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The atlas of inequality aversion: theory and empirical evidence on 55 countries from the Luxembourg Income Study database

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Abstract

Research background: In the distributive analysis, the constant relative inequality aversion utility function is a standard tool for ethical judgements of income distributions. The sole parameter ε of this function expresses a society's aversion to inequality. However, the profession has not committed to the range of ε. When assessing inequality and other welfare characteristics, analysts assume an arbitrary level of ε, common to all countries and years. This assumption seems unjustified.
Purpose of the article: This paper aims to estimate the parameter ε for each country and year individually using datasets from the Luxembourg Income Study Database in all available years, which dates back to the 1970s.
Methods: We utilise the method of estimating ε, which assumes the generalised beta of the second kind distribution of incomes. The estimator of ε is derived from the mathematical condition of the existence of the social welfare function.
Findings & value added: We have elaborated an 'atlas' of 388 estimates of ε for 55 countries across time. Inequality aversion is country-year specific, with a minimum of 0.97 and a maximum of 3.8. Ninety per cent of all estimates are less than 2.5. Inequality aversion is negatively correlated with income inequality, but it is independent of economic development. Thus, inequality

aversion appears as an additional dimension of the classical inequality-development relationship. This article contributes to solving a fundamental problem of Welfare Economics: directly measuring the social utility of income (welfare) function. The estimates of ε for 55 countries imply a complete knowledge of these countries' constant relative inequality aversion utility functions.

Introduction

The aim of this paper is twofold. The first is to estimate the inequality aversion parameter *ε* of the *constant relative inequality aversion utility function* (CRIA) (Atkinson, 1970), employing income data for 55 countries from the Luxembourg Income Study (LIS) database. We estimate ε by the mean of Kot's (2020) method after a small complement. The second aim is to verify some prominent hypotheses proposed in the literature concerning relationships between inequality aversion and some economic phenomena. We propose augmenting the standard inequality-development relationship by accounting for inequality aversion.

Knowledge of *ε* is essential for various reasons. CRIA, with the single parameter ε, is a widely used parametric tool for assessing welfare in the distributive analysis. Schlör *et al.* (2012, p. 137) argue that "[*ε*] *reveals both the values of society with respect to distributional justice and the willingness of society to accept transfer costs to achieve distributional justice. […] The epsilon parameter represents a connection between the universal, equal political rights of the citizens and the efficiency criterion of the economy, and it defines fairness from the perspective of society*". As the (minus) elasticity of the marginal utility of income, *ε* also has a central role in public economics (Young, 1990).

The parameter *ε* is also a crucial component of the social discount rate that determines the inter-temporal trade-offs acceptable to society (Groom & Maddison, 2019). Thus, the knowledge of *ε* is essential in evaluating social projects and policies impacting different socioeconomic groups (Evans, 2005; Layard *et al*., 2008; Aristei & Perugini, 2016).

Frisch (1959) emphasised the importance of inequality aversion when calling for a 'worldwide atlas' of inequality aversion. Our paper addresses this demand by providing the estimates of *ε* for a broad spectrum of countries and years. The elaborated 'atlas' of countries' inequality aversion opens new, exciting avenues in empirical research.

Despite the importance of the parameter in question, "[…] *there is little consensus on the estimation of inequality aversion in the context of income*" (Costa-Font & Cowell, 2019, p. 175). As CRIA represents unobservable social preferences over income distributions, the problem is what empirical data the preferences could convincingly reveal.

Various data have been used in the literature for eliciting ε, particularly data coming from the leaky bucket experiments and data from tax schedules (see the next section for a review). However, such data are scarce and imperfect (Berg *et al*., 2018; Clark & D'Ambrosio, 2015). This obstacle limits their usage in worldwide analyses of inequality aversion across countries and over time.

In this paper, we argue that data on disposable incomes are adequate for solving the abovementioned problem. In democratic countries, where the majority election rule holds, government's choices reveal society's prevailing attitudes (Aristei & Perugini, 2010). Thus a society's unobservable preferences manifest themselves in legislative rules and decisions concerning the redistribution of *market* incomes (wages and capital incomes) by taxes and transfer systems. This claim may also be valid for not fully democratic countries.[1]

Suppose l competitive redistributive policies differ in inequality aversion ε, therefore offering different distributions of *disposable incomes* (incomes after taxes and transfers). However, only one policy 'wins' the competition according to the legally binding social choice rules. Therefore, one may recognise the current distribution of disposable income as the observable manifestation of social preferences. Then one may ask what ε would be if the current distribution of disposable income were 'the winner'.

To answer this question, we approximate the observed discrete distribution of disposable incomes by the generalised beta distribution of the second kind, GB2($x;a,b,p,q$), $x>0$ (McDonald, 1984). Under GB2, the social welfare function (SWF, for short) will be the expected value of the CRIA with respect to this distribution. This expected value exists, i.e. SWF is finite if and only if ε lies in the interval $(0,ap+1)$ (Kot, 2020). Any redistributive policy using ε outside this interval would promise infinite social welfare. Remarkably, the *Rawlsian leximin*, the limiting case of CRIA when ε approaches infinity (Lambert, 2001, p. 99), promises such unrealistic welfare. We argue in the methodological section that ε follows the uniform distribution within $(0,ap+1)$ interval. The mean of this distribution can be a plausible theoretical approximation of ε.

The rest of this paper runs as follows. The next section provides a concise review of the literature on the methods of estimating ε. The section entitled 'Methodology and statistical data' presents the method of estimating ε from fitted GB2 distribution. This section also offers a detailed description of the Luxembourg Income Study statistical data used in this paper. The following section presents the results of estimating the inequality

[1] We are thankful to an anonymous referee for his/her remarks concerning this point.

aversion parameter. Next, we test some prominent hypotheses concerning inequality aversion. The last section concludes.

