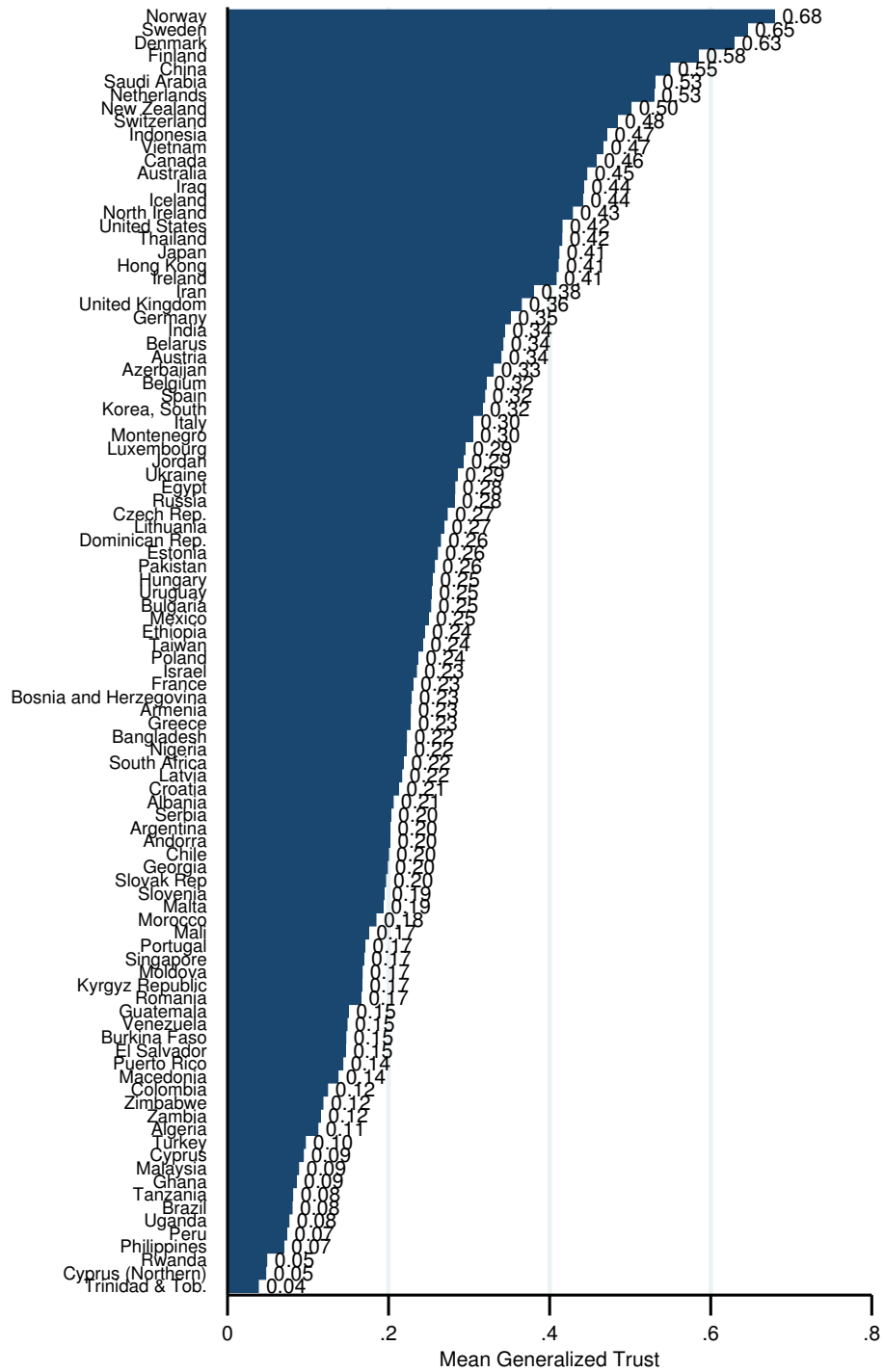


Table 1.4: Descriptive statistics of the variables used in micro regressions

variable	N	mean	p25	p50	p75	sd	min	max
Trust	400292	0.29	0	0	1	0.45	0	1
SWB	415475	6.71	5	7	9	2.43	1	10
Happy	409932	1.97	1	2	2	0.73	1	4
Age	417125	42.09	28	40	54	16.75	13	108
Married	416237	0.58	0	1	1	0.49	0	1
Sex	417049	0.47	0	0	1	0.50	0	1
(Sub.) Income	307985	4.68	3	4	6	2.45	1	11
Number of children	340241	1.86	0	2	3	1.76	0	8
Have children	340241	0.71	0	1	1	0.45	0	1
Education	321361	4.68	3	5	6	2.18	1	8
Self-Employment	409831	0.09	0	0	0	0.28	0	1
Student	409831	0.07	0	0	0	0.26	0	1
Employment	409831	0.54	0	1	1	0.50	0	1
Employment (ext.)	409831	0.69	0	1	1	0.46	0	1
Full-Employment	409831	0.38	0	0	1	0.49	0	1
Unemployment	409831	0.09	0	0	0	0.28	0	1
Habitat size	297689	4.74	2	5	7	2.50	1	8
Religious	385549	0.70	0	1	1	0.46	0	1
Atheist	385549	0.05	0	0	0	0.21	0	1
Protestant	369786	0.15	0	0	0	0.36	0	1
Muslim	369786	0.15	0	0	0	0.35	0	1
Buddhist	369786	0.02	0	0	0	0.13	0	1
Catholic	369786	0.34	0	0	1	0.47	0	1
Hindu	369786	0.02	0	0	0	0.15	0	1
Jew	369786	0.01	0	0	0	0.08	0	1
Sunni	369786	0.01	0	0	0	0.08	0	1
Shia	369786	0.01	0	0	0	0.10	0	1

4 Results

A measurable definition of social capital through the question of interpersonal trust among people which has been used as an indicator of social capital is gaining importance. In this chapter, I revisit the hypotheses of generalized trust and its effects on economic development, their links with institutional quality, and their determinants at the micro level. I have a larger and a newer data.

4.1 Trust and Economic Development

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Before I continue to interpret the results of the analysis I undertook; we need to remind ourselves the objective of this chapter - Does the generalized trust persistently have positive effects on economic development? And of course, the

³⁷ 1. "Index of human capital" sourced from the latest PWT 9.0 which is based on educational attainment - Barro and Lee (2013) and returns to education - Psacharopoulos and Patrinos (2004). This is an alternative for total schooling years (not just secondary school years' average which is the standard usage in the literature). Results do not change much on the choice of variable.

2. Dependent variables are the average annualized growth of 10 years following the average generalized trust scores within a country.

3. Excluded countries from the regressions for reasons mentioned earlier are: Latvia (1990), Lithuania (1990), Estonia (1990), Russia (1990), Romania (1993), Belarus (1990), Bulgaria (1991), Hungary (1991) and Bosnia and Herzegovina (1998).

4. Appendix has regression tables for alternative growth variable (t+7 years average).

Table 1.5: Growth on Trust - pseudo-panel fixed effects regressions 1980-2009

	(1)	(2)	(3)	(4)	(5)
	ln(Growth)	ln(Growth)	ln(Growth)	ln(Growth)	ln(Growth)
Trust	0.015** (0.01)	0.017*** (0.01)	0.018*** (0.01)	0.019*** (0.01)	0.014* (0.01)
ln(GDP per capita)	-0.940** (0.39)	-0.980** (0.39)	-0.836* (0.43)	-0.974** (0.48)	-1.546** (0.59)
Investment	-0.796** (0.35)	-0.825** (0.36)	-0.836** (0.40)	-0.806* (0.47)	-2.686*** (0.83)
Education	0.125 (0.16)	0.048 (0.18)	0.020 (0.18)	-0.006 (0.18)	0.201 (0.29)
ln(Population)		1.417 (0.94)	1.046 (0.90)	1.087 (0.89)	1.211 (2.19)
Gini coefficient			0.018 (0.01)	0.017 (0.02)	-0.062 (0.05)
Economic Freedom				0.107 (0.09)	
Rule of Law					0.507 (0.77)
Constant	8.684*** (2.37)	-4.555 (9.78)	-2.726 (9.33)	-2.416 (9.17)	4.786 (21.79)
Observations	188	188	179	173	79
Overall-R ²	0.45	0.17	0.23	0.24	0.17
Within-R ²	0.27	0.28	0.29	0.30	0.54
Between-R ²	0.43	0.21	0.26	0.29	0.19
Prob(Chi2)	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

manner in which I compute our average annualized growth variable that follows the respective reading of trust levels, brings us closer to the causality argument.³⁸

A one SD of trust levels (15 percentage points) is associated with an increase of 1.5% to 1.9% increase in growth over 10-year horizon, holding all other variables constant depending on the alternative specification of the model.³⁹ These are positive and significant at 1% level (at 5% in specification (1) and at 10% in specification (5)).

The results are indeed encouraging - the overall R-squared - which is the explanatory power of the model, is in the upper bound of the estimates compared to other empirical evidence in the literature. This is encouraging since most of the other papers have included few survey waves or have had a regional focus. Another interesting observation emerges here - the overall R-squared is the highest in our baseline specification (specification (1)) and declines as we control for additional explanatory variables. Simultaneous increase in the within R-squared is observed implying a trade-off for country-specific explanatory power of the model. This also suggests that the impact of trust on growth increases over the time horizon have a lasting effect, on average, across countries on economic performance.

Another check of validity has been undertaken - I test these three models with

³⁸ Hausman test implemented to ensure fixed effects to be a good fit, and not random effects.

³⁹ However, the latest wave of WVS from 2010-2014 recently released needs to be exploited to verify the magnitude and signs of these results.

regional dummies and “levels of development” dummies.⁴⁰⁴¹ Regional dummies don’t have any effect. However, the “levels of development” dummies have a significant effect on growth confirming their fixed effects. This is also reflected in the investment variables always remaining negative, and the education variable not being significant. This could be explained by the fact that growth in the 1990s and 2000s (unlike the historical development episodes of the now developed countries which was heavily dependent on education, skilled population share of the country and human capital accumulation in general) are eminent from the emerging countries where the traditional measures are on average low, like the school enrollment and educational attainment rates. A better measure of human capital is required to correctly attribute the impact of education in this diverse and dynamic world. Nonetheless, the education variable is always positive, but not statistically significant.

4.2 Institutions and Trust

Table 1.6: Institutions and Trust - cross-country fixed effects regressions 1980-2009

	(1)	(2)	(3)	(4)	(5)
	ICRG	Economic freedom	Rule of law	Property rights	Government Functioning
Trust	0.153*	1.020	0.509***	16.869**	0.817
	(0.09)	(0.63)	(0.18)	(7.84)	(0.75)
ln(GDP/capita)	0.047	0.464*	0.244***	-5.777	-0.093
	(0.05)	(0.24)	(0.07)	(3.57)	(0.53)
ln(Pop in '000 refyr)	0.116	-1.365	-0.535*	-3.530	-2.733
	(0.11)	(1.09)	(0.27)	(17.76)	(2.12)
Education	-0.031**	0.098	-0.014	0.077	-0.243
	(0.01)	(0.09)	(0.02)	(0.93)	(0.24)
Gini coefficients	-0.003	-0.009	0.003	0.148	0.068**
	(0.00)	(0.02)	(0.00)	(0.23)	(0.03)
Ethnic fractionalization	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)
Constant	-0.646	15.328	3.288	138.253	35.701*
	(1.08)	(11.02)	(2.76)	(170.19)	(20.97)
Observations	204	186	184	218	147
R ²	0.173	0.165	0.202	0.088	0.170
Adjusted R ²	0.152	0.141	0.180	0.067	0.141

Standard errors in parentheses

Huber and White robust standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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From the table 6, we see that trust almost always have a significant, positive effect on institutions (except on government functioning). However, before

⁴⁰ World Bank Income Groups and Regional Groups of countries of the world classification used for this purpose.

⁴¹ Refer to the regression table 11 in the appendix.

⁴² 1. Without wave fixed effects tables presented in appendix.

2. Excluded countries from the regressions for reasons mentioned earlier are: Latvia (1990), Lithuania (1990), Estonia (1990), Russia (1990), Romania (1993), Belarus (1990), Bulgaria (1991), Hungary (1991) and Bosnia and Herzegovina (1998).

we proceed and interpret the results, we need to keep in mind the important contributions pioneered by North, Acemoglu, Aghion and many others on the complexities of determinants of the types of institutions, and the myriad factors responsible for their existence or creation. Hence, the evidence presented here is to be read as an indication.

For one point increase in trust levels (which varies between 0 and 100), the institutional quality measures are expected to increase by 0.153, 1.020, 0.509, 16.869 and 0.817 points respective to the model, holding all other variables constant, and in the cross-country sense.⁴³ This suggests that there exists a positive association of trust on ICRG, Rule of Law and Property rights index, and less so on Economic Freedom and Government Functioning index (the last two are not significant either).

As briefly mentioned earlier, let us remind ourselves that the measures of institutional variables are ajar to criticisms. So, how can I interpret these results to provide some useful insight, even if it is just an indication? - Trust is always positively related to institutions. There is also the average income or levels of development having positive effects on institutional quality. The reverse causality question is not clear - do institutions cause income increases for example? This reaffirms the general hypotheses that “good” institutions working to ensure contracts are enforced, set the rules of the game and facilitate economic activities turn out to have higher incomes.

When we turn to observe Gini coefficients’ point estimates, we see that they are negatively correlated (and not significant) to institutions in models (1) and (3). When they are positive in models (2) and (4), they are also interestingly significant. However, when we observe closely we notice that the institutions quality variables of models (2) and (4) are rather specific - pertaining to very specific economic spheres of institutions - property rights and economic freedom. They are expected to facilitate economic activity and hence improve incomes. This, in turn, will have an impact on the income distribution. From the results we observe that in countries where property rights are stronger and economic freedoms are higher, they are also positively correlated with higher income inequalities. At the same time, of course, the question of causality lurks in the direction of the relationship between inequality and economic freedom or between inequality and property rights.

⁴³ To recall, the institutional variables are standard normalized on the following scale:

1. ICRG - 0 to 1
2. Economic Freedom - 1 to 10
3. Rule of Law - -2.5 to 2.5
4. Property rights - 10 to 100.

Population and ethnicity can perhaps be merged together while interpreting our table 6, partly because they are significant simultaneously in the model (3) and negative. This could mean that creating institutions in a less fractionalized society with relatively less population is easier. This manifests in other models too by the sign of their correlations, but they are not always significant.

4.3 Determinants of Trust - Logistic regression micro-estimates

A logistic model has been used to fit our data with the binary outcome dependent variable of “interpersonal trust” at the micro level, thanks to the Integrated Values Data merging all the WVS and EVS survey waves. I have 421,799 observations in the total sample. This data will also enable us to include the country fixed effects.⁴⁴ A cross-country investigation of determinants of trust is of course inviting, but the pseudo R-squared of our micro-estimates suggest that apart from the variables I can control for, there are several country-specific heterogeneity for the determinants of trust that require moving away from a cross-country analysis. A regional focused, micro or better, a multilevel model is useful to control for several hierarchically affecting factors. The cross-country analysis approach is also well documented in the subjective well-being literature.⁴⁵

Age and age squared variables are significant and take an “inverted U” form against trust - a downward concave relationship. This is akin to what is also found in the subjective well-being literature of the relationship between age and happiness variables, or the life satisfaction variables using the values surveys. This means that the odds of being trustful increases with age up until a certain point (or age), then it declines.⁴⁶ Remember, our data is a snapshot of the world,⁴⁷ so this result does not imply that this is a generational trend - that a person is more trusting as he grows up and then his trusting behavior declines after a certain age. Perhaps this is the case, but this is not clear. To verify this, a panel data is required.

Being a male also favors to be more trusting, as found in other empirical papers, but they are not significant in any of our models. Being married increases the odds of being more trusting, and significantly so in models (1) and (2).⁴⁸

Employment (along with Student dummy) is one of the most significant variables in terms of high odds of increasing trusting behavior, across all the models

⁴⁴ Country-survey fixed effects and survey fixed effects alone are also tested.

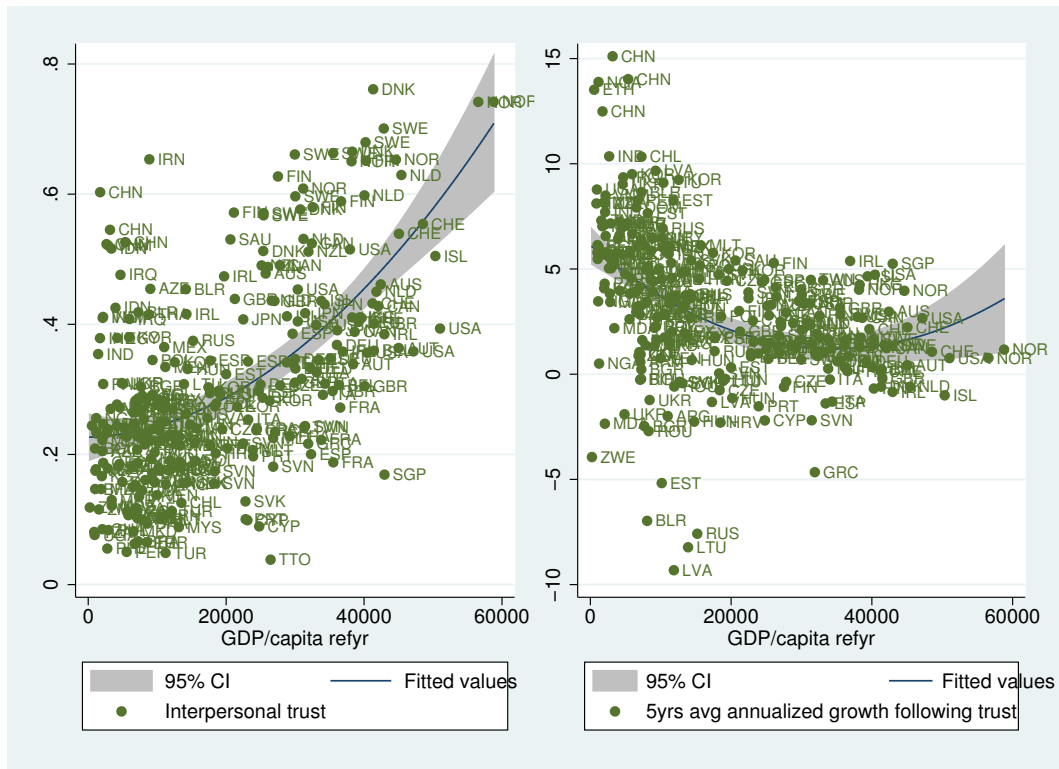
⁴⁵ Cf. [Easterlin et al. \(2010\)](#), [Clark et al. \(2008\)](#), [Graham \(2014\)](#) among others.

⁴⁶ Graphs on quadratic relationship and the marginal effects of age and trust are found in the appendix.

⁴⁷ Although, a snapshot of over 28 years of data.

⁴⁸ Incidentally, when I extend the definition of marriage to include all unions (but not officially married), they are no longer significant.

Figure 1.3: Twoway Trust-GDP per capita and Growth-GDP per capita (full sample)



Average generalized trust levels and growth rates on GDP per capita.
 Note: Luxembourg and Bosnia & Herzegovina observations dropped from this figure.

Summary tables found in appendix.

with 1% statistical significance. This is also true with increasing education levels of people.⁴⁹ I can infer that the capability of being employed or educated (or currently in education - student dummy) increases the odds of being trustful of others. If I were to stretch this interpretation further, I can also say that the social stigma of not being employed and not being educated has its negative effects. This is further strengthened with the unemployed dummy odds on trusting behavior.

Having children improves the trusting attitudes of people or parents at least. These are positive and significant in all the models.⁵⁰ Habitat size (the population size of the village/town/city in which one lives in) has a negative and significant effect on trust. This may imply that the more people in a society, the social interactions, and personal transactions are “anonymized” and thus leading to declining in the likelihood of interpersonal trust between “unknown” people.

When I turn to the coefficients of being religious or not dummy, I see that they

⁴⁹ The probability of being trustful increases with higher levels of education accomplished. Refer to the graph in the appendix on the marginal effects of education levels on trust.

⁵⁰ However, I don't observe the similar relationship as observed between the marginal effects of education and trust, with respect to the number of children and trust. The relationship is a lot weaker if any.

are negatively and significantly related to trust; much like being an atheist (or not dummy). Every “major” religious denomination that a person declares to adhere to, has a positive and significant effect on trusting others, except for being a Buddhist, Jew or a Shia. Being a Buddhist or being a Jew is positively correlated to trust, but they are not significant. Being a Shia is negatively correlated to trust, but that is not significant either.

I have executed the Hausman test which points at using the fixed effects model instead of a random effects model. This confirms what we discussed earlier on the pseudo R-squared and the micro versus macro trade-offs.⁵¹

All our models of the three principal equations have gone through several validity and robustness tests. To summarize what I have done for robustness and internal validity, I answer the following questions: First, how our estimated parameters vary as different models are used. Second, in these papers found in this literature, researchers tend to examine only a few representative specifications, but there is no reason why they couldn’t examine much more if the data were available; I did precisely that. I would also add that the effect may change when I alter the covariates or the sample, but it does so in a predictable and theoretically consistent manner - yet another definition to be called robust.

4.4 Associational activity and civic norms - 2000 combined WVS and EVS sample

Inequality is the prominent variable, almost always significant at 5% and a negative determinant of trust and civic norms in our sample. Olsonian groups (and not so much Putnamian groups) in general have a significant effect on trust and civic norms. For one percentage point increase in Olsonian groups’ membership, the trust measures are positively associated between 0.34 and 0.40 points on average, depending on the model, holding all other variables constant. Levels of development is one variable having a significant positive effect on trust and not civic norms. The same is observed with education having a positive and significant effect on trust, and not on civic norms (they are surprisingly negative and significant).

Of course, this section is to provide us with an indication alone on the associational activity and its links with trust and civic norms in a country.

⁵¹ 1. Brant and BIC tests.

2. With and without fixed effects results presented in the appendix.

3. Employment dummies also tested with various arbitrary cutoffs of education levels.

4. Literacy dummies also tested.

5. Children dummies instead of the number of children were also used.

Table 1.7: Determinants of Trust: Group memberships [2000 sample]

	(1)	(2)	(3)	(4)	(5)
	Trust	Trust	Trust	Trust	Trust
ln(GDP/capita)	0.034** (0.01)	0.039*** (0.01)	0.032** (0.01)	0.040*** (0.01)	0.040*** (0.01)
Education	1.859** (0.92)	1.503 (0.98)	1.754* (0.92)	1.436 (1.03)	1.337 (1.13)
Gini coefficients	-0.005*** (0.00)	-0.002 (0.00)	-0.006*** (0.00)	-0.001 (0.00)	-0.001 (0.00)
Groups	0.057** (0.02)				-0.030 (0.10)
Olsonian		0.342*** (0.10)		0.448*** (0.15)	0.506** (0.24)
Putnamian			0.141** (0.07)	-0.084 (0.10)	-0.029 (0.18)
Constant	-0.004 (0.17)	-0.134 (0.17)	0.073 (0.17)	-0.186 (0.15)	-0.183 (0.15)
Observations	53	53	53	53	53
R ²	0.438	0.502	0.401	0.512	0.514
Adjusted R ²	0.391	0.461	0.351	0.460	0.450

Standard errors in parentheses

Huber and White robust standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.8: Determinants of Trust: Group memberships [2000 sample]

	(1)	(2)	(3)	(4)	(5)
	Civic	Civic	Civic	Civic	Civic
ln(GDP/capita)	0.000 (0.00)	0.001 (0.00)	0.000 (0.00)	0.001 (0.00)	0.001 (0.00)
Education	-0.571** (0.26)	-0.606** (0.26)	-0.588** (0.26)	-0.600** (0.27)	-0.644** (0.26)
Gini coefficients	-0.001*** (0.00)	-0.001** (0.00)	-0.001*** (0.00)	-0.001** (0.00)	-0.001* (0.00)
Groups	0.006* (0.00)				-0.011 (0.02)
Olsonian		0.034** (0.01)		0.028 (0.03)	0.050 (0.04)
Putnamian			0.018* (0.01)	0.005 (0.02)	0.026 (0.05)
Constant	0.393*** (0.03)	0.382*** (0.03)	0.401*** (0.03)	0.385*** (0.04)	0.386*** (0.04)
Observations	41	41	41	41	41
R ²	0.273	0.288	0.271	0.289	0.297
Adjusted R ²	0.192	0.209	0.190	0.188	0.173

Standard errors in parentheses

Huber and White robust standard errors

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5 Conclusion

In this exercise to revisit the questions of social capital and its economic payoffs, I observe that [interpersonal] trust continues to be an important variable in a larger sense if I consider social cohesion as an important dimension of human development, and has economic payoffs in societies.

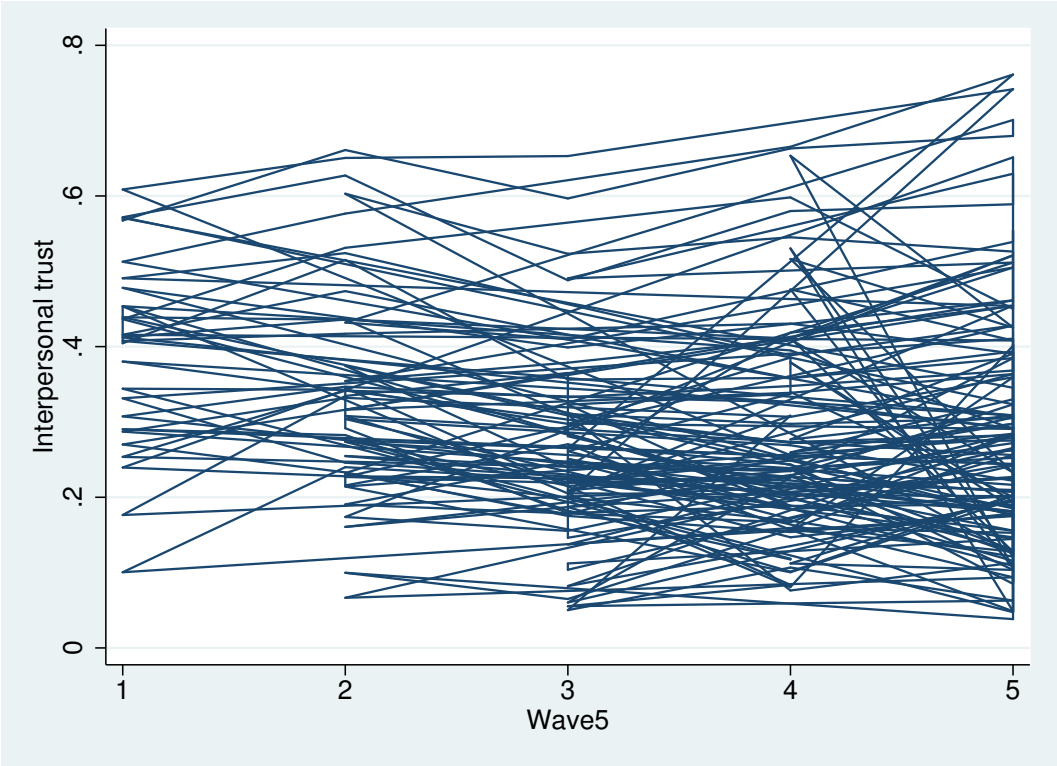
Generalized trust can be *trusted* over time and across countries, to have positive effects on economic development and institutions. This is true when I take all countries together (a cross-national global phenomenon). More importantly, I go a step further in establishing causality between trust and economic development. Trust also tends to have a longer lasting effect on economic development (10 years > 7 years). There are of course some confounding elements that this analysis unveils, and this in our opinion only nourishes the research on social capital.

6 Appendix

Table 1.9: Relational Capability Index: Dimensions and components

Dimensions	Components	Deprived if
Integration to network	Employment status Access to transport Access to telecommunications Access to information	No stable job with regular professional relations No means of transport Does not use a phone, a computer or the internet Does not obtain news from radio, television or newspaper
Private relations	No. of people in the HH Family ties Close friends Financial support Trust in the community	Lives alone No trust in family No close friends providing psychological & emotional support No financial support from relatives or acquaintances No trust in people the individual knows
Civic commitment	Membership Collective action Vote Solidarity Trust in others	No active membership in a group No participation in political action Does not vote No active membership in common interest group No trust in unknown people

Figure 1.4: Generalized trust levels across time in the combined WVS and EVS surveys



Missing countries: Latvia (1990), Lithuania (1990), Estonia (1990), Russia (1990), Romania (1993), Belarus (1990), Bulgaria (1991), Hungary (1991) and Bosnia and Herzegovia (1998).
Waves 1: 1981-84, 2: 1989-93, 3: 1994-98, 4: 1999-2004 and 5: 2005-09

Table 1.10: Determinants of Trust - ordered-logit micro estimates 1980-2009

	(1)	(2)	(3)	(4)	(5)
	Trust	Trust	Trust	Trust	Trust
Trust					
Age	0.005*** (0.00)	0.004* (0.00)	0.007*** (0.00)	0.006** (0.00)	0.005* (0.00)
Age squared	-0.000** (0.00)	0.000 (0.00)	-0.000 (0.00)	-0.000 (0.00)	-0.000 (0.00)
Married	0.030*** (0.01)	0.019* (0.01)	0.017 (0.02)	-0.018 (0.02)	0.023 (0.02)
Sex	0.007 (0.01)	0.004 (0.01)	0.012 (0.01)	0.018 (0.01)	0.019 (0.01)
Employment	0.177*** (0.01)	0.122*** (0.01)	0.162*** (0.02)	0.129*** (0.02)	0.160*** (0.02)
Education		0.101*** (0.00)	0.087*** (0.00)	0.075*** (0.00)	0.080*** (0.00)
No. of children			0.015*** (0.01)	0.015*** (0.01)	0.016*** (0.01)
Unemployed			-0.052* (0.03)	-0.033 (0.03)	-0.060* (0.03)
Student			0.249*** (0.03)	0.245*** (0.04)	0.236*** (0.03)
Self-employed			0.055** (0.02)	0.072*** (0.03)	0.046* (0.02)
Habitat size			-0.010*** (0.00)	-0.012*** (0.00)	-0.010*** (0.00)
Religious or not			-0.068*** (0.02)	-0.058*** (0.02)	-0.072*** (0.02)
(Sub.) Income				0.041*** (0.00)	
Atheist					0.067* (0.04)
Protestant					0.070** (0.03)
Muslim					0.187*** (0.04)
Buddhist					0.082 (0.08)
Catholic					0.050** (0.02)
Hindu					0.136** (0.07)
Jew					0.145 (0.12)
Sunni					0.261** (0.13)
Shia					-0.146 (0.22)
Constant	-1.731*** (0.06)	-2.203*** (0.06)	-1.815*** (0.09)	-1.926*** (0.09)	-1.819*** (0.09)
Observations	378669	293346	155559	137903	144745
AIC	441710.2	326336.5	171666.3	151920.9	158841.6
BIC	442881.4	327490.8	172641.8	152874.8	159899.0

Standard errors in parentheses

Country fixed effects included

Huber and White robust standard errors

Country population weights applied

Regression 4 with subjective income scales variable

Coefficients represent the odds of Trust=1 when X increases by 1 unit

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.11: Growth on Trust - pseudo-panel fixed effects regressions 1980-2009

	(1)	(2)	(3)	(4)	(5)
	Growth	Growth	Growth	Growth	Growth
Trust	0.041** (0.02)	0.044** (0.02)	0.059*** (0.02)	0.066*** (0.02)	0.075** (0.03)
ln(GDP per capita)	-2.133 (1.29)	-2.183* (1.31)	-1.435 (1.30)	-1.985 (1.45)	-3.843 (2.50)
Investment	-2.949*** (1.02)	-2.957*** (1.01)	-2.453** (0.94)	-2.289** (1.01)	-6.784** (2.59)
Education	0.513* (0.31)	0.408 (0.28)	0.132 (0.24)	0.023 (0.23)	-0.191 (1.10)
ln(Population)		1.940 (2.72)	1.873 (2.32)	2.199 (2.14)	12.036 (7.83)
Gini coefficient			0.202*** (0.07)	0.194*** (0.07)	-0.005 (0.17)
Economic Freedom				0.401 (0.27)	
Rule of Law					-1.583 (2.83)
Constant	19.596** (9.47)	1.419 (24.43)	-10.726 (20.98)	-10.955 (18.44)	-77.338 (72.87)
Observations	195	195	186	180	81
Overall-R ²	0.41	0.31	0.31	0.35	0.19
Within-R ²	0.17	0.17	0.28	0.31	0.52
Between-R ²	0.28	0.27	0.28	0.32	0.23
Prob(Chi2)	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

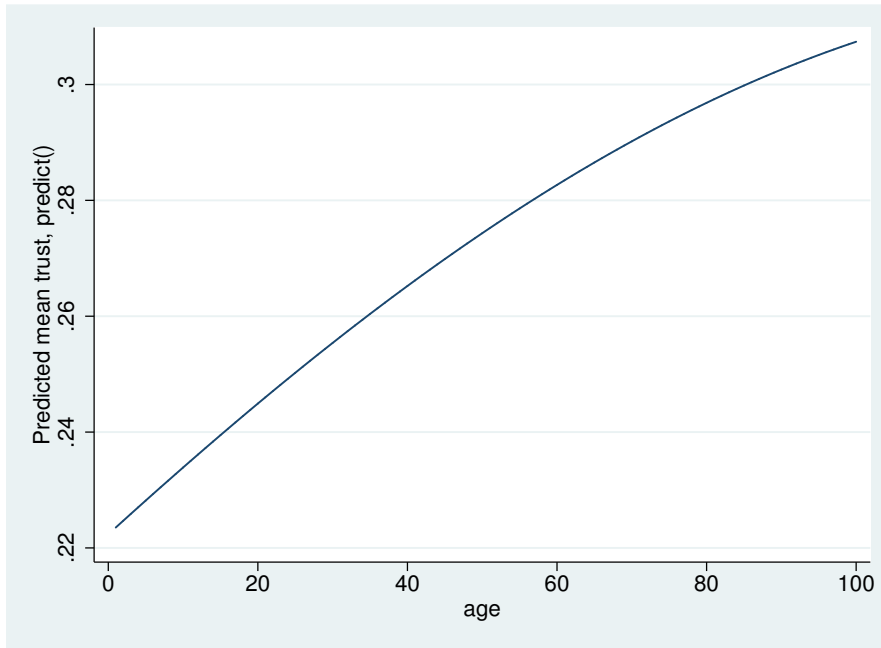
Table 1.12: Growth on Trust - pseudo-panel fixed effects regressions 1980-2009

	(1)	(2)	(3)	(4)	(5)
	Growth7	Growth7	Growth7	Growth7	Growth7
Trust	0.032 (0.02)	0.035 (0.02)	0.048** (0.02)	0.056*** (0.02)	0.089** (0.04)
ln(GDP per capita)	-0.536 (1.51)	-0.591 (1.54)	-0.021 (1.64)	-0.268 (1.85)	-3.364 (3.09)
Investment	-4.275*** (1.35)	-4.284*** (1.40)	-3.777** (1.49)	-3.733** (1.70)	-5.315 (3.34)
Education	0.586* (0.32)	0.471 (0.32)	0.233 (0.28)	0.145 (0.32)	-0.820 (1.04)
ln(Population)		2.127 (3.41)	2.241 (3.28)	2.157 (3.29)	24.575** (10.11)
Gini coefficient			0.196*** (0.06)	0.191*** (0.07)	0.022 (0.25)
Economic Freedom				0.293 (0.46)	
Rule of Law					-2.626 (4.05)
Constant	5.617 (11.14)	-14.308 (30.16)	-26.728 (28.57)	-25.071 (27.26)	-204.319** (95.96)
Observations	195	195	186	180	81
Overall-R ²	0.08	0.10	0.09	0.12	0.11
Within-R ²	0.10	0.10	0.19	0.20	0.44
Between-R ²	0.03	0.04	0.03	0.04	0.16
Prob(Chi2)	0.00	0.00	0.00	0.00	0.00