Previous literature on estimating inequality aversion

Some preliminaries

In the distributional analysis, CRIA is a preferable parametric utility-of-income function. This function has the following form

$$u(x) = \begin{cases} \frac{x^{1-\varepsilon}}{1-\varepsilon}, for \varepsilon \neq 1 \\ lnx, for \varepsilon = 1 \end{cases}, x>0, \quad (1)$$

where the parameter ε reflects *inequality aversion* (Atkinson, 1970).

CRIA (1) with $\varepsilon<0$ represents an 'inequality prone' society. When $\varepsilon=0$, *u(x)* reflects an 'inequality neutral' society. Such a society prefers one income distribution *F* over another *G* if and only if under *F* the mean income is higher than under *G* (Lambert, 2001, p. 99). When $\varepsilon>0$, the utility function *u(x)* represents an 'inequality averse' society. This society supports the Pigou-Dalton Principle of Transfers (Lambert, 2001, p. 46). Young (1990) noted that ε is equal to (minus) the elasticity of the marginal utility of income; high values of ε mean that the marginal utility of income declines as income grows, and therefore an income transfer from the rich to the poor is increasingly desirable.

Let the positive valued random variable *X,* with the distribution function *F(x),* (*X~F(x),* for short), describe income distribution.[2] The utilitarian *social welfare function* (SWF) is the expected value of *u(x)* with respect to *F(x),* namely

$$SWF=E[u(X)]=\int_D u(x)dF(x), \quad (2)$$

where *E* is the expected value operator, and *D* is an admissible integration region. This Lebegue-Stiltjes integral comprises both discrete and continuous types of income distributions.

[2] We assign capital letters for random variables and lower case letters for the values of random variables.

If income distribution is discrete, with probability mass function $P(X=x_i)=p_i$, $p_i>0$ for all $i=1,2,\ldots$, $\sum_i p_i = 1$, the integral (2) will become the following sum

$$SWF = \sum_i x_i p_i,\ i=1,2,\ldots \tag{3}$$

For $i=1,2,\ldots,n<\infty$, SWF (3) is finite.

When we approximate the discrete income distribution by a continuous one with the density function $f(x)\geq 0$, $x>0$, SWF (2) will become the 'usual' Riemann integral, namely

$$SWF = \int_0^\infty u(x) f(x) dx \tag{4}$$

SWF (4) is finite if and only if the following condition holds

$$\int_0^\infty |u(x)| f(x) dx < \infty \tag{5}$$

(Fisz, 1967, p. 64).

Some authors assume an arbitrary upper limit z of x to avoid the appearance of convergence problems at the top end. For instance, Lambert (2001, p. 20) describes z as "[any] income level in excess of the highest one actually occurring." Then SWF (4) will have the form

$$SWF = \int_0^z u(x) f(x) dx \tag{6}$$

(Lambert, 2001, p. 21).

Our paper does not follow such a 'top coding' guaranteeing finite SWF. Instead, we can only check whether the integral (4) satisfies the condition (5).

Continuous distributions for always finite sets of *observed* incomes deserve some explanation. Since Pareto (1897), continuous distributions have become a standard mathematical tool for constructing theoretical models of income distributions and applying statistical techniques. Kleiber and Kotz's (2003) monograph presents a broad spectrum of continuous parametric models of income distributions.

Johnson *et al.* (1994, p. 1) noted that the most continuous distributions in model building are *approximations* to discrete distributions. The authors added that such an approximation facilitates mathematical and statistical analysis. The limit theorems justify approximations of discrete income distributions by continuous ones since the *finite* populations of income recipients in countries are usually huge,

Building on the interpretation of ε as inequality aversion, Atkinson (1970) proposed the normative index of inequality $A(\varepsilon,\mu)$

$$A(\varepsilon, \mu) = 1 - \frac{\mu_\varepsilon}{\mu}, \tag{7}$$

where μ is the mean income and μ_ε is *the equally distributed equivalent income* (EDEI) that, if received by all persons, gives the same level of *SWF* (1) as the present distribution (Kolm, 1969; Atkinson, 1970; Sen, 1973). More specifically, μ_ε is the solution to the equation: $u(\mu_\varepsilon)=\mathrm{E}[u(X)]$. For utility function (1) and social welfare function (2), μ_ε gets the following form:

$$\mu_\varepsilon = \begin{cases} (E[X^{1-\varepsilon}])^{1/(1-\varepsilon)}, for\ \varepsilon \neq 1 \\ \exp\{E[\ln X]\}, for\ \varepsilon = 1 \end{cases} \tag{8}$$

For a given income distribution, μ_ε (8) is the SWF, which is determined by ε entirely. If ε=1, μ_ε is the geometric mean, and if ε=2, μ_ε is the harmonic mean. For a given income distribution, μ_ε is a declining function of ε (Lambert, 2001, Section 4).

For a *sample* of incomes, $x_1,\dots,x_n$, Atkinson (1970) proposed the following estimator of EDEI (8):

$$\hat{\mu}_\varepsilon = \begin{cases} \left(\frac{1}{n}\sum_{i=1}^{n} x_i{}^{1-\varepsilon}\right)^{1/(1-\varepsilon)}, for\ \varepsilon \neq 1 \\ exp\left\{\frac{1}{n}\sum_{i=1}^{n} ln\, x_i\right\}, for\ \varepsilon = 1 \end{cases} \tag{9}$$

Using (7) we can express SWF (8) in terms of the mean income and inequality solely

$$\mu_\varepsilon = \mu(1 - A(\varepsilon, \mu)) \tag{10}$$

Eq. (9) is known as the Atkinson *abbreviated social welfare function.* A descriptive counterpart of (10) is Sheshinski's (1972) abbreviate social welfare function, popularised by Sen (1973)

$$SAWF = \mu(1 - G), \tag{11}$$

where G is the Gini index of inequality.