Standard errors in parentheses

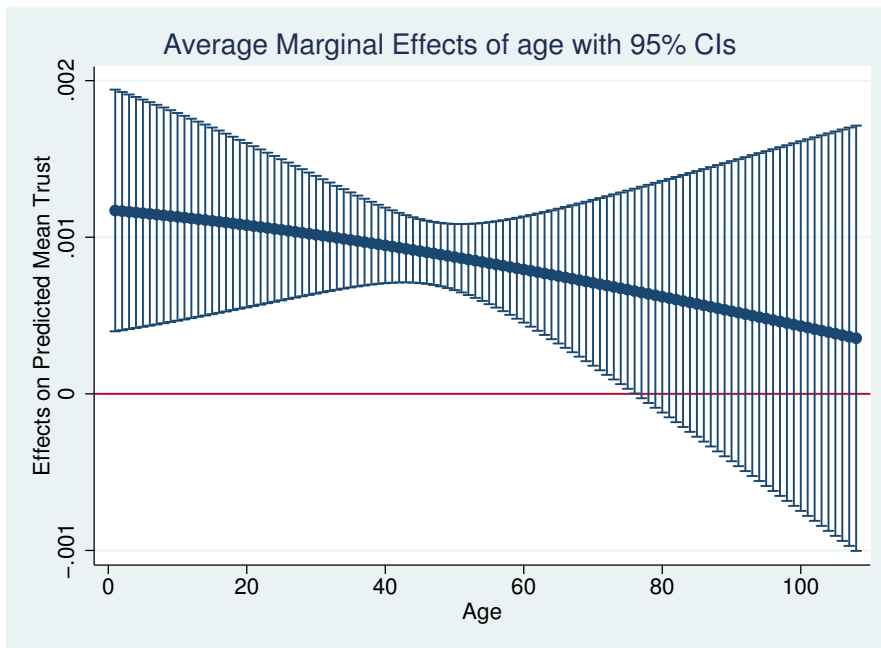
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 1.5: Marginal effects of Age on Trust (quadratic and continuous)



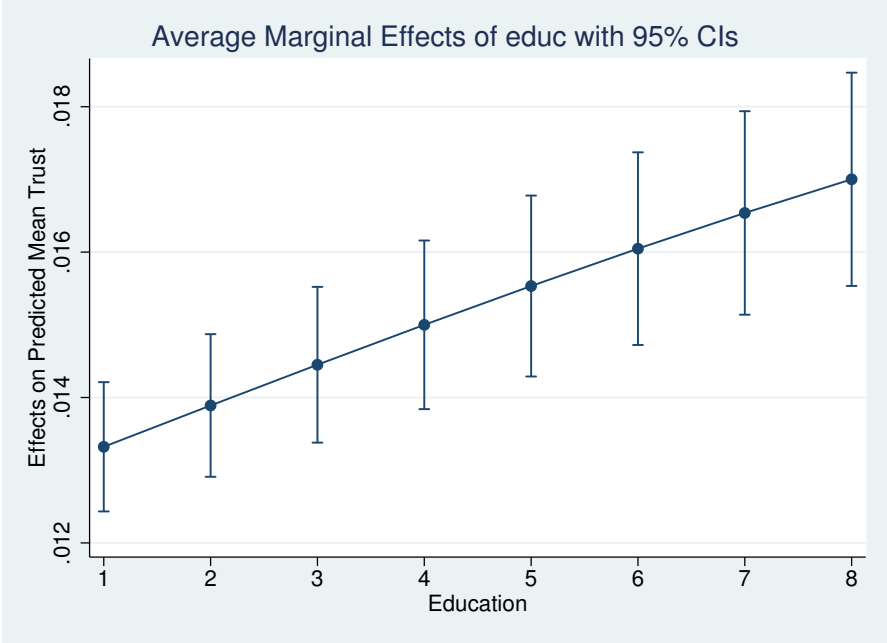
Combined sample 1980 - 2005

Figure 1.6: Marginal effects of Age on Trust



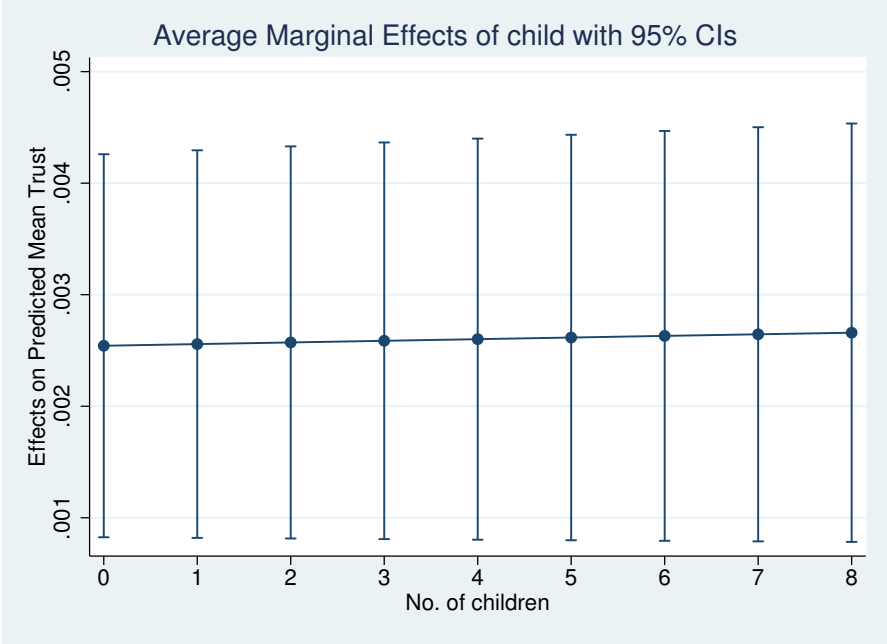
Combined sample 1980 - 2005

Figure 1.7: Marginal effects of Education Levels on Trust



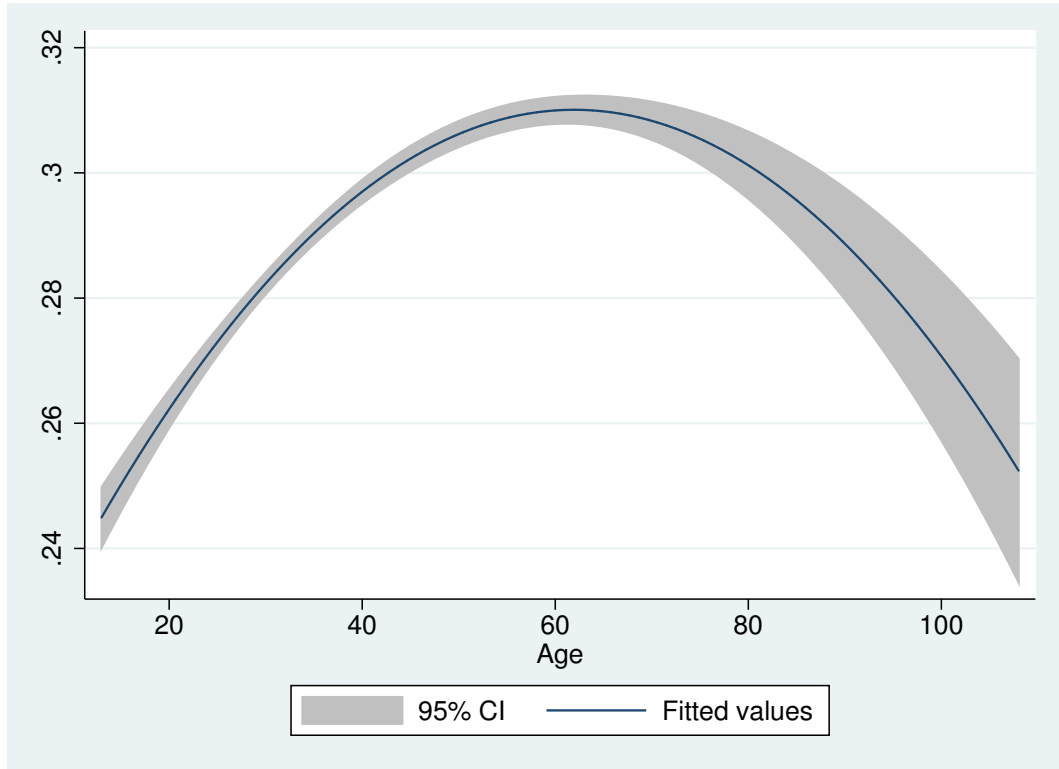
Combined sample 1980 - 2005

Figure 1.8: Marginal effects of Number of Children on Trust



Combined sample 1980 - 2005

Figure 1.9: Trust and age - quadratic relationship



Combined sample 1980 - 2005

Figure 1.10: Trust and per capita income levels by survey waves

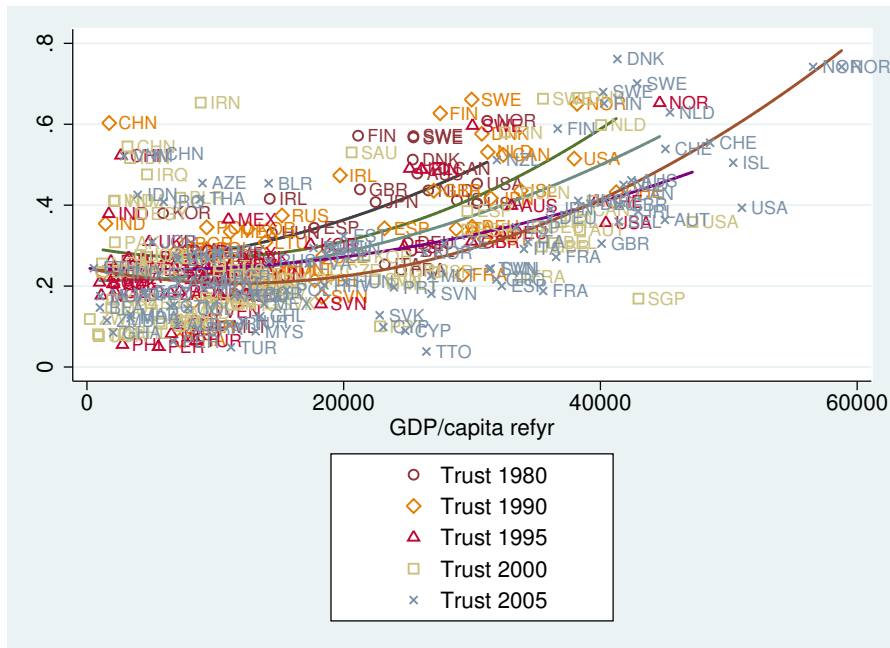


Figure 1.11: Trust and per capita income levels by survey waves

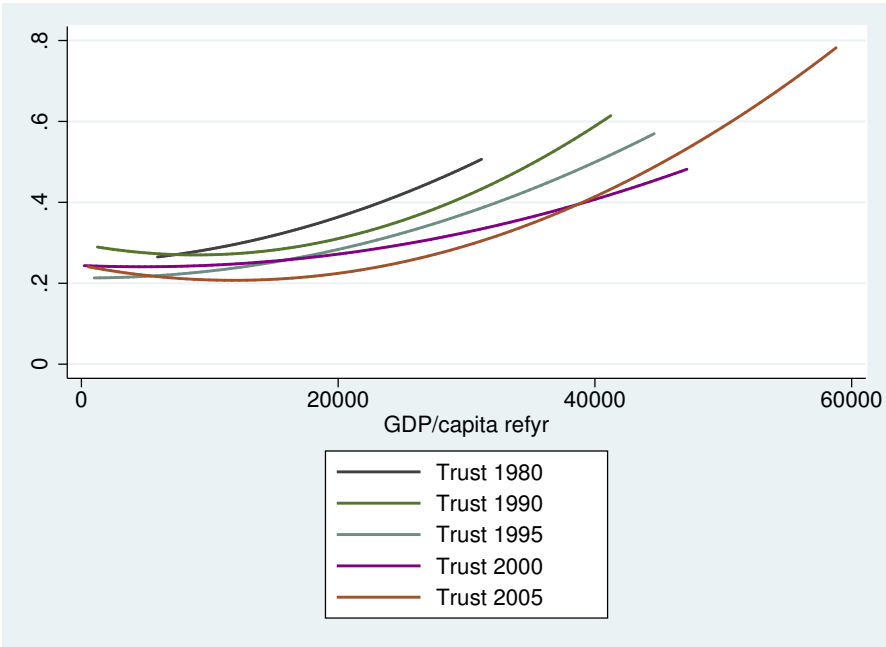


Table 1.13: World Values Survey - 2000 sample

No.	Country	year	trust	congov	lifesat	happy	civic	growth
1	Sweden	1999	0.66	.	7.65	3.29	.	3.09
2	Iran	2000	0.65	2.86	6.38	2.81	36.86	1.18
3	China	2001	0.55	3.36	6.53	2.87	37.58	10.22
4	S. Arabia	2003	0.53	.	7.28	3.35	.	-0.55
5	Indonesia	2001	0.52	2.57	6.96	3.15	35.77	0.50
6	Iraq	2004	0.48	2.20	5.23	2.66	.	14.87
7	Japan	2000	0.43	2.10	6.48	3.17	37.35	0.58
8	Vietnam	2001	0.41	3.74	6.52	3.41	38.08	6.63
9	India	2001	0.41	2.58	5.14	2.95	35.74	4.66
10	Canada	2000	0.39	2.33	7.80	3.39	36.22	2.93
11	Egypt	2000	0.38	2.66	5.36	3.06	37.78	3.32
12	United States	1999	0.36	2.31	7.65	3.32	35.33	2.78
13	Spain	2000	0.34	2.39	6.99	3.06	35.89	3.99
14	Pakistan	2001	0.31	2.26	4.85	2.94	38.89	0.82
15	Jordan	2001	0.28	3.34	5.64	2.92	38.32	0.81
16	South Korea	2001	0.27	2.19	6.21	2.96	.	4.28
17	Nigeria	2000	0.26	2.48	6.87	3.58	35.80	1.81
18	Albania	2002	0.24	2.62	5.17	2.59	35.53	4.48
19	Morocco	2001	0.24	2.63	6.05	3.05	37.94	1.66
20	Bangladesh	2002	0.24	3.28	5.78	2.90	39.40	1.87
21	Israel	2001	0.23	.	7.03	3.02	.	1.66
22	Chile	2000	0.23	2.58	7.12	3.16	33.13	4.65
23	Puerto Rico	2001	0.23	2.48	8.49	3.47	36.91	3.81
24	Mexico	2000	0.21	2.18	8.13	3.48	31.96	1.39
25	Serbia	2001	0.20	2.09	5.62	2.83	36.32	2.97
26	Turkey	2001	0.19	2.28	5.81	3.03	.	1.72
27	Singapore	2002	0.17	.	7.13	3.23	35.40	3.04
28	Kyrgyzstan	2003	0.17	2.13	6.48	3.04	33.78	0.86
29	Venezuela	2000	0.16	2.58	7.52	3.42	34.75	0.20
30	Bosnia & Herz.	2001	0.16	2.17	5.77	3.02	37.36	38.74
31	Argentina	1999	0.15	1.85	7.33	3.13	35.91	0.08
32	Moldova	2002	0.15	2.18	4.57	2.53	28.88	-0.11
33	Macedonia	2001	0.14	1.59	5.12	2.89	35.51	0.66
34	Zimbabwe	2001	0.12	2.56	3.94	2.66	38.09	-2.12
35	South Africa	2001	0.12	2.54	5.81	3.12	33.26	2.10
36	Algeria	2002	0.11	2.48	5.67	2.96	35.16	1.84
37	Peru	2001	0.11	2.06	6.44	2.95	34.02	1.54
38	Philippines	2001	0.08	2.54	6.67	3.26	30.65	0.72
39	Tanzania	2001	0.08	3.34	3.87	3.50	37.91	1.42
40	Uganda	2001	0.08	3.15	5.62	3.03	33.71	2.69

Note: congov - Confidence in Government; lifesat - Life Satisfaction; happy - Happiness; trust1 - Trust in Neighborhood; and trust2 - Trust in Family.

Table 1.14: European Values Study - 2000 sample

No.	Country	year	trust	lifesat	happy	civic	rci	growth
1	Denmark	1999	0.67	8.24	3.39	37.73	.	2.73
2	Sweden	1999	0.66	7.65	3.29	.	.	2.11
3	Netherlands	1999	0.60	7.88	3.41	35.33	.	3.11
4	Finland	2000	0.58	7.87	3.13	35.44	.	4.11
5	Belarus	2000	0.42	4.81	2.69	28.64	.	.
6	Iceland	1999	0.41	8.05	3.44	.	.	0.70
7	N. Ireland	1999	0.39	8.07	3.42	.	.	.
8	Spain	1999	0.39	7.09	3.06	.	.	2.85
9	Ireland	1999	0.36	8.17	3.38	.	.	9.63
10	Germany	1999	0.35	7.61	3.03	35.82	.	1.10
11	Austria	1999	0.34	8.02	3.25	35.74	.	2.30
12	Italy	1999	0.33	7.17	2.95	36.12	.	1.39
13	Belgium	1999	0.31	7.56	3.33	33.59	.	2.11
14	United Kingdom	1999	0.30	7.40	.	35.14	.	3.93
15	Ukraine	1999	0.27	4.56	2.44	31.65	.	.
16	Bulgaria	1999	0.27	5.34	2.41	.	.	-1.26
17	Luxembourg	1999	0.26	7.87	3.29	33.37	.	3.67
18	Lithuania	1999	0.25	5.09	2.79	32.38	.	.
19	Czech Republic	1999	0.24	7.06	2.96	34.79	.	2.50
20	Greece	1999	0.24	6.67	2.91	31.45	.	1.98
21	Russia	1999	0.24	4.74	2.46	33.18	.	-3.28
22	Estonia	1999	0.23	5.90	2.70	.	.	4.88
23	France	1999	0.22	6.93	3.22	32.86	.	1.50
24	Hungary	1999	0.22	5.69	2.81	.	.	2.27
25	Slovenia	1999	0.22	7.23	2.91	.	.	5.99
26	Malta	1999	0.21	8.21	3.16	.	.	4.35
27	Poland	1999	0.19	6.37	2.93	.	.	6.13
28	Croatia	1999	0.18	6.46	2.90	35.36	.	3.36
29	Latvia	1999	0.17	5.27	2.61	.	.	.
30	Slovakia	1999	0.16	6.03	2.74	.	.	5.91
31	Romania	1999	0.10	5.23	2.39	.	.	1.66
32	Portugal	1999	0.10	6.98	3.00	.	.	3.02
33	Turkey	2001	0.07	5.09	2.61	.	.	1.94

Note: Relational Capability Indicator (RCI) could not be constructed due to several missing questions for our 2000 sample.

Table 1.15: World Values Survey - 2008 sample

No.	Country	year	trust	trust1	trust2	congov	lifesat	happy	civic	rci	growth
1	Norway	2008	0.74	0.91	0.99	2.53	7.96	3.33	35.86	0.77	2.01
2	Sweden	2006	0.68	0.90	1.00	2.35	7.74	3.39	35.28	0.78	3.24
3	Finland	2005	0.59	0.86	0.99	2.67	7.84	3.21	35.94	0.70	3.14
4	Switzerland	2007	0.54	0.87	0.99	2.70	8.01	3.36	37.18	0.73	1.40
5	China	2007	0.52	0.86	0.99	3.32	6.76	2.94	35.38	.	12.23
6	Vietnam	2006	0.52	0.90	1.00	3.78	7.09	3.15	36.41	0.58	7.56
7	New Zealand	2004	0.51	0.91	0.99	2.34	7.89	3.36	36.62	.	2.50
8	Australia	2005	0.46	0.82	0.99	2.31	7.28	3.27	36.41	0.73	2.30
9	Netherlands	2006	0.45	0.70	0.93	2.08	7.76	3.36	36.68	0.69	1.42
10	Canada	2006	0.43	0.84	0.98	2.30	7.76	3.41	36.38	0.73	2.32
11	Indonesia	2006	0.43	0.78	0.99	2.61	6.91	3.18	37.36	0.68	3.55
12	Thailand	2007	0.42	0.76	0.98	2.36	7.21	3.32	30.97	0.56	4.40
13	Hong Kong	2005	0.41	.	.	2.58	6.41	2.90	35.45	.	4.71
14	Iraq	2006	0.41	.	.	2.69	4.46	2.42	.	.	-1.00
15	United States	2006	0.39	0.80	0.98	2.31	7.32	3.27	35.34	0.71	1.77
16	Japan	2005	0.39	.	.	2.14	6.99	3.18	37.37	.	1.49
17	Germany	2006	0.37	0.76	0.98	2.01	7.13	3.02	35.73	0.66	1.32
18	Jordan	2007	0.31	0.86	1.00	3.43	7.12	3.14	36.37	.	3.64
19	United Kingdom	2006	0.31	0.80	0.98	2.18	7.60	3.43	35.53	0.71	2.81
20	Italy	2005	0.29	0.69	0.99	2.07	6.89	3.07	36.81	0.63	1.30
21	Uruguay	2006	0.28	0.76	0.96	2.65	7.46	3.15	35.10	.	0.40
22	South Korea	2005	0.28	0.72	0.99	2.38	6.35	2.99	35.29	0.61	5.21
23	Ukraine	2006	0.28	0.73	0.98	2.04	5.67	2.83	31.34	0.61	11.88
24	Russia	2006	0.26	0.68	0.99	2.32	6.09	2.76	32.62	0.59	10.24
25	Ethiopia	2007	0.24	0.79	0.97	2.09	4.99	2.88	36.95	0.66	3.54
26	Taiwan	2006	0.24	0.81	0.99	2.15	6.58	3.04	35.71	0.62	3.99
27	India	2006	0.23	0.87	0.98	2.63	5.79	3.02	31.86	0.67	5.72
28	Bulgaria	2006	0.22	0.74	0.99	2.14	5.22	2.60	35.22	0.57	7.58
29	Romania	2005	0.20	0.50	0.97	2.00	5.75	2.56	36.14	0.51	8.28
30	Andorra	2005	0.20	0.51	0.98	2.21	7.13	3.20	34.55	0.65	.
31	Spain	2007	0.20	0.76	0.99	2.37	7.32	3.05	35.19	.	2.26
32	Poland	2005	0.19	0.75	0.98	1.94	7.02	3.12	35.34	0.59	4.27
33	France	2006	0.19	0.82	0.95	2.01	6.91	3.25	33.04	0.67	1.55
34	South Africa	2007	0.19	0.73	0.98	2.94	7.03	3.15	33.87	0.61	3.55
35	Egypt	2008	0.19	0.95	1.00	.	5.74	2.91	37.21	0.56	2.55
36	Georgia	2008	0.18	0.92	1.00	2.14	4.96	2.75	37.38	0.59	9.29
37	Slovenia	2005	0.18	0.60	0.98	2.07	7.24	2.97	33.56	0.61	4.57
38	Moldova	2006	0.18	0.54	0.98	2.11	5.45	2.48	31.70	0.55	8.14
39	Argentina	2006	0.18	0.71	0.98	2.22	7.79	3.20	34.94	0.62	1.99
40	Mali	2007	0.17	0.86	0.98	2.96	6.09	3.20	31.15	0.62	2.16
41	Guatemala	2005	0.16	.	.	2.20	7.95	3.23	31.89	.	1.30
42	Mexico	2005	0.16	0.54	0.91	2.35	8.23	3.49	30.55	0.58	1.79
43	Serbia	2006	0.15	0.66	0.99	2.01	6.01	2.69	25.50	0.61	6.51
44	Burkina Faso	2007	0.15	0.71	0.95	2.44	5.57	3.01	33.83	0.54	2.08
45	Colombia	2005	0.14	0.56	0.96	2.46	8.31	3.35	.	0.56	2.92
46	Morocco	2007	0.13	0.84	0.99	2.62	5.25	3.03	36.68	0.60	4.45
47	Chile	2005	0.13	0.57	0.97	2.39	7.16	3.08	32.47	0.54	3.90
48	Zambia	2007	0.12	0.58	0.94	2.41	6.06	2.78	30.31	0.60	2.71
49	Iran	2007	0.11	.	.	2.60	6.43	2.94	33.98	.	4.17
50	Cyprus	2006	0.10	0.51	0.98	2.52	7.37	3.21	34.62	0.62	1.94
51	Brazil	2006	0.09	0.56	0.94	2.34	7.65	3.24	31.90	0.60	1.73
52	Malaysia	2006	0.09	0.81	0.99	3.02	6.84	3.31	29.50	0.60	3.47
53	Ghana	2007	0.09	0.63	0.94	2.95	6.12	3.25	35.59	0.59	2.95
54	Peru	2008	0.06	0.38	0.93	1.79	7.04	2.94	.	0.50	3.68
55	Rwanda	2007	0.05	0.90	0.97	.	4.97	2.95	34.82	.	5.64
56	6. APPENDIX Tunisia	2007	0.05	0.75	0.99	2.77	7.46	3.19	37.94	0.52	4.08
57	Trinidad & To.	2007	0.04	0.61	0.95	2.12	7.33	3.37	34.29	0.61	11.17

Table 1.16: European Values Study - 2008 sample

No.	Country	year	trust	congov	lifesat	happy	civic	rci	growth
1	Denmark	2008	0.76	2.54	8.36	3.44	37.60	0.80	1.15
2	Norway	2008	0.74	2.43	8.10	3.36	36.07	0.73	1.79
3	Sweden	2009	0.70	2.47	7.63	3.19	34.16	0.73	2.78
4	Finland	2009	0.65	2.28	7.72	3.00	36.50	0.63	2.95
5	Netherlands	2008	0.63	2.41	8.01	3.52	36.10	0.71	1.47
6	Switzerland	2008	0.55	2.64	8.01	3.34	36.29	0.69	1.61
7	Iceland	2009	0.50	2.17	8.01	3.48	36.62	0.76	1.87
8	Azerbaijan	2008	0.45	2.65	5.94	2.82	34.32	0.59	27.31
9	Belarus	2008	0.45	2.67	6.07	2.91	29.91	0.54	10.99
10	Germany	2008	0.40	2.07	7.10	2.96	35.07	0.60	1.47
11	United Kingdom	2009	0.40	1.87	7.49	3.33	36.59	0.59	1.87
12	Ireland	2008	0.38	2.23	7.79	3.41	34.36	0.67	1.88
13	Austria	2008	0.36	1.92	7.55	3.16	34.30	0.61	2.32
14	Belgium	2009	0.36	2.13	7.67	3.38	34.41	0.62	1.98
15	Spain	2008	0.35	2.19	7.32	3.17	34.44	0.56	1.30
16	Luxembourg	2008	0.33	2.71	7.90	3.31	34.59	0.64	2.99
17	Estonia	2008	0.32	2.20	6.69	2.89	34.84	0.54	8.06
18	Italy	2009	0.31	2.01	7.14	3.00	36.24	0.68	0.37
19	Czech Republic	2008	0.31	1.91	7.21	2.97	33.20	0.54	5.50
20	Lithuania	2008	0.30	2.05	6.45	2.73	32.15	0.47	9.61
21	Russia	2008	0.29	2.64	6.52	2.81	31.53	0.54	9.56
22	N. Ireland	2008	0.29	2.02	7.84	3.35	34.88	0.63	.
23	Ukraine	2008	0.28	1.81	6.08	2.79	34.62	0.54	11.60
24	Poland	2008	0.28	1.92	7.21	3.05	33.65	0.52	5.37
25	France	2008	0.27	2.10	7.08	3.26	33.26	0.63	1.02
26	Bosnia & Herz.	2008	0.27	1.92	7.09	3.06	35.74	0.46	4.93
27	Latvia	2008	0.26	1.90	6.36	2.84	32.84	0.52	10.11
28	Montenegro	2008	0.25	2.23	7.43	3.05	36.30	0.49	7.34
29	Slovenia	2008	0.24	2.30	7.55	3.04	35.39	0.57	5.41
30	Georgia	2008	0.23	2.46	5.48	2.81	36.44	0.56	10.05
31	Malta	2008	0.23	2.48	7.91	3.24	38.30	0.55	2.10
32	Greece	2008	0.22	1.87	6.92	3.01	32.93	0.55	3.63
33	Hungary	2008	0.21	1.77	6.29	2.92	36.29	0.52	3.79
34	Armenia	2008	0.21	2.41	5.70	2.94	35.32	0.53	14.06
35	Croatia	2008	0.20	1.81	7.04	2.98	34.45	0.50	5.03
36	Portugal	2008	0.20	1.99	6.82	3.06	35.59	0.56	0.26
37	Macedonia	2008	0.19	2.43	6.85	3.03	37.04	0.57	4.39
38	Bulgaria	2008	0.18	1.66	5.83	2.69	36.97	0.52	7.90
39	Romania	2008	0.18	1.96	6.78	2.84	33.73	0.48	9.05
40	Slovak Republic	2008	0.13	2.44	7.27	2.94	32.42	0.57	7.50
41	Serbia	2008	0.12	1.80	6.84	2.85	36.67	0.48	6.62
42	Moldova	2008	0.12	2.17	6.59	2.71	34.45	0.47	7.85
43	Turkey	2009	0.11	2.48	6.50	2.93	38.72	0.52	5.07
44	Kosovo	2008	0.11	2.82	6.90	3.09	38.35	0.50	.
45	Albania	2008	0.10	1.97	6.30	2.76	33.84	0.47	12.48
46	Cyprus	2008	0.09	2.69	7.36	3.15	33.28	0.57	1.87
47	N. Cyprus	2008	0.05	2.30	6.28	2.99	39.00	0.54	.

CHAPTER 2

Coherent Multidimensional Poverty Measurement

1 Introduction

This chapter presents a family of multidimensional poverty indexes that measure poverty as a function of the extent and the intensity of poverty. We provide a unique axiomatics from which both extent and intensity of poverty can be derived, as well as the poor be endogenously identified. This axiomatics gives rise to a family of multidimensional indexes whose extremal points are the geometric mean and the Maximin solution. We show that, in addition to all the standard features studied in the literature, these indexes are continuous (a must for cardinal poverty measures) *and* ordinal, in the sense that they do not depend upon the units in which dimensions of achievements (or deprivations) are computed. Moreover, they verify the decreasing marginal rate of substitution property: the higher one's deprivation in one dimension, the smaller the increase of achievement in that dimension that suffices to compensate for a decrease of achievement in another dimension.

As acknowledged by Villar et al. (2010), “defining a poverty measure in a truly multidimensional context involves a number of subtle and difficult issues: choosing the appropriate poverty dimensions beyond income or wealth, deciding on whether they all are equally important, fixing sensible thresholds in those dimensions and setting criteria to identify as poor those individuals whose achievements lie partially below them, defining an overall measure of poverty intensity, etc. Those difficulties anticipate that many compromises are required and, indirectly, that the axiomatic approach may be the best way to deal with this type of problem as it makes explicit all those compromises.”¹

Here, we provide an axiomatization for a family of Multidimensional Poverty Indices. This is part of a larger research program devoted to a Relational Capability Index applied as a new poverty measure in Nigeria, Indonesia and India.²

Each index can be characterized as lying somewhere between the two extremal points of our family of indices: the geometric mean (Villar et al. (2010)) and the Rawlsian Maximin (Rawls (1971)). Although both social choice correspondences have been thoroughly studied from the social choice theoretical viewpoint,³ we are not aware of any attempt to link these two major concepts of justice with the

¹See Dardanoni (1995), Ravallion (1996), Tsui (2002), Bourguignon and Chakravarty (1999), Lugo and Maasoumi (2009), Alkire and Foster (2011a), Wagle (2009), and Chakravarty (2009).

²HDCA WP.

³See Dhillon and Mertens (1999) and Fleurbaey and Maniquet (2006) to name but a few path-breaking papers in this area.

concerns involved in the literature devoted to poverty measurement. This chapter is a first attempt to fill this gap.

We suggest that the geometric mean can be interpreted as being a (hyperbolic) version of the “utilitarian” viewpoint. With this interpretation in mind, our family of indices builds a bridge between celebrated theories of justice and poverty measurements. An alternative standpoint enables us to characterize each one of our indices as being the supremum of the weighted geometric averages, the sup being taken over some collection of weights over dimensions and people. When the collection of weights reduces to the uniform vector, we are back to the standard geometric mean (this is the “utilitarian” solution). When the underlying collection of weights includes the whole unit simplex over dimensions and people, then we get the Maximin solution. One possible interpretation is as follows: suppose that the economist who is in charge of measuring poverty in a given population reflects as if she were in Rawls’ original position. Beyond the veil of ignorance, the point that is ignored is not which role one will endorse (as in the standard, political interpretation of Rawls’ theory of justice) but in which dimension one will get some talent (or some endowment, or some “social capital”). So uncertainty bears on dimensions rather than on persons. In addition, from the viewpoint of the analyst in the “original position”, there might be some ambiguity concerning the probability according to which achievements and deprivations will be distributed. As a result, if the economist has no prejudice about the distribution of achievements and deprivations, she might opt for the Maximin solution as a way to measure multidimensional poverty. If, on the contrary, she has good reasons to believe that the distribution will be uniform, she may want to choose the “utilitarian” solution (i.e., in our context, the geometric average). Else, she might choose an index in our family which lies somewhere in between the first two. If one wishes so, it is also possible to include ambiguity about the persons (and not only dimensions) in the non-symmetric version of our family of indices.

To the best of our knowledge, this is the first attempt to formally fill the gap between theories of justice and poverty measurements. As we take inspiration from [Artzner et al. \(1999\)](#) (where an additive version of a similar axiomatization was introduced in order to measure the risk position of a portfolio), we call *coherent* a multidimensional poverty index belonging to our family. We finally show that such indices satisfy the following properties that are considered as desirable in the literature:⁴

(i) Each index is continuous: slight changes in the achievements of certain persons only induce slight changes in the poverty measurement;

⁴See, e.g., [Bourguignon and Chakravarty \(2003\)](#) and [Alkire and Foster \(2011a\)](#).

(ii) Each index is ordinal, in the sense that it does not depend upon the choice of the specific units in which dimensions of achievements are measured. This property deserves some comment. In [Alkire and Foster \(2011a\)](#) it is argued that data describing capabilities and functionings in the spirit of Sen’s Multidimensional Human Index, are ordinal in nature. They therefore may lack a basis for comparisons across dimensions. This, of course, is a challenge for Multidimensional Poverty measurement. In the above quoted paper, indeed, only one kind of measure is shown to be ordinal in that sense (the M^0 measure in their parlance) while the others don’t. At the same time, this ordinal measure fails to satisfy a number of other properties. In particular, it cannot capture the intensity of poverty — a failure that can be viewed as arising from its being a piecewise constant (hence discontinuous) measure. Here, we prove that coherent Poverty measures are ordinal in the following sense: If one multiplies any dimension by $\lambda > 0$ (both for achievements and for the poverty cut-off), then the set of poor is unaffected while the Index, P , is simply multiplied by λ . As a consequence, a normalized version of the index, Q , is independent of such changes in the dimensions’ unit.

(iii) it yields a criterion for “relative poverty” that depends upon the whole population under scrutiny;

(iv) the marginal rate of substitution among subjects or among dimensions is decreasing. The reduction in the deprivation⁵ of dimension k for poor individual i required to compensate an increase in the deprivation of dimension k for individual h is larger the higher the initial level of deprivation in i .

(v) As in [Villar et al. \(2010\)](#), it is multiplicatively decomposable by population subgroups (but it does not satisfy Subgroup Decomposability in the additive form given in [Bourguignon and Chakravarty \(2003\)](#)). This property says the following: if the population is partitioned into subgroups, the overall poverty index corresponds to the weighted average of subgroup poverty values, where the weights correspond to population shares.

(vi) In certain circumstances, we may have additional information that allows us to regard certain dimensions and/or certain subgroups of the population as meriting a greater relative weight than others. Each index can be adjusted so as to capture this kind of requirements. Of course, if one wishes so, it can as well be made symmetric among persons.

(vii) It verifies the transfer principle ([Villar et al. \(2010\)](#)): a reduction of size $\delta > 0$ in the deprivation with respect to dimension k of a poor person i who is worse off in this dimension than another poor person, j , more than compensates

⁵Recall that a person is said to be *deprived* in one dimension whenever her achievement falls below the cut-off or dimension-specific poverty line.

an increase of the same size, δ , in the deprivation of j , provided their relative positions remain unaltered.

(viii) Principle of population: a replica of the population does not change the poverty measure.

To the best of our knowledge, coherent poverty measures are the first examples of continuous and ordinal Multidimensional Poverty measure that are sensitive to inequality. To take but alternative examples, the measure M^0 introduced in [Alkire and Foster \(2011a\)](#) is ordinal but discontinuous and inequality-insensitive. On the other hand, the measures M^1 and M^2 are inequality-sensitive and continuous but no more ordinal.

The chapter is organized as follows. The next section provides the model and points out the link between the “utilitarian” standpoint and the geometric mean. Section 3 deals with the axiomatization of coherent multidimensional poverty indices. The last section provides the main properties of this family of indices.

2 Should we aggregate into multidimensional indices?

Consider now the Multidimensional Poverty Index (MPI) developed by [Alkire and Santos \(2010\)](#) for the 2010 Human Development Report ([UNDP \(2010\)](#)). They choose 10 variables for their MPI under the same three headings - health, education and living standards - as the UNDP’s Human Development Index (HDI). There are two variables for health (malnutrition, and child mortality), two for education (years of schooling and school enrollment), and six for deprivation in “living standards” (namely cooking with wood, charcoal or dung; not having a conventional toilet; lack of easy access to safe drinking water; no electricity; dirt, sand or dung flooring and not owning at least one of a radio, TV, telephone, bike or car). Poverty is measured separately in each of these 10 dimensions. The equally-weighted aggregate poverty measures for each of these three main headings are then weighted equally (one-third each) to form the composite index, also echoing the HDI. A household is identified as being poor if it is deprived across at least 30% of the weighted indicators. While the HDI uses aggregate country-level data, the [Alkire and Santos \(2010\)](#) MPI uses household-level data, which are then aggregated to the country level. [Alkire and Santos \(2010\)](#) construct their index for more than 100 countries.

[Alkire and Santos \(2010\)](#) (2010b, p.7) argue that their index goes beyond previous international measures of poverty to identify the poorest people and aspects in which they are deprived. Such information is vital to allocate resources where they are likely to be most effective.

Consider the following stylized example of a policy problem. Suppose that there are two dimensions of welfare, "income" and "access to services". Assume that an "income-poor" but "services-rich" household attaches a high value to extra income but a low value to extra services, while the opposite holds for an "income-rich" but "services-poor" household. There are two policy instruments, a transfer payment and service provision. The economy is divided into geographic areas (which could be countries) and a given area gets either the service or the transfer. We then calculate a composite index like the [Alkire and Santos \(2010\)](#) MPI based on survey data on incomes and access to services. There is bound to be a positive correlation between average income and service provision, but (nonetheless) some places have high income poverty but adequate services, while others have low income poverty but poor services. The policymaker then decides whether each area gets the transfer or the service. Plainly, the policymaker should not be using the aggregate MPI for this purpose, for then some income-poor but service-rich households will get even better services, while some income-rich but service poor households will get the transfer. The total impact on (multidimensional) poverty would be lower if one based the allocation on the MPI rather than the separate poverty measures - one for incomes and one for access to services. It is not the aggregate index that we need for this purpose but its components.

In certain emergency situations (such as on the battle field), treatment decisions often require prioritizing patients ("triage") and it appears that this is typically based on the probability of survival, which is a single index. But then one is not creating a "mashup index" since the variables and weights are entirely determined by their ability to predict that probability. There is nothing analogous to this probability in a MPI.

2.1 What are market prices good for?

[Ravallion \(2011\)](#): "One can distinguish two approaches to forming an aggregate poverty index. The first is to use prices (actual or imputed) to form a composite index for aggregate consumption, to be compared to a poverty line defined in the same space. Ideally this is not just consumption of market goods and services, but should include imputed values for non-market commodities. For market goods, either their market prices or appropriate shadow prices can be used. For non-market goods the missing "prices" will need to be assigned on a priori grounds or estimated. In practice, most poverty measures require imputations for missing prices, so this approach is a natural extension of prevailing practices. In principle we can broaden this approach to allow for non-commodity dimensions of welfare.

The space defined by all primary dimensions of welfare (including commodities) can be called the “attainment space” (though the term “achievements” is also used in the literature), and the aggregation can be called “attainment aggregation”. The weights on attainments can be called “prices”, understood to include imputed prices.”

The second approach measures poverty in each of the dimensions separately and then aggregates the dimension-specific “deprivations” into a composite index. Formal treatments of this approach can be found in Tsui (2002), Bourguignon and Chakravarty (2003), Duclos et al. (2006) and Alkire and Foster (2011b). The Alkire and Santos (2010) MPI is an example. We shall call this “deprivation aggregation.”

“taking the attainment-aggregation approach, the remaining challenges are all in applications, notably in estimating missing prices.”

The main argument in favor of the attainment-aggregation approach seems to be the following:

“For the attainment-aggregation approach, it is plain that the poverty measure’s MRS - the increment to z_1 needed to compensate for less of z_2 keeping the poverty measure constant - is simply the relative price, p_1/p_2 . As long as the poverty bundle is consistent with the choices made by someone living at the poverty line, the poverty orderings based on this approach will be consistent with consumer welfare, in the sense that if someone living at the poverty line becomes worse (better) off then measured poverty rises (falls). Under these conditions, the poverty line is the point on the consumer’s expenditure function (inverse of the indirect utility function) corresponding to the poverty level of utility. Then any exogenous welfare-reducing (increasing) change - such as due to a change in relative prices, or any other shift parameter of the individual utility function - will be poverty increasing (decreasing) for all standard poverty measures. Thus welfare consistency is assured with appropriate calibration.” (p. 12).

“The upshot of these observations is that aggregation across deprivations cannot in general yield poverty measures that are consistent with the welfare of someone living at the poverty line. This is because deprivation aggregation essentially ignores all implications for welfare measurement of consumer choice in a market economy. While those implications need not be decisive in welfare measurement, it is clearly worrying if the implicit trade-off between any two market goods built into a poverty measure differs markedly from the trade-off facing someone at the poverty line. When calibrated correctly, an

attainment-aggregation measure guarantees that poor people would accept the trade-offs built into the poverty measure.” (p. 13).

In other words, the strength of the attainment-aggregation procedure (which, in the framework of the present chapter, amounts to restricting poverty indices to the utilitarian one, weighted by market prices) would be that it allegedly enables to identify welfare-improving changes with poverty-reducing reforms. Which, in turn, guarantees that the poor themselves and the policymakers must agree on such changes/reforms. Of course, such a viewpoint faces a major empirical challenge, which consists in computing reasonable “shadow prices” for those services or social goods that are not marketed. Obviously, the author is perfectly aware of this difficulty. Let us nonetheless stress its depth. OECD’s arm’s length principle.

But there is a much deeper problem faced by this argument in favor of the attainment-aggregation procedure —a difficulty that would appear even if all achievements of interest were tradable in perfectly competitive markets. Are we so sure, indeed, that any exogenous change that reduces poverty indeed increases the welfare of each household (as measured by some implicit utility function whose MRS are given by p)?

Here are a number of objections:

1) First, changes must be infinitesimal for the argument to hold water. Any change outside the budget set of non-negligible size might end up at a point that makes the household *worse off* rather than better off in terms of welfare. Thus, to be convincing, the argument should describe what it concretely means, in terms of public policy, to put into practice infinitesimal increments of some attainments.

2) Second, the MRS are equal to the price ratios only for barter economies. As soon as money is introduced, there is a wedge induced by the short-term interest rate.

The upshot is that, in order to be able to infer any relationship between the slope of the poverty line and the MRS of the household, one needs to take into account the conditions prevailing on the credit market to which the household has access. Given the widespread use of microcredit nowadays, it would be hardly convincing to pretend that poor households are not affected, in some way or another, by the credit conditions.

3) Suppose, now, that we know what infinitesimal changes mean, and that we can dream up a barter economy where some policymaker would aim at fighting against poverty. Even then, the argument sketched above would not work, as a household is not a single person, in general. How do we know that it behaves on markets in the same way as would a single individual? In fact, not only we

do not have any evidence for that, but neoclassical micro-economics even teaches us that there is no hope, in general, for a household to behave in the same way as an individual does —unless the household were just made of a single person. This is the celebrated Sonnenschein-Mantel-Debreu theorem, which tells that the aggregate excess demand function of an economy with L marketed commodities can be any continuous and inward-pointing vector field on the (positive part of the) unit sphere of normalized prices, provided it is populated by at least L consumers. This implies that, even when observed prices (p_1, p_2) were supposed to be equilibrium prices that clear the market for attainments 1 and 2, these prices could hardly be interpreted as being the MRS of any household made up with at least 2 persons.

4) The complications do not stop there. As pointed out by Keen (p. 50), taking seriously the micro-economic theory of supply curves implies that the budget “line” faced by any consumer, in fact, *must be a curve*. When a household purchases a first unit of some attainment, it pays some given price, p_1 . But if its demand for that attainment increases, then, due to decreasing marginal productivity, the price will rise up. As stated by Keen, “the budget *curve* might start at the same point as the line did (with an isolated consumer) when consumption is zero, but it must slope more steeply than the line as the consumer’s consumption rises above zero” (p 52). Of course, if returns to scale of the production sector are not decreasing but rather increasing, the problem does not disappear: the budget “line” is still a curve but, now, in addition, the budget set is no more convex. Since, in general, we have good reasons to believe that manufactured commodities exhibit increasing returns to scale, this means that, in general, the poverty line should be a hyperbola as shown in Figure 1. This is exactly the situation of which the next section will provide the theoretical grounds.

3 The model

Let $\mathbf{N} = \{1, \dots, N\}$ denote a society consisting of N individuals and let $\mathbf{K} = \{1, \dots, K\}$ be a set of dimensions.

A social state is a matrix, $y_{ij} \in \mathcal{M}_{N \times K}(\mathbb{R}_{++})$, with N rows, one for each individual, and K columns, one for each dimension. The entry $y_{ij} \in \mathbb{R}_{++}$ describes the value of variable j for individual i . Since we are mostly going to deal with ordinal Poverty measures, there is little loss of generality in imposing from the outset that all variables be strictly positive.⁶

⁶Of course, we cannot claim that this entails no loss of generality. If some achievement is “naturally” given as being (strictly) positive, then, whether it is scored $\varepsilon > 0$ or $\lambda\varepsilon > 0$ does not

A vector $\mathbf{z} \in \mathbb{R}_{++}^K$ of reference values describes the poverty thresholds for all dimensions. How these thresholds are fixed is definitely an important issue, but we leave it aside here and take \mathbf{z} as given. Those reference values may have been fixed externally (absolute poverty lines) or may depend on the data of the social state matrix itself (relative poverty lines, such as a fraction of the median or the mean value). The units in which achievements are measured are chosen so that $\mathbf{z} \gg \mathbf{1} := (1, \dots, 1) \in \mathbb{R}_{++}^{1 \times K}$.⁷ In the particular case where all individuals are attributed the same cut-offs, then $\mathbf{z} = (z, \dots, z)$, for some reference vector $z \in \mathbb{R}_{++}^K$. In this case, if $y_i < z$, then *individual* i can be said to be poor (the converse being false, in general).

We denote by $N_p(y; \mathbf{z}) \subset \mathbf{N}$ the set of poor that results from a social state matrix y and a vector z of reference values. The number of poor people is $n_p(y; \mathbf{z}) := |N_p(y; \mathbf{z})|$. As we shall see, $N_p(y; \mathbf{z})$ (hence $n_p(y; \mathbf{z})$) will be determined endogenously by the choice of a coherent multidimensional poverty index.

3.1 The utilitarian index

A *poverty index* is a mapping $P : \mathbb{R}_{++}^{KN} \rightarrow \mathbb{R}_+$. We begin with three axioms that unambiguously characterize the “utilitarian” Poverty index.

The first one, anonymity, says that all agents and all dimensions are equally important:

Anonymity. Let $x \in \mathbb{R}_{++}^{KN}$ and let $\pi \in \mathcal{S}_{KN}$ denote a permutation over its components $\{1, \dots, KN\}$. Then,

$$P(s) = P(\pi(s))$$

The second Axiom implies that P reduces to the identity mapping on the diagonal of \mathbb{R}_+^{KN} :

Normalization. Let $s \in \mathbb{R}_{++}^{KN}$ be such that $s_i = a \forall i = \{1, \dots, KN\}$. Then,

$$P(s) = a$$

matter. However, if the original achievement was 0, then, replacing it by $\varepsilon > 0$ might have an effect on the poverty measure. The same problem arises, e.g., in Seth (2013). Provided the restriction of achievements to strictly positive numbers is accepted, coherent poverty indices can be applied to cardinal measures.

⁷Given two vectors x, y , $x \ll y$ if the strict inequality holds coordinate-wise.

The last property requires that the difference between the new and the initial values of P when subject i 's achievement relative to dimension j changes from s_{ij} to t_{ij} , be a monotone function of the difference between s_{ij} and t_{ij} .

Difference Monotonicity Let $s, t \in \mathbb{R}_+^{KN}$ be such that $\exists i \neq j$ for which $s_{hq} = t_{hq} \forall (h, q) \neq (i, j)$ for some increasing function $g_{ij} : \mathbb{R}_+ \rightarrow \mathbb{R}$. Since $g_{ij}(0) = 0$, it follows that $g_{ij}(x) \geq 0$ if, and only if, $x \geq 0$. Then,

$$P(s) - P(t) = g_{ij}(s_{ij} - t_{ij})$$

Proposition 3.1 *An index $P(\cdot)$ satisfies Anonymity, Normalization and Difference Monotonicity if, and only if, it takes the form*

$$P(s) = \frac{1}{KN} \sum_{i \in N, j \in K} s_{ij}.$$

This index corresponds to the familiar arithmetic average, and we denote it P_U .

Proof See subsection 6.1 of the Appendix.

3.2 The geometric average

The link between the (fairly classical) index, P_U , and the geometric average is given by the following transformation. Consider the following Poverty index, $G(\cdot)$, defined on \mathbb{R}_{++}^{KN} :

$$G(x) := \left[\prod_{k,h} x_{k,h} \right]^{\frac{1}{kn}}. \quad (2.1)$$

Given a vector, $x \in \mathbb{R}_{++}^{KN}$, let us denote by $\ln x$ the vector whose coordinates are $\ln x_{k,h}$, every h, k . Obviously,

$$G(x) = \exp P_U(\ln x). \quad (2.2)$$

From this very simple remark, one deduces the axiomatization provided by [Villar et al. \(2010\)](#) that fully characterizes the geometric average as a Poverty index: Indeed, it follows from (2.2) that G must verify the anonymity and normalization Axioms together with the following ratio monotonicity:

Ratio Monotonicity Let $s, t \in \mathbb{R}_{++}^{KN}$ be such that $s_{hq} = t_{hq} \forall (h, q) \neq (i, j)$. Then,

$$\frac{G(s)}{G(t)} = g_{ij}\left(\frac{s_{ij}}{t_{ij}}\right),$$

for some increasing function $g_{ij} : \mathbb{R}_{++} \rightarrow \mathbb{R}$. Since $g_{ij}(1) = 1$, it follows that $g_{ij}(x) \geq 1$ if, and only if, $x \geq 1$.

In other words, the geometric (or Cobb-Douglas) average may be viewed as the outcome of the Utilitarian rule after the transformation given by (2.2). The next section shows that $G(\cdot)$ is but one extremal point of a whole family of Poverty indices that can be constructed in quite a similar way. The opposite extremal index of this family turns out to be the Maximin rule.

4 Coherent Poverty Indices

In order to define a coherent Poverty index, we need to impose some axioms on the mapping $P(\cdot)$. For this purpose, we define a *poverty exit set*, $\mathcal{E} \subset \mathbb{R}_{++}^{KN}$. A population belongs to \mathcal{E} whenever it is *not* poor.

4.1 Axioms for \mathcal{E} .

In order to build an *ordinal* index (i.e., an index that does not depend upon the choice of units in which dimensions are measured), we consider only normalized achievements. That is, if $x \in \mathbb{R}_{++}^{KN}$ is a given social state, we shall deal with $\mathbf{x} := (x_{hk}/z_{hk})_{h,k}$. For the sake of clarity, achievements, $x \in \mathbb{R}_{++}^{KN}$, are said to be non-normalized. Let also $\mathbf{1} := (1, \dots, 1)$ denote the unit vector in \mathbb{R}^{KN} .

Axiom 1. $\mathbf{1} + \mathbb{R}_+^{KN} \subset \mathcal{E}$.

Next, consider a population where *all* its individuals have non-normalized achievements that are *all* below the thresholds given by \mathbf{z} , and at least one subject has at least one achievement strictly below the corresponding threshold. Again, such a population should be considered as poor. This is the content of the next Axiom.⁸

Axiom 2. $\mathcal{E} \cap (\mathbf{1} + \mathbb{R}_-^{KN}) = \{\mathbf{1}\}$.

We now define a “box product” that will be helpful for our purposes. For every $x, y \in \mathbb{R}_{++}^{KN}$, let $x \square y$ denote the vector in \mathbb{R}_{++}^{KN} whose coordinates are $x_{k,h}z_{k,h}$. Consequently, $\mathbf{1}/y$ denotes the (unique) vector such that $y \square \mathbf{1}/y = \mathbf{1}$, while $x \square \lambda$

⁸We could replace Axiom 2 by the weaker $\mathcal{E} \cap (\mathbf{1} + \mathbb{R}_-^{KN}) = \emptyset$. But the remaining axioms would nevertheless strengthen it into Axiom 2 in most cases of interest for practical purposes.

is the vector with coordinates $x_{k,h}^\lambda$, for any $\lambda \in \mathbb{R}$. For the sake of brevity, we sometimes write x^λ —instead of $x^{\square\lambda}$ — whenever the meaning is clear from the context. The “box product” can be interpreted as formalizing a change in the achievements of the population under scrutiny. For instance, $x^{\square\mathbf{1}} = x$ stands for “no change”. By contrast, $x^{\square\mathbf{0}} = \mathbf{0}$ represents a radical depletion of the population, etc. For an arbitrary vector, $y \in \mathbb{R}_{++}^{KN}$, $x^{\square}y$ will represent a change that may be dimension- and individual-dependent. Observe that $G(\cdot)$, defined by (2.1), is a group morphism from $(\mathbb{R}_{++}^{KN}, \square)$ to (\mathbb{R}_{++}, \cdot) , that is: $G(x^{\square}y) = G(x)G(y)$. Moreover, $G(x^\lambda) = G^\lambda(x)$, $\forall x \in \mathbb{R}_{++}^{KN}, \lambda \geq 0$.

A set $\mathcal{F} \subset \mathbb{R}_{++}^{KN}$ is *multiplicatively convex* whenever, as soon as $x, y \in \mathcal{F}$, then $x^\alpha \square y^{1-\alpha} \in \mathcal{F} \forall \alpha \in [0, 1]$.

Axiom 3. The Poverty exit set, \mathcal{E} , is multiplicatively convex

Axiom 1 says that, if *all* the individuals of a population exhibit all their achievements weakly above the threshold (i.e., if $\mathbf{x} \geq \mathbf{1}$), this population is not poor. Conversely, if $\mathbf{x} \ll \mathbf{1}$, Axiom 2 implies that the population is poor. Ambiguity remains only whenever *some* individuals exhibit *some* achievements above the threshold, and others, not. Axiom 3 deals with such ambiguous cases. Suppose that a population, x , is not poor. Take $\lambda > 0$ and consider the auxiliary population given by x^λ . Axiom 4 says that this new population should not be considered as poor neither. Clearly, if $x^{\square\mathbf{1}/z} \geq \mathbf{1}$ (resp. $x^{\square\mathbf{1}/z} < \mathbf{1}$), then $(x^\lambda)^{\square\mathbf{1}/z} \geq \mathbf{1}$ (resp. $< \mathbf{1}$), so that the auxiliary population turns out, indeed, not to be poor (resp. to be poor). What the next Axiom says is that this property should not hold only for the extreme cases envisaged by Axioms 1 and 2 but also for the “intermediary” cases.

A set $\mathcal{F} \subset \mathbb{R}_{++}^{KN}$ is a *multiplicative cone* whenever, as soon as $x \in \mathcal{F}$, then $x^\lambda \in \mathcal{F}$ for any $\lambda \geq 0$.

Axiom 4. The Poverty exit set, \mathcal{E} , is a multiplicative cone.

Examples The two following sets verify Axioms 1 to 4.

a) The “**utilitarian** case”. Consider

$$\mathcal{E} := \{\mathbf{x} \in \mathbb{R}_{++}^{KN} \mid G(\mathbf{x}) \geq G(\mathbf{1})\},$$

\mathcal{E} is the upper-set of the hyperbola $\{\mathbf{x} : G(\mathbf{x}) = 1\}$, and is closed and (both additively⁹ and multiplicatively) convex.

b) The “**Rawlsian** case”. Consider

$$\mathcal{E} := \{\mathbf{x} \geq \mathbf{1}\},$$

⁹I.e., in the usual sense borrowed from convex analysis.

\mathcal{E} is closed and is both an affine (additively) convex cone and a multiplicative cone.

Although it is not necessary for the core of our theory, the next Axiom will prove handfult.

Axiom 5. \mathcal{E} verifies the following Anonymity property: Let $x = (x_1, \dots, x_n) \in \mathbb{R}_{++}^{KN}$ and $\sigma(x) := (x_{\sigma(1)}, \dots, x_{\sigma(N)}) \in \mathbb{R}_{++}^{KN}$ the vector obtained after having swapped its individuals with the permutation $\sigma \in \mathcal{S}_N$. Then,

$$\mathbf{x} \in \mathcal{E} \iff \sigma(\mathbf{x}) \in \mathcal{E} \quad \forall \sigma \in \mathcal{S}_N.$$

4.2 Axioms for P .

Given a set \mathcal{E} , the Poverty index, $P_{\mathcal{E}}$, is defined as a measure of the minimal additional “achievements” that have to be added to a given distribution so that the population can be considered as non-poor, i.e., so that the resulting distribution belongs to \mathcal{E} . Obviously, $P_{\mathcal{E}}$ will heavily depend upon the choice of \mathcal{E} . And it is plain from the previous subsection that there are countless possible poverty exit sets. This is why the axiomatic studied here only defines a *family* of poverty indices, each index being identified through its corresponding poverty exit set.

Given \mathcal{E} , the mapping $P_{\mathcal{E}}(\cdot)$ is defined as:

$$P_{\mathcal{E}}(\mathbf{x}) := \inf\{\tau \in \mathbb{R} \mid \mathbf{x} \square \mathbf{z}^{\tau} \in \mathcal{E}\}. \quad (2.3)$$

Axiom 1 implies $P_{\mathcal{E}}(\mathbf{1}) = 0$, and Axiom 2, $\lim_{x \rightarrow 0} P(\mathbf{x}) = +\infty$. Conversely, given a Poverty exit index, $P(\cdot)$, one defines the Poverty exit set, \mathcal{E}_P , as

$$\mathcal{E}_P := \{\mathbf{x} \in \mathbb{R}_{++}^{KN} \mid P(\mathbf{x}) \leq 0\}. \quad (2.4)$$

We now state several properties for P . As we shall see, they can be deduced from Axioms 1-4 on \mathcal{E} via (2.3). Conversely, Axioms 1-4 can be deduced from the following properties of P , via (2.4).

AXIOM HI (HOMOTHETIC INVARIANCE) $\forall \mathbf{x} \in \mathbb{R}_{++}^{KN}, \alpha \in \mathbb{R}, P(\mathbf{x} \square \mathbf{z}^{\alpha}) = P(\mathbf{x}) - \alpha$.

A consequence of Axiom HI is that $P(\mathbf{x} \square \mathbf{z}^{P(\mathbf{x})}) = 0$ —which is consistent with (2.3). It follows that

$$\forall \mathbf{x}, \mathbf{x} \square \mathbf{z}^{P(\mathbf{x})} \in \mathcal{E}. \quad (2.5)$$

AXIOM S (SUBMULTIPLICATIVITY) $\forall \mathbf{x}, \mathbf{y}, P(\mathbf{x} \square \mathbf{y}) \leq P(\mathbf{x}) + P(\mathbf{y})$.

Axiom S can be interpreted as follows: Since x and y are vectors of the same dimension, they correspond to populations of the same size. Averaging (in the multiplicative sense) two populations does not magnify the extent of poverty (i.e., the share of the poor within the global population), nor its intensity (i.e., the individual deprivation suffered from each individual) above the sum of the indices of the subpopulations. Hence, this axiom is a weak version of the subgroup additive decomposability applied to populations of equal size.

AXIOM PH (POSITIVE HOMOGENEITY): $\forall \mathbf{x} \in \mathbb{R}_{++}^{KN}, \forall \lambda \geq 0, P(\mathbf{x}^\lambda) \leq \lambda P(\mathbf{x})$.

Axiom S implies that $P(\mathbf{x}^n) \leq nP(\mathbf{x})$ for every integer n . Axiom PH extends this property to any nonnegative real number.

AXIOM M (MONOTONICITY): $P(\mathbf{x}) \leq P(\mathbf{y}) \forall \mathbf{y} \leq \mathbf{x}$.

AXIOM NT (NON-TRIVIALITY): $P(x) > 0 \forall x < \mathbf{z}$ (where the last inequality means that $x \leq 0$ and $x \neq 0$).

By analogy from Artzner et al. (1999), a Poverty index that satisfies Axioms HI, S, PH, M and NT is said *coherent*.

Quite similarly to the anonymity axiom for \mathcal{E} , the next one is not needed for the characterization of coherent poverty measures, but will prove useful.

AXIOM A (ANONYMITY): Let $\mathbf{x} = (x_1, \dots, x_n) \in \mathbb{R}_{++}^{KN}$ and a permutation $\sigma \in \mathcal{S}_n$. Then, $P(\mathbf{x}) = P(\sigma(\mathbf{x}))$.

Proposition 4.1 (i) If a Poverty index, $P(\cdot)$, is coherent, then its Poverty exit set, \mathcal{E}_P , defined by 2.4, verifies Axioms 1-4 and is closed. Moreover, $P(\cdot) = P_{\mathcal{E}_P}(\cdot)$.

(ii) Conversely, if a set \mathcal{F} satisfies Axioms 1-4, then $P_{\mathcal{F}}$ is coherent, and

$$\mathcal{E}_{P_{\mathcal{F}}} = \overline{\mathcal{F}}.^{10}$$

(iii) \mathcal{E} verifies the Anonymity axiom if, and only if, $P(\cdot)$ does.

Proof See subsection 6.2 in the Appendix.

¹⁰ $\overline{\mathcal{F}}$ is the topological closure of \mathcal{F} .

5 Properties of coherent multidimensional poverty measures

5.1 A representation theorem and ordinality

We now provide a full characterization of the whole family of coherent Poverty exit indices. For this purpose, let us define a weighted geometric average. Given any vector in the unit simplex, $\pi \in \Delta_+^{KN} := \{p \in \mathbb{R}_+^{KN} \mid \sum_{k,h} p_{k,h} = 1\}$, the π -geometric average, $G^\pi(\cdot)$, is defined by:

$$G^\pi(x) := \prod_{k,h} x_{kh}^{\pi_{k,h}}.$$

Proposition 5.1 *The index P is coherent if, and only if, there exists a family, $\mathcal{P} \subset \Delta_+^{KN}$, of weight vectors, such that*

$$P(x) = -\inf \left\{ \frac{\ln(G^\pi(x))}{\ln(G^\pi(z))} \mid \pi \in \mathcal{P} \right\}.$$

Proof The “if” part is immediate. The “only if” part can be deduced from Proposition 2.1 in [Huber and Ronchetti \(2009\)](#), and can be stated as a consequence of the bipolar theorem in linear duality theory. Consider the set

$$C := \{x \in \mathbb{R}^{KN} \mid x_{hk} = \ln(y_{hk}) \text{ for some } y \in \mathcal{E}\}.$$

It follows from Axiom 3 and 4 together with the closedness of \mathcal{E} that C is a convex and closed cone in \mathbb{R}^{KN} . Thus, its a polar cone.

$$C^\circ := \{\alpha \in \mathbb{R}_+^{KN} \mid \sum_{hk} \alpha_{hk} x_{hk} \geq 0 \forall x \in C\}$$

is also a convex and closed cone in \mathbb{R}_+^{KN} . The bipolar theorem implies that

$$C = \{x \in \mathbb{R}^{KN} \mid \sum_{h,k} \pi_{hk} x_{hk} \geq 0 \forall \pi \in \mathcal{P}\},$$

where $\mathcal{P} := \Delta_+^{KN} \cap C^\circ$. We deduce from (2.5) that $\ln x + P(x) \ln z \in C$, for every $x \in \mathbb{R}_{++}^{KN}$. Thus, $\forall \pi \in \mathcal{P}$, $\sum_{h,k} \pi_{hk} (\ln x_{hk} + P(x) \ln z_{hk}) \geq 0$. Therefore,

$$P(x) \sum_{h,k} \pi_{h,k} \ln z_{hk} \geq - \sum_{h,k} \pi_{hk} \ln x_{hk} \quad \forall \pi \in \mathcal{P}.$$

Hence,

$$P(\mathbf{x}) \geq \sup_{\pi} -\frac{\ln\left(\prod_{hk} \mathbf{x}_{hk}^{\pi_{hk}}\right)}{\ln\left(\prod_{hk} \mathbf{z}_{hk}^{\pi_{hk}}\right)} = -\inf\left\{\frac{\ln(G^{\pi}(\mathbf{x}))}{\ln(G^{\pi}(\mathbf{z}))} \mid \pi \in \mathcal{P}\right\}.$$

Conversely, we deduce from Axiom 2 that $\ln \mathbf{x} + P(\mathbf{x}) \ln \mathbf{z} + \ln \varepsilon \notin C$ for every $\mathbf{x} \in \mathbb{R}_{++}^{KN}$ and every $0 \ll \varepsilon \ll 1$. Therefore, $\forall \pi \in \mathcal{P}$, $\sum_{h,k} \pi_{hk} (\ln \mathbf{x}_{hk} + P(\mathbf{x}) \ln \mathbf{z}_{hk} + \ln \varepsilon) < 0$. It follows that

$$P(\mathbf{x} \square \varepsilon) < -\inf\left\{\frac{\ln(G^{\pi}(\mathbf{x}))}{\ln(G^{\pi}(\mathbf{z}))} \mid \pi \in \mathcal{P}\right\}.$$

The equality follows by continuity of $P(\cdot)$.

Examples

- a) The “utilitarian case” corresponds to uniform weights: $\mathcal{P} = \{(1/KN, \dots, 1/KN)\}$.
- b) The “Rawlsian” case corresponds to $\mathcal{P} = \Delta_+^{KN}$.

The next figure provides an illustration of the typical geometry of \mathcal{E} .

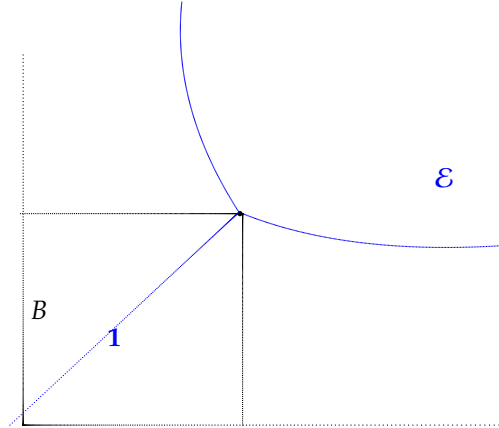


Fig 1. A piecewise smooth poverty exit set

Observe that, in general, the frontier of the set \mathcal{E} need not be smooth, as there is typically a kink at $\mathbf{1}$. The “utilitarian” case corresponds to the situation where the two branches of hyperbola coincide with the hypercurve: $\prod_{h,k} \mathbf{x}_{h,k} = 1$. It is the unique case where the boundary of \mathcal{E} is a smooth submanifold. The larger the set \mathcal{P} , the smaller the subset \mathcal{E} . Finally, the Rawlsian case corresponds with the situation where \mathcal{E} coincides with the affine nonnegative orthant.

$$\mathcal{E} = \mathbf{1} + \mathbb{R}_+^{KN}.$$

Notice that weights in \mathcal{P} can differ both across individuals and dimensions. When P (or, equivalently, \mathcal{E}) verifies Anonymity, the set of weights, \mathcal{P} , reduces to

weights over dimensions. The weighted geometric average now becomes:

$$G^{\hat{\pi}}(x) := \prod_{k,h} x_{kh}^{\hat{\pi}_k} \quad \forall \hat{\pi} \in \hat{\mathcal{P}} \subset \Delta_+^K.$$

Corollary 5.2 *The index P is coherent and anonymous if, and only if, there exists a family, $\hat{\mathcal{P}} \subset \Delta_+^K$, of weights over dimensions such that*

$$P(\mathbf{x}) = -\inf \left\{ \frac{\ln(G^\pi(\mathbf{x}))}{\ln(G^\pi(\mathbf{z}))} \mid \pi \in \hat{\mathcal{P}} \right\}.$$

Thanks to Theorem 5.1, whether it is anonymous or not, a coherent index P can also easily be shown to be *ordinal* in the following sense.

Ordinality. A measure, Q , is said to be ordinal if the following holds. Given some $N \times K$ -matrix $\Lambda = (\lambda_{ij}) \in \mathcal{M}_{N \times K \times K}(\mathbb{R}_{++})$, given also a social status matrix $y \in \mathcal{M}_{N \times K}(\mathbb{R}_{++})$, and a cut-off vector, $\mathbf{z} \in \mathbb{R}_{++}^{KN}$, there exists some $\lambda \in \mathbb{R}$ which depends only upon Λ , such that:

$$Q(y; \mathbf{z}) + \lambda = Q(y \square \Lambda; \mathbf{z} \star \Lambda),$$

where $y \square \Lambda$ is the $N \times K$ -matrix with entry $(y \square \Lambda)_{ij} := y_{ij} \Lambda_{ij}$, and $\mathbf{z} \star \Lambda$ is the NK -vector with entry $(\mathbf{z} \star \Lambda)_{nk} := \mathbf{z}_{nk} \Lambda_{nk}$.

An example will easily illustrate how this abstract property solves several problems related to ordinal data. Consider the question: “Which kind of toilet facility does your household have?”, together with three possible answers:

- a. “Open defecation field”
- b. “Shared flush”
- c. “Private flush”

Of course, the metric between each one of these answers does not have any sensible meaning. To circumvent this issue, it suffices to capture this question through two dimensions, each of them accepting two answers, $\{a, b\}$ and $\{a, c\}$, each captured by two variables $\{\alpha, \beta\} \subset \mathbb{R}$ and $\{\alpha, \gamma\} \subset \mathbb{R}$ respectively, with $\alpha < \beta < \gamma$. Ordinality then ensures that the choice of (α, β, γ) does not matter.

Going back to coherent poverty measures, it is straightforward that, for any $x \in \mathbb{R}_{++}^{KN}$ and any Λ as above, $x\Lambda/\mathbf{z}\Lambda = x/\mathbf{z}$. Thus, as we only deal with normalized achievements, any Multidimensional Poverty Index is ordinal.

5.2 Who is poor?

In this subsection, we confine ourselves to the subfamily of anonymous coherent Poverty indices. Consequently, P is associated with a set, $\mathcal{P} \subset \Delta_+^k$, of K -dimensional vector of weights, $\pi = (\pi_k)_k$ –one for each dimension–, belonging to the unit simplex.

We are now in a position to provide an answer to the question: “who is poor”? Regarding this issue, two kinds of approach have been explored in the literature.¹¹ The “union” approach regards a person who is deprived in one dimension as being poor at the multidimensional level. This is usually acknowledged to be overly inclusive and lead to exaggerate estimates of poverty. By contrast, the “intersection” approach requires a person to be deprived in all dimensions before getting considered as poor. This is often considered too restricting, and may lead to untenable low estimates of poverty. We now show that the natural definition of a poor person that follows from the “coherent” approach leads to an endogenous determination that is always strictly less inclusive than the “union” approach and weakly more inclusive than the “intersection” approach. Therefore it lies somewhere between these two extremes, and in fact, it turns out that only the Rawlsian case coincides with the “intersection” viewpoint.

Two examples will help identify how the determination of poor persons occurs in the present setting. Consider the case where $N = 1$, i.e., the population consists of a single person. Then, clearly, this single person, i , will be poor whenever the population is so, i.e., when $P(\mathbf{x}_i) < 0$. Next, suppose that the population is made of n identical people. Again, each person will be poor if the population is so, i.e., if, and only if, $\prod_k x_i^{\pi_k} < \prod_k z_i^{\pi_k}$ for every $\pi \in \mathcal{P}$.¹²

It is this latter condition that we adopt as a definition. Indeed, a simple continuity argument explains why no other choice can be made: Take $0 \ll \varepsilon \ll 1$; one has $x \square \varepsilon$ poor and $G^\pi(\mathbf{x}) < 1$ for any π . However, $\lim_{\varepsilon \rightarrow 1} G^\pi(\mathbf{x}) = 1^-$. Thus, no population such that $G^\pi(\mathbf{x}) < 1$ can be considered as non-poor.

Given a coherent Poverty index, P , associated with a set $\mathcal{P} \subset \Delta_+^{KN}$ of weights, a person, i , is poor whenever

$$\prod_k x_{i,k}^{\pi_k} < \prod_k z_k^{\pi_k} \quad \forall \pi \in \mathcal{P}$$

or, equivalently, when

$$\sup_{\pi \in \mathcal{P}} G^\pi(\mathbf{x}_i) < 1.$$

¹¹See, e.g., Alkire and Foster (2011a) and Villar et al. (2010).

¹²Notice that, here, x is *not* normalized.

In the “utilitarian” case (where \mathcal{P} reduces to the uniform singleton), this definition coincides with the one introduced by Villar et al. (2010).

As an illustration, consider a society with two dimensions. The poor are all the individuals whose characteristics are located strictly below the two branches of hyperbola:

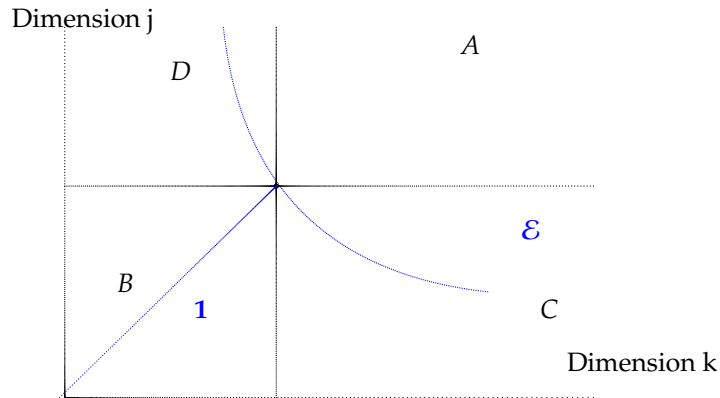


Fig 2. Who is poor?