Estimation of inequality aversion in experimental economics and beyond

There is a lack of agreement among economists concerning the level of ε (Costa-Font & Cowell, 2019, p. 175). In relatively infrequent studies, it is common to assume ε as invariant over time and space. However, little theoretical or empirical ground exists to assume such homogeneity (Aristei & Perugini, 2016).

In one strand of literature, analysts elicit ε from the Leaky Bucket Experiment (LBE) (Okun, 1975). In the LBE, participants assess a tolerable money loss (‘leakage’), which inevitably occurs during discrete transfers among society members. The higher leakage a participant of the LBE permits, the greater his/her aversion to inequality.

Usually, the LBE yields relatively low estimates of ε, notably 0.25 (Amiel *et al*., 1999) or 0.5 (Pirttilä & Uusitalo, 2010). Clark and D’Ambrosio (2015) note that LBE data have produced quite an extensive range for the estimated level of inequality aversion. The LBE-method is impractical in the retrospective analysis of inequality aversion. Furthermore, conducting worldwide LBEs does not seem feasible. Therefore, the estimates of ε obtained from the LBE are of little use in worldwide analyses of inequality aversion.

In another strand of literature, ε is derived from the relationship between income and happiness (e.g. Layard *et al*., 2008) or indirect behavioural evidence about consumption patterns (Attanasio & Browning, 1995; Blundell *et al*., 1994). In yet another approach, ε is estimated as the ratio of the income elasticity of demand to the compensated own-price elasticity (Evans, 2005). Kot (2017) estimates ε using data from the survey in which respondents evaluate income thresholds delimiting the just perceptible changes in the household’s welfare.

One can also elicit inequality aversion, ε, from the equal sacrifice model (Richter, 1983; Vitaliano, 1977; Young, 1987). This model assumes that income taxes yield the same loss in individual utility across all income levels. Algebraically, the principle of equal sacrifice implies that for all income level x and some constant $u_0>0$, the following identity holds:

$$u(x) - u[x - t(x)] = u_0 \tag{12}$$

where x is market income, $u(x)$ is utility and $t(x)$ is the total tax liability according to the income tax schedule (Lambert, 2001, p.175). If the utility function have the form (1), then differentiating Eq. (12) with respect to x and solving for ε will yield

$$\varepsilon = \frac{log\ (1-mtr)}{log\ (1-atr)} \tag{13}$$

where $atr=t(x)/x$ is the average tax rate and $mtr = \partial t(x)/\partial x$ is the marginal tax rate (Cowell & Gardiner, 1999; Evans, 2005; Groom & Maddison, 2019).

The estimates of ε based on the equal sacrifice model are much greater than those obtained by the LBE. Evans (2005) estimated ε for 20 OECD countries and found all values in the range 1–2, with the smallest estimate for Ireland (ε =1) and the largest for Austria (ε =1.79). For the UK, Cowell and Gardiner (1999) obtained the estimates of ε as 1.43 and 1.41. Groom and Maddison (2019) got an ε of about 1.5.

However, estimating ε based on the equal sacrifice criterion has some shortfalls. Lambert and Naughton (2009) and Ok (1995) pointed out some theoretical difficulties with the equal sacrifice model. Young (1990) and Mitra and Ok (1996) demonstrated that, in practice, the equal sacrifice criterion might be violated. Groom and Maddison (2019) are more radical on this issue when maintaining that testing the equality of sacrifice assumption is impossible. A practical obstacle in applying the equal sacrifice model for estimating ε is that usable cross-country income data are scarce and imperfect (Berg *et al*., 2018).

Lambert *et al.* (2003) estimate countries' inequality aversion by hypothesising the existence of *the natural rate of subjective inequality* (NRSI). According to the authors' terminology, the Atkinson index (7) expresses 'subjective inequality', whereas the Gini index expresses 'objective inequality'. The NRSI hypothesis states that countries arrange their affairs to result in the same level φ of 'subjective inequality'. Thus, ε will be the solution to the equation:

$$A(\varepsilon,\mu)= \varphi \tag{14}$$

Lambert *et al.* (2003) use data on income shares for 96 countries and solve Eq. (14) numerically assuming seven hypothetical values of φ from 0.1 to 0.4, with a step size of 0.05. Thus, the authors obtain seven sets of estimates of ε, which range from 0.194 to 193. We shall test the NRSI hypothesis in Section 6.

Bourguignon and Spadaro (2012) estimated the elasticity of the marginal utility of income nonparametrically. This elasticity is a non-parametric counterpart of the (minus) inequality aversion. The authors inverted the typical logic of deducing the optimal tax-benefit rate schedule from a given social welfare function. Bourguignon and Spadaro (2012) applied their "optimal tax inverse method' to the French redistribution system. The authors ignored non-labour taxable income.

Methodology and data

The method of estimating inequality aversion from a parametric distribution of incomes

This paper estimates the parameter ε of inequality aversion using Kot's (2020) method after introducing a slight complement. The method has the following assumptions:

1. A social decisionmaker's utility-of-income function is CRIA (1).
2. The disposable income distribution is the observable manifestation of a society's attitude towards inequality.
3. The generalised beta of the second kind distribution, GB2(*a,b,p,q*), (McDonald, 1984), is the theoretical model of the disposable income distribution.

We present the first assumption only for form's sake; CRIA (1) has the single parameter ε, which is the object of our interest. CRIA does not pretend to be a universal form of utility-of-income functions.

We discussed the validation of the second assumption in the introduction. In democratic countries, policymakers ought to represent and fulfil societies' expectations and preferences toward various values, particularly income inequality. Policymakers can redistribute income in society through the tax and transfer systems. The *current* distribution of disposable income reflects inequality aversion, i.e. the rate at which a society is willing to trade off efficiency for equality.

Concerning the third testable assumption, disposable incomes (per equivalent adult) follow the generalised beta distribution of the second kind, GB2(*a,b,p,q*), with the density function:

$$f(x) = \frac{ax^{ap+1}}{b^{ap}B(p,q)\left[1+\left(\frac{x}{b}\right)^{a}\right]^{p+q}}, x>0, \tag{15}$$

where a, *b, p* and *q* are positive parameters and *B(p,q)* is the Beta function (McDonald, 1984).

The GB2 distribution is now widely acknowledged as providing an excellent theoretical model of income distributions while including many other models as particular or limiting cases (Jenkins, 2007). Bandourian *et* *al.* (2003) and Chotikapanich *et al.* (2018) show that the GB2 distribution is suitable for approximating the actual distribution of income.

Let us consider the l competitive redistributive policies more formally than we discussed in the introduction. Suppose each of the l policies uses the social welfare function (4) based on CRIA (1) but with a different level of inequality aversion ε_i, i=1,…,l. The l social welfare functions induce l optimal tax-benefit rate schedules (Mirrlees, 1971; Bourguignon & Spadaro, 2010). Applying these schedules would give l resulting distributions of disposable incomes, say $f(x|\varepsilon_1),\ldots,f(x|\varepsilon_l)$. Thus, every policy promises the social welfare SWF$_i$, of the following form

$$SWF_i = \begin{cases} \frac{1}{1-\varepsilon_i}\int_0^\infty x^{1-\varepsilon_i} f(x|\varepsilon_i)dx, for\ \varepsilon_i \neq 1 \\ \int_0^\infty logx f(x|\varepsilon_i)dx, for\ \varepsilon_i = 1 \end{cases}, i=1,\ldots,l, x>0 \quad (16)$$

As we now use continuous distribution GB2, we have to impose the constraint (5), which guarantees the existence of SWF_i.

According to the legally binding social choice rules, only one policy, say mth, 'wins' the competition in a given year. It means the acknowledgement of ε_m as the socially tolerable level of inequality aversion. Therefore, *the current distribution* of disposable incomes, with the density function $f(x|\varepsilon_m)$, reveals society's preferences toward income inequality.

One may ask what the level of ε_m would be if the current distribution of disposable incomes had the density function $f(x)$ (15)? The following theorem provides a general answer to this question.

Theorem 1 (Kot, 2020). Let $u_\varepsilon(x)$ with $\varepsilon \neq 1$ be given by (1). Let incomes follow the GB2 distribution (15) with a finite mean. Then SWF (16) exists if and only if inequality aversion ε belongs to the interval $(0,ap+1)$.

Theorem 1 states that if the observed GB2(a,b,p,q) distribution of disposable incomes resulted from the social choice based on the CRIA as a criterion, inequality aversion ε must have been in the interval $(0,ap+1)$. The values of ε outside this interval would characterise illusory policies that promised infinite social welfare.

Theorem 1 specifies an interval of inequality aversion ε, but a single value of ε is needed. Kot (2020) proposed the midpoint of the interval $(0,ap+1)$ as the socially tolerable inequality aversion ε, i.e.

$$\varepsilon_{mid} = \frac{1}{2}(ap+1) \quad (17)$$

Although (17) seems plausible, it needs some justification.

We could say more about (17) if we knew the distribution of ε within (0,ap+1) interval. However, if we have no idea about the location of ε, we are in the situation of *total ignorance*, i.e.*, in the state of maximum entropy.* Then the random variable Ɛ will follow the uniform distribution in this interval because only this distribution exhibits the maximum entropy among all continuous probability distributions with a bounded domain (Cover & Thomas, 1991, p. 269). So, we may treat ε as a realisation of the random variable Ɛ that has the uniform distribution in (0,ap+1) interval, [Ɛ ~ U(0,ap+1), for short].

Using known formulae for the uniform distribution, we can get the following descriptive statistics of Ɛ:
The mean:

$$E[\mathcal{E}] = \bar{\varepsilon} = \frac{1}{2}(ap+1) \tag{18}$$

The median, Me_ε is equal to the mean $\bar{\varepsilon}$. A single mode of Ɛ does not exist, or every number in (0,ap+1) interval might be the mode.

As Eq. (17) is precisely the same as Eq. (18), we may interpret the midpoint (17) either as the mean (18) or the median of the U(0,ap+1) distribution.

The kth central moment of Ɛ is

$$E[(\mathcal{E}-\bar{\varepsilon})^k] = \begin{cases} 0, & for\ k\ odd \\ \frac{1}{k-1}\left(\frac{ap+1}{2}\right)^k, & for\ k\ even \end{cases}, \quad k=1,2,\ldots \tag{19}$$

Therefore, the standard deviation of Ɛ is

$$D[\mathcal{E}] = \sigma_\varepsilon = \frac{ap+1}{2\sqrt{3}} \tag{20}$$

Other basic descriptive statistics of Ɛ do not depend on a and p; the coefficient of variation $V=\sqrt{3}$, the coefficient of skewness $Sk= 0$, the kurtosis, $Ku=-6/5$.

One can also specify ε_{mid} for the particular cases of the GB2($x;a,b,p,q$) distribution. For the Dagum distribution (Dagum, 1977), i.e. for GB2 with q=1, the formula (17) is valid. For the Singh-Maddala distribution (Singh & Maddala, 1976), i.e. for GB2 with p=1, and the Fisk distribution (Fisk, 1961), i.e. for GB2 with p=1, q=1, we get $\varepsilon_{mid} = \frac{1}{2}(a+1)$. When incomes obey the beta distribution of the second kind (McDonald, 1984), i.e.

GB2 with a=1, the midpoint estimate of inequality aversion will be $\varepsilon_{mid} = \frac{1}{2}(p+1)$.