The set \mathcal{E} is always larger than the one defined by the intersection approach, and is always contained in the one provided by the union approach. The Rawlsian case, here, coincides with the intersection approach.

5.3 Other properties

Here are the properties verified by coherent Poverty indices. When they are evident, proofs are left to the reader.

1. **MULTIPLICATIVE DECOMPOSABILITY:** Suppose that x_1 (resp. x_2) is a population of size n_1 (resp. n_2). Let us denote by $\langle x_1, x_2 \rangle$ the population of size $n = n_1 + n_2$, obtained by merging the first two. One has:

$$G^\pi(\langle x_1, x_2 \rangle) = \left[G^\pi(x_1) \right]^{\frac{n_1}{n}} \left[G^\pi(x_2) \right]^{\frac{n_2}{n}} \quad \forall \pi \in \mathcal{P},$$

so that

$$P\langle x_1, x_2 \rangle = P(x_1^{\frac{n_1}{n}} \square x_2^{\frac{n_2}{n}}).$$

2. The next property is a special case of multiplicative decomposability:

REPLICATION INVARIANCE: For any population, x ,

$$P\langle x, x \rangle = P(x).$$

3. SYMMETRY: If x is obtained from y by a permutation, then $P(x) = P(y)$.

4. PATH INDEPENDENCE: One can aggregate individual unidimensional values first across dimensions and then across agents, or vice versa, obtaining the same result.

5. In order to check the various monotonicity properties of coherent measures, let us recall that x is said to be obtained from y by

4. The next property asks that a reduction of size $\delta > 0$ in the deprivation with respect to dimension k of a poor person i who is worse off in this dimension than another poor person, j , more than compensates an increase of the same size, δ , in the deprivation of j , provided their relative positions remain unaltered. Formally, if $x_{jk} - x_{ik} \geq 2\delta$, $y_{ik} = x_{ik} + \delta$ and $y_{jk} = x_{jk} - \delta$, while $y_{h\ell} = x_{h\ell} \forall (h, \ell) \notin \{(i, k), (j, k)\}$.

TRANSFER PRINCIPLE. $P(\mathbf{y}) \leq P(\mathbf{x})$.

Indeed,

$$x_{ik}x_{jk} < (x_{ik} + \delta)(x_{jk} - \delta) = y_{ik}y_{jk}.$$

It follows that $[x_{ik}x_{jk}]^{\alpha_k} \leq [y_{ik}y_{jk}]^{\alpha_k}$, for every $\alpha_k \geq 0$. The conclusion follows.

Also observe that the geometric mean is a distribution sensitive measure that penalizes the dispersion of the individual values, relative to the arithmetic mean. In particular, for two distributions with identical mean values it assigns higher value of the intensity of the poverty to that in which the distribution of the y_{ij} values is more disperse.

5. The reduction in the deprivation of dimension k required to compensate an increase in the deprivation of dimension ℓ is smaller the smaller the initial level of achievement in ℓ . This feature simply follows from the DECREASING MARGINAL RATE OF SUBSTITUTION of the individual poverty index across achievement dimensions. Obviously, this property cannot be satisfied by any (weighted) arithmetic measure (Alkire and Foster (2011b)).

6. The POVERTY FOCUS requirement says that only changes within the population, $N_p(y; \mathbf{z})$, of poor affect P . This property is not fulfilled, in general, by coherent indices as these capture some kind of substitutability among poor and non-poor. However, as long as the cut-off, \mathbf{z} , is exogenous, one easy way to recover Poverty focus consists in censoring achievements as follows, before normalizing them.¹³

$$\tilde{x}_{ik} := \begin{cases} x_{ik} & \text{if } x_{ik} < \mathbf{z}_{ik} \\ \mathbf{z}_{ik} & \text{if } x_{ik} \geq \mathbf{z}_{ik}. \end{cases}$$

¹³This is standard practice, see Alkire and Foster (2011a).

7. The same censoring provides us with the DEPRIVATION FOCUS property, namely: only changes in dimensions where poor people are deprived affect P .

8. Following Kolm (1977) and Alkire and Foster (2011a), we can check how much a coherent poverty index, P , is sensitive to inequality in the distribution of achievements and deprivations. There are several ways to do this. One way consists in considering mean-preserving spreads, i.e., transformations of a given population that increase the spreads of the achievements with respect to their arithmetic mean without affecting the mean itself. (Such transformations are the reversal of the change considered above for the Transfer principle.) An inequality-sensitive Index should be decreasing with respect to such transformations. Formally, an increase of size $\delta > 0$ in the deprivation with respect to dimension k of i should not compensate an decrease of the same size, δ , in the deprivation of j . Formally, if $x_{jk} - x_{ik} \geq 0$, $y_{ik} = x_{ik} - \delta$ and $y_{jk} = x_{jk} + \delta$, while $y_{h\ell} = x_{h\ell} \forall (h, \ell) \notin \{(i, k), (j, k)\}$, then, by the same argument as for the Transfer principle, we get:

MEAN-PRESERVING SPREAD SENSITIVITY $P(\mathbf{x}) < P(\mathbf{y})$.

9. Following Atkinson and Bourguignon (1982) and Alkire and Foster (2011a), we say that x is obtained from y by a *simple rearrangement among the poor* if the achievements of two poor persons, i and j , have been reallocated so that, for each dimension k :

$$(x_{ik}, x_{jk}) = (y_{jk}, y_{ik}) \quad \text{or} \quad (x_{ik}, x_{jk}) = (y_{ik}, y_{jk}),$$

while the achievements of anyone else remain untouched. If, in addition, y_i and y_j are comparable but x_i and x_j are not, then x is said to be obtained from y by an *association decreasing rearrangement among the poor*. Reducing inequality this way does trivially decrease any coherent multidimensional Poverty Index:

$$P(\mathbf{y}) \leq P(\mathbf{x}).$$

This property is called WEAK ARRANGEMENT.

10. Another way to test the sensitivity towards inequality of an Index consists in averaging the achievement vectors, y_i and y_j of two poor persons, i and j in such a way that i now exhibits $x_i := (1 - \lambda)y_i + \lambda y_j$ (with $\lambda \in (0, 1)$) and $x_j := \lambda y_i + (1 - \lambda)y_j$. The new population (x_i, x_j) is viewed as being unambiguously less unequal than the original one, (y_i, y_j) , which should result in a lower or equal value of the multidimensional poverty index. Here, we translate linear convex combinations in geometric combinations, so as to arrive at the following definition. We say that $x \in \mathcal{M}_{n \times k}(\mathbb{R}_{++})$ is obtained from $y \in \mathcal{M}_{n \times k}(\mathbb{R}_{++})$ by a

geometric averaging of achievements among the poor if, for every poor i , there exist weights $(\alpha_j)_{j \in N_p(y; \mathbf{z})} \in \Delta_+^{N_p(y; \mathbf{z})}$ such that

$$x_i = \prod_{j \in N_p(y; \mathbf{z})} y_j^{\alpha_j},$$

while non poor persons are not affected (i.e., $x_i = y_i$ for $i \notin N_p(y; \mathbf{z})$).

MULTIPLICATIVE WEAK TRANSFER. If x is obtained from y by a geometric averaging of achievements among the poor, then one should have $P(\mathbf{x}) \leq P(\mathbf{y})$.

However, this property is not satisfied by a coherent measure, in general. Consider, for example, a population, (a, b) , consisting in 2 persons and a single dimension (with $a < b < 1$). The population $(a^{1/3}b^{2/3}, b)$ is obtained from (a, b) by a geometric averaging of achievements among the poor, but:

$$G(a^{1/3}b^{2/3}, b) > G(a, b).$$

6 Appendix

6.1 Proof of Prop. 3.1

labelproof-utilitarian-prop

Proof Let $s \in \mathbb{R}_+^{KN}$. By difference monotonicity and normalization,

$$\begin{aligned} P(s_{11}, 0, \dots, 0) - P(0, \dots, 0) &= g_{11}(s_{11}) \\ P(s_{11}, s_{12}, \dots, 0) - P(s_{11}, 0, \dots, 0) &= g_{12}(s_{12}) \end{aligned}$$

so that

$$P(s) = P(0) + \sum_{i,j} g_{ij}(s_{ij}).$$

By anonymity, $g_{ij}(\cdot) = g(\cdot) \forall i, j$. The Normalization axiom yields: $P(0, \dots, 0) = 0$. Moreover,

$$P(a, \dots, a) = KNg(a) = a.$$

Therefore, $g(a) = \frac{a}{KN}$. The conclusion follows.

6.2 Proof of Prop. 4.1

Proof (i) 1) $P_{\mathcal{E}}(\mathbf{1}) = 0$ and Monotonicity imply that \mathcal{E} verifies Axiom 1.

2) If $\mathbf{x} \ll \mathbf{1}$, Monotonicity implies $P_{\mathcal{E}}(\mathbf{x}) \geq 0$. However, we can find $\alpha > 0$ such that $\mathbf{x} \square \mathbf{z}^\alpha \ll 0$, so that $P_{\mathcal{E}}(\mathbf{x} \square \mathbf{z}^\alpha) \geq 0$. HI then implies that $\alpha \leq 0$. Contradiction. Thus, \mathcal{E}_p verifies Axiom 2.

3) Axioms S and PH imply that \mathcal{E}_p is multiplicatively convex.

4) If $x \in \mathcal{E}_p$, one has: $P(x^\lambda) \leq \lambda P(x) \leq 0$ for all $\lambda \geq 1$. Consequently, \mathcal{E}_p is a multiplicative cone.

5) Axioms PH and S imply that the function $x \ni \mathbb{R}_{++}^{KN} \mapsto P(\exp(x))$ is convex, hence continuous. Consequently, $x \mapsto P(x)$ itself must be continuous, so that \mathcal{E}_p is closed.

(ii) 0) Axioms 2 and 3 ensure that $P_{\mathcal{F}}$ is well-defined.

1) $\inf\{\tau \in \mathbb{R} \mid \mathbf{x} \square \mathbf{z}^{\tau+\alpha} \in \mathcal{E}\} = \inf\{\tau \in \mathbb{R} \mid \mathbf{x} \square \mathbf{z}^\tau \in \mathcal{E}\} - \alpha$, which proves HI.

2) Suppose that $\mathbf{x} \square \mathbf{z}^\lambda$ and $\mathbf{y} \square \mathbf{z}^\beta$ both belong to \mathcal{E} . Axiom 3 implies that $(\mathbf{x} \square \mathbf{z}^\lambda)^{\frac{1}{\alpha}}$ and $(\mathbf{y} \square \mathbf{z}^\beta)^{\frac{1}{1-\alpha}}$ also belong to \mathcal{E} for every $\alpha \in [0, 1)$. Axiom 2 then implies that $(\mathbf{x} \square \mathbf{y}) \square \mathbf{z}^{\alpha+\beta} = (\mathbf{x} \square \mathbf{z}^\lambda) \square (\mathbf{y} \square \mathbf{z}^\beta) \in \mathcal{E}$. This proves the multiplicative convexity.

3) Suppose $\mathbf{x} \leq \mathbf{y}$ and $\mathbf{x} \square \mathbf{z}^\lambda \in \mathcal{E}$. Then, $\mathbf{y} \square \mathbf{z}^\lambda \geq \mathbf{x} \square \mathbf{z}^\lambda$, so that, by Axiom 1, $\mathbf{y} \square \mathbf{z}^\lambda \in \mathcal{E}$. The monotonicity of P follows.

4) If $m \geq P_{\mathcal{E}}(\mathbf{x})$, then, $\mathbf{x} \square \mathbf{z}^m \in \mathcal{E}$, hence, $\forall \lambda > 0$, $\mathbf{x}^\lambda \square \mathbf{z}^{\lambda m} = (\mathbf{x} \square \mathbf{z}^m)^\lambda \in \mathcal{E}$. Therefore, $P_{\mathcal{E}}(\mathbf{x}^\lambda) \leq \lambda m$.

5) $\forall \mathbf{x} \in \mathcal{F}$, $P(\mathbf{x}) \leq 0$. Thus, $\mathcal{F} \subset \mathcal{E}_{P_{\mathcal{F}}}$.

CHAPTER 3

Relational Capability Index 2.0

1 Introduction

Relational Capabilities, as introduced by [Giraud et al. \(2013\)](#) aims to introduce social capital and social inclusion in the capabilities paradigm. This chapter presents RCI 2.0, an alternative version of the Relational Capability Index (RCI). It is tailored for long-run monitoring of a country's performance and cross-country comparison. It gives due consideration to the critics on aggregation methods that applies to multidimensional development indicators or 'composite' indexes. For the first time, we use the Gallup World Poll database. The richness of the database allows disintegrating the RCI 2.0 into different groups: rural vs. urban, by gender, and by income levels - across the world - decoupling the possibility of analysis. Our results verify second order stochastic dominance across all the aforementioned groups when weighted by population size. We also find RCI 2.0 to be strongly correlated to the Human Development Index and income levels in our sample of countries.

This chapter draws upon [Giraud et al. \(2013\)](#) to provide an alternative indicator, time and space comparable, available for a larger set of countries and disintegrated by region (urban vs. rural), gender (male vs female) and income levels. It is conceived to facilitate direct comparisons with the Human Development Index (HDI) and other multidimensional indexes. This version, RCI 2.0, takes stock of several critics addressed towards multidimensional human development indicators which we will discuss in the following sections.

The capability approach, popularized by Sen ([Sen \(1976\)](#), [Sen \(1979a\)](#), [Sen \(1985\)](#), [Sen \(1989\)](#)), along with others ([Alkire \(2005\)](#), [Nussbaum \(1988\)](#), [Robeyns \(2003\)](#)), has helped make great strides towards a holistic approach of human development, vision promoted by the United Nations Development Programme (UNDP) in their Human Development Reports (HDR) and synthesized in the Human Development Index (HDI). Nevertheless, Mahbub ul Haq's operationalization of Sen's framework¹ leaves behind the "political" dimensions of the capability approach, whether it is understood as "organization of the city" or "living together".

The choice of the three dimensions included in the HDI was a pragmatic answer to a strong set of constraints. Conceived as an advocacy tool to promote

¹ refer to [UNDP, ed \(1990\)](#)

people centered development²³, the HDI had to be simple and arrive at a consensus. The universal recognition of health, education and living conditions as core dimensions of human rights thus shaped its content, so as data availability and comparability. Since its inception and aware of its limitation, HDI's initiators underlined the importance of focusing on other human capabilities.

The Relational Capability Index aims at addressing one of HDI's missing dimension by focusing on the quality of relationships among people and on their level of relational empowerment. The conceptual and the philosophical roots of such a measurement concept, as well as its methodological challenges are discussed in [Giraud et al. \(2013\)](#).

To put it briefly, there are two central reasons for an approach towards constructing and monitoring a relational capability index. First, in the social capital approach, social interactions are instrumental, devoid of ethical considerations as social relationships are not seen as an accomplishment and a good in itself. In this accumulation perspective, social capital is considered an asset "against" other people, in a generalized competition framework. It primarily falls short of acknowledging a complete understanding of functionings and outcomes of social interconnection. Our view is to equate the cohesive ties or social connectedness with (creating) an environment that facilitates trust and cooperation among actors. The resulting environment has a proliferating effect, under certain conditions. Obviously, there are numerous situations which are quite ambiguous and require a deeper analysis, as it is the case with any public good.

Second and most importantly, our approach is entrenched into Sen's capability view ([Sen \(2009\)](#)) insofar as complementing Rawls' view ([Rawls \(1971\)](#)): the maximin is better applied to the capabilities and functionings than to the rights and resources of people - different people who have the same resources won't be equally able to transform their abilities into functionings. But the first two principles of Rawls apply: a fair society has to provide all its citizens with an equal set of freedoms and to make sure they will be equally entitled to develop themselves. Our index then builds on Nussbaum's perspective ([Walzer \(1983\)](#)) concerning the central capabilities: we defend the idea that a certain minimum threshold has to be provided for⁴. Finally, because exclusion is a relational concept, it cannot be measured only in absolute terms, thus, it also needs to be assessed in relative terms, as in [Laderchi et al. \(2003\)](#): exclusion may be due to structural

² see the discussion in one of the earlier papers by Anand, S. and Sen, A.K. (1993), Human Development Index: Methodology and Measurement. HDRO Occasional Paper. New York: UNDP.

³ Cf. [Desai \(1991\)](#)

⁴This is the original conception of the RCI - which is different from RCI 2.0, for reasons presented in the next section

characteristics of societies that lead to certain deprivations for some individuals and groups.

Our approach therefore puts social networks central to the conception of human development but, at the same time, acknowledges the diversity of personal and collective values and specific ends. Defending the view that inclusion is inseparable from social cohesion, we understand relational capabilities as a way towards more inclusive societies. Symmetrically, exclusion is to be regarded as the inverse of inclusion, hence, an expression of the failure of the development process. The three dimensions of the relational capabilities we distinguish are given below⁵:

1. To be integrated into networks;
2. To have specific attachments to others, including friendship and love;
3. To commit to a project within a group: which aims at serving a common good or a social interest, to take part in decision-making in a political society.

As a reminder, the following table provides information on the questions and thresholds (cutoffs) used to construct the original RCI.

⁵A detailed discussion be found in detail in [Renouard \(2011\)](#)

Table 3.1: Relational Capability Index: Dimensions and components

Dimensions	Components	Deprived if
Integration to network	Employment status Access to transport Access to telecommunications Access to information	No stable job with regular professional relations No means of transport Does not use a phone, a computer or the internet Does not obtain news from radio, television or newspaper
Private relations	No. of people in the HH Family ties Close friends Financial support Trust in the community	Lives alone No trust in family No close friends providing psychological & emotional support No financial support from relatives or acquaintances No trust in people the individual knows
Civic commitment	Membership Collective action Vote Solidarity Trust in others	No active membership in a group No participation in political action Does not vote No active membership in common interest group No trust in unknown people

2 Relational Capability Index 2.0 (RCI 2.0)

In this section, we discuss in detail the introduction of RCI 2.0. We put RCI 2.0 in the forefront of our multidimensional relational capabilities index in the perspective of cross-country comparison over time and disintegration.

In the literature, we found two ways of computing multidimensional indexes related to human development. The normative computation is the most frequently used (including the Multidimensional Poverty Index (MPI)). This major strand of literature has been particularly inspired by the [Alkire and Foster \(2011a\)](#) method. It consists of an arithmetical aggregation of poverty - or development dimensions - that are theoretically laid out. Each dimension is a weighted average of components, and is also weighted in the final computation of the index. For example in the case of the MPI, each component represents one aspect of deprivation. Naturally, identifying the poor first requires the definition of a poverty cutoff. In the MPI, a deprivation cut off is defined for each component. The index is then computed as an average (a certain mean) across dimensions. Second, a dimensional cutoff is defined: an individual is considered non-poor when his index is higher than a poverty line.

A data-driven index is the other direction. One might differentiate data driven indexes based on cardinal information from data-driven indexes based on ordinal information. The former are primarily built using data analysis processes, which can be distinguished into two subsets: descriptive and explanatory models. The latter is used to build a composite index implementing a ranking approach of several development indicators with a certain aggregation method.

The primary aim of our RCI is comparative; thus, we chose the normative approach. Three main reasons guided us towards moving away from the rich aggregation methods presented in the original paper⁶ to this version (RCI 2.0). First, within a deprivation approach, thresholds are necessary to identify who is "relationally poor". However, defining theoretically grounded cutoffs, consistent for every society, is a very ambitious objective, probably not achievable, or at least subject to debates that can hardly be conclusive. Second, deriving a micro vs. macro interpretability from the data in use in RCI 1.0 seems hazardous.

Finally, with RCI 2.0, we pledge for an imperfect substitutability of RCI dimensions and thus to reconsider the use of the arithmetic mean.

- arbitrary cutoffs
- micro/macro interpretability

⁶ refer to page 23 of [Giraud et al. \(2013\)](#) - Utilitarian, Geometric and Rawlsian

- (im)perfect substitutability

The choice of cutoffs renders comparability across countries difficult. Although at the inception of the indicator, the careful choice *if an individual is deprived in relational capability sense* seemed robust theoretically; in practice, data constraints exposed some of the shortcomings. For instance, the voting behavior component of the civic commitment dimension which is to represent the ability of an individual who can take control of his own political destiny. A deprivation of this right automatically induces a relational deprivation. Furthermore, there are also instances where a person even granted with this right chooses not to use it or is indifferent in the political participative processes of a democracy; this phenomenon is often referred to as disenchantment - Gauchet (2005). RCI wants to capture these two aspects and ascertain if a person is deprived in a relational capability sense. We noticed that in several countries of Latin America and in Belgium, for example, voting in the elections is mandatory, attracting prosecution of a certain form, otherwise. This is an antithesis to what RCI ideally wants to capture.

Another example is the "Lives alone" component of the private relations dimension. There is a demographic glitch where we find that in some countries a sizable proportion of youth are living alone during their higher education (say between 18 and 26 years of age). They are not necessarily deprived of emotional support, love and friendship. Hence, irrespective of the choice of cutoff, it tends to produce biased results. In other words, ranks some countries favorably (or otherwise) over other countries⁷.

The second criticism is concerned with the aggregation method of relational capabilities. The average of capabilities (and not deprivations) renders cross-country comparisons easy. We definitely do not intend to discount the deprivations approach of RCI⁸, but a macro versus micro interpretation is difficult to conceive, since it raises several questions given the non-linearity of links between income levels, inequality and social cohesion.

Lastly, the RCI 2.0 methodology addresses, and disagrees on the perfect substitutability property of an arithmetic mean. In the interest of holistic human existence as a developmental prerequisite, the three dimensions of relational capabilities index are the three central pillars of individual's capabilities, and hence, not freely substitutable. This is why a geometric mean which allows for such

⁷We want to remind that the data (dimensions or components) is defined as a proportion of people in a given country. This, in our opinion, does not override the cutoffs-free argument since this is independent of indicator constructor's choices.

⁸In our opinion, the deprivations approach is appropriate for microanalysis with individual or household level data.

aggregation is used at the dimensional level (D_k). However, we allow for the perfect substitutability at the component level (a_i). The latter is similar to the original RCI and we intend to preserve this approach.

Finally, the criticisms provided by Ravallion (2012) towards the HDI, also applying to other multidimensional indicators, doesn't affect RCI or RCI 2.0. Indeed, the supposed perverse trade-offs acknowledged by Ravallion, arise from the inclusion of a monetary measure as a dimension/component in the construction of a composite indicator, which is not the case in the RCI or RCI 2.0.

Nonetheless, as we'll notice in the data section, the information gathered through the Gallup word poll cannot possibly, at the moment, solve all the problems.

3 Data and results

3.1 Data

For the first time we use the *Gallup World Poll*. These surveys provide rich information on social, political and economic atmosphere of most of the countries over the world, making the World Poll, one of the most complete databases of households' perceptions available nowadays. Most importantly, the surveys are aimed at obtaining a public opinion, at a mass level, on political and policy-relevant questions. These are similar to the Global Barometers Surveys⁹ and World Values Surveys (WVS)¹⁰ or the European Values Study (EVS)¹¹, however, Gallup surveys are conducted on a yearly basis, whereas the previously mentioned databases are less frequently updated (e.g. every 5 years for the World Value Surveys).

Table 2 provides information on the questions or variables retained in the construction of the RCI 2.0. The information pertains to the year 2012, which is the latest available relevant year for our study.

We verify whether there is redundancy of information from the components used in the construction of RCI 2.0 with the 'new' Gallup world poll data. From the following two tables of correlation matrix (listwise and pairwise - refer to tables 3 and 4 respectively), we can confirm that the information each variable brings to the RCI 2.0 is rather unique i.e., the variables are weakly correlated with each other (pairwise correlation score ranging from 0.02 to 0.49). Hence, they are not substitutes or redundant.

⁹<http://www.jdsurvey.net/gbs/gbs.jsp>

¹⁰<http://www.worldvaluessurvey.org/wvs.jsp>

¹¹<http://www.europeanvaluesstudy.eu/>

Table 3.2: Relational Capability Index 2.0: Dimensions and components (Gallup)

Dimensions	Components	Capabilities
Integration to network	Employment status Access to transport Access to telecommunications Access to information	Stable job (full time for an employer, full time self-employed, and part time do not want full time) - missing - Max. of possessions by proportion of HH at the country level - Internet, land-line telephone or cellular phone Does your home have a television?
Private relations	No. of people in the HH Family ties Close friends (1) Close friends (2) Financial support Trust in the community	- missing - - missing - If you were in trouble, do you have relatives or friends you can count on to help? Are you satisfied with your city in - opportunities to meet people and make friends? In the last year, received money or goods AND sent financial help? In the last month, have you helped a stranger who needed help?
Civic commitment	Membership Collective action Vote Solidarity (1) Solidarity (2) Trust in others	- missing - In the past month, have you voiced opinion to an official? - missing - In the past month, have you volunteered your time? In the past month, have you donated money to a charity? Feel safe while walking in your area?

Note 1: The deprivation cutoffs are not present in RCI 2.0.

Note 2: The answers to the questions is available as the % of the population declaring as agreeing.

When we look closely at the correlation matrix tables, we see that there are three pairs of variables that are among the most correlated: the two solidarity variables (*solidarity (1)* and *solidarity (2)*); *solidarity (1)* and trust in the community variable (*trustcomm*); and *solidarity (2)* and *trustcomm* variable.

Table 3.3: Correlation matrix of all the components of RCI 2.0

	emp	tele	info	friends	support	finance	trustcomm	collective	solidarity1	solidarity2	safe
emp	1.00										
tele	-0.01	1.00									
info	-0.05	0.72	1.00								
friends	0.33	0.18	0.18	1.00							
support	0.32	0.41	0.46	0.43	1.00						
finance	-0.01	-0.32	-0.47	-0.15	-0.13	1.00					
trustcomm	0.02	-0.07	-0.10	0.18	0.09	0.41	1.00				
collective	0.21	0.02	0.00	0.33	0.38	0.31	0.49	1.00			
solidarity1	0.32	-0.01	-0.01	0.28	0.31	0.28	0.49	0.42	1.00		
solidarity2	0.35	0.23	0.24	0.45	0.41	0.11	0.34	0.38	0.56	1.00	
safe	0.13	0.18	0.14	0.26	0.10	-0.11	0.01	0.02	0.14	0.41	1.00

Table 3.4: Pairwise correlation matrix of all the components of RCI 2.0

	emp	tele	info	friends	support	finance	trustcomm	collective	solidarity1	solidarity2	safe
emp	1.00										
tele	0.10	1.00									
info	0.05	0.70	1.00								
friends	0.35	0.25	0.22	1.00							
support	0.31	0.45	0.48	0.42	1.00						
finance	-0.04	-0.28	-0.45	-0.15	-0.12	1.00					
trustcomm	0.03	-0.05	-0.13	0.22	0.16	0.39	1.00				
collective	0.20	0.03	-0.06	0.32	0.33	0.31	0.45	1.00			
solidarity1	0.26	0.03	0.04	0.22	0.31	0.27	0.49	0.44	1.00		
solidarity2	0.36	0.33	0.30	0.46	0.42	0.14	0.32	0.36	0.49	1.00	
safe	0.15	0.17	0.11	0.27	0.07	-0.07	0.01	0.02	0.08	0.37	1.00

We decide to keep these variables in the RCI 2.0 for two reasons: they are still moderately correlated (since a correlation score of 0.49, 0.49 and 0.32 respectively is not high enough to be eliminated¹²); and their inclusion compensates for the shortfall of variables in the private relations and civic commitment dimension of the RCI¹³.

¹²the correlations are significant at 95% level.

¹³A much stronger argument for the inclusion of all the three variables, provided improved specification, which is made possible by micro data would be to analyze the types of benevolent

3.2 Functional Form

As explained earlier, we construct RCI 2.0 using a geometric mean to introduce an imperfect sustainability between dimensions. Indeed, we defend a holistic approach, which implies that deficiency in one dimension (D_k) cannot be equally compensated by a gain in another. As illustrated, every dimension provides rather unique and insightful information.

At the component level (a_i), an arithmetic mean is applied:

$$D_k = \frac{1}{n} \sum_{i=1}^n a_i \quad (3.1)$$

For the RCI 2.0, the geometric mean of the dimensions (D_k) is then computed:

$$RCI\ 2.0 = \left(\prod_{k=1}^3 D_k \right)^{\frac{1}{3}} \quad (3.2)$$

3.3 Results - RCI 2.0

The RCI 2.0 scores and their components' country averages can be found in tables of the appendix of this chapter for the 124 countries without missing values, and the remaining countries wherever information is available. Table 5 below provides the descriptive statistics for the RCI 2.0 and dimensions.

Table 3.5: Descriptive statistics

Variable	Obs	Mean	p50	Std. Dev.	Min	Max
RCI 2.0	124	0.510	0.495	0.083	0.339	0.689
Integration to network (LC)	136	0.713	0.763	0.137	0.277	0.897
Private relations (PR)	129	0.607	0.600	0.084	0.458	0.815
Civic commitment (CV)	130	0.323	0.297	0.096	0.160	0.558

Scrutinizing the country ranking, the first result that stands out is that the two prominent North American nations i.e., United States of America and Canada rank in the top two of our RCI 2.0. Then, followed by eight European nations in the top 10 including The Netherlands, Norway, New Zealand, United Kingdom, Austria, Iceland, Ireland and Switzerland (in descending order). While the only Asian country, Thailand, almost made the cut in the top 10 (ranked at no. 11).

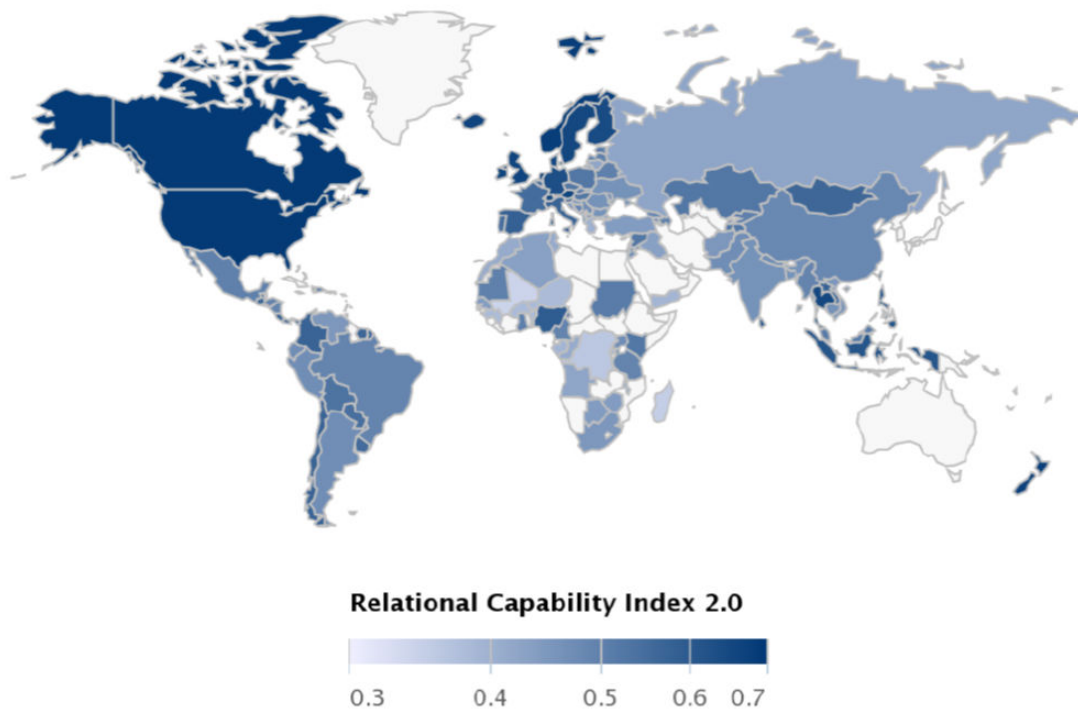
The bottom 10 nations belong to Sub-Saharan Africa with one exception of Yemen (ranked at 115). They include Gabon, Rwanda, Benin, Burkina Faso, Niger, Guinea, Democratic Republic of Congo, Madagascar and Mali (in that order - 116 to 124 rank).

individual or household: One who volunteers their time alone, one who participates in donating money to a charity alone, one who does both, and finally one who does neither.

A closer look at the scores and the their dimensions/components has several lessons, and are worth analyzing further. Some might consider that USA topping the chart as *eye-popping* due to the well-documented evidence on inequalities based on race, gender and region, and the consequential race based political cleavages or polarization. But, data suggests that USA on average does particularly well in comparison with the other countries in the top - in the private relations and civic commitment dimensions (especially finance, trust in the community, collective action and the two solidarity variables).

N.B. Due to the non-disclosure agreement with Gallup, we cannot display the raw data that constitutes the indicator at the component level.

Relational Capability Index 2.0 – 2012



*Note: Heat map produced using highmap Stata plugin. Cf. Roca (2014).
Browse the results: http://stats4dev.com/dataviz/RCI_map2012.html*

Comparing USA vis-a-vis other countries sheds more light. Lets take France (rank 38) for example, which does relatively bad in comparison to other European countries. Among other reasons, in general we could think of the French outlier particularity as demonstrated by [Senik \(2014\)](#) in the subjective well-being, happiness and opinion surveys. A second look informs us that the low scores of two solidarity variables (0.25 and 0.24), trust in the community (0.35), and finance (0.40) points us towards the welfare state replacing (or ‘crowding out’) the existence of the community-based (any denomination) organizations as observed by

Table 3.6: RCI 2.0 adjusted - excluding solidarity variables (First 20 and last 20 countries)

Country	Rank	RCI 2.0	LC	PR	CV	Country	Rank	RCI 2.0	LC	PR	CV
Norway	1	0.71	0.84	0.73	0.59	Haiti	105	0.48	0.47	0.71	0.33
Austria	2	0.70	0.81	0.75	0.57	Botswana	106	0.47	0.59	0.68	0.27
Sweden	3	0.70	0.84	0.72	0.57	Congo	107	0.47	0.52	0.58	0.35
Denmark	4	0.70	0.80	0.69	0.61	Russian Fed.	108	0.47	0.82	0.53	0.24
United States	5	0.69	0.81	0.77	0.52	South Africa	109	0.47	0.63	0.67	0.25
Canada	6	0.68	0.81	0.75	0.53	Myanmar	110	0.47	0.39	0.55	0.48
Finland	7	0.68	0.81	0.78	0.51	Pakistan	111	0.47	0.67	0.57	0.27
Iceland	8	0.68	0.90	0.67	0.53	Niger	112	0.46	0.32	0.59	0.51
Netherlands	9	0.68	0.84	0.72	0.52	Rwanda	113	0.45	0.35	0.49	0.55
Switzerland	10	0.68	0.82	0.69	0.55	Angola	114	0.45	0.63	0.55	0.27
Thailand	11	0.67	0.87	0.72	0.47	Benin	115	0.45	0.44	0.48	0.44
Germany	12	0.67	0.82	0.68	0.53	Burkina	116	0.45	0.40	0.56	0.41
Slovenia	13	0.66	0.83	0.65	0.54	Afghanistan	117	0.45	0.58	0.53	0.30
Luxembourg	14	0.66	0.84	0.63	0.54	Gabon	118	0.44	0.39	0.63	0.35
United Kingdom	15	0.65	0.82	0.71	0.49	Iraq	119	0.44	0.73	0.52	0.23
Ireland	16	0.65	0.80	0.72	0.47	Malawi	120	0.43	0.41	0.62	0.31
New Zealand	17	0.64	0.83	0.77	0.41	DR Congo	121	0.41	0.41	0.56	0.31
Philippines	18	0.64	0.68	0.74	0.52	Guinea	122	0.41	0.36	0.56	0.35
Spain	19	0.64	0.76	0.66	0.51	Mali	123	0.41	0.28	0.58	0.42
Hong Kong	20	0.63	0.81	0.63	0.50	Madagascar	124	0.37	0.38	0.52	0.27

several others - [Hungerman \(2005\)](#) and [Gill and Lundsgaarde \(2004\)](#). We can say that this result shows how important is the challenge of fostering quality bonds in a society where many social benefits (social security and welfare) are mediated by the state.

To disentangle the significance of welfare states and social cohesion, we verify the index scores by removing the two solidarity variables from the RCI 2.0. We then have the following result (refer to table 6).

We find that the ‘usual suspects’¹⁴ countries, which are also largely welfare states emerge in the top 10, suggesting perhaps that France is an exception even in the relational sense (albeit an improvement of 9 positions). In the bottom 10, some of the Sub-Saharan African countries are replaced by Afghanistan, Iraq and Malawi favoring Niger, Rwanda and Yemen.