Kot (2020) showed that the maximum likelihood (ML) estimator $\hat{\varepsilon}$ of ε_{mid} (17) has the asymptotically normal distribution with the mean of $\hat{\varepsilon}$:

$$E[\hat{\varepsilon}] = \frac{1}{2}[\hat{a}\hat{p} + \widehat{cov}(\hat{a},\hat{p}) + 1] \tag{21}$$

In Eq. 21, the symbols $\hat{a}$ and $\hat{p}$ denote the ML-estimators of a and p, respectively, and $\widehat{cov}(\hat{a},\hat{p})$ is the covariance between $\hat{a}\ and\ \hat{p}$. The standard error of $\hat{\varepsilon}$ has the following form

$$D[\hat{\epsilon}] = \frac{1}{2}\begin{Bmatrix} \hat{a}^2\hat{\sigma}_p^2 + \hat{p}^2\hat{\sigma}_a^2 + 2\hat{a}\hat{p}\cdot\widehat{cov}(\hat{a},\hat{p}) \\ +[\widehat{cov}(\hat{a},\hat{p})]^2 \end{Bmatrix}^{1/2}, \tag{22}$$

where $\hat{\sigma}_a^2$ and $\hat{\sigma}_p^2$ are the variances of $\hat{a}$ and $\hat{p}$, respectively (Kot, 2020).[3] The construction of the asymptotic confidence intervals for ε is apparent.

Statistical data

We estimate countries' aversion to inequality based on microdata on disposable household incomes from the Luxembourg Income Study (LIS) Database (2020).[4] We also utilized several datasets from the ERF-LIS Database, namely Egypt (1999, 2004, 2008, 2010, 2012, 2015), Iraq (2007, 2012), Jordan (2002, 2006, 2008, 2010, 2013), Palestine (2010, 2017), and Sudan (2009).[5] These datasets contain disposable household incomes comparable across other datasets available at LIS. We use all available LIS data for 55 countries from 1967 to 2018. Thus we have 391 country-year cases (hereafter called 'cases'). Incomes are expressed in International $US PPP adjusted and constant 2011 prices.

[3] If a software applied for estimating GB2 does not provide a variance-covariance matrix, $\widehat{cov}(\hat{a},\hat{p})$ might be omitted since the absolute value of this component is usually very small.

[4] Note that the number of LIS datasets increases four times per year as new datasets are added to the Luxembourg Income Study (LIS) Database. For details on each dataset included in LIS database, please consult METadata Information System (METIS), available at https://www.lisdatacenter.org/frontend#/home. For a general description of the Luxembourg Income Study (LIS) and its databases, see Ravallion (2015).

[5] The ERF-LIS Database was provided to LIS by the Economic Research Forum (ERF) and harmonized at LIS with the same standards as the other LIS datasets. For more information, see https://www.lisdatacenter.org/our-data/erf-lis-database.

Table 1 illustrates the geographical representativeness of the data for the World Bank geographic regions. About 68% of the LIS data comprises the European Region, Central Asia, and North America. 16% of cases include data from the Region of Latin America and the Caribbean. 17% of the cases represent the remaining regions. About 68% of LIS data comprises cases from OECD countries.

We adjust disposable household incomes by the square root equivalence scale (Atkinson *et al.*, 1995). We exclude from our statistical analysis households with zero disposable income. We apply weights equal to household sizes multiplied by survey weights in all calculations. We assume the 0.05 significance level for all statistical tests applied.[6]

It is worth adding that our statistical analyses utilise household disposable income *without* top-coding and bottom-coding. In other words, we neither follow the LIS procedure to top-code incomes at ten times the median nor employ bottom coding at 1% of mean income.[7] Some LIS datasets contain data already top-coded by data providers to guarantee the confidentiality of high-income households/persons. For further details, see Eriksson (2011). Top-codes' assignment diminishes the estimates of inequality measures such as the Gini index (see, among others, Larrimore *et al.*, 2008; Feng *et al.*, 2006; Burkhauser *et al.*, 2004; Burkhauser *et al.*, 2007).

We estimate the Gini indices using non-top-coded and top-coded data to assess how top-coding affects economic inequality estimates. The relaxation of top coding has a considerable impact on the measurement of economic inequality. The mean difference accounts for 2.18 per cent of the mean Gini estimated from non-top-coded data.

The results

Fitting the GB2 distribution

We estimate parameters *a, b, p,* and *q* of the GB2 distribution by the maximum likelihood method using the *gb2lfit* Stata procedure (Jenkins, 2007).[8] The estimates of the parameters are presented in Table 2. Unfortunately, we cannot test the goodness of fit of the GB2 distribution to countries' income

[6] We perform calculations using the software Stata and Statistica (StatSoft) and additional computer programs written by ourselves in Fortran 99.

[7] For LIS practices in respect to the microdata, see Ravallion (2015).

[8] One can also use the R codes elaborated by Graf and Nedyalkova (2010).

data because the Stata *gb2lfit* procedure does not provide a relevant statistical test.[9]

Classical tests of goodness of fit have usually prescribed the rejection of theoretical distributions. McDonald and Xu (1995) noticed that this result is not uncommon in large sample sizes applications. For instance, Bandourian *et al.* (2003) fitted the GB2 distribution to grouped LIS data on market household income for 23 countries and 82 country-year cases. The χ^2 test rejected the GB2 distribution in all but five instances, namely Hungary for the year 1991 and Israel for 1979, 1986, 1992, and 1997. It is worth adding that the sample sizes of those five cases were small.

McDonald (1984) recommends an indirect approach to checking the goodness of fit by comparing estimated population characteristics with independently obtained results. Table 3 illustrates the accuracy of GB2 in predicting the mean incomes (Model 1) and the Gini indices (Model 2).[10]

In Table 3, variables with subscript 'emp' are empirical statistics, whereas variables with subscript 'GB2' are the same statistics predicted by the GB2 distribution. Examining Table 3 shows that the GB2 distribution predicts basic distributional statistics accurately.