In South Asia, we see that the RCI 2.0 scores (refer to tables 8 to 10 in appendix) are consistent with the analysis provided in Dreze and Sen’s latest book - [Dreze and Sen \(2013\)](#). Sri Lanka (rank 22) is doing impressively better than India (rank 93) and all its neighbors. Indeed, according to a widely accepted opinion since the era of independence dawned on the Asian subcontinent, the rapid and sustained economic expansion in Sri Lanka (albeit the civil war) has created a shared prosperity. The government has fostered inclusive policies by prioritizing investments

¹⁴Nevertheless, [Scheepers, Grotenhuis and Gelissen \(2002\)](#) demonstrate that differential social security rates in 13 European countries does not explain the differences in social capital (social contacts).

in primary health care, public education and infrastructure (electricity, sanitation and transportation). Thus, despite its relatively lower average income per capita PPP (although at least twice higher than other neighboring countries in the region), Sri Lanka gets higher scores in all the three dimensions of the relational capability (0.69, 0.67 and 0.47 respectively): large parts of the population have been better integrated to networks; a stronger sense of unity is reflected in the civic commitment dimension (the causality remains to be tested).

All the countries in the region started with a low base. Bangladesh (rank 92), in addition, has had a late start (independence from Pakistan in 1971) as well. The country has been on a steady democratic development path. The textile industry, agriculture and women-centered micro-finance have created jobs that have had an impact on the country's development (although the level of wages remains very low and many workers do not enjoy decent working conditions). Some public policies have contributed to counter poverty, improve literacy, educational attainments (especially girls), sanitation and health care. These policies may translate in increased relational opportunities for people, either because they enjoy a better access to employment, communication and information, or because they have increased agency and resources that enable them to take part in civic activities. Bangladesh is ranked (marginally) better than India despite the less than half its income per capita. This reiterates the importance of monitoring RCI as a complementary development indicator.

In India, the stark unequal patterns of development well documented in the authors' comprehensive book, contrasts with the positive picture of the "rising India" as painted by the media. The country fares low across social indicators. As the authors put it aptly, "*...the country looks more and more like islands of California in a sea of sub-Saharan Africa*". This goes along with a deterioration of the quality of the social bonds.

Few aberrant scores emerge in countries like Russia (rank 107, RCI 2.0 score of 0.42) where the low overall RCI 2.0 score seems to be driven by the civic commitment dimension. These can be alleviated for instance, if we can observe all types of solidarity action taken by citizens and if we can include all forms of collective actions undertaken. Perhaps 'voicing opinion to an official' is not the most common way to express feedback since we have seen large scale demonstrations and protest marches in Russia in the recent years. Hence, any multidimensional indicator, like the RCI 2.0 is constrained by data availability¹⁵.

Elsewhere in countries like Nigeria (rank 25, RCI 2.0 score of 0.59) and Syria

¹⁵Values surveys like World Values Surveys and Barometers surveys have extensive information on civic commitment dimension to facilitate further investigation.

(rank 45, RCI 2.0 score of 0.52), also seem counter-intuitive of what RCI ideally likes to capture. One might suspect that in Nigeria where well-documented chieftdom prevalence which hands out fruits of development in a clientelist fashion is reflected in the high RCI 2.0 scores - where private relations (highest score of 0.82 in the entire sample) is crucial in obtaining these benefits. When we look further, this can be explained by the deep divide (10 percentage points) in the relational capabilities between the top 20% income earners and the bottom 20% income earners. This is also cross-verified with a 'high' Gini coefficient of 42.95 (year 2010¹⁶). Whereas in Syria, we can extend a similar argument that when a country experiences war and faced with sever political uncertainty, the best option for citizens is to have a deeper personal ties (personal relations dimension score of 0.67 which is the highest among the countries within a range of +/- 20 RCI 2.0 ranks; and among the highest in the entire sample for 'support', 'finance' and 'friend1' and 'friend2' components) and a robust solidarity (relatively high score of 0.31 in the same subcategory of countries) given that the overall civic commitment dimension score is strongly pulled downwards by the collective action component.

We also explore how the RCI 2.0 interacts (refer to table 7) with the other prominent (multidimensional) development indicators. Overall, RCI 2.0 is strongly correlated¹⁷ with the income levels (GDP per capita), HDI and subjective well-being indicator (life satisfaction). However, we observe that they are not strongly correlated (positive or negative) with the subjective legitimacy or institutional quality variables.

Firstly, higher income levels are not a prerequisite to having a flourishing life in the relational capability sense. There is no denying that income serves (a 0.69 correlation between RCI 2.0 and GDP per capita) as a means of expanding choice sets of individuals, liberties and access to opportunities¹⁸. However, we observe that Thailand and Philippines are in the top 20 of the chart (rank 11 and 20 respectively) which are emerging upper-middle and lower-middle income countries respectively¹⁹. Secondly, RCI 2.0 is also strongly correlated with HDI (0.65), and very close to the correlation with GDP per capita (0.69).

All this suggests the interest of monitoring RCI along with HDI and income measures, since they bring different information for development policy decisions.

Notes:

¹⁶World Bank - World Development Indicators

¹⁷all correlations are significant at 95% level

¹⁸We also observe that GDP per capita and HDI are also correlated (0.71) which does not mean that they are substitutes - refer to table 7.

¹⁹as per the World Bank income classification of countries: <http://data.worldbank.org/about/country-and-lending-groups>

Table 3.7: Pairwise correlation table RCI 2.0, year 2012

Variables	RCI 2.0	HDI	GDPpc	Polity	Unemploy.	Health exp.	Edu.	Corrupt.
HDI	0.6531 0.0000							
GDP per capita	0.685 0.0000	0.7107 0.0000						
Polity	0.3791 (0.0000)	0.3572 (0.0000)	0.0367 (0.6544)					
Unemploy.	-0.1675 (0.0640)	0.0661 (0.4157)	-0.1604 (0.0390)	0.1448 (0.0713)				
Health exp.	0.6948 (0.0000)	0.7385 (0.0000)	0.7233 (0.0000)	0.3847 (0.0000)	-0.0306 (0.6941)			
Edu.	0.5462 (0.0000)	0.7457 (0.0000)	0.4139 (0.0000)	0.2096 (0.0394)	-0.0207 (0.8328)	0.2965 (0.0016)		
Corrupt.	-0.3793 (0.0000)	-0.4014 (0.0000)	-0.5733 (0.0000)	0.016 (0.8631)	0.1743 (0.0500)	-0.5041 (0.0000)	-0.1485 (0.1859)	
Subj. well-being	0.7278 (0.0000)	0.7667 (0.0000)	0.6596 (0.0000)	0.326 (0.0002)	-0.1552 (0.0681)	0.7236 (0.0000)	0.5157 (0.0000)	-0.4062 (0.0000)

HDI: *Human Development Index - UNDP*

GDPpc: *GDP per capita, PPP (constant 2011 international \$) - WDI*

Polity: *Polity IV, political regime 0: Dictatorship to 10: Democracy*

Unemploy.: *Unemployment, total (% of total labor force, modeled ILO estimate)- ILO*

Health exp.: *Health expenditure per capita, PPP (constant 2005 international \$) - WDI*

Edu.: *Primary education completion rate, total (% of relevant age group) - WDI*

Corrupt: *Corruption in government - Gallup World Poll*

Subj. well-being: *Life satisfaction - Gallup World Poll*

4 RCI 2.0: towards disintegrability

As referenced earlier, the Human Development Index is the most successful attempt in operationalization of Sen's capability framework. Since 1990, HDI's methodology and content have evolved, taking stock of the critics and reflecting the progress of development (thankfully, literacy rate is no longer discriminant in education achievement). Component's cap²⁰ insofar as functional form, have evolved over time. Nevertheless, its "macro" feature prevent it from zooming into populations, from getting closer to the people. This can be seen as paradoxical for an indicator symbolizing people oriented development. Alongside and based on household surveys, the Multidimensional Poverty Index somehow addresses the "little people centered" limitation of the HDI, however the MPI can hardly be considered as a capability index.

Over the years, HDI has paid heed to the critics of being an average human development evaluation supposed to reflect the entire population of a country. For this reason, the indicator is particularly indifferent to the extent of the inequality in distribution of human development dimensions within a country.

There are several measures of HDI adjusted for (income) inequality, they are readily found in the literature documented in the UNDP Human Development Reports (HDR). Some of them include the [Atkinson \(1970\)](#) inequality measure also dubbed as the 'Atkinson's welfare standard', 20-20 ratios, and the Sen's welfare standard which simply discounts the income inequality using the Gini estimates from the HDI country score. In the same light, some other examples include the HDI by socioeconomic factors. Some examples include the HDI by gender (HDR 1991), by race and gender (HDR 1993), by regions (NHDR 2002), by income quintiles (HDR 2006). It's worth mentioning at this juncture that although inequalities in other dimensions of human development are well recognized, its rarely measured and monitored in a systematic manner.

The main asset of our RCI 2.0 lies in its disintegrability. Indeed, the underlying data allows us to disintegrate our index by gender, income level and region. We assume that the RCI 2.0 is sensitive to the inequality in the distribution of relational capabilities within a country and suggest zooming in. We introduce three measures for this purpose:

- RCI 20-20
- RCI by sex

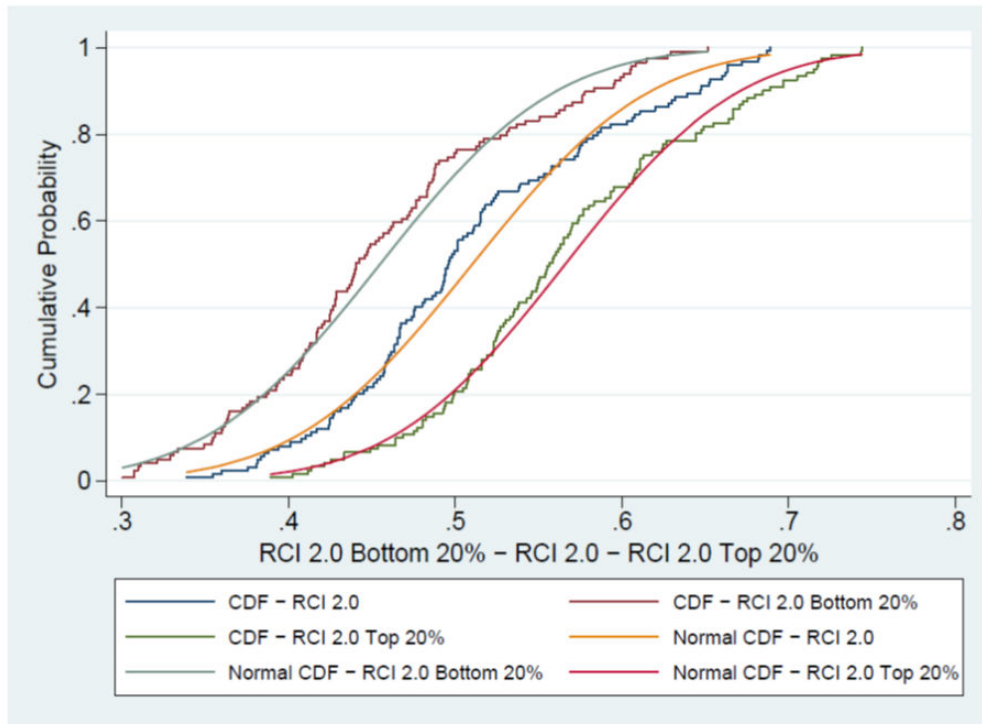
²⁰way of normalizing setting an upper limit after which a variable is assigned the maximum value, i.e. 1 in the case of HDI components

- RCI by regions

These three disaggregated measures of RCI for analysis above were chosen among other possible measures to be representative of the several aspects that are the persistent in the manifestation of inequality. This is also made possible thanks to the Gallup world poll. Their sampling is ensured to be representative for all types of demographics disaggregation like the employment, income quintiles, sex, etc.

4.1 RCI by top 20% and bottom 20% income

Figure 3.1: Cumulative Distribution Function (CDF) of RCI 2.0 (bottom 20% income earners - top 20% income earners)



The relationship between income inequalities and relational inequalities is a key issue as several recent works show the increase of wealth and income inequalities within countries and between countries - [Piketty \(2013\)](#). We interestingly observe that relational inequalities tend to be high in industrialized countries where income inequality is high, which is consistent with the work of [Wilkinson and Pickett \(2010\)](#)²¹. The authors show that health and social problems (including trust and community life) are much more acute in more unequal countries. Some

²¹Earlier references in this literature include - [Galbraith and Berner, eds \(2001\)](#) and [Galbraith \(2000\)](#)

Table 3.8: RCI 2.0 by top 20% and bottom 20% income (First 10 and last 10 countries)

Country	Rank	RCI 2.0 ^(t)	RCI 2.0 ^(b)	Distance	Country	Rank	RCI 2.0 ^(t)	RCI 2.0 ^(b)	Distance
Angola	1	0.43	0.44	-0.33	Zimbabwe	117	0.59	0.33	25.97
Uganda	2	0.50	0.50	-0.07	Portugal	116	0.61	0.40	20.92
Ecuador	3	0.51	0.48	2.35	South Africa	115	0.56	0.37	18.86
Thailand	4	0.68	0.65	2.84	Estonia	114	0.61	0.43	18.14
Vietnam	5	0.47	0.44	2.89	Bulgaria	113	0.55	0.38	17.90
Italy	6	0.59	0.56	3.24	Malawi	112	0.53	0.36	17.33
Ghana	7	0.50	0.46	3.95	Myanmar	111	0.57	0.40	17.02
Greece	8	0.42	0.38	4.46	Mauritania	110	0.59	0.42	17.00
Syria	9	0.54	0.49	5.05	Tanzania	109	0.57	0.41	16.74
Mexico	10	0.53	0.47	5.89	Romania	108	0.55	0.39	16.38

Note 1: RCI 2.0^(t) - RCI 2.0 of top 20% income earners.

Note 2: RCI 2.0^(b) - RCI 2.0 of bottom 20% income earners.

Note 2: Distance is the arithmetic difference between the top 20% and bottom 20% income earners within a country, expressed as a percentage.

of the social problems that the authors analyze are also components of the second and third dimensions of the RCI.

From table 8, we see that the difference of relational capabilities between the top 20% income earners and the bottom 20% income earners within a country can attain up to 26 percentage points (Zimbabwe). For example, in South Africa, which features at the bottom of the list, we may expect that the racial cleavage persists (at least in terms of income inequality) from the Apartheid era. This may contribute to destroy the quality of the social bonds within the population as a whole, which is reflected in the lowest civic commitment dimensional score in the world of 0.21.

With respect to industrialized countries, what we notice is that, except for Portugal (rank 116, second lowest rank with a 21 percentage points relational capabilities difference), Ireland (rank 102, 16 percentage points difference) and Hong Kong (rank 99, 15.7 percentage points difference), none of the industrialized economies is lowly ranked in terms of relational capabilities differences between the top 20% income earners and bottom 20% income earners. This is rather intuitive, since the entire population of these countries has a definitely better access to networks (first dimension of the RCI: employment, transportation, information and telecommunications) than developing countries. The trend is similar on average for the civic commitment dimension of the RCI in comparison with non-industrialized countries. However, rather surprisingly, these same industrialized countries (N.B. including the Scandinavian countries) are not highly ranked either. This suggests that the distribution of relational capabilities between the top and low income earners in these countries fall short in the civic dimension and private relations dimension of the RCI. One explanation is the

hypothesis of the state mediated social services goods provision which may have a deleterious effect on civic commitment and private relations dimension of the RCI. This requires further analysis on where these discrepancies arise from.

Lastly, there are two countries, Angola and Uganda namely, where the bottom 20% income earners are better off in terms of relational capabilities versus the top 20% income earners. Angola could be considered as an “outlier”. Angola has a low rank (rank 110) in comparison with other countries). This result seems dubious given the oil exports intensive economy with inherent social inequalities pervasive in the society. This country also has one of the lowest RCI disparities by sex. In this light, a further investigation is required and nothing can be concluded. On the other hand, Uganda (RCI 2.0 rank 76) is the country where the bottom 20% income earners are better off versus the top 20% income earners. This country has made enormous progress to abate poverty in the recent years. Despite these achievements, large parts of the country’s population remain poor, and it is also fraught with the high HIV incidence. The private relations score of 74% in Uganda is the best in the world, perhaps a sign of the improved social climate?

4.2 RCI by sex

We disaggregate the relational capabilities (RCI 2.0) of countries by sex in the order of their average relational capabilities (RCI 2.0 country scores) to observe the disparity. Overall, all the countries in the world in 2012 with the only exception being Sweden (with a positive disparity of -0.015 favoring women in the relational capability sense), putting women at a disadvantage.

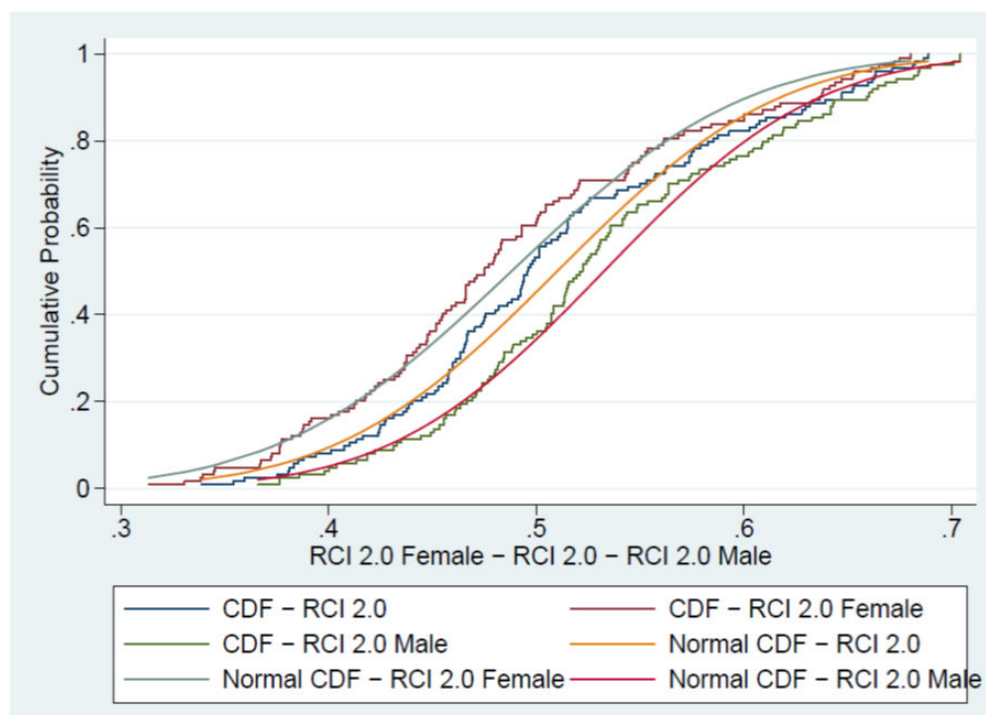
Norway and United Kingdom are the only two countries which feature in the top ten countries of the RCI 2.0 as a country average (0.72 and 0.70 respectively) and are doing well with least disparity between the sexes (0.0014 and 0.0068 respectively). On the other hand, Yemen is the only country that features in the bottom ten countries on the average relational capabilities (0.446) and among the worst countries in absolute disparities (0.09) between the sexes. Although, Afghanistan is the worst country in terms of absolute disparities (0.164), it is still better to be a woman in Afghanistan than in Yemen.

When we look closer into the relational capabilities disparities between men and women (refer to 11), we also observe that disparities in relational capabilities narrow down as the cross-country relational capabilities rise. In other words, disparities by sex are higher in a relationally poor country and vice-versa in a relationally rich country. This might be explained by different scores on the first and third dimensions of RCI, concerning integration to networks (employment, transport, telecommunications and information) and civic commitment.

Figure 3.2: RCI 2.0 Top 20% income earners vs. Bottom 20% earners



Figure 3.3: Cumulative Density Function (CDF) of RCI 2.0 (Male-Female)



Note: After a certain (higher) threshold of relational capabilities, the gap between men-women narrows down.

Although there are several forms of gender discrimination in the economically developed nations, we can expect the whole population of these countries to be well connected to transportation, information and communication means, and to be equally able to participate in community activities and public life.

On the other side of the spectrum, there could be cultural reasons why women in the developing world are less integrated to networks or are less involved than men in society. Firstly, there is a clear shortage of infrastructure that prevents people from accessing to labor markets, transportation, telecommunications and information, and that may further reduce opportunities for women. Secondly, some specific cultural factors (like patriarchy) may also contribute to increase the gender divide. For example, the prevalence of female feticide and infanticide in South Asia; female genital mutilation in sub-Saharan Africa; and reduced rights in Middle Eastern countries towards women: these observed worst forms of violence against women translate to persistent discrimination throughout their existence. At this point, one might highlight the disparities between urban men and rural women.

Lastly, we need to mention that, with no missing information in all the countries surveyed, the rankings and the disparities rankings picture could change.

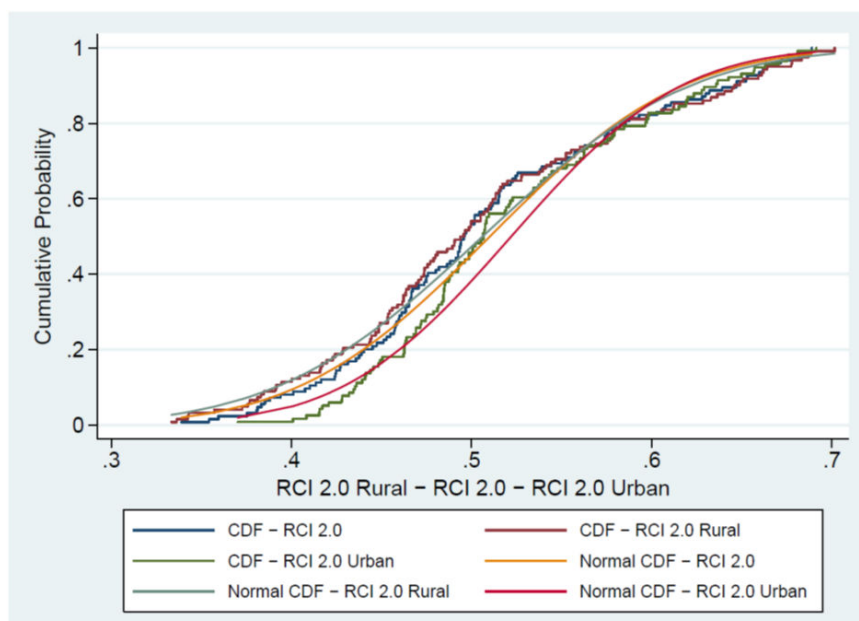
Figure 3.4: RCI 2.0 Male vs. Female



4.3 RCI by regions

In a similar exercise as the RCI 2.0 by sex, the urbanization effects are discussed in this section of our RCI 2.0 disaggregated by Urban-Rural areas within a country. Here again, we disaggregate the relational capabilities (RCI 2.0) of countries by urban-rural areas in the order of their average relational capabilities (RCI 2.0 country scores) to observe the disparity.

Figure 3.5: Cumulative Distribution Function (CDF) of RCI 2.0 (Urban-Rural)



Note: After a certain (higher) threshold of relational capabilities, the 'urban' and 'rural' lines intersect.

In 46 out of 114 countries, persons on average are relationally better off in rural areas as opposed to urban areas. Argentina heads the chart with a disparity of -0.06 with persons relationally richer in the rural areas. On the other hand, Guinea and Madagascar have a pronounced effect skewed towards the urban areas in the relational capabilities of the individuals (0.14 and 0.13 respectively).

United States is the only country which features in the top ten countries of the RCI 2.0 (0.72), is also doing well with the least urban-rural divide (0.004). On the other hand, Benin, Burkina Faso, Guinea, DR Congo and Madagascar are the countries that feature in the bottom ten countries on the average relational capabilities (0.38, 0.38, 0.37, 0.35 and 0.35 respectively) and among the worst countries in absolute disparities (0.07, 0.08, 0.14, 0.07 and 0.14 respectively) between the regions.

Figure 3.6: RCI 2.0 Urban vs. Rural



4.4 RCI 2.0 - stochastic dominance and weighting

Comparison of distributions (for example, of income of different countries, or for a same country in different time periods) include largely in computing inequality measures which ideally satisfies several of the *inequality axioms*²². Whenever inequality measures satisfy the five axioms, they are part of the general entropy (GE) class of measures. Atkinson measures are part of the GE class of inequality adapted to ordinal data²³.

The alternative approach to compare distributions destined for social welfare comparisons is derived from the stochastic dominance theory. When rankings distributions are composite indexes, ordinal or rankings in nature or even, ambiguous rankings, stochastic dominance theory suits well for the comparison of distributions. We check for the first order stochastic dominance (FOSD) and second order stochastic dominance (SOSD) in RCI 2.0 distribution for the disaggregated data. Both these have been well explored in the realm of income and poverty analysis. These arise from the seminal works of authors like Dalton (1920), Pigou (1912), Theil (1979), Atkinson (1970), Cowell (1980), Shorrocks (1983) and Bourguignon (1979) among others²⁴. This theory is also extended for analyzing the distribution of growth by Ravallion (called the Growth Incidence curves).

In this chapter, the first and second order stochastic dominance over distributions essentially does the following:

- for FOSD - cumulative RCI 2.0 scores plotted against cumulative population (for example, CDF²⁵).
- for SOSD - cumulative RCI 2.0 shares scaled by the mean²⁶ plotted against the cumulative population (for example, Generalized Lorenz Curves (GLC)).

The value of the Cumulative Distribution Function (CDF) $[F(y)]^{27}$ at (y) is the proportion of countries that have less than RCI 2.0 scores y . If there is no crossing, distribution of B dominates distribution of A i.e., FOSD, if $F_A(y) \geq F_B(y), \forall y$. This means that the proportion of countries disaggregated by distribution A of the RCI

²² Pigou-Dalton transfer principle, income scale independence, population principle, anonymity and decomposability.

²³ refer Atkinson and Bourguignon, eds (2000) for a comprehensive reference on distribution analysis

²⁴ Contributions roughly in chronological order.

²⁵ Some authors prefer the *Pen's Parade*, which is simply the inverse of CDF.

²⁶ We could also use median, but RCI 2.0 mean and median are less than 0.2 times s.d. apart, and the entire RCI 2.0 distribution is within +/- 3 s.d. (that is to say, without any extreme points - which affects the mean of any distribution).

²⁷ Here, the function F can be read as the geometric mean (to compute RCI 2.0) from the dimension with the arithmetic mean of its respective components.

2.0 scores ²⁸ with lower than y RCI 2.0 scores, is higher than the proportion of such countries disaggregated by the (counterpart) distribution B of the RCI 2.0 scores. Of course, this holds true if the *social welfare function* is equal to the sum of RCI 2.0 scores of countries which is an increasing²⁹ function of dimensions (and its respective components); and in addition we have to assume there is additive separability of the RCI 2.0 country scores. This results in concluding that the social welfare of distribution B of RCI 2.0 scores is higher than in distribution A of RCI 2.0 scores.

Generalized Lorenz Curves was extended (or “generalized”) from the original Lorenz curves to account for levels of incomes (destined for cross-country comparisons)³⁰. In other words, Lorenz is concerned, by construction, with the distribution of the pie. Whereas, the GLC is concerned, by construction, to look at *both* the distribution of the pie *and* the size of the pie.

SOSD can also be checked with the help of the integral of the CDF³¹ of distributions y_A and y_B . If the integral of the CDF of distribution y_A lies never above and somewhere below that of distribution y_B , then distribution y_A has second order stochastic dominance over distribution $y_B \forall y$. GLC is essentially the same as the integral of the CDF³². Using the same notations as above, where, $GLC(g) = \text{integral of } y^*dF(y)$; $GL_B(g) \geq GL_A(g)$. Hence, for any social welfare function that is increasing and concave³³, will have SOSD, and imply higher levels of welfare in B over A.

When we look at the CDF graphs of the RCI 2.0 disaggregated by income earners, sex and regions. We can easily imply that we find FOSD of the distribution of top 20% income earners over the bottom 20% income earners; and of the distribution of male over female. However, this is not the case for the distribution of urban regions over the distribution of rural regions in the world. SOSD at first glance would have the results as the FOSD for all the distributional comparisons in question. This is because, all these distributions are within the 2.5 s.d. of the mean. Additionally, there is no need to worry about kurtosis, since the mean and the median are less than 0.2 times the s.d. apart - for all the these disaggregated distributions.

Does this mean that we have a clear (representative, at least) snapshot of the world of the wedging RCI 2.0 inequalities of FOSD (and SOSD) of men over women; and top 20% income earners over bottom 20% income earners? Not

²⁸ Income earners, sex or region in this chapter.

²⁹ However not strictly increasing for RCI 2.0 due to the geometric version of aggregation.

³⁰ refer to [Shorrocks \(1983\)](#)

³¹ commonly called the “Quantile function”.

³² ([Atkinson and Bourguignon, 1990](#)) and [Howes \(1993\)](#) have proved this in their papers.

³³ Of course, additive separability of y , read RCI 2.0 scores, is an already included assumption.

quite. This will not take us closer to the true picture of disaggregated relational capabilities' inequalities unless we weight the results with population size. At the same time, our previous result of disaggregation by regions' distributions doesn't reflect FOSD and SOSD. So, weighting the RCI 2.0 scores change our results? In other words, how can we compare the *negative* inequalities that we found in Sweden of women over men to countries like Afghanistan, Pakistan and Malaysia which have three to twenty times Sweden's population? In the same spirit, how can we compare Belize, Iceland and Malta (found in our Gallup data) all of which account for less than 500,000 in total population, with China and India?³⁴

When RCI 2.0 scores are weighted by population size of the countries, two interesting results emerge³⁵. First, there is FOSD and SOSD across all disaggregated distributions (by income earners, by sex and by regions). More interestingly, the FOSD or the SOSD of distributions by region would not have appeared otherwise. Second, the gaps are more pronounced for all the relationally poor countries. For example, there exists a roughly 10 percentage points relational capabilities gap between men and women for close to 70% of the population of the world. Similarly, since most of the emerging and developing countries are experience urban centric growth phenomenon, where the relational capabilities tend to be higher in contrast with the rural areas, we see a, almost 70% of the population in the world experience deficits of at least four percentage points of relational capabilities favoring urban population over rural population. This is more pronounced for almost 40 percent of the rural population in the world that experience deficits of over 6 percentage points as compared to urban population.

4.5 Rank robustness and redundancy

Foster et al. (2013) have laid out theoretical principles and guidelines for rank robustness tests, and tests of redundancy of components and dimensions in a composite index. I have implemented the same for the RCI 2.0 and HDI for the years 2012 and 2013 (allowing for both arithmetic mean and geometric mean aggregation at the tails). The results are presented in the appendix and they suggest that the RCI 2.0 is robust to choice *and* weights of components and dimensions that go into RCI 2.0.

³⁴ Of course, weighting will not entirely complete the picture since some countries have adverse sex ratios, or in countries where the proportion of urban and rural populations are not the same etc. A step further would be to account for these proportions too.

³⁵ All graphs and tables are to be found in the appendix.

5 Conclusion

RCI 2.0, an alternative to the RCI (original version), has a twofold advantage as demonstrated in this chapter. Firstly, the continuous version eliminates the arbitrariness of the cutoffs that affects a multidimensional development indicator. The aggregation method used here allows for local perfect substitutability along the first diagonal; and the geometric mean which has a varying elasticity of substitution and lower substitutability is applied on the tails, which is justified as a basis for holistic human existence. This version also has better micro/macro interpretability, coupled with empirical application using the standardized Gallup World Poll dataset.

Secondly, RCI 2.0 allows for a rigorous cross-country comparison. The results (re)confirm the importance of monitoring relational capabilities as a development objective per se. The prime interest lies in its complementarity to other development indicators. The decomposability is another significant feature; thanks to Gallup World Poll, we study the cross-cutting dividing lines of various forms of inequalities in a society; in particular the relationship between income or gender inequalities and relational capabilities has to be further explored and can lead to interesting public policy recommendations (e.g. reduced income inequalities lead to higher relational capabilities).

Hence, we believe, a composite multidimensional indicator of relational capabilities should be favored in monitoring countries' performance. The Relational Capability Indicator essentially reflects some key outcomes of various pressing development debates in the world (on distribution, growth, social cohesion and capabilities).