The estimates of inequality aversion

We estimate the parameter ε of inequality aversion using the formula (21). The covariance between the estimators of a and p is calculated based on the exact Fisher's information matrix of GB2, developed by Brazauskas (2002). Table 4 contains the estimates of ε, standard errors, 95% confidence intervals, and related normative characteristics.

Fig. 1 shows the estimated density function of the distribution of inequality aversion. We estimate the Gaussian kernel's density function, taking all country-year cases into account. In Fig.1, we observe two peaks, at ε=1.62 and 1.9, and the positive skewness of this distribution.

In Fig. 2, we present the world map with the estimated inequality aversions (ε). We take ε for the latest available income year and create the dec-

[9] The distributional diagnostic plots for each country-year estimation, such as plots of the quantiles of equivalent disposable income against the quantiles of a GB2 distribution as well as the probability plot for disposable equivalent income compared with a GB2 distribution are available upon request. These graphs were generated with commands *qgb2* and *pgb2* using Stata and provided by Nicholas J. Cox.

[10] We have to drop three cases from our sample, notably Israel 1979, and Luxembourg 1991 and 2000, since some parameters of GB2 estimate of the parameter a of the fitted GB2 distribution was statistically insignificant. Nevertheless, we present the estimates of parameters of the GB2 distribution for these 3 cases in Table 2.

iles of ε based on 55 countries.[11] Fig. 2 clearly illustrates the diversification of inequality aversion by country and region, where most European and Central Asian countries, together with Taiwan, Vietnam, Egypt, and Uruguay, present the highest inequality aversion (8^{th}-10^{th} decile groups).

Table 5 presents the basic statistics of ε broken down by the World Bank's Geographic Regions. In this table, regions are arranged in descending order of the mean of ε.

Examining Table 5 shows that all estimates of global inequality aversion ε range from 0.97 (Peru, 2004) to 3.8 (Egypt, 1999). The differences in inequality aversion between geographic regions are statistically significant.[12] 90% of all estimates of ε are less than 2.5. Thus, we get a range of ε estimates that often do not match the values utilised in empirical research and are calculated based on experiments or surveys. It is worth adding that the mean inequality aversion in the Sub-Saharan Region and the North America Region do not differ statistically (Welch's p=0.954). The latter region comprises two rich countries, notably the USA and Canada.

The verification of some prominent hypotheses

Estimating countries' inequality aversion enables the empirical verification of some hypotheses proposed in the literature. In this section, we test the following two hypotheses:
Hypothesis 1: The richer the country, the greater its inequality aversion (Frisch, 1959; Atkinson, 1970).
Hypothesis 2: There is a single 'natural rate of subjective inequality' across countries (Lambert *et al*., 2003)

We can verify hypothesis 1 by estimating the regression functions $\varepsilon=\alpha_0+\alpha_1 Mean_{GB2}+z$, where z is the disturbing term. We obtained the OLS estimate of α_1=0.000001 with the standard error of 0.000003. As p-$value$=0.614, we cannot reject the null hypothesis H_0: $\alpha_1=0$ against H_1: $\alpha_1>0$. Thus, our data do not confirm **Hypothesis 1.** A good illustration of the lack of the relationship between inequality aversion and the level of economic development is the abovementioned comparison of inequality aversion in the North American Region and the Sub-Saharan Region. Nevertheless, the verification of this hypothesis could be more convincing when more advanced econometric models were applied.

[11] Most of the country's epsilons are based on the LIS Wave IX (around the year 2013) and X (around the year 2016). Several mapped cases are from previous waves (i.e., Sweden, Romania, France, Island, Ireland, Dominican Republic, Sudan, and India).

[12] We apply Welch's F in ANOVA to test for equality of means because of unequal variance. We get F=40.12963, p=0.00.

Hypothesis 2 is the Natural Rate of Subjective Inequality (NRSI) hypothesis mentioned in the section on the literature review. This hypothesis was put forward by Lambert *et al.* (2003). To verify this hypothesis, we apply the classical *modus tollens* inference rule: if NRSI is true, then an empirical consequence *C* should be observed, but if *C* does not hold, then NRSI is false.[13] Empirical data are decisive whether 'C' or 'not *C*' occurs.

One can deduct two observable consequences of the NRSI. First, C_1*:* the distribution of the Atkinson index among countries has the one-point distribution at φ, according to Eq. (14). The second consequence, C_2, of the NRSI was suggested by Lambert *et al.* (2003) as follows: "(…) countries with low (high) tolerance for inequality have low (high) inequality as measured by the Gini coefficient as well." In other words, the greater (lower) societies' inequality aversion, the lower (higher) their income inequality. In general, C_2 reads as: 'the Gini coefficient in income distributions is a declining function of ε.'

The distribution of the Atkinson index, A_ε, presented in Fig. 3, can help assess whether C_1 occurs or not. Examining Fig. 3 shows that A_ε does not have a one-point distribution; two maxima of the density function at φ_1=0.2567 and φ_2=0.4875 are apparent. This observation suggests there might be two 'natural subjective inequality' rates globally. It is worth noting that Lambert *et al*. (2003) could not see the second maximum since they assumed the level φ of NRSI did not exceed 0.4.

To check formally whether the A_ε distribution is egalitarian (a one-point distribution) or not, we test the statistical hypothesis H_0: G_A=0 against H_1: G_A>0, where G_A is the Gini index of the A_ε distribution. As the sample Gini index has the asymptotic normal distribution, the ratio $Z = \hat{G}/D\left[\hat{G}\right]$ has the asymptotic standard normal distribution under null, where $\hat{G}$ is the estimator of G and $D[\hat{G}]$ is the standard deviation of $\hat{G}$. We get $\hat{G}$=0.181993, and $D[\hat{G}]$ = 0.006755. As z=26.94 is greater than the critical value z_α=1.64, we reject the NRSI hypothesis since the empirical consequence C_1 does not occur.

Two circumstances must be accounted for when the second empirical consequence (C_2) of the NRSI hypothesis confronts reality. For presenting the first circumstance let us consider two societies, S_1 and S_2, with income distributions X_i~GB2(x,a_i,b_i,p_i,q_i), and the Lorenz curves $L_i(u)$, $u\epsilon[0,1]$, i=1,2, respectively. G_1 and G_2 denote the Gini indices in distributions X_1 and X_2, respectively. Lorenz dominance, $\geq_L$, is defined as

[13] Formally: [(*NRSI*→*C*) ∧ ~*C*] → ~*NRSI,* which reads: *If NRSI then C, but if not C then not NRSI.*

$$X_1 \geq_L X_2 \leftrightarrow L_1(u) \leq L_2(u), \ \forall \ u \epsilon [0,1], \tag{23}$$

provided the Lorenz curves do not intersect (Kleiber & Kotz, 2003, p. 24). Note that inequality in X_1 is not less than inequality in X_2; thus, $G_2 \leq G_1$. In the case of GB2, necessary conditions for Lorenz dominance are

$$a_1 p_1 \leq a_2 p_2 \text{ and } a_1 q_1 \leq a_2 q_2 \tag{24}$$

(Kleiber & Kotz, 2003, p.192). Recalling (17), we get

$$\varepsilon_1 \leq \varepsilon_2 \text{ and } a_1 q_1 \leq a_2 q_2 \tag{25}$$

Clearly, the fulfilment of inequality $\varepsilon_1 \leq \varepsilon_2$ *alone* in (23) is not the necessary condition of Lorenz dominance. In other words, greater inequality aversion of S_2 than that of S_1 does not necessarily imply lower income inequality in X_2 than in X_1.

The second circumstance is that C_2 has a competitor in the form of the well-known inequality-development relationship (IDR). Kuznets (1955) originated this relationship in the famous *inverted-U hypothesis*. He showed that during development, inequality first increases and then declines. A large research body has tested Kuznets's hypothesis (see, among others, Tuominen, 2015, for an extensive review) and was recently challenged by Piketty (2014).

It is worth noticing that Kuznets and most of his followers have analysed IDR based on inequality in the distribution of *market incomes*, i.e., incomes before tax and social transfers. Thus, they have ruled out all redistributive issues. However, if an analysis of IDR is based on *disposable incomes*, the effects of redistributive policies should be considered. To do this, we propose augmenting IDR by including social attitudes toward inequality. More specifically, we may treat income inequality, measured by the Gini index, as a function of ε and the mean household disposable income as a development measure.

We shall analyse such an *augmented inequality-development relationship* (AIDR) nonparametrically using graphical visualisations of empirical data. This approach appears to reveal more features of AIDR than imposed parametric models.

To illustrate this supposition, we present the AIDR for the Latin America and Caribbean Region. Fig. 4a shows the standard IDR in this region.

The parameters of the fitted quadratic polynomial in Fig. 4a are not statistically significant except for the intercept. Thus, one cannot hold that inequality in the Latin America and Caribbean Region traces the classical inverted U-curve.

Fig. 4b shows a parametric AIDR for the region in question, where a quadratic form smoothes the Gini index's surface. AIDR in Fig. 4b shows decreasing inequality when increasing ε, at higher levels of development, *ceteris paribus*. However, inequality seems to follow a U-shaped curve for lower levels of development. Thus the NRSI hypothesis seems to be valid only at high levels of development. The standard IDR appears to be increasing for small ε and decreasing for large ε.

Fig. 4c displays AIDR smoothed by splines; thus, without any parametric form imposed. Examining Fig. 4c shows that the Gini index is a declining function of ε for all development levels, ceteris paribus. This fact corroborates the NRSI hypothesis for the Latin America and Caribbean Region. We also observe that inequality aversion influences the shape of the IDR. For low levels of inequality aversion, the Gini surface exhibits a U-shaped form. However, for high levels of inequality aversion, the shape of the surface becomes the classical Kuznets inverted U-shaped curve. This fact explains the failure in estimating the standard IDR, as in Fig. 4a. The AIDR has an advantage over the standard IDR, which reveals only partial information about the behaviour of inequality in the region in question.

We can draw the same conclusions when examining the contour plot of the AIDR in Fig. 4d. The contour plot in Fig. 4d enables a visual inspection of any single dimension's impact on inequality, *ceteris paribus*. For a given level of development, inequality diminishes with increasing inequality aversion, *ceteris paribus*. This observation corroborates the NRSI hypothesis. For a given level of inequality aversion, we get the standard IDR. The pivotal value of ε of about 1.5 delimits the AIDR shape changes from a U-shaped form to an inverted U-shaped form.

Figures 5a and 5b display the global AIDR for all LIS data cases. Examining Fig. 5b shows some exciting features of AIDR. A broad scatter of empirical points on the plain explains the weakness of Hypothesis 1, which we tested earlier. We also observe that income inequality follows a U-shaped curve as ε increases. Therefore, the NRSI hypothesis is falsified on a global scale. However, the area of increasing inequality aversion is visible for ε above 2.5, which is the last decile of inequality aversion (see Table 3). This observation suggests the falsification of the NRSI hypothesis in about 10% of all cases. It is a matter of an analyst's taste whether 10% is an acceptable level of significance or not. In Fig. 5b, one can also observe a U-shaped standard IDR, obvious at low inequality aversion levels.

The global AIDR presented in Figures 5a, and 5b is the composition of countries' AIDRs. Because of limited space, we shall show only the regional contour maps of the AIDR.