6 Appendix

Figure 3.7: Rank robustness r

$$\begin{aligned}
 & x C_0 y \\
 & x \in X \text{ and } y \in Y \text{ in } D \geq 2 \\
 \Delta = & \left\{ w \in R^D : w \geq 0 \text{ and } w_1 + \dots + w_D = 1 \right\} \\
 & C : X \times \Delta \rightarrow R \\
 & C(x; w) = w \cdot x = w_1 x_1 + \dots + w_D x_D \\
 & C_0(x) = C_0(x; w^0) \\
 \\
 & r \in [0, 1] \\
 \\
 r = & \begin{cases} 1 & \forall B = 0 \\ \frac{A}{A+B} & \forall B > 0 \end{cases} \\
 \\
 A = & C(x; w^0) - C(y; w^0) > 0 \\
 B = & \max_{w \in \Delta} [C(x; w) - C(y; w), 0] \\
 \\
 p : & [0, 1] \rightarrow [0, 1] \\
 \forall r \in & [0, 1], \text{ the share } p(r) \in [0, 1]
 \end{aligned}$$

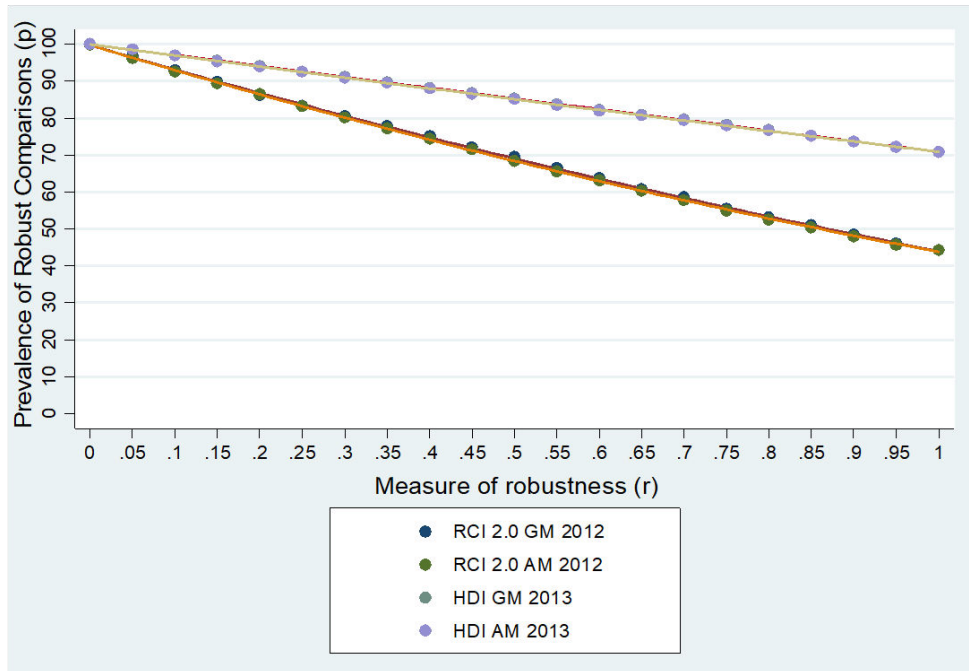


Table 3.9: RCI 2.0 scores and ranks - dimensions and components

Country	rank	rcig	LC	PR	CV	emp	tele	info	friends	support	finance	trust	coll.	solidr1	solidr2	safe
USA	1	0.69	0.81	0.77	0.53	0.54	0.91	0.98	0.84	0.90	0.55	0.77	0.30	0.45	0.62	0.74
Canada	2	0.69	0.81	0.75	0.54	0.55	0.90	0.97	0.90	0.94	0.51	0.64	0.21	0.42	0.68	0.84
Netherlands	3	0.68	0.84	0.72	0.53	0.62	0.93	0.98	0.87	0.94	0.49	0.57	0.27	0.37	0.69	0.77
Norway	4	0.68	0.84	0.73	0.52	0.56	0.98	0.97	0.86	0.93	0.59	0.53	0.30	0.35	0.56	0.87
New Zealand	5	0.67	0.83	0.77	0.47	0.59	0.92	0.98	0.88	0.93	0.61	0.67	0.18	0.40	0.67	0.64
UK	6	0.66	0.82	0.71	0.51	0.54	0.94	0.98	0.83	0.93	0.41	0.65	0.22	0.29	0.76	0.75
Austria	7	0.66	0.81	0.75	0.49	0.55	0.91	0.96	0.88	0.94	0.60	0.56	0.32	0.28	0.52	0.82
Iceland	8	0.66	0.90	0.67	0.48	0.72	0.99	0.98	0.80	0.98	0.45	0.45	0.25	0.25	0.63	0.80
Ireland	9	0.66	0.80	0.72	0.50	0.46	0.96	0.97	0.84	0.96	0.43	0.64	0.20	0.37	0.70	0.74
Switzerland	10	0.65	0.82	0.69	0.49	0.60	0.93	0.92	0.83	0.94	0.46	0.54	0.31	0.32	0.56	0.78
Thailand	11	0.65	0.87	0.72	0.44	0.69	0.95	0.98	0.96	0.90	0.66	0.37	0.20	0.12	0.70	0.74
Denmark	12	0.65	0.80	0.69	0.49	0.49	0.95	0.97	0.87	0.94	0.43	0.53	0.41	0.20	0.54	0.80
Sweden	13	0.65	0.84	0.72	0.45	0.61	0.98	0.94	0.88	0.92	0.56	0.51	0.32	0.13	0.53	0.81
Finland	14	0.64	0.81	0.78	0.42	0.53	1.00	0.89	0.88	0.92	0.75	0.55	0.24	0.27	0.39	0.77
Malta	15	0.63	0.80	0.66	0.48	0.44	0.97	0.99	0.73	0.91	0.53	0.46	0.24	0.24	0.72	0.72
Germany	16	0.63	0.82	0.68	0.45	0.49	0.99	0.97	0.84	0.92	0.40	0.56	0.27	0.27	0.47	0.79
Luxembourg	17	0.63	0.84	0.63	0.47	0.56	0.98	0.98	0.79	0.91	0.37	0.44	0.34	0.30	0.51	0.73
Slovenia	18	0.62	0.83	0.65	0.44	0.53	0.97	0.99	0.83	0.92	0.41	0.45	0.22	0.34	0.35	0.85
Hong Kong	19	0.61	0.81	0.63	0.44	0.48	0.96	1.00	0.80	0.82	0.36	0.55	0.11	0.15	0.63	0.88
Philippines	20	0.61	0.68	0.74	0.45	0.48	0.80	0.77	0.93	0.81	0.61	0.60	0.38	0.43	0.31	0.66
Indonesia	21	0.61	0.75	0.61	0.49	0.54	0.79	0.92	0.88	0.82	0.35	0.40	0.12	0.30	0.63	0.89
Sri Lanka	22	0.60	0.69	0.67	0.47	0.39	0.82	0.87	0.76	0.82	0.57	0.54	0.20	0.46	0.45	0.77
Costa Rica	23	0.59	0.78	0.69	0.39	0.46	0.90	0.98	0.85	0.89	0.37	0.65	0.38	0.27	0.37	0.53
Cyprus	24	0.59	0.79	0.62	0.42	0.46	0.92	0.99	0.64	0.76	0.52	0.54	0.25	0.27	0.47	0.68
Nigeria	25	0.59	0.64	0.82	0.38	0.54	0.61	0.78	0.67	0.81	1.12	0.66	0.26	0.36	0.30	0.61
Laos	26	0.58	0.74	0.64	0.42	0.55	0.79	0.87	0.88	0.69	0.48	0.49	0.27	0.20	0.47	0.75
Panama	27	0.58	0.79	0.68	0.36	0.47	0.93	0.96	0.77	0.88	0.63	0.44	0.32	0.31	0.34	0.48
Spain	28	0.58	0.76	0.66	0.38	0.38	0.92	0.99	0.87	0.93	0.35	0.50	0.24	0.17	0.32	0.78
Italy	29	0.57	0.74	0.63	0.41	0.35	0.93	0.95	0.72	0.86	0.37	0.56	0.22	0.25	0.50	0.66
Colombia	30	0.57	0.80	0.70	0.34	0.49	0.94	0.98	0.85	0.91	0.33	0.70	0.37	0.24	0.29	0.45
Israel	31	0.57	0.82	0.59	0.39	0.57	0.97	0.93	0.62	0.89	0.35	0.49	0.19	0.21	0.53	0.63
Chile	32	0.57	0.80	0.60	0.39	0.49	0.94	0.98	0.74	0.85	0.28	0.53	0.31	0.13	0.54	0.57
Mongolia	33	0.56	0.82	0.64	0.34	0.52	0.97	0.97	0.68	0.91	0.47	0.48	0.23	0.29	0.39	0.46
Guatemala	34	0.56	0.75	0.63	0.38	0.40	0.87	0.97	0.83	0.80	0.34	0.55	0.29	0.40	0.29	0.53
Taiwan	35	0.56	0.81	0.62	0.35	0.46	0.98	0.99	0.83	0.80	0.39	0.46	0.08	0.19	0.41	0.70
Suriname	36	0.56	0.80	0.68	0.32	0.52	0.92	0.97	0.88	0.75	0.61	0.47	0.20	0.22	0.25	0.60
Uruguay	37	0.55	0.80	0.62	0.34	0.51	0.91	0.99	0.81	0.85	0.25	0.55	0.31	0.15	0.40	0.51
France	38	0.55	0.77	0.60	0.36	0.47	0.89	0.96	0.73	0.93	0.40	0.35	0.27	0.25	0.24	0.67
Paraguay	39	0.54	0.76	0.61	0.35	0.54	0.83	0.91	0.91	0.93	0.21	0.39	0.22	0.24	0.49	0.44
Belgium	40	0.54	0.74	0.60	0.35	0.38	0.87	0.97	0.80	0.92	0.29	0.39	0.15	0.25	0.35	0.66
Portugal	41	0.54	0.77	0.62	0.33	0.44	0.89	0.98	0.77	0.85	0.40	0.45	0.28	0.16	0.27	0.60
Bolivia	42	0.53	0.80	0.60	0.31	0.58	0.89	0.93	0.84	0.78	0.22	0.54	0.33	0.24	0.25	0.40
Czech Rep.	43	0.52	0.84	0.59	0.29	0.57	0.97	0.99	0.78	0.89	0.33	0.34	0.22	0.14	0.22	0.59
Poland	44	0.52	0.78	0.57	0.32	0.42	0.93	0.99	0.78	0.91	0.23	0.37	0.16	0.12	0.32	0.68
Syria	45	0.52	0.68	0.67	0.31	0.34	0.71	1.00	0.52	0.54	0.95	0.65	0.21	0.15	0.40	0.49

Table 3.10: RCI 2.0 scores and ranks - dimensions and components (contd.)

Country	rank	rcig	LC	PR	CV	emp	tele	info	friends	support	finance	trust	coll.	solidr1	solidr2	safe
Kazakhstan	46	0.52	0.80	0.61	0.28	0.51	0.91	0.99	0.74	0.87	0.36	0.48	0.16	0.29	0.17	0.51
Kosovo	47	0.52	0.74	0.60	0.31	0.24	0.98	0.99	0.73	0.75	0.48	0.45	0.11	0.08	0.30	0.75
Tajikistan	48	0.52	0.72	0.50	0.38	0.34	0.85	0.96	0.50	0.72	0.35	0.44	0.14	0.41	0.11	0.86
Hungary	49	0.52	0.76	0.61	0.29	0.43	0.88	0.98	0.62	0.90	0.41	0.52	0.30	0.10	0.21	0.56
Kenya	50	0.52	0.57	0.77	0.31	0.53	0.81	0.37	0.75	0.83	0.84	0.65	0.19	0.28	0.28	0.50
Estonia	51	0.51	0.81	0.61	0.28	0.53	0.93	0.98	0.77	0.86	0.41	0.40	0.14	0.18	0.17	0.61
Malaysia	52	0.51	0.81	0.59	0.28	0.51	0.93	0.99	0.90	0.83	0.30	0.33	0.12	0.19	0.36	0.45
Dominican Rep.	53	0.51	0.71	0.67	0.28	0.38	0.87	0.89	0.85	0.87	0.39	0.58	0.13	0.35	0.24	0.39
Sudan	54	0.51	0.65	0.67	0.30	0.34	0.85	0.77	0.80	0.81	0.45	0.63	0.16	0.19	0.16	0.68
Mauritania	55	0.50	0.60	0.72	0.30	0.34	0.84	0.63	0.74	0.76	0.94	0.42	0.23	0.12	0.21	0.63
Latvia	56	0.50	0.79	0.60	0.27	0.48	0.92	0.97	0.77	0.83	0.44	0.35	0.09	0.09	0.31	0.58
Azerbaijan	57	0.50	0.79	0.47	0.34	0.44	0.94	0.99	0.44	0.74	0.26	0.44	0.22	0.28	0.17	0.69
Belarus	58	0.50	0.85	0.52	0.29	0.68	0.88	0.98	0.63	0.86	0.26	0.34	0.12	0.30	0.11	0.61
Comoros	59	0.50	0.61	0.70	0.29	0.39	0.73	0.72	0.78	0.72	0.73	0.55	0.19	0.18	0.08	0.72
Ghana	60	0.50	0.58	0.62	0.35	0.57	0.71	0.47	0.64	0.68	0.64	0.50	0.17	0.21	0.27	0.73
Mexico	61	0.50	0.68	0.58	0.31	0.49	0.61	0.94	0.86	0.75	0.34	0.38	0.23	0.25	0.22	0.54
Kyrgyzstan	62	0.50	0.80	0.57	0.27	0.49	0.92	0.98	0.60	0.85	0.37	0.47	0.16	0.25	0.15	0.51
Slovakia	63	0.50	0.78	0.56	0.28	0.46	0.90	0.99	0.79	0.89	0.24	0.30	0.13	0.11	0.33	0.55
Nicaragua	64	0.49	0.70	0.59	0.29	0.42	0.80	0.87	0.81	0.89	0.27	0.40	0.19	0.17	0.25	0.56
Haiti	65	0.49	0.47	0.71	0.37	0.24	0.75	0.41	0.47	0.73	1.19	0.44	0.25	0.36	0.45	0.40
Cameroon	66	0.49	0.62	0.71	0.28	0.50	0.74	0.62	0.67	0.74	0.74	0.67	0.20	0.13	0.17	0.60
Moldova	67	0.49	0.80	0.59	0.26	0.47	0.94	0.98	0.64	0.79	0.52	0.39	0.16	0.19	0.22	0.46
Myanmar	68	0.49	0.39	0.55	0.56	0.54	0.17	0.47	0.73	0.61	0.38	0.46	0.06	0.43	0.85	0.89
Brazil	69	0.49	0.81	0.63	0.24	0.53	0.93	0.98	0.79	0.89	0.40	0.42	0.12	0.13	0.23	0.46
Bosnia & Herz.	70	0.49	0.74	0.58	0.28	0.39	0.83	0.99	0.57	0.77	0.65	0.33	0.15	0.04	0.27	0.65
Honduras	71	0.49	0.66	0.58	0.31	0.29	0.87	0.82	0.76	0.78	0.27	0.50	0.22	0.28	0.23	0.49
Tanzania	72	0.49	0.45	0.71	0.36	0.56	0.60	0.20	0.56	0.83	0.96	0.49	0.27	0.19	0.39	0.58
Lebanon	73	0.48	0.79	0.52	0.27	0.47	0.92	0.99	0.72	0.70	0.17	0.50	0.06	0.08	0.32	0.62
Georgia	74	0.48	0.68	0.51	0.31	0.28	0.80	0.97	0.78	0.52	0.37	0.38	0.11	0.18	0.03	0.91
Uganda	75	0.47	0.49	0.74	0.30	0.55	0.74	0.17	0.77	0.88	0.70	0.61	0.30	0.23	0.25	0.41
Ecuador	76	0.47	0.76	0.55	0.26	0.52	0.81	0.96	0.85	0.77	0.13	0.45	0.19	0.15	0.21	0.47
Montenegro	77	0.47	0.83	0.47	0.27	0.53	0.97	1.00	0.62	0.69	0.24	0.34	0.13	0.08	0.13	0.74
Nepal	78	0.47	0.59	0.54	0.33	0.50	0.78	0.48	0.57	0.73	0.37	0.50	0.19	0.26	0.25	0.61
Jordan	79	0.47	0.77	0.51	0.26	0.34	0.98	0.99	0.70	0.82	0.12	0.38	0.05	0.06	0.13	0.81
Argentina	80	0.47	0.77	0.58	0.23	0.47	0.84	0.99	0.85	0.88	0.14	0.46	0.09	0.17	0.20	0.45
Peru	81	0.47	0.70	0.55	0.27	0.52	0.71	0.88	0.71	0.75	0.27	0.45	0.19	0.20	0.21	0.46
Armenia	82	0.47	0.74	0.51	0.27	0.29	0.94	0.99	0.63	0.66	0.29	0.47	0.14	0.08	0.07	0.78
Serbia	83	0.47	0.76	0.52	0.26	0.40	0.88	0.99	0.71	0.81	0.26	0.31	0.15	0.07	0.18	0.62
Pakistan	84	0.47	0.67	0.57	0.27	0.42	0.89	0.69	0.68	0.54	0.55	0.51	0.12	0.15	0.38	0.41
Cambodia	85	0.46	0.66	0.48	0.32	0.47	0.81	0.69	0.85	0.60	0.25	0.21	0.10	0.09	0.45	0.63
Macedonia	86	0.46	0.73	0.50	0.27	0.30	0.91	0.99	0.64	0.76	0.32	0.29	0.16	0.07	0.22	0.63
Romania	87	0.46	0.74	0.53	0.25	0.39	0.86	0.96	0.71	0.72	0.32	0.38	0.15	0.08	0.23	0.54
Albania	88	0.46	0.79	0.50	0.25	0.41	0.96	0.99	0.66	0.77	0.32	0.25	0.17	0.10	0.13	0.59
Ukraine	89	0.46	0.82	0.51	0.23	0.60	0.88	0.99	0.59	0.85	0.23	0.36	0.10	0.29	0.08	0.46
El Salvador	90	0.46	0.72	0.56	0.24	0.34	0.85	0.96	0.75	0.80	0.31	0.38	0.14	0.18	0.11	0.53

Table 3.11: RCI 2.0 scores and ranks - dimensions and components (contd.)

Country	rank	rcig	LC	PR	CV	emp	tele	info	friends	support	finance	trust	coll.	solidr1	solidr2	safe
Bangladesh	91	0.46	0.57	0.57	0.30	0.40	0.83	0.48	0.89	0.58	0.32	0.49	0.07	0.13	0.17	0.81
India	92	0.46	0.64	0.48	0.31	0.46	0.82	0.65	0.74	0.51	0.38	0.29	0.17	0.18	0.28	0.61
Bulgaria	93	0.46	0.76	0.54	0.23	0.43	0.86	0.98	0.77	0.83	0.21	0.36	0.12	0.07	0.15	0.59
Viet Nam	94	0.45	0.82	0.48	0.24	0.63	0.85	0.97	0.61	0.75	0.18	0.38	0.08	0.08	0.13	0.67
Venezuela	95	0.45	0.78	0.59	0.20	0.47	0.90	0.98	0.85	0.93	0.11	0.45	0.22	0.19	0.14	0.26
Croatia	96	0.45	0.81	0.49	0.23	0.53	0.92	0.98	0.67	0.73	0.24	0.31	0.11	0.06	0.10	0.66
Afghanistan	97	0.45	0.58	0.53	0.29	0.34	0.85	0.55	0.49	0.52	0.48	0.62	0.20	0.17	0.41	0.39
South Africa	98	0.45	0.63	0.67	0.21	0.26	0.80	0.82	0.69	0.90	0.55	0.54	0.22	0.21	0.14	0.27
Senegal	99	0.44	0.48	0.68	0.26	0.25	0.60	0.59	0.80	0.71	0.52	0.68	0.17	0.15	0.16	0.57
Turkey	100	0.44	0.74	0.54	0.21	0.30	0.96	0.97	0.65	0.73	0.42	0.34	0.12	0.05	0.13	0.55
Zimbabwe	101	0.44	0.50	0.68	0.25	0.44	0.64	0.42	0.61	0.89	0.72	0.49	0.14	0.23	0.10	0.52
Botswana	102	0.44	0.59	0.68	0.21	0.36	0.81	0.59	0.65	0.83	0.73	0.51	0.18	0.19	0.11	0.35
Algeria	103	0.43	0.75	0.54	0.20	0.32	0.93	0.99	0.58	0.83	0.30	0.44	0.07	0.08	0.12	0.53
Palestine	104	0.43	0.70	0.52	0.21	0.22	0.91	0.98	0.63	0.77	0.31	0.38	0.07	0.07	0.08	0.63
Iraq	105	0.43	0.73	0.52	0.21	0.31	0.92	0.96	0.58	0.67	0.41	0.42	0.04	0.11	0.26	0.41
Russia	106	0.42	0.82	0.53	0.18	0.58	0.91	0.98	0.63	0.86	0.28	0.33	0.09	0.17	0.06	0.39
Lithuania	107	0.42	0.83	0.50	0.19	0.56	0.93	0.99	0.55	0.85	0.23	0.37	0.09	0.12	0.08	0.45
Malawi	108	0.42	0.41	0.62	0.30	0.52	0.55	0.16	0.81	0.60	0.51	0.56	0.12	0.30	0.29	0.49
Angola	109	0.42	0.63	0.55	0.21	0.44	0.65	0.81	0.58	0.71	0.45	0.46	0.17	0.17	0.13	0.36
Tunisia	110	0.41	0.77	0.46	0.20	0.39	0.95	0.98	0.48	0.60	0.20	0.55	0.06	0.04	0.11	0.59
Morocco	111	0.41	0.74	0.47	0.20	0.29	0.96	0.98	0.64	0.60	0.17	0.47	0.10	0.07	0.06	0.56
Congo	112	0.41	0.52	0.58	0.23	0.41	0.68	0.48	0.74	0.62	0.39	0.55	0.19	0.10	0.10	0.51
Greece	113	0.40	0.75	0.54	0.16	0.33	0.92	0.99	0.72	0.81	0.33	0.30	0.07	0.04	0.06	0.47
Yemen	114	0.39	0.56	0.51	0.22	0.24	0.75	0.70	0.73	0.68	0.20	0.41	0.12	0.04	0.05	0.65
Gabon	115	0.39	0.39	0.63	0.24	0.38	0.07	0.73	0.62	0.73	0.59	0.59	0.35	0.12	0.12	0.35
Rwanda	116	0.39	0.35	0.49	0.34	0.40	0.54	0.10	0.75	0.64	0.31	0.27	0.23	0.10	0.15	0.86
Benin	117	0.38	0.44	0.48	0.27	0.58	0.51	0.24	0.61	0.52	0.40	0.37	0.16	0.12	0.08	0.71
Burkina Faso	118	0.38	0.40	0.56	0.25	0.48	0.60	0.13	0.63	0.74	0.39	0.46	0.11	0.08	0.10	0.70
Niger	119	0.38	0.32	0.59	0.30	0.42	0.43	0.11	0.76	0.70	0.39	0.49	0.15	0.11	0.06	0.86
Guinea	120	0.38	0.36	0.56	0.26	0.47	0.45	0.17	0.63	0.54	0.56	0.51	0.19	0.18	0.17	0.50
DR Congo	121	0.36	0.41	0.56	0.20	0.42	0.54	0.28	0.63	0.77	0.55	0.30	0.13	0.11	0.08	0.48
Madagascar	122	0.35	0.38	0.52	0.23	0.67	0.31	0.16	0.85	0.67	0.31	0.25	0.13	0.27	0.10	0.40
Mali	123	0.34	0.28	0.58	0.24	0.49	0.00	0.34	0.68	0.82	0.40	0.42	0.16	0.06	0.08	0.67

Table 3.12: RCI 2.0 scores and ranks for missing values - dimensions and components (contd.)

Country	rank	rcig	LC	PR	CV	emp	tele	info	friends	support	finance	trust	coll.	solidr1	solidr2	safe
Australia	.	.	.	0.75	0.46	.	0.92	0.99	0.86	0.94	0.55	0.64	0.16	0.34	0.67	0.65
Bahrain	.	.	0.78	.	.	0.35	0.99	1.00	.	0.89	0.49	.	.	.	.	.
Belize
Bhutan
Burundi
Central African Rep.
Chad	.	.	.	0.58	0.19	0.49	0.64	.	0.70	0.67	0.46	0.50	0.18	0.12	0.13	0.33
Côte d'Ivoire
Djibouti
Egypt	.	.	0.75	.	0.22	0.35	0.92	0.97	.	0.73	.	0.47	0.09	0.07	0.15	0.57
Ethiopia	.	.	0.45	.	.	0.54	0.50	0.30	.	0.66	0.23	0.43	.	0.11	0.10	0.69
Guyana
Jamaica
Japan	.	.	0.82	.	.	0.48	0.99	0.99	.	0.90	0.35	.	.	.	.	0.77
Korea, Republic	.	.	0.78	.	.	0.43	0.93	0.97	.	0.77	0.49	.	.	.	.	0.67
Kuwait	.	.	0.84	.	.	0.54	0.99	1.00	.	0.89	.	.	.	.	.	.
Lesotho
Liberia
Libya	.	.	0.79	.	.	0.43	0.96	0.98	.	0.85	0.56	0.72	0.25	0.37	0.29	.
Mauritius
Mozambique
Namibia
Puerto Rico
Qatar	.	.	0.78	.	0.48	0.38	0.99	0.98	.	0.84	0.59	0.73	0.20	0.19	0.60	0.92
Saudi Arabia	.	.	0.78	0.54	.	0.35	0.99	0.99	0.66	0.80	0.12	0.58	.	0.14	0.27	.
Sierra Leone
Singapore	.	.	0.84	.	0.43	0.58	0.94	0.99	0.83	0.79	0.35	.	0.08	0.17	0.55	0.90
Swaziland
Togo
Trinidad & Tob.
UAE	.	.	0.83	.	.	0.52	0.99	0.99	0.84	0.83	0.30	.	.	.	.	.
Uzbekistan	.	.	0.84	0.63	.	0.56	0.96	0.99	0.72	0.92	0.38	0.50	.	0.38	0.20	0.84
Zambia	.	.	.	0.74	0.28	0.41	0.66	.	0.75	0.78	0.78	0.63	0.16	0.27	0.22	0.46

CHAPTER 4

Relational Capabilities and Subjective Well-Being: Influence of Exclusion and Ethnic Polarization

1 Introduction

This chapter presents a novel approach to ethnic polarization in a country and extends its relevance beyond social conflict and civil wars to subjective well-being (SWB) and relational capabilities construct.

I test the hypothesis whether the individual sense of exclusion (disenfranchisement and discrimination) as a result of lack of social cohesion is a close correlate of how polarized a country is rather than of how fractionalized the same country is. My results point to ethnic divisions influencing exclusion - polarization to a larger extent than fractionalization. My results also suggest that exclusion is a significant determinant of the individual's SWB; and also how engaged the individual is in the public sphere of their existence as measured by the civic commitment dimension of Relational Capabilities Index (RCI).

I use Latinobarómetro for the years 2001 and 2009 - a representative opinions survey of some 18 Latin American countries.

Social cohesion is desirable for normative reasons. Social cohesion also has merits that can be felt in all spheres of a society - social, cultural, political, and it is also definitely economically prudent as many studies have tried to demonstrate. The literature on social cohesion has taken several forms implicitly and directly over the decades, albeit by specific to different domains of knowledge in all of the social sciences.

Social cohesion is a recurrent theme in the social capital literature with cohesion as a key aspect. [Putnam et al. \(1993\)](#) notes that social cohesion, political harmony, and good governance as an implicit precondition to the existence of a thriving civic community and people's engagement in associational activities. [Olson \(1982\)](#) in his seminal work points out that the groups of people in a society requires cohesion to promote growth. There is also a further classification by [Putnam and Goss \(2002\)](#) of social cohesion as bonding networks, "connecting people who are like one another in important respect and bridging networks ('connecting people who are unlike one another'); and how these facilitate formal and informal groups creation. This in turn translate to the quality of institutions that determine economic growth ([Knack and Keefer \(1997\)](#), [Acemoglu et al. \(2005\)](#), [Algan and Cahuc \(2014\)](#), [Easterly \(2007\)](#), [Alesina et al. \(2003\)](#), [Rothstein and Stolle \(2008\)](#)). Yet, there is no clear consensus in the literature of what social cohesion encompasses. Hence, I proceed to focus on the *inverse* of social cohesion - social exclusion - which has been rather explicitly studied as opposed to social cohesion.

Exclusion is a construct that I posit as arising from lack of social cohesion. Exclusion could have important implications for social inequalities. There is a vast body of literature studying the effects of migrants on the host economies on economic, fiscal and social consequences - of sending and receiving economies; and question of immigration has always been a debate in the view of political economy.¹ On the other hand, the effect of immigration on home country and their incentives to migrate have also been studied in the development literature of migrantsremittances and the "brain drain" effects on home countries - [Azam and Gubert \(2006\)](#), [Chami et al. \(2005\)](#), [Bhagwati and Hamada \(1974\)](#) and [Beine et al. \(2008\)](#). More recently, there are studies like [Nikolova and Graham \(2015\)](#) and [Akay et al. \(2014\)](#) focused on the well-being and quality of life of natives *and* migrants as an event of immigration. [Polgreen and Simpson \(2011\)](#), among many others, suggest that migration is associated with unhappiness. This hints at the exclusion of the sort associated with lack of freedom and opportunities (I shall discuss this further in the results section of the related evidence found in my dataset).

Another manifestation of exclusion is found in the literature on social inequalities and especially horizontal inequalities² which broaden the scope from class divisions to include cleavages along the lines of race and ethnicity. This is also covered in the cultural-structuralist approach of systematic exclusion as presented in [Bourdieu and Passeron \(1990\)](#).

Building upon the pioneering work of [Lenski \(1966\)](#), more recently Economics has studied group-based inequalities. Both in Sociology and Economics, the primary focus has been the study of disadvantaged groups - race, gender, ethnic minorities, indigenous groups etc. There is a range of experimental evidence ([Hoff and Pandey \(2004\)](#) and [Bertrand and Mullainathan \(2004\)](#)) and empirical evidence of policy interventions, and other studies to inform policy debate ([Brown et al. \(2000\)](#), [Thorp and Paredes \(2010\)](#), [Eversole et al., eds \(2005\)](#), [Wodak \(2008\)](#) and [Beaman et al. \(2009\)](#)). As [Appadurai \(2004\)](#) puts it, "Poverty is many things, all of them bad. It is material deprivation and desperation. It is lack of security and dignity. It is exposure to risk and high costs for thin comforts. It is inequality materialized. It diminishes its victims. It is also the situation of far too many people in the world, even if the relative number of those who are escaping the worst forms of poverty is also increasing."

In psychology, there is a wealth of knowledge on exclusion in the study of

¹ Refer to [Haas \(2010\)](#) for a historical perceptive political economy perspective of migration.

² Refer to [Stewart et al. \(2005\)](#) where they illustrate the importance of horizontal inequalities (between groups) as compared with vertical inequalities (between individuals) with evidence from the United States and South Africa.

stress, motivation, self-worth, self-esteem and what constitutes a purposeful life for individuals (Maslow (1943), Costa and McCrae (1980), Keyes (1998), Masten et al. (2009) and Stillman et al. (2009) among others.). Related to this chapter, there is evidence found of a general consensus that (ethnic) minority status is a negative predictor of psychological well-being originating from social exclusion³.

Another research topic that has been crosscutting disciplines is SWB. Psychologists have long been interested in the psychological well-being, which is a related concept to SWB of individuals; essentially to analyze whether the individual perceives his or her life as worthwhile. Recently, SWB has been taken with great interest by economists and public policy analysts since it has been starting to serve as a useful goal criterion (Diener (2000), Veenhoven (2004), Clark and Senik, eds (2014) and Graham (2005) (with a focus on Latin America relevant to this chapter)). This is undertaken by understanding the determinants of an individual's SWB⁴. However, SWB literature has not adequately considered social exclusion as a (potential) determinant⁵.

The ultimate objective of this study is to enrich policy debate through addressing the impact of social exclusion, in particular, the cognitive evaluation of exclusion. A mention to the capabilities approach as made popular by A. Sen is necessary (Sen (1979a) and Sen (2001))⁶. Especially, given that relational capabilities construct operationalized by Relational Capabilities Index (RCI) is used in this chapter. The RCI succinctly captures the above-discussed dimensions⁷ - inclusion/exclusion and social networks (the dimensions of the index include - integration to network, private relations, and civic commitment⁸). In its inception and in the construction of the index (see table below), Relational Capabilities approach aims to introduce social capital and social inclusion in the capabilities paradigm. Hence, these two indicators (SWB and relational capabilities) constitute my outcome (or dependent) variables of interest to observe the interplay of perception of exclusion on the goal criteria of SWB and relational capabilities. These two outcome variables jointly constitute the *Quality of Life* assessment.

³ Refer to Walton and Cohen (2011) and Yoo and Lee (2005)

⁴ SWB has two key components. First, hedonic (emotional evaluations) well-being which is commonly measured as the happiness question. Second, eudaimonic (cognitive evaluations) well-being which is commonly measured as the life satisfaction question.

⁵ To my knowledge, there are two studies making this link from a distance - Bellani and D'Ambrosio (2010) and Vroome and Hooghe (2015)

⁶ A unique article by Graham and Nikolova (2015) brings these two domains of SWB and capabilities together.

⁷ Alternately, A. Sen terms this as substantive freedoms of people to lead the lives they have reason to value.

⁸ Refer to the latest continuous version of the index, RCI 2.0 - Giraud et al. (2015); Giraud and Renouard (2009) and Giraud et al. (2012) for the theory and application of relational capabilities which is informative for this study.

The analytical framework of this study faces some challenges. Perceptions of exclusion are probably the robust way to evaluate social exclusion, but this comes with an intractable problem of endogeneity - *causality*. This would mean that less happy people are more likely to perceive social exclusion and even to report as being in the minority group. I do acknowledge that the results presented in this chapter cannot be interpreted as causal evidence despite a number of ways I try to approach this problem by cross-checking the data and its results with the evidence found in the literature and performing several robustness checks - descriptively and analytically. On this front, the novelty or contribution of this paper is the utilization of the dashboard measurement metrics of social divisions, a *second best* way to corroborate evidence that explains social exclusion via - fractionalization and polarization index - as extensively found in the study of economic growth, provision of public goods, social conflict and civil wars.

Table 4.1: Relational Capability Index: Dimensions and components

Dimensions	Components	Deprived if
Integration to network	Employment status Access to transport Access to telecommunications Access to information	No stable job with regular professional relations Not satisfied with public transport Does not use a phone (portable or landline) Doesn't obtain news more than 3 days/week from radio, television or newspaper
Private relations	No. of people in the HH Family ties Close friends Financial support Trust in the community	- missing - Doesn't feel that he & his family are heading in the right direction - missing - No remittances from relatives or friends Safety in the neighborhood getting worse
Civic commitment	Membership Collective action Vote Solidarity Trust in others	- missing - Doesn't believe social movements are normal or necessary Does not vote - missing - No trust in people in general

2 Social Divisions

I postulate that social conflict is often a symptom of social exclusion. This appears observable and is supported by experiences of many individuals and particular groups in the world. Social exclusion can be reflected in a range of phenomena experienced in various degrees compared to other groups in the same society. This is the reason I investigate the dashboard measures of social divisions - simple (groups) proportions, fractionalization, polarization, cultural distance, segregation, crosscuttingness, horizontal inequality, and intermarriage indicators. This clearly and may even explain some individuals and groups' sense of social exclusion.⁹ Due to data constraints, I propose testing three measures which include: proportions of groups, fractionalization, and polarization.

The study of social divisions undertaken for the last few decades has been primarily focused on the analysis of social conflict. The purpose is to understand the potential resulting or outbreak of a civil war (propensity, onset, duration and intensity of a conflict). The works of [Esteban and Ray \(1994\)](#), [Montalvo and Reynal-Querol \(2002\)](#) and [Duclos et al. \(2004\)](#) has explored this in depth and explain the conditions under which a social conflict can occur.

This study of social conflict further developed towards other domains as found in the analysis of public goods provision such as ([Banerjee et al. \(2005\)](#), [Alesina et al. \(2016\)](#), [Egel \(2013\)](#) and [Gisselquist et al. \(2016\)](#)). Economic growth is the focus by ([Easterly and Levine \(1997\)](#) and [Staveren and Pervaiz \(2015\)¹⁰](#)). This ever increasing empirical work suggests that diversity has adverse impacts. In fact, [Habyarimana et al. \(2007\)](#) suggested that instead of confirming that such a relationship exists, research should focus on under what conditions the relationship exists. However, there is novel evidence contesting such a widely accepted relationship - [Gisselquist et al. \(2016\)](#) - that diversity can indeed support clear welfare gains.

The most notable measures of social divisions utilized in the literature for studying a variety of topics are fractionalization and polarization. Both these indexes of social divisions (in its basic form) measure the probability that two individuals are drawn from a sample belonging to a different group. The difference between these measures is that fractionalization is not affected by the size of the group that the two individuals belong to; whereas the polarization index is weighted by the relative size of the (all) group that the two randomly drawn

⁹ Refer to [McDoom and Gisselquist \(2015\)](#) for a detailed review of how these measures of social divisions relate to each other theoretically, conceptually and empirically.

¹⁰ The latter paper is a new effort in clarifying the channels of ethnic diversity and economic growth.

individuals belong to. In other words, fractionalization index can be viewed as an index of *diversity* or the group heterogeneity of the sample as the size of the groups does not matter in the construction of the index. On the other hand, the size of the groups affects the polarization index and hence it can be viewed as the *representation* of the different groups in the sample.

In a nutshell, my chapter is to examine the associations of perceptions of exclusion on SWB and relational capabilities, if any. Furthermore, I want to verify if social divisions explain the individual's perception of exclusion. I expect that polarization *rather than* fractionalization should explain the exclusion better if the theory and empirical works of social divisions is any indication.

3 Data and methods

I use region-wide data from Latin American countries to test my hypotheses from Latinobarómetro surveys. These surveys are uniquely suited for my analysis. This is an annual opinion survey, which includes approximately 20,000 individual interviews across 18 countries of Latin America and the Caribbean (LAC). The surveys are designed to monitor the development of democracies, economies, and societies - using surveys to provide information using indicators of opinions, values, attitudes, and behaviors. Latinobarómetro lack data on income whereas, it has data on wealth. Wealth is the sum of past income and the determinant of availability to save, it is, therefore, a good proxy for income I believe¹¹), I have all the variables that I am interested in this study as I detail below.

Dependent variables: The dimension of SWB - life satisfaction - the evaluative judgment of one's life as a whole is available in these surveys as a four-point Likert-type scale of this form, "*Generally speaking, would you say that you are satisfied with your life?*" with responses of "very satisfied", "quite satisfied", "not very satisfied" and "not at all satisfied" to choose from.

My other outcome variable of interest being relational capabilities, I use a set of questions found in the Latinobarómetro 2009 survey to construct the RCI for all individuals in the sample. Questions utilized from the 2009 survey (refer to Table 1) relate to individual's *Integration to networks* - stable employment, satisfaction with public transport, access to fixed phone/cell phone, access to information through television/newspaper/radio; individual's *Private relations* - feels her/his family is heading in the right direction, financial support from relatives/friends, safety perception of the neighborhood the individual living in; and individual's

¹¹ Data on types of assets available range from ownership of television, mobile phone and computer to owning second/holiday home. I construct a (simple average) wealth index from this.

Figure 4.1: SWB in LAC (2001)

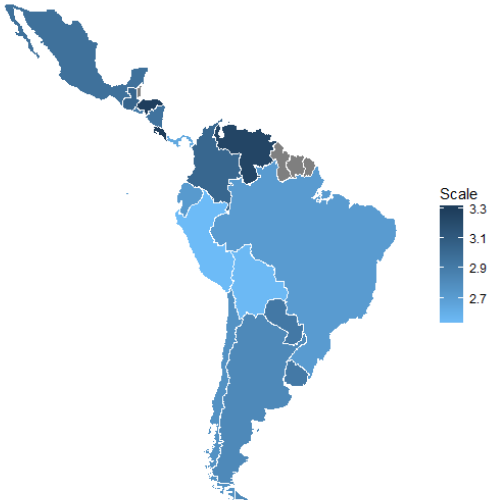


Figure 4.2: SWB in LAC (2009)

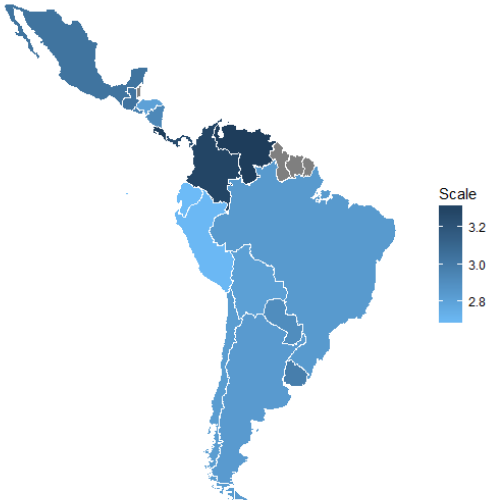


Figure 4.3: RCI in LAC (2009)



Civic commitment - belief in social movements, voted in elections or not, trust in people in general;^{12 13}:

Independent variables: information on the standard socioeconomic correlates like age, age squared, sex, education, occupation, marital status, size of the town/city, religious denomination, religiosity, ethnicity and wealth index. In addition, my explanatory variable of interest is the perception of social exclusion. Questions related to exclusion perception is present in the 2001 and 2009 survey wave.

2001: *“How do you feel, mainly? Do you feel like a White, a Mestizo, a (nationality), an Hispano American, an Indigenous, a Black or an Immigrant?”*

This question captures the feeling of being disenfranchised that might allow people to choose their ethnic identity over identifying themselves as a citizen of that nation¹⁴. This serves as an indicator of social exclusion. I code this as an indicator variable where 1 = *not a (nationality)*, and 0 otherwise¹⁵. In 2009, I utilize a different question than the one (only) available in 2001.

2009: *“Would you describe yourself as part of a group that is discriminated in (country) or not?”*¹⁶

Starting 2009, Latinobarómetro surveys have incorporated the question of whether the respondent believes to be part of an ethnic group that is discriminated against. This is a contingent evaluation method (as used in stated preferences studies), and hence I believe this measure qualifies as a good candidate for explaining (part of the) SWB and relational capabilities. These are the overall robust assessments of lives in the evaluative sense and in the multidimensional approach respectively. Especially since revealed preferences approach performs worse than the stated preferences due to adaptation and coping mechanisms of individuals. In other words, individuals are denied the opportunities to change the situation. This results in individuals understating the welfare costs of say pollution, inequality, inflation and unemployment.¹⁷ This is demonstrated with

¹² RCI could not be constructed for 2001 and hence omitted, because a significant number of components that constitute the dimensions of RCI is not available, or deemed insufficient to best reflect the information captured in RCI.

¹³ Find in table 1 of appendix, the original set of questions used to construct RCI. They also reflect the ideal set of information to best reflect the RCI construct. As you might notice, by comparison, the questions found in Latinobarómetro 2009 still closely reflect the ‘ideal’ RCI. However, this does not apply to the 2001 survey, hence I have omitted this round to construct RCI.

¹⁴ This is a recurring theme of questions on opinions asked in values surveys. For instance, Afro Barometer surveys explicitly ask the respondents to choose between their national identity and ethnic identity.

¹⁵ I could also extend this to the feeling of an immigrant, but for simplicity, I restrict my exclusion variable to only ‘disenfranchisement’.

¹⁶ This question reappears every year after 2009. A forthcoming extension paper will focus on a longitudinal study of the same hypotheses.

¹⁷ However, Layard (2006) maps out the merits and pitfalls of this approach which serves as a

examples from Latin America by [Graham \(2009\)](#). This variable is coded as 1 = *yes*, describe oneself as part of a group that is discriminated against and 0 otherwise.

As I am interested in investigating how social divisions might affect social exclusion in explaining SWB and relational capabilities. I construct these measures of social divisions (find below) with data on ethnic identities and interact them with individual's sense of social exclusion. In the following section, I clarify this relationship as presented in my model and measures of social divisions.

3.1 Model

$$SWB_{i,c} = \alpha + X'_{i,c}\beta + Excluded'_{i,c}\gamma + ETH'_c\delta + Excluded'_{i,c} * ETH'_c\zeta + F_c + \epsilon_{i,c} \quad (4.1)$$

$$RCI_{i,c} = \alpha + X'_{i,c}\beta + Excluded'_{i,c}\gamma + ETH'_c\delta + Excluded'_{i,c} * ETH'_c\zeta + F_c + \epsilon_{i,c} \quad (4.2)$$

As mentioned earlier, my dependent variables are $SWB_{i,c}$ and relational capabilities ($RCI_{i,c}$)¹⁸ for each individual i in country c . X' a vector of socioeconomic correlates. F_c are the country fixed effects included to control for country level differences. *Excluded* is the explanatory variable of interest of social exclusion ('disenfranchised', in 2001 and 'discriminated', in 2009). ETH_c is the measure of social divisions which is constructed taking the country-level ethnic identities composition as the base¹⁹. I construct fractionalization (*FRAC*) and polarization (*POL*) indexes and utilize these subset of measures of social divisions as presented below.

3.1.1 Relational Capabilities Index

$$D_k = \frac{1}{n} \sum_{i=1}^n a_i$$

$$RCI = \left(\prod_{k=1}^3 D_k \right)^{\frac{1}{3}} \quad (4.3)$$

Here, a_i are the components of RCI and D_k are the dimensions of RCI as found in table 1. The RCI is a geometric mean allowing for imperfect substitutability at the dimensional level (D_k). However, simple average that verify perfect sub-

useful guidebook to inform public policy.

¹⁸ I test the model for different components and dimensions of RCI to see the association of exclusion on individual components and dimensions of relational capabilities.

¹⁹ Although country level aggregation computation of social divisions is the convention, I could also explore a construction of these measures at a much more local level.

stitutability property is used at the component level (a_i)²⁰ as can be observed in equation (3).

3.1.2 Fractionalization

$$FRAC = 1 - \sum_{i=1}^n \pi_i^2 \quad (4.4)$$

Here, π_i is the proportion of individuals that belong to group i and n is the number of groups. This measure produces scores ranging between 0 (perfect homogeneity) and 1 (perfect heterogeneity) i.e., the probability that two randomly selected individuals belong to a different group. This is the most commonly used measure of social divisions.

3.1.3 Ethnic polarization: Esteban-Ray (1994)

$$POL - ER(\pi, k) = k \sum_{i=1}^n \sum_{j=1}^n \pi_i^{1+\alpha} \pi_j |y_i - y_j| \quad (4.5)$$

$$k > 0$$

$$\alpha \in (0, \alpha^*] \text{ where } \alpha^* \simeq 1.6$$

3.1.4 Ethnic polarization: Reynal-Querol (2002)

$$POL - RQ = 1 - \sum_{i=1}^n \left(\frac{0.5 - \pi_i}{0.5} \right)^2 \pi_i \quad (4.6)$$

π , i and n is the same as in $FRAC_c$. k is any constant, and α is ‘polarization sensitivity’ ranging from 1 to 1.6 (least sensitivity to highest sensitivity). $|y_i - y_j|$ is the euclidean income distance of the individuals belonging to i and j groups. Essentially, the POL-RQ belongs to the same family of measures as POL-ER, and is a specific case of discrete polarization when I substitute the euclidean income distance to *does/does not belong* to the group. Hence, $POL-ER(1,4) = POL-RQ$. This measure attains a maximum value at symmetric bi-modal distribution ($n=2$ and $\pi = 0.5$).

The basic difference between the construction of fractionalization index and polarization index is the relative size of each group’s contribution to the index. This is central to the study and analysis of the social divisions as the size of a group determines its ability to organize and mobilize for various ends. In fractionalization, each of the terms in the sum is the probability that two randomly

²⁰ The justification for this aggregation method of a human development composite index (RCI) is found in Giraud et al. (2015).

selected individuals belong to different groups when one of them belongs to a particular group i . These probabilities have the same weight in each of the terms of fractionalization index, but they have the weight equal to the relative size of group i in the case of polarization index.

Put differently, in fractionalization index, the size of each group has no effect on the weight of the probabilities of two individuals belonging to different groups (say i and j , $i \neq j$). However, in the family of polarization indexes, these probabilities are essentially weighted by the relative size of each group and are definitely true in my specific measure.

Roughly speaking, I can say that large (small) groups contribute to the index of polarization proportionally more (less) than their relative size. The opposite is true for the index of fractionalization: large (small) groups contribute to the index less (more) than their relative size.

4 Results - descriptive

Ethnic composition in the region as found in table 2 suggest that the Mestizos as a self-described ethnic identity are the majority in the region on average. The smaller or minority groups by population share include the Mulatto, Black and Indigenous persons that represent 10% of the population share or less²¹. However, all these ethnic groups population share varies widely from country to country.

The term "Mestizo" means mixed in Spanish and Portuguese, and is generally used throughout the LAC to describe people of mixed ancestry that include a white European and an indigenous background. Similarly, the term "Mulatto" – *mulato* in Spanish – commonly refers to a mixed-race ancestry that includes white European with black African roots.

The regional average of Mulatto is at around 5%. In Brazil and the Caribbean countries where populations with African ancestry are widespread, their share can go up to 15%. This is similar with the Mestizos, they represent a majority in Mexico, and they are among the largest groups in most other Central American countries.

Sole increase in a population share is found among individuals identifying themselves as Mulatto, Mestizo and Asian by 1.36% and 12.58% and 0.07% respectively between 2001 and 2009 in the region. I also have taken note of the missing values in the surveys at 6.61% and 8.08% in 2001 and 2009 respectively.

²¹ Although, Indigenous population is at 11.44% in 2001 and 8.59% in 2009, they are widely referred to as minorities in the LAC region due to their socioeconomic disadvantage. This is also evident for the Indigenous group when I observe other metrics in this database.

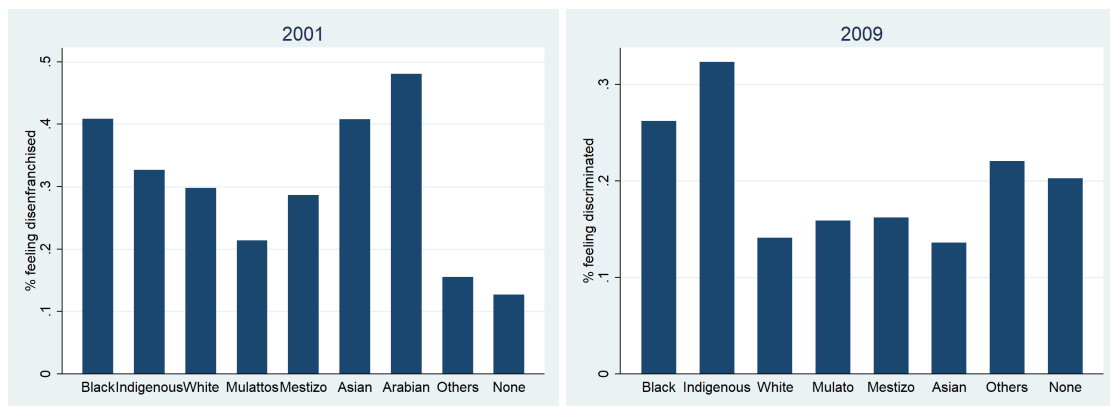
These pertain to “No answer / Don’t know”²² and could be for a variety of reasons from people not willing to disclose their ethnic identity, not willing to be identified as part of one ethnic identity, not actually knowing their entire ancestry to provide a clear reply, or even consider that this is a private question to respond.

In figure 1, the exclusion perception of disenfranchisement and discrimination, as I notice here can reach approximately 50% and 30% in 2001 and 2009 respectively for certain groups.

Table 4.2: Ethnic composition for years 2001 and 2009

Ethnicity	2001			Ethnicity	2009		
	Freq.	Percent	Cumulative		Freq.	Percent	Cumulative
Black	1,415.77	7.81	7.81	Black	901.25	4.46	4.46
Indigenous	2,073.76	11.44	19.24	Indigenous	1,735.8	8.59	13.05
White	5,086.19	28.05	47.29	White	5,549.59	27.47	40.52
Mulatto	839.52	4.63	51.92	Mulatto	1,209.4	5.99	46.51
Mestizo	5,529.56	30.49		Mestizo	8,701.88	43.07	89.58
Asian	137.98	0.76	83.17	Asian	168.44	0.83	90.41
Arabian	68.62	0.38	83.55	Others	305.73	1.51	91.92
Others	907.2	5.00	88.55	.	1,631.89	8.08	100.00
None	878.05	4.84	93.39				
.	1,198.33	6.61	100.00				
Total	18,135	100		Total	20,204	100	

Figure 4.4: Exclusion perception by ethnicity for 2001 and 2009.



Note: The y-axes scale for 2001 and 2009 are different.

Indigenous groups’ exclusion perception hasn’t changed between the two years on the indicators of disenfranchisement and discrimination, whereas it has improved for all other groups. The group’s feeling of disassociation with national identity is at 32.29% from 2001 survey. Indigenous persons are also most likely compared to other groups to report to have experienced discrimination according to my findings from 2009 survey at 26.69% of all indigenous persons. These experiences of discrimination based on ethnic identity reflect in them having

²² I ensure that the missing values don’t bias my results in the robustness checks.

among the lowest perception of upward mobility as can be observed in Figure A5 in the appendix. Every other ethnic group edge out the Indigenous group in their perception of upward mobility which also includes respondents who identify themselves as Black in 2001 and 2009²³. These are similar to the findings found in these comprehensive reports on Indigenous persons in the LAC region - [Eversole et al., eds \(2005\)](#) and more recently [Costa et al. \(2015\)](#).

In 2001, apart from the Arabian and Asian groups (who also incidentally constitute the smallest groups in the region), persons identifying themselves as Black feel the most disassociation from being a citizen of a country (48.09% and 40.82% and 40.83% respectively for Arabian, Asian and Black groups). In 2009, respondents belonging to Black group after the Indigenous group is among the most likely to report to have experienced discrimination due to their ethnic identity (26.22% and 32.35% respectively for Black and Indigenous groups). Black and Indigenous groups represent a population share of 7.81% and 11.44% in the same year of 2009.

Country wise averages of social exclusion provide additional insights on the concentration of these negative phenomena of disenfranchisement and discrimination (Figure A1 and A2 in Appendix). Brazil which has a relatively high share of the Black population also has the highest proportion of the total population (all groups) who prefer to identify themselves with their ethnic identity rather than their national identity - over 50%. This is similar in the other Andean countries of Latin America where the share of people belonging to Indigenous groups are relatively higher - Ecuador, Peru, and Bolivia (43.06%, 34.73% and 27.71% respectively). Mexico is another large Latin American nation situated in Central America which has higher proportions of their population disassociating themselves from national identities (33.68%).

Mexico also features among the top in 2009 with the total population shares having experienced discrimination at 16.82%. Again, Bolivia, Brazil, Peru and Ecuador²⁴ are among the countries with the largest shares of their population reporting to have been discriminated against due to their ethnic identities.

The importance of unpacking social exclusion cannot be stressed enough. Social exclusion also has consequences as I notice in the database for 2009 (table 3) where the intention to migrate (people who have *seriously* considered migrating) among discriminated to another country is higher compared to the people without the intent (20.62% to 17.22%), whereas the people without the intent to migrate are

²³ Concurrently, the perception of upward mobility has marginally improved for all groups between 2001 and 2009.

²⁴ In that order, at 31.71%, 26.36%, 24.69% and 21.74% respectively.

also the largest chunk of the total population not experienced discrimination.²⁵

Table 4.3: Exclusion and Intent to Migrate - 2009

Discriminated	Intent to migrate		Total
	0	1	
0	13203	2738	15941.7
	82.78	79.38	82.18
1	2746	712	3457.27
	17.22	20.62	17.82
Total	15948.95	3450.049	19399
	100	100	100

Table 4.4: Exclusion by Size of Town

Exclusion	Size of town							Capital	Total
	Up to 5'	5'-10'	10'-20'	20'-40'	40'-50'	50'-100'	>100'		
2001 - Disenfranchised									
No	269.57	644.68	1053.96	1762.93	554.50	1486.18	3471.33	3596.36	12839.51
	2.10	5.02	8.21	13.73	4.32	11.58	27.04	28.01	100.00
	68.30	74.50	76.64	77.59	78.72	70.82	65.69	69.96	70.80
Yes	119.86	214.83	295.00	477.01	138.99	562.31	1738.94	1475.83	5022.78
	2.39	4.28	5.87	9.50	2.77	11.20	34.62	29.38	100.00
	30.37	24.83	21.45	20.99	19.73	26.80	32.91	28.71	27.70
2009 - Discriminated									
No	803.71	858.66	1698.71	2220.58	890.12	1705.31	5430.15	2319.06	15926.30
	5.05	5.39	10.67	13.94	5.59	10.71	34.10	14.56	100.00
	79.62	77.85	74.29	78.98	77.22	80.54	80.36	78.19	78.83
Yes	172.96	192.54	477.31	476.02	210.42	316.35	1054.89	553.44	3453.93
	5.01	5.57	13.82	13.78	6.09	9.16	30.54	16.02	100.00
	17.13	17.46	20.87	16.93	18.25	14.94	15.61	18.66	17.10

Note: A quick look suggests that size of town doesn't matter for the sense of exclusion in the years 2001 and 2009.

However, internal migration from rural areas to urban areas, for instance, doesn't seem to provide that respite that excluded people hoped for as I notice from table 4. The motivations and incentives to migrate are numerous. They can be categorized as absolute and relative deprivation in terms of income or otherwise, and including social exclusion - [Massey et al. \(1993\)](#) and [Stark and Taylor \(1989\)](#). There are several studies in the developing and developed world context linking the social exclusion to poverty-related deprivation - [Shields and Price \(2005\)](#) and [Gordon et al. \(2000\)](#).

This result is interesting because migration to cities or urban areas has long been championed to be a liberating force to the migrants. But I notice here that despite the economic gains, the sense of social exclusion is not that different in

²⁵ The intent to migrate question is as follows - "Have you and your family ever seriously considered going to live abroad?" (Yes/No).

urban areas or the economic centers of a society in comparison with low-income areas. This phenomenon is studied in depth in the SWB literature. The paradox of income failing to contribute to SWB after a certain level of income is explored in the eponymous works of - [Easterlin \(1974\)](#) and more recently [Easterlin et al. \(2010\)](#) where he (re)establishes the relationship. Tables 5 and 6 below and the figure A4 in appendix on the wealth index cumulative distribution function graphs, descriptively lends support for this relationship in the Latin American context that there are the first emerging signs of the Easterlin Paradox.²⁶ This is also the founding principle of the capability approach to moving away from a myopic income approach of human development and operationalized in the Human Development Index (HDI) of the United Nations Human Development Reports (UNHDR). This approach is further developed in the RCI to include social networks and relational capabilities at an individual level; to reflect the social cohesion and social capital at the societal level as mentioned earlier.

Table 4.5: Change in SWB and Income per capita.

Trends: Latin America (2000-2011)	
(n=18, time span = 7-12 years, mean = 11.72 years)	
Annual change in LS (scale 1-4)	0.052
Annual growth in GDP/capita (percent)	2.557

Table 4.6: SWB, Wealth Index and Income per capita - 2001 and 2009

Latin America (n=18, LS=1-4 scale, 11 assets)			
Year	Life satisfaction	Wealth index	GDP/capita
2001	2.90	5.92	\$ 3,523.3
2009	2.97	9.87	\$ 4,290.1

Clearly, this perception of exclusion is not strictly restricted to the historically disadvantaged or minority groups like Black and Indigenous populations in the LAC. I notice that other ethnic groups are not that far on these indicators. The greater the intensity of social divisions along ethnic lines²⁷, perhaps creates animosity between groups that leads to the perception of exclusion by all groups despite a better socioeconomic status.

However, the social divisions alone might not fully explain the exclusion perception among non-Black and non-Indigenous groups. This sense of exclusion could be differently emanating for the different groups indeed, and of course a

²⁶ A discussion on the Easterlin Paradox with examples from Latin America is found in [Graham \(2005\)](#).

²⁷ Social divisions indexes capture the distance between (ethnic) groups along several bases, which in my opinion is an aggregate index that provides indication of negative phenomena of social exclusion at the micro-level (individual).

range of factors contributing to these groups in question as well. Growing sense of entitlement and/or greater expectations (or rather due to unmet expectations - [Graham \(2012\)](#)) from the government for better policies to improve incomes and opportunities might be another reason. Several theories and empirical works have tried to explain this phenomena of 'lackluster' improvements in one's lives. There is another relevant evidence from [Clark et al. \(2015\)](#) where the educational attainments of individuals translate into at best weakly positive satisfaction. This result is also confirmed in my data. Their results are explained away by increased aspirations or could be tied back to unmet expectations.

Differential cultural norms of specific ethnic groups could structurally shape perceptions and experiences about life. In addition, political scientists have long emphasized the importance of institutions and social contract of the state with its citizens to be one such determinant of people's experienced quality of life.^{28 29}

Table A2 presents the perceptions of Latin Americans' in their own personal future and that of their country's future from the sample of 2009. I disaggregate these perceptions by discriminated and non-discriminated people alike in this table. Figure A9 and A10 present the same information by ethnicity. From the entire sample, 35.7% have a favorable opinion that the country's future economic situation is bound to improve ("*A little better*" and "*Much better*"). Out of which, people without discrimination experience have a favorable opinion at 36.57%, where discriminated people's favorable opinion is at 31.67%, a net difference of 4.9%. A similar gap is observed in people's optimism of their own future economic situation - favorable perception of the total population at 48.46%, non-discriminated population share at 49.42% and discriminated population share at 44.03% resulting in an optimism gap of 5.39%). Closing the gap within the entire population and in particular with the disenfranchised, discriminated, voiceless and in general socially excluded back into the cultural, economic, political and social life of a society is resonantly clear here.

The tepid confidence in the future state of the economy and their own economic prosperity can dampen aspirations, and hence may be the reason for the poor rating of government, political representatives, and the institutions. These very institutions are perceived to have failed to better the lives of the people in the LAC. This feeling is more pronounced among the discriminated population. Figure A8 describes the gap in reported confidence between the discriminated and non-discriminated population in a range of institutions and organizations.

²⁸ These are also reflected in the RCI scores when I disaggregate by dimensions (a special note on France's counter-intuitive relative low RCI score has been made).

²⁹ [Senik \(2014\)](#) provides a detailed account of the French unhappiness puzzle with a historical and cultural perspective of the French society.

Political parties followed by judiciary and other state machinery like the public administration, police and parliament attract the lowest confidence opinion among the population (in that order, 24.10%, 33.28%, 35.24%, 34.73% and 35.69% for the total population share) and discriminated people with the lower levels of 18.34%, 26.98%, 27.58%, 28.67%, 28.68% in the same order. The confidence gap between these two groups in these institutions is at least 7% and up to 10%). Church stands out among both groups believing to be most trustworthy of all institutions and organizations (71.18% and 68.10%). The confidence gap is also the lowest among the groups towards the Church (3.08%).

It is evident that religion and ethnic identities play a certain role in an individual's life in shaping their evaluative satisfaction of life and relational capabilities. Hence, I control for their differential effects using dummies in my model.

5 Results - regressions

I undertake OLS analysis in my regressions despite my dependent variable being ordinal, not cardinal (except for RCI). Ordered logit analyses could have been implemented, but in Ferrer-i Carbonell and Frijters (2004) the authors demonstrate that OLS works similarly in their performance as probit or logit analyses. In addition, coefficients from OLS are ready to interpret.³⁰ Another model that could have been utilized is the hierarchical linear model (multilevel analysis) since the social divisions variable is computed at the country level. I notice that given the lack of other country-level variables not included in my model (as it is also out of the scope of this chapter), I proceed with OLS³¹.

Of course, the indicative results discussed in the above section can be only treated with face-value as they are bi-variate correlations and there is a strong element of endogeneity - socially excluded people tend to report all types of negative phenomena. I am able to partially control for these correlates and disentangle the relative importance of each of the factors included in the analysis. This is not entirely clear from the endogeneity problem, but most importantly I attempt to see if measures of social divisions explain a part of the perceptions of social exclusion.

³²

Many variables affect the quality of life³³ of individuals. Age and age squared

³⁰ OLS is come to become the standard analytical framework in the literature.

³¹ I verify that multilevel analysis yield similar results as OLS.

³² Indeed, tables A5 and A6 in the appendix allow us to observe that socioeconomic factors partly explain the individual's perception of social exclusion.

³³ As mentioned earlier, Quality of life construct includes both subjective and objective measures of well-being.

terms of the age variable indicates that age takes a U-shaped relationship with SWB and RCI. This is found conclusively in the literature and summarized in [Clark and Oswald \(2006\)](#). I see that for 2001 and 2009 the U-shape is confirmed, and is at its minimum for the age group 40-49, and regains the positive relationship for age 50 and upwards.³⁴ Being male in LAC is more strongly correlated (as compared to women) with SWB and RCI. This result is contrary to the literature where vast evidence suggests that women are on average happier than men. [Graham and Chattopadhyay \(2013\)](#) find that women all over the world (including LAC), with the exception of sub-Saharan Africa, have higher levels of well-being. In the same paper, they also find that well-being gap between men and women is greater in older (aged 25 years and over) than in younger cohorts. However, new research from [Stevenson and Wolfers \(2009\)](#) suggest that the gender gap in life satisfaction is closing and has even reversed in most industrialized countries in the recent years. This suggests that country-wise study is useful.³⁵

Other demographic factors like wealth index (my proxy for income³⁶) and companionship status of the individuals have a similar relationship on the SWB and RCI as found in the literature.

The wealth index is a significant determinant of life satisfaction and relational capabilities. It draws a coefficient of roughly +0.05 in 2001, +0.028 in 2009 which is 5% and 2.8% of a step on the 4-step Likert scale³⁷ of higher life satisfaction with every extra asset of the wealth index. Wealthier people are evaluating their lives better than poor people. However, with a coefficient of +0.007 in 2009, the association remains positive and significant between wealth and relational capabilities but has a much lower magnitude of association on relational capabilities precisely because RCI includes dimensions and components that might not allow better wealth to easily access, other things being equal.

Separated/divorced/widowed people rate their lives significantly less than married people as can be seen from table 7 and 8. Table 9 suggests that the direction of the relationship holds for separated/divorced/widowed individuals on RCI, however, the coefficients are not significant. Being single also determines lesser life satisfaction and relational capabilities compared to being married. However, single people are relatively better off than the separated/divorced/widowed people.³⁸

³⁴ Refer to Figure A11 through A14 in the appendix.

³⁵ Refer to the coefficients of 'age', 'age squared' and 'male=1' tables 7, 8 and 9.

³⁶ It could also be considered a proxy for material well-being since the wealth index constitutes the goods and assets at the disposal of the household.

³⁷ To remind ourselves: the 4-step signifies, 4 = "very satisfied", 3 = "quite satisfied", 2 = "not very satisfied" and 1 = "not at all satisfied".

³⁸ Subjective economic status, subjective health status, and religiosity are significantly associ-

In 2001, education defined here as the number of years at school has a cross-sectional monotonically increasing relationship with life satisfaction. But in 2009, it displays a cross-sectional U-shape with life satisfaction. This is similar for relational capabilities and numbers of years of education of an individual albeit not significant. This will be interesting to explore further why the positive linear relationship in early 2000 has changed in the recent years; with more data for several years controlling for cohort effects might provide a clearer picture.

Interestingly, as I observe the social exclusion variables (disenfranchised and discriminated for years 2001 and 2009 respectively) I notice something striking. Being socially excluded amounts to 6.5% (2001), 17.9% (2009) lower life satisfaction evaluation out of one step on the 1-4 scale. These are obtained from the model specifications without the interaction terms of social exclusion and social divisions (model 3 in table 7 and 8).

ated with SWB and RCI. However, I choose to omit them in my model as I aimed to retain only the most exogenous variables as explanatory variables.

Table 4.7: SWB and Social Exclusion - 2001

	Model 1	Model 2	Model 3	Model 4	Model 5
Age	-0.014*** (0.00)	-0.013*** (0.00)	-0.013*** (0.00)	-0.013*** (0.00)	-0.013*** (0.00)
Age squared	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)
Male=1	0.030** (0.02)	0.038** (0.02)	0.040** (0.02)	0.040** (0.02)	0.040** (0.02)
Years at school	0.013* (0.01)	0.014* (0.01)	0.014* (0.01)	0.014* (0.01)	0.014* (0.01)
(Years at school) ²	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)
Wealth index	0.051*** (0.00)	0.049*** (0.00)	0.049*** (0.00)	0.049*** (0.00)	0.049*** (0.00)
Married (omitted)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Single	-0.018 (0.02)	-0.008 (0.02)	-0.005 (0.02)	-0.005 (0.02)	-0.005 (0.02)
Seperated/Divorced	-0.051** (0.02)	-0.048* (0.03)	-0.048* (0.03)	-0.048* (0.03)	-0.048* (0.03)
Lives in the Capital	-0.043** (0.02)	-0.038** (0.02)	-0.037* (0.02)	-0.037* (0.02)	-0.037* (0.02)
Self-emp (omitted)		0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Public wage		0.072*** (0.03)	0.070** (0.03)	0.070** (0.03)	0.070** (0.03)
Private wage		0.013 (0.02)	0.013 (0.02)	0.013 (0.02)	0.012 (0.02)
Unemployed		-0.182*** (0.03)	-0.185*** (0.03)	-0.185*** (0.03)	-0.185*** (0.03)
Retired		0.055 (0.03)	0.057* (0.03)	0.057* (0.03)	0.057* (0.03)
Homemaker		0.014 (0.02)	0.013 (0.02)	0.013 (0.02)	0.013 (0.02)
Student		0.029 (0.03)	0.025 (0.03)	0.024 (0.03)	0.024 (0.03)
Disenfranchised			-0.065*** (0.02)	0.094 (0.15)	-0.403** (0.20)
Disenfranchised*FRAC				-0.228 (0.22)	
Disenfranchised*POL					0.481* (0.29)
Constant	3.051*** (0.09)	3.046*** (0.09)	3.068*** (0.09)	3.075*** (0.09)	3.083*** (0.09)
Observations	16201	16201	16017	16017	16017
Adjusted R ²	0.103	0.107	0.108	0.108	0.108

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.8: SWB and Social Exclusion - 2009

	Model 1	Model 2	Model 3	Model 4	Model 5
Age	-0.018*** (0.00)	-0.017*** (0.00)	-0.018*** (0.00)	-0.018*** (0.00)	-0.018*** (0.00)
Age squared	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)	0.000*** (0.00)
Male=1	0.021* (0.01)	0.024* (0.01)	0.020 (0.01)	0.019 (0.01)	0.019 (0.01)
Years at school	-0.011* (0.01)	-0.011* (0.01)	-0.010 (0.01)	-0.010 (0.01)	-0.010 (0.01)
(Years at school) ²	0.001*** (0.00)	0.001*** (0.00)	0.001*** (0.00)	0.001*** (0.00)	0.001*** (0.00)
Wealth index	0.028*** (0.00)	0.027*** (0.00)	0.027*** (0.00)	0.027*** (0.00)	0.027*** (0.00)
Married (omitted)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Single	-0.027* (0.02)	-0.023 (0.02)	-0.025 (0.02)	-0.025 (0.02)	-0.025 (0.02)
Seperated/Divorced	-0.106*** (0.02)	-0.104*** (0.02)	-0.103*** (0.02)	-0.103*** (0.02)	-0.103*** (0.02)
Lives in the Capital	0.001 (0.02)	0.004 (0.02)	0.010 (0.02)	0.010 (0.02)	0.009 (0.02)
Self-employed (omitted)		0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Public wage		0.080*** (0.02)	0.084*** (0.03)	0.084*** (0.03)	0.083*** (0.03)
Private wage		0.019 (0.02)	0.018 (0.02)	0.018 (0.02)	0.017 (0.02)
Unemployed		-0.129*** (0.03)	-0.123*** (0.03)	-0.123*** (0.03)	-0.123*** (0.03)
Retired		0.022 (0.03)	0.016 (0.03)	0.015 (0.03)	0.014 (0.03)
Homemaker		0.009 (0.02)	-0.000 (0.02)	-0.001 (0.02)	-0.002 (0.02)
Student		0.052* (0.03)	0.043 (0.03)	0.042 (0.03)	0.042 (0.03)
Discriminated=1			-0.179*** (0.02)	-0.275*** (0.07)	-0.425*** (0.11)
Discriminated*FRAC				0.174 (0.12)	
Discriminated*POL					0.337** (0.15)
Constant	3.019*** (0.14)	3.029*** (0.14)	3.087*** (0.14)	3.080*** (0.14)	3.084*** (0.14)
Observations	18323	18323	17653	17653	17653
Adjusted R ²	0.098	0.100	0.107	0.107	0.107

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.9: RCI and Social Exclusion - 2009

	LC	PR	CV	RCI
Age	-0.001** (0.00)	-0.003*** (0.00)	0.010*** (0.00)	0.002*** (0.00)
Age squared	0.000 (0.00)	0.000*** (0.00)	-0.000*** (0.00)	-0.000* (0.00)
Male=1	-0.021*** (0.00)	0.012*** (0.00)	0.011** (0.00)	0.010** (0.00)
Years at school	-0.001 (0.00)	-0.002 (0.00)	-0.003 (0.00)	-0.003 (0.00)
(Years at school) ²	0.000 (0.00)	0.000 (0.00)	0.000*** (0.00)	0.000** (0.00)
Wealth index	0.007*** (0.00)	0.004*** (0.00)	0.002*** (0.00)	0.007*** (0.00)
Married (omitted)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Single	-0.017*** (0.00)	-0.007 (0.01)	-0.004 (0.00)	-0.016*** (0.01)
Seperated/Divorced	-0.007 (0.01)	-0.003 (0.01)	-0.010 (0.01)	-0.008 (0.01)
Lives in the Capital	-0.022*** (0.00)	-0.029*** (0.01)	0.013** (0.01)	-0.018*** (0.01)
Self-employed (omitted)	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Public wage	0.161*** (0.01)	0.019** (0.01)	-0.003 (0.01)	0.053*** (0.01)
Private wage	0.151*** (0.00)	0.001 (0.01)	-0.019*** (0.01)	0.040*** (0.01)
Unemployed	-0.005 (0.01)	-0.003 (0.01)	-0.020** (0.01)	-0.012 (0.01)
Retired	-0.047*** (0.01)	-0.022** (0.01)	-0.005 (0.01)	-0.031*** (0.01)
Homemaker	0.019*** (0.00)	-0.009 (0.01)	-0.020*** (0.01)	-0.014** (0.01)
Student	0.010 (0.01)	-0.004 (0.01)	-0.050*** (0.01)	-0.021** (0.01)
Discriminated=1	-0.043* (0.03)	-0.164*** (0.04)	0.029 (0.03)	-0.055 (0.04)
Discriminated*POL	0.039 (0.03)	0.169*** (0.05)	-0.057 (0.04)	0.015 (0.05)
Constant	0.695*** (0.03)	0.560*** (0.05)	0.431*** (0.05)	0.485*** (0.06)
Observations	14016	16151	16417	12285
Adjusted R ²	0.191	0.027	0.063	0.049

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

As I proceed to test my primary hypothesis and interact the social exclusion variables with ethnic fractionalization index, the effect is more negative on SWB, but not conclusively significant (model 4 of table 7 and 8 for the years 2001 and 2009). On the other hand, when I interact with ethnic polarization index, the perception of discrimination is more negative (even compared to coefficients with interaction terms of social exclusion and ethnic fractionalization index) with 40.3% and 42.5% association of lower SWB of one step of the 1-4 scale. Furthermore, the association of ethnic polarization on SWB becomes more and more negative as can be seen with the coefficient of the interaction terms being positive. All the variables in question are significant as well (model 5 of table 7 and 8 for the years 2001 and 2009).

My results of social exclusion and social divisions' association with RCI are somehow mitigated. A coefficient of -0.055 and a +0.015 (discriminated and interaction term respectively), however, they are not significant. This could be due to the fact that RCI is a composite index with information on different categories of relational capabilities. Hence, when I focus on the three different dimensions that constitute the RCI by utilizing them as three dependent variables. I notice that feeling discriminated clearly reduces integration to networks with a coefficient of -0.043 and +0.039 (discrimination and interaction term respectively).³⁹ The personal relations dimension of RCI results in a significant coefficient of discrimination at -0.164 and the interaction term coefficient of +0.169 is consistent with the arguments made earlier that the exclusion emerges from lower material well-being which is realized by a stable job, and possessing satisfactory means for access to markets by transport digital connections - these are well captured in the dimension of 'Integration to Networks' of RCI.⁴⁰ And more interestingly, the coefficients are negative and larger than the 'Integration to networks' dimension suggesting that the supports systems of friends, family and community are weak and vulnerable for discriminated people, and this dimension is felt more.

The "Civic Commitment" dimension of RCI and the positive relationship with social exclusion and social division seems to have a counter-intuitive result. When I disaggregate this dimension further I find something very interesting⁴¹. Feeling discriminated is positively associated with accepting dissent in its various forms as healthy in the political process, and positively determining the voting behavior of the socially excluded people. However, these coefficients are not significant. Regardless of the lack of statistical significance, these coefficients are encouraging to believe that excluded people aren't (yet) disillusioned, and continue to believe in the redress avenues of the political affairs of the country to participate in bettering the public policies. The last component of this dimension is a significant negative relationship (-0.034) with the generalized trust - discriminated people have trouble trusting people in general. These results confirm my descriptive differences of gaps of RCI and its dimensions by social exclusion and ethnicity (table A3 and table A4 in the appendix).

In summary, as the theory of social divisions based on ethnicity indicates us, diversity (or fractionalization indexes) does not explain social exclusion as

³⁹ Results found in model titled, "LC" in Table 9.

⁴⁰ Results found in model titled, "PR" in Table 9.

⁴¹ Refer to results in table A7 in the appendix.

well as polarization indexes. Surprisingly, social exclusion is not restricted to the absence of physical well-being alone and includes cultural estrangement, political disenfranchisement, and social isolation. It spans across demographic characteristics as I have demonstrated - and strikingly across ethnic lines. Two different societies with same levels of income, wealth and inequality may have very different levels of social welfare as I attempt to show in this chapter where the reasons for the perception of social exclusion is different for different individuals.

The interest of observing individuals' perception of social exclusion is what I believe to be a robust indicator of evaluation of the negative phenomena of one's life. Much like the life satisfaction as a measure of overall life satisfaction (eudemonic SWB). This measure to observe social exclusion (of disenfranchisement and discrimination in the LAC) works well to encapsulate a range of negative phenomenon. Of course, the precise measure or question that could be used from these barometer surveys may vary.

Hence, future work should focus on exploring social exclusion variables in other regions of the world. Also, to make the channels of social divisions in tandem with social exclusion's association with the quality of life (subjective and objective indicators) clearer. Better data to include cohort effects and to allow us to perform a country-level analysis is another step in this direction.

6 Conclusion

Quality of life is significantly lower for socially excluded people. Surprisingly, this perception of social exclusion is not restricted to the disadvantaged groups in the LAC. I have used the evaluative life satisfaction of SWB, and RCI as proxies for subjective indicators and objective capabilities to demonstrate this in my chapter. More importantly, I demonstrate that social divisions along ethnic lines as measured by ethnic polarization explains this perception of social exclusion *and not* ethnic fractionalization. This is crucial since social tensions across a given demographic base is responsible *and not* ethnic diversity or heterogeneity of a population.

7 Appendix

Table 4.10: Relational Capability Index: Dimensions and Components

Dimensions	Components	Deprived if
Integration to network	Employment status Access to transport Access to telecommunications Access to information	No stable job with regular professional relations No means of transport Does not use a phone, a computer or the internet Does not obtain news from radio, television or newspaper
Private relations	No. of people in the HH Family ties Close friends Financial support Trust in the community	Lives alone No trust in family No close friends providing psychological & emotional support No financial support from relatives or acquaintances No trust in people the individual knows
Civic commitment	Membership Collective action Vote Solidarity Trust in others	No active membership in a group No participation in political action Does not vote No active membership in common interest group No trust in unknown people

Note: Refer to [Giraud et al. \(2012\)](#) and [Giraud et al. \(2015\)](#) for more details on the RCI.

Figure 4.5: Population share of Social Exclusion by Country - 2001

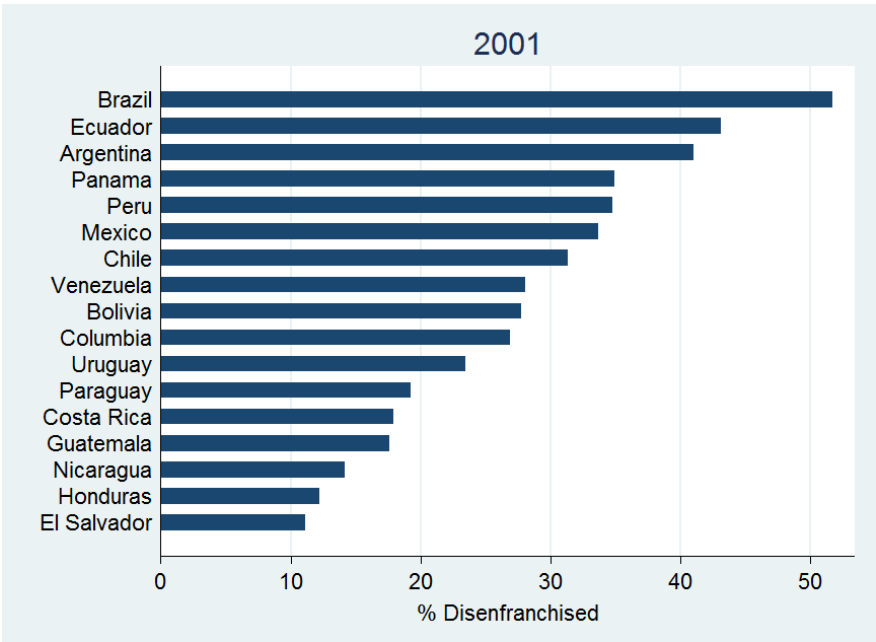


Figure 4.6: Population share of Social Exclusion by Country - 2009

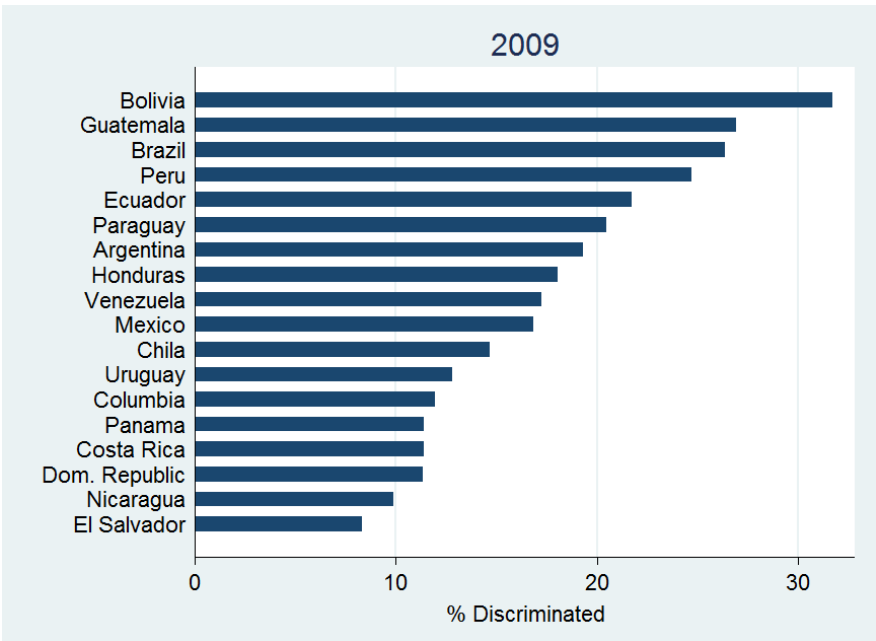


Figure 4.7: SWB and Wealth Index by Ethnicity - 2001

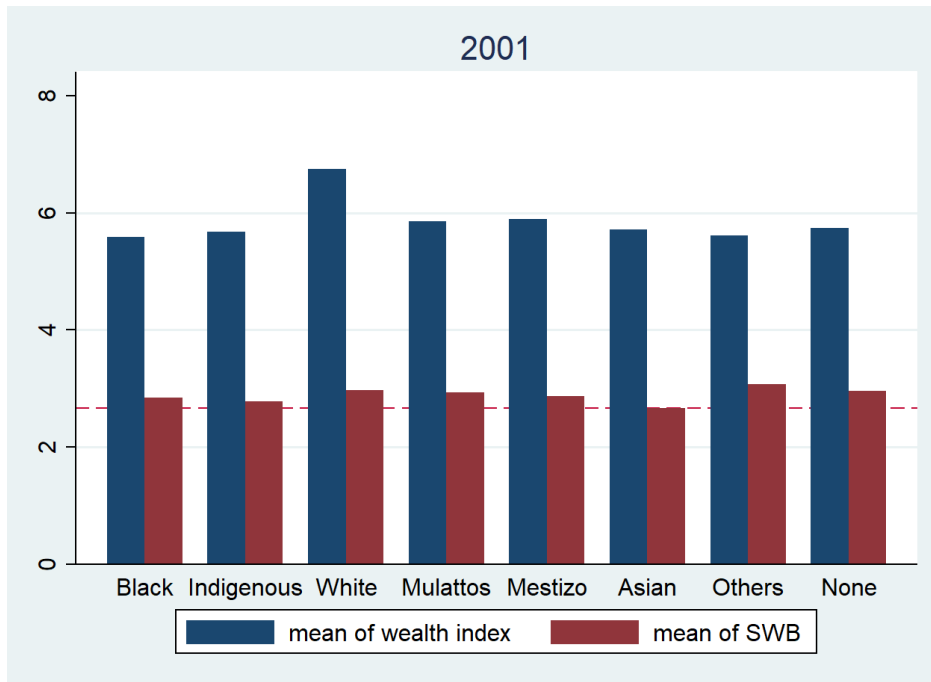


Figure 4.8: SWB and Wealth Index by Ethnicity - 2009

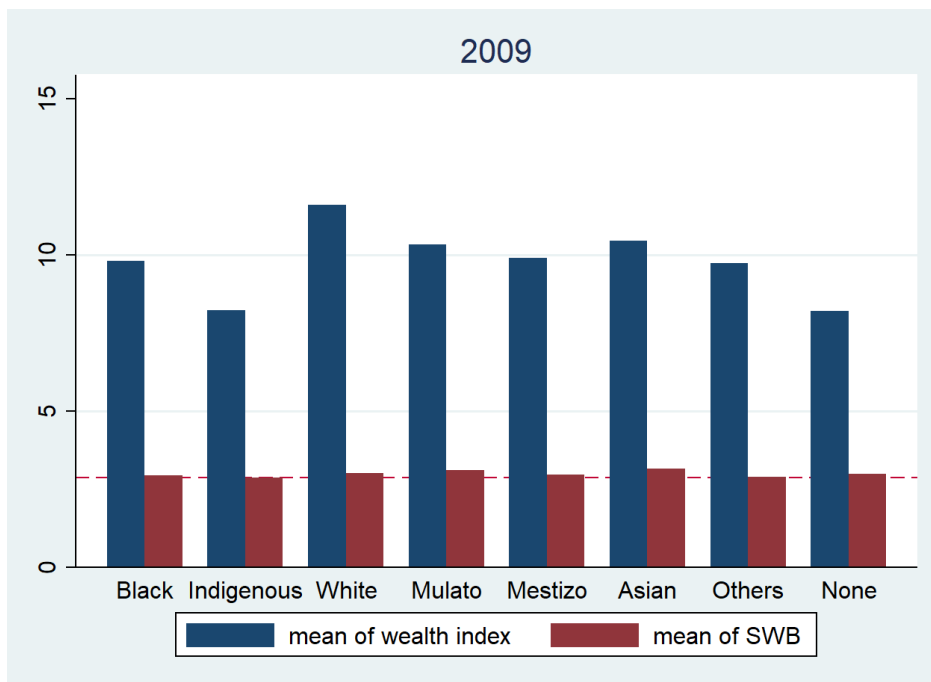
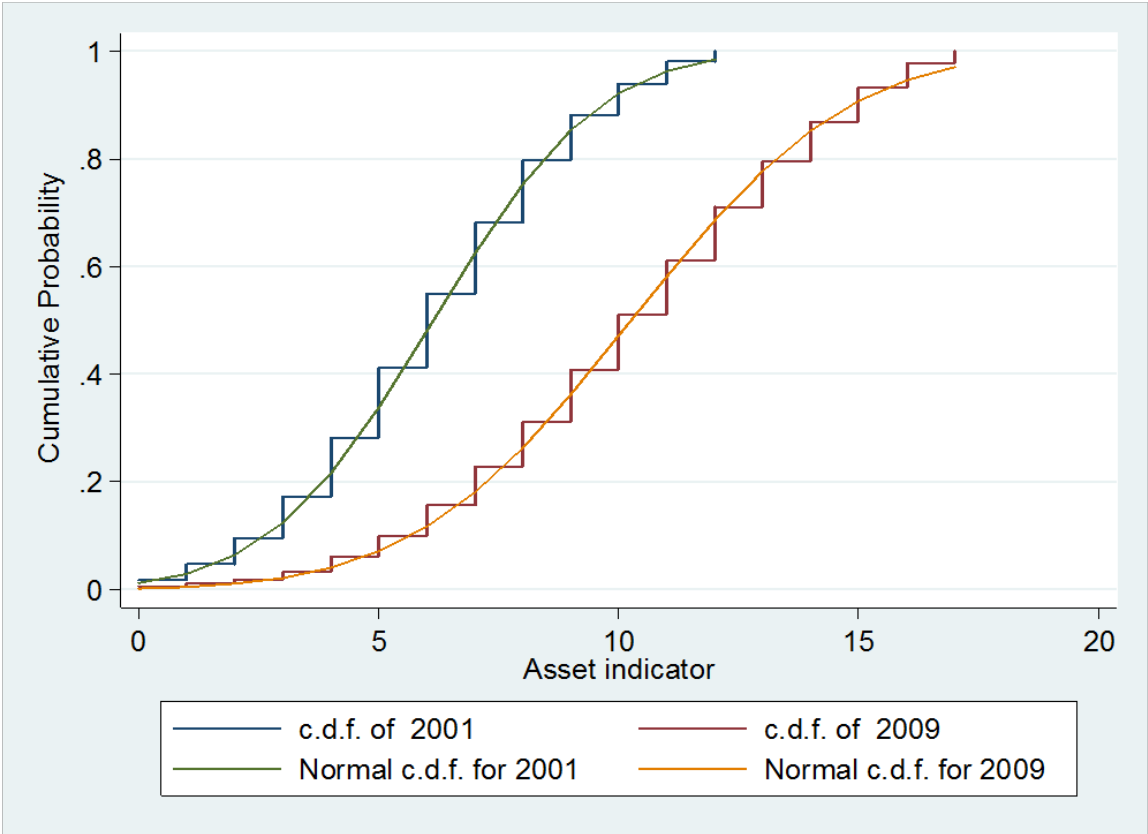


Figure 4.9: CDF of Wealth Index for 2001 and 2009



Note 1: Increased possession of number and types of assets in the household between 2001 and 2009.

Note 2: The list of surveyed assets included in the questionnaire *also* increased in these same years from 11 to 16.

Figure 4.10: Perception of Upward Mobility by Ethnicity - 2001

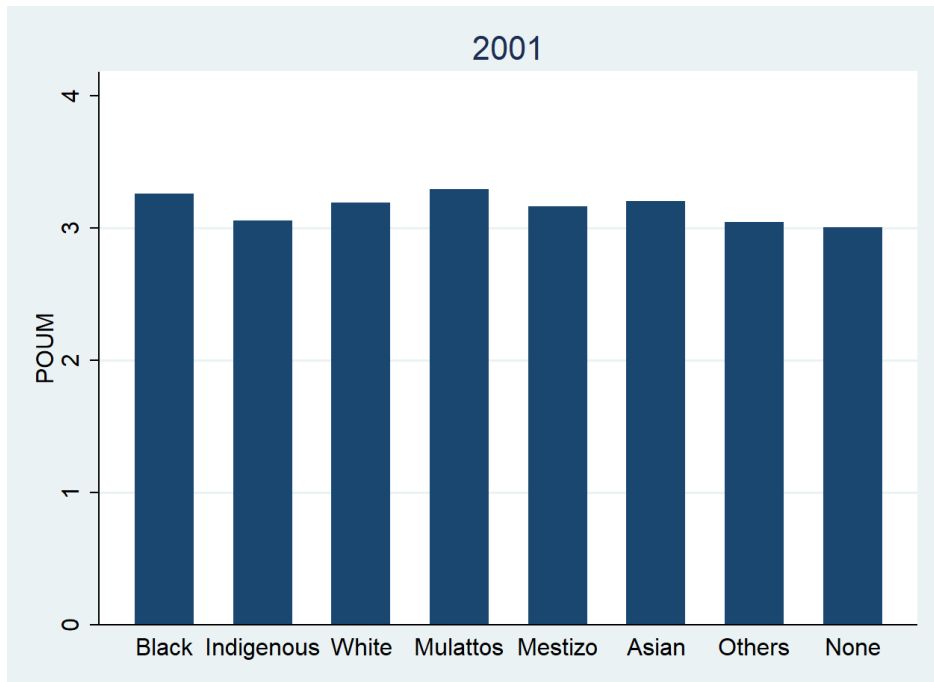


Figure 4.11: Perception of Upward Mobility by Ethnicity - 2009

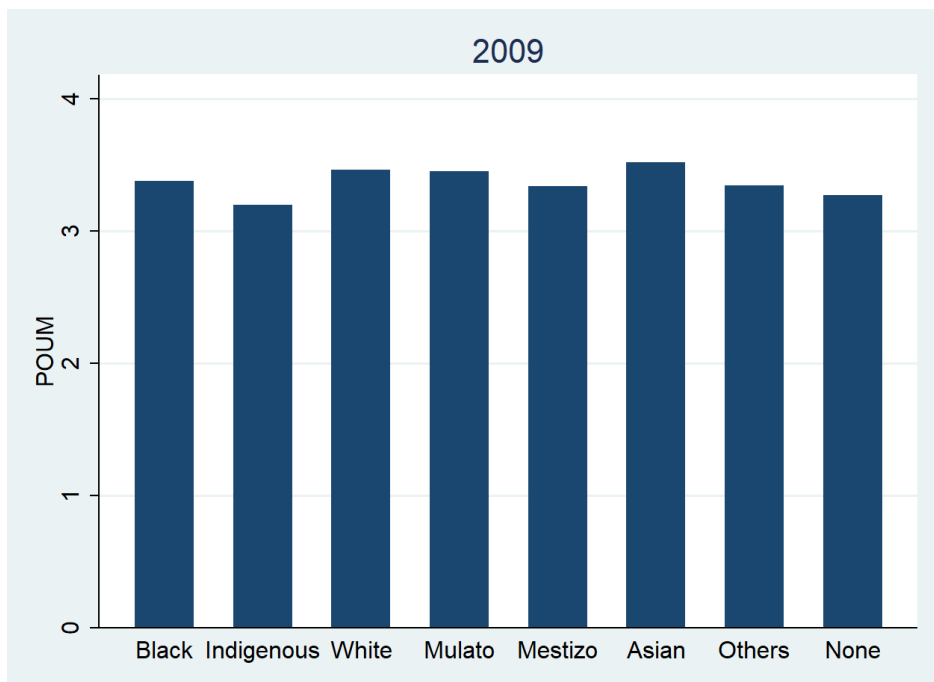


Table 4.11: Perception of future economic situation - 2009

	2009					
Discriminated	Country's future economic situation (much better(5) - much worse(1))					
	1	2	3	4	5	Total
No	1,212.71	2,631.75	5,494.43	4,526.59	858.98	14,724.45
	8.24	17.87	37.31	30.74	5.83	100
Yes	315.19	716.26	1,146.54	870.64	138.92	3,187.55
	9.89	22.47	35.97	27.31	4.36	100
Total	1,527.89	3,348.00	6,640.97	5,397.23	997.90	17,912.00
	8.53	18.69	37.08	30.13	5.57	100
	Future personal economic situation (much better(5) - much worse(1))					
No	659.65	1,605.46	5,165.20	5,690.25	1,569.89	14,690.45
	4.49	10.93	35.16	38.73	10.69	100
Yes	199.52	480.66	1,090.48	1,139.35	253.54	3,163.55
	6.31	15.19	34.47	36.02	8.01	100
Total	859.17	2,086.12	6,255.68	6,829.60	1,823.43	17,854.00
	4.81	11.68	35.04	38.25	10.21	100

Figure 4.12: Confidence in Institutions/Organizations by Discrimination

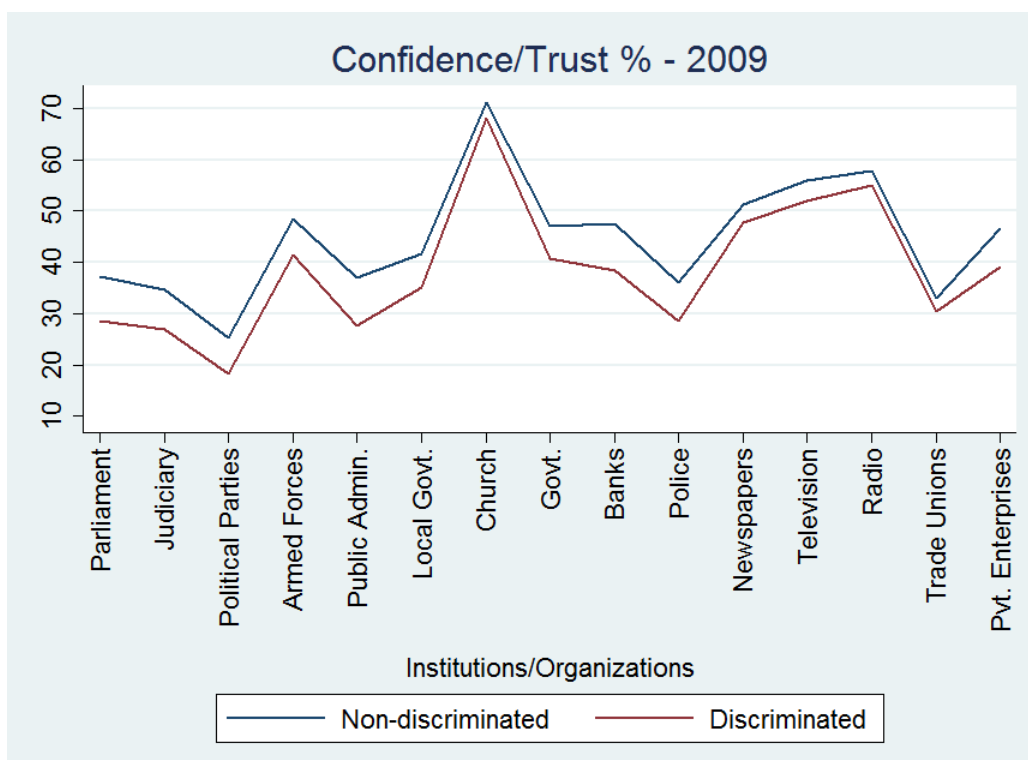


Figure 4.13: Perception of Personal Future Economic Situation - 2009

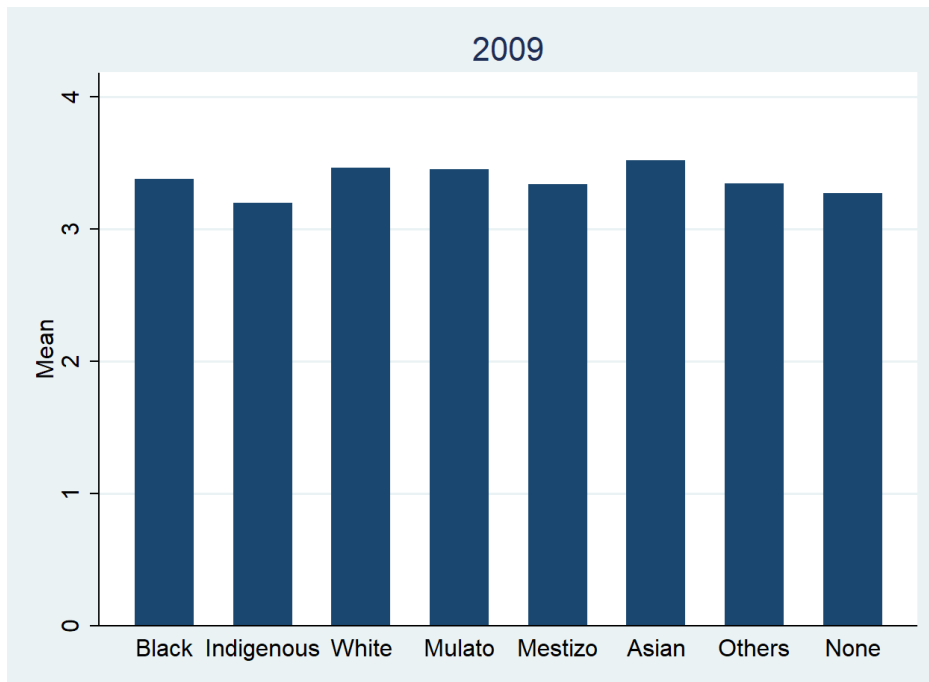


Figure 4.14: Perception of Country's Future Economic Situation - 2009

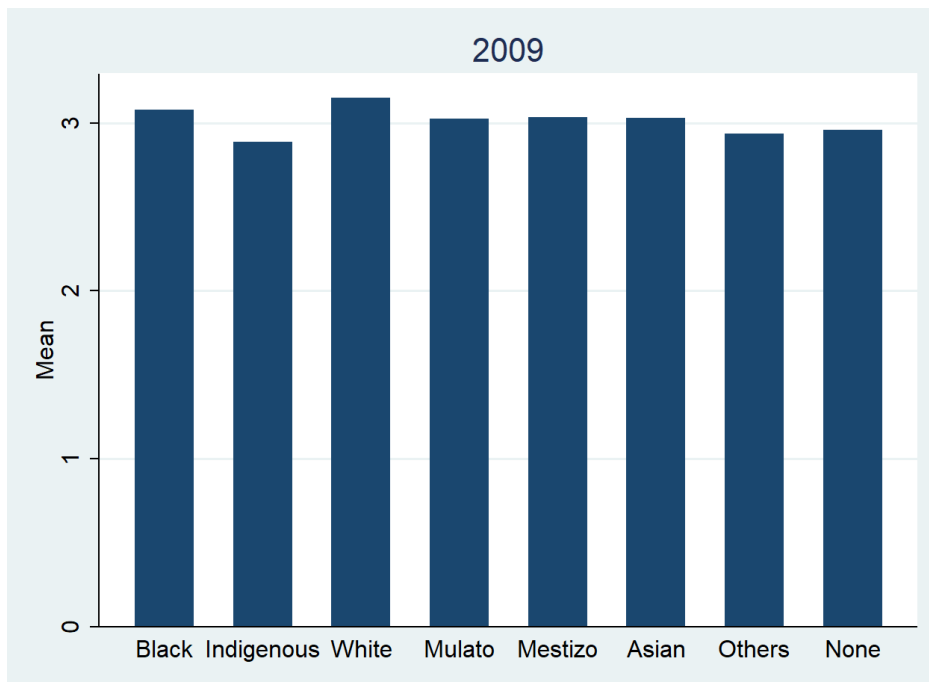


Table 4.12: RCI and Dimension Scores by Social Exclusion

	Discriminated - 2009		
	0	1	Difference
RCI	0.5686	0.5152	0.0534
Integration to network	0.7542	0.7274	0.0268
Private relations	0.5209	0.4751	0.0457
Civic commitment	0.6097	0.5973	0.0124

Table 4.13: RCI by Ethnicity and Social Exclusion

Ethnicity	RCI - 2009		
	Discriminated (0)	Discriminated (1)	Difference
Black	0.5432	0.5380	0.0051
Indigenous	0.5718	0.5356	0.0361
White	0.5815	0.5233	0.0582
Mulatto	0.5626	0.5462	0.0164
Mestizo	0.5629	0.4956	0.0673
Asian	0.6031	0.5880	0.0151
Others	0.5606	0.5093	0.0512

Table 4.14: Social Exclusion and Socioeconomic Correlates - 2001

	Disenfranchised
Age	0.001 (0.00)
Age squared	-0.000 (0.00)
Male=1	0.005 (0.01)
Years at school	0.006* (0.00)
(Years at school) ²	-0.000 (0.00)
Wealth index	0.001 (0.00)
Married (omitted)	0.000 (.)
Single	-0.001 (0.01)
Seperated/Divorced	0.015 (0.01)
Lives in the Capital	0.019* (0.01)
Self-emp (omitted)	0.000 (.)
Public wage	-0.025 (0.02)
Private wage	0.004 (0.01)
Unemployed	-0.012 (0.02)
Retired	0.010 (0.02)
Homemaker	-0.023** (0.01)
Student	-0.002 (0.02)
Constant	0.132*** (0.05)
Observations	16098
Adjusted R ²	0.070

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.15: Social Exclusion and Socioeconomic Correlates - 2009

	Discriminated
Age	0.001 (0.00)
Age squared	-0.000* (0.00)
Male=1	-0.009 (0.01)
Years at school	0.003 (0.00)
(Years at school) ²	-0.000* (0.00)
Wealth index	-0.012*** (0.00)
Married (omitted)	0.000 (.)
Single	0.005 (0.01)
Seperated/Divorced	0.028*** (0.01)
Lives in the Capital	0.034*** (0.01)
Self-employed (omitted)	0.000 (.)
Public wage	-0.019 (0.01)
Private wage	-0.018** (0.01)
Unemployed	0.017 (0.01)
Retired	-0.024* (0.01)
Homemaker	-0.032*** (0.01)
Student	-0.035** (0.01)
Constant	0.298*** (0.08)
Observations	17718
Adjusted R^2	0.055

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.16: Social Exclusion and Civic Commitment - 2009

	Collective Action	Vote	Interpersonal Trust
Age	0.001 (0.00)	0.030*** (0.00)	-0.002 (0.00)
Age squared	-0.000 (0.00)	-0.000*** (0.00)	0.000** (0.00)
Male=1	0.017** (0.01)	-0.007 (0.01)	0.021*** (0.01)
Years at school	-0.000 (0.00)	-0.001 (0.00)	-0.005 (0.00)
(Years at school) ²	0.000 (0.00)	0.000** (0.00)	0.000 (0.00)
Wealth index	0.001 (0.00)	0.003** (0.00)	0.002 (0.00)
Married (omitted)	0.000 (.)	0.000 (.)	0.000 (.)
Single	0.005 (0.01)	-0.029*** (0.01)	0.009 (0.01)
Seperated/Divorced	-0.018 (0.01)	-0.013 (0.01)	-0.001 (0.01)
Lives in the Capital	0.012 (0.01)	-0.003 (0.01)	0.032*** (0.01)
Self-employed (omitted)	0.000 (.)	0.000 (.)	0.000 (.)
Public wage	-0.015 (0.01)	0.016 (0.01)	-0.014 (0.01)
Private wage	-0.029*** (0.01)	-0.005 (0.01)	-0.027*** (0.01)
Unemployed	-0.005 (0.01)	-0.044*** (0.01)	-0.005 (0.01)
Retired	0.000 (0.02)	0.010 (0.01)	-0.034** (0.02)
Homemaker	-0.026** (0.01)	-0.027*** (0.01)	-0.005 (0.01)
Student	0.011 (0.02)	-0.149*** (0.02)	-0.015 (0.02)
Discriminated=1	0.004 (0.01)	0.002 (0.01)	-0.034*** (0.01)
Constant	0.769*** (0.08)	0.220*** (0.07)	0.302*** (0.08)
Observations	17001	17464	17246
Adjusted R ²	0.040	0.165	0.031

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 4.15: Mean SWB and Age - 2001



Figure 4.16: Mean SWB and Age - 2009



Figure 4.17: Life satisfaction and age (quadratic fit) - 2001



Figure 4.18: Life satisfaction and age (quadratic fit) - 2009



Conclusion

This dissertation studies the different lenses of approaches affecting welfare, and the measurements of welfare of individuals in a society — social capital, capabilities, relational capabilities and subjective well-being. Through the four chapters of this dissertation, I have examined the potential - explicit and implicit - links between a subset of welfare measurements (aforementioned).

At the micro level analysis of this dissertation, I explore one aspect of social cohesion (or lack thereof) affecting social capital explained through social divisions based on identity. This is associated and has implications for subjective well-being and relational capabilities of an individual which are not clearly captured in the revealed preferences methods and other objective measures of welfare.

I also address how to make tenable coherent cross-country comparisons of multidimensional development indexes with an axiomatic approach resulting in a family of coherent multidimensional indexes; this, in turn, I test and check empirically (here RCI 2.0) and analyze the results thereof for continuous multidimensional index's (RCI 2.0) cross-country comparisons around the world.

From the macro level, I also study the importance of social capital and its association with economic development.

Chapter one revisits the question of social capital and its economic payoffs. I observe that generalized [interpersonal] trust continues to display positive association with economic performance of a country over a long time span and our empirical evidence is applied to a globally representative sample.

More importantly, by applying pseudo-panel data methods, I go a step further in demonstrating causality between trust and economic development.

Chapter two presents a family of multidimensional indexes that measures poverty as a function of extent and intensity of poverty. The unique set of axioms renders the extremal points of the family to be the geometric mean and Maximin solution. I also show that the resulting aggregated indexes are continuous and ordinal. This helps us to provide a framework to update the Relational Capability Index, RCI 2.0, which is investigated in the next chapter.

The chapter on RCI 2.0 has its advantages in its local perfect substitutability along the first diagonal, and varying elasticity of substitution as a result of a normative choice by applying geometric mean. This continuity of the index facilitates the elimination of arbitrariness of cutoffs that often affects a multidimensional development index.

This chapter also demonstrates the rigor in monitoring cross-country comparisons across time and space. More importantly, this chapter serves for this dissertation to provide some evidence for the complementarity, and to have a dashboard of welfare measures. This is also, I believe, evidence that provides an alternative for the century-old critic-fraught revealed preferences approach applied in classical economics.

In the last chapter, I address the questions of social cohesion and individual social exclusion. I provide an explanation for this observed phenomenon

by measures of identity-based social divisions - a proxy index of social tensions (ethnic polarization) explains social exclusion better than ethnic diversity (ethnic fractionalization). More importantly, I believe, this chapter shows how identity, social cohesion, social capital, relational capabilities and subjective well-being are intertwined.

To my knowledge, this is the first study to examine these seemingly similar concepts of welfare and concepts that affect welfare simultaneously. The take-aways of this dissertation is that the quality of social networks can be measured and monitored across space and time in a coherent manner (via the RCI 2.0), it can hence serve as a useful (candidate) goalpost of public policy. I also demonstrate that social networks and/or relational capabilities is embedded in the social capital which is positively associated with the growth or economic development of a country. Furthermore, the social divisions of a society measured as polarization - by income inequalities, by gender, and urban-rural divide. These threaten the social cohesion of a society and is captured in the reported social exclusion and affects the individual subjective well-being. It may, in turn, dampen the economic growth capacity of a country, but definitely reduce the relational capabilities of an individual (as demonstrated with our study in Latin America).

I reckon that I'm scratching the surface with this dissertation, so future research could focus on integrating the cross-cutting measures of welfare. For example, social capital or relational capabilities, could essentially prove to be a variable or an additional factor of production in macro models if the results are any indication. SWB could explore new application since now it has predictive power - which had recently surfaced in the literature. Lastly, further deepening the links of identity-based social divisions and social cohesion and its implications to a range of welfare measures could also be explored.

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Essays on Social Capital and Welfare Measurements

Ces trois dernières décennies, de multiples recherches ont été menées sur le capital social afin de comprendre son fonctionnement, son importance sur l'être humain, son impact sur le bien-être de l'individu et son implication dans le bon fonctionnement de la société.

De son côté, la théorie des capacités développée par Amartya Sen met en exergue des concepts essentiels pour l'économie du développement. Cette approche est centrée sur l'individu et laisse de côté le versant collectif de la problématique du développement. L'importance et l'impact des réseaux sociaux sont ignorés dans l'approche des capacités.

Les réseaux sociaux, en manifestant l'implication des individus dans des groupements et des actions collectives, offrent un lien évident avec les capacités des individus aussi bien qu'avec leur capital social. Cet aspect a été développé par Giraud et al. (2013).

Un autre déterminant ne doit pas être négligé dans le processus de développement : le bonheur ou bien-être subjectif. L'un des intérêts majeurs du capital social n'est-il pas de contribuer au bien-être subjectif des individus ? Ce dernier n'est-il pas une mesure, parmi d'autres, du « développement » ? A quoi bon accumuler du capital social ou déployer des capacités, fussent-elles relationnelles, si cela n'ajoute rien au bonheur ?

Ces différents concepts et les liens qui les unissent, ne sont pas suffisamment approfondis dans la littérature. Cette thèse propose de tester différentes réponses possibles à la question : quels sont les liens entre capital social, capacités relationnelles, bonheur et développement économique ?

Mots-clés : Capital social ; Capacités ; Exclusion sociale ; Bien-être subjectif

Welfare economics in a behavioral world is gaining increasing traction for research in economics and social sciences at large. Especially the last three decades, ever more research efforts have been directed to understand welfare better.

Social capital has been one of the prime candidates and now a domain of research. Research is undertaken to understand its importance, how it operates, and what impact it has on the well-being of an individual and the health of a society.

The capabilities approach developed by Amartya Sen highlights the fundamental role of economic development that focuses on the improving individual capabilities and expanding choice sets of each individual. However, this capability approach is individual-centric and inadvertently leaves out the shared or the collective nature of an individual's existence.

The social networks/interconnectedness is not addressed in the capability approach of Sen. At the same time, the social networks embody the mobilization of individuals in groups, association, and civic action. This aspect is developed by Giraud et al. (2013), called the relational capability approach.

Another major research domain that cannot be neglected in the economic or human development evaluation is happiness (or subjective well-being). The concept of subject well-being is closely related to the social capital domain.

In the literature, these concepts of social capital, relational capabilities, subjective well-being and development, and especially the linkages between them are not well explored or explicitly studied. This is the primary motivation for this dissertation.

Keywords: Social capital; Capabilities; Social exclusion; Subjective well-being