Fig. 6 shows the AIDR for Europe and Central Asia. Fig. 6 shows declining inequality as ε increases at the lowest level (below $10000) of development, *ceteris paribus*. For higher levels of development and $\varepsilon<2.4$, inequality increases, *ceteris paribus*. As $\varepsilon_{0.90}=2.41$ (see Table 3), about ten per cent of all cases falsifies the NRSI hypothesis in the region in question. For low levels of inequality aversion, namely for $\varepsilon<1.5$, one can observe the declining part of standard IDR. For $\varepsilon>1.5$, IDR traces out an inverted U-shape with a vanishing segment of a decrease.

Fig. 7 displays the AIDR for the North America Region. Fig. 7 shows that inequality is a declining function of ε for all income levels. This observation corroborates the NRSI hypothesis in this region. The standard IDR is an increasing function of development for $\varepsilon<1.7$ and an inverted U-shaped function for greater inequality aversion levels.

Fig. 8 displays the AIDR for the Middle East and North Africa Region. Examining Fig. 8 shows that inequality is a declining function of ε for all development levels. Similarly, the standard IDR is a declining function of development in the region in question.

Fig. 9 shows the AIDR for East Asia and the Pacific Region. Examining Fig. 9 shows that inequality is a declining function of inequality aversion for all development levels. Thus, the NRSI hypothesis is not falsified. The standard IDR displays a U-shaped form, although its increasing segment seems insignificant and consecutively vanishes with increasing ε.

We cannot present the augmented inequality-development relationship for the Sub-Saharan Africa and South Asia regions since the small number of observations makes a visual presentation inconclusive.

Discussion

This paper offers the first in the literature collection of estimates of inequality aversion parameters, encompassing so many countries and years as 388 country-year cases. We have derived the estimates of ε from the GB2 distribution, the best theoretical model of income distributions, using the LIS statistical data, which have been justly acknowledged as the most harmonized and comparable microdata on household incomes.

In the section reviewing the literature on the method of estimating inequality aversion parameter ε, we discussed recent empirical achievements in this field. We realized that empirical examples of estimates of ε are not numerous concerning usually selected countries and years. In the literature, only estimates of inequality aversion obtained by Lambert *et al.* (2003) cover a broad spectrum of countries, although only for a single year. Specifically, the authors offered seven sets of inequality aversion estimates for 96 countries in 1999 and assumed seven hypothetical levels of the Atkinson inequality index, interpreted as the natural rate of subjective inequality (NRSI). However, the question about the 'true' level of NRSI is still open. This circumstance makes the 'NRSI-estimates' of ε doubtful.

To compare the NRSI estimates of ε with our findings, we use the estimates of ε and the Atkinson index in Table 4 from the 1998–2000 period. This period covers 1999, for which NRSI-estimates of ε are available. Further, we utilize 32 of our estimates from 27 countries, as some countries appear more than once.

Fig. 10 shows the distribution of the Atkinson index among selected countries. This distribution is apparently bimodal, with maxima of about 0.25 and 0.53. Non-rich countries, namely Chile, Mexico, and Paraguay, exhibit 'subjective inequality' around the last maximum. This result replicates the bimodal distribution of NRSI presented in the previous section, where we used observations from all available years. Perhaps the NRSI for non-rich countries is different from that for rich countries.

Next, we select the set of NRSI-estimates of ε for the hypothetical NRSI of 0.25. Fig. 11 displays the distributions of inequality aversion estimated from our data and the data of Lambert *et al*. (2003). The differences between the two distributions in Fig. 11 are remarkable. It follows that the methods in question provide different estimates of inequality aversion. The differences between descriptive statistics in Table 6 support this finding.

It needs to be mention that the use of the GB2 distribution or its particular forms might limit the application of the method presented in this paper while estimating ε. For instance, we have dropped three cases from our sample, notably Israel 1979 and Luxembourg 1991 and 2000, since some parameters of GB2 estimate of the parameter a of the fitted GB2 distribution was statistically insignificant.

A more general limitation of this study is the constant inequality aversion utility function as the model for the social welfare function. Although this function with the single parameter ε is a widely used parametric tool for assessing welfare in the distributive analysis, it does not pretend to be a universal utility model.

Conclusions

This paper offers the atlas of inequality aversion, ε, for 388 country-year cases from LIS datasets using the method proposed by Kot (2020). The method is based solely on disposable income distributions, which embody society's unobservable preferences regarding inequality. Assuming GB2 distribution of disposable income, one can elicit ε from a mathematical condition for the social welfare function's finiteness.

Applying the method in question is easy since only estimates of the parameters of the GB2 distribution, or its particular cases, are necessary to estimate ε. One can use standard software for this purpose.

Our empirical findings reveal several exciting features of countries' inequality aversion. The estimates of ε turn out to be country-specific, with a minimum of 0.97 and a maximum of 3.8. Ninety per cent of all estimates are less than 2.5. Thus, assuming an arbitrary level of ε, *common* to all countries, is unjustified.

Also, the country's ε varies over time. These observations do not necessarily entail changing policymakers' attitudes towards inequality. According to our model of *l competitive policies*, the collective choice selects one policy that is the most adequate to the *current* challenges of an economic situation and social expectations. We hope that understanding the thresholds of a population's tolerance for inequality can help steer economic policy decision making.

The possibility of estimating countries' inequality aversion opens up new exciting perspectives in distributional and welfare analyses. In this paper, we have tested two hypotheses. We found that affluent societies are not necessarily more inequality-averse than poor ones. For ascertaining the NRSI hypothesis, we put forward the augmented inequality-development relationship, which explains income inequality by economic development *and* inequality aversion. Generally, we have confirmed the NRSI hypothesis in about 90% of all cases. Thus, we may say that the existence of one natural rate of inequality seems probable, although the existence of two such natural rates might also be taken into account.

While this paper contributes to welfare economics, we believe that the estimates of inequality aversion for such a large number of countries over time could benefit research in other social science disciplines. We call it the Atlas of Inequality Aversion Parameters, the first such database that allows researchers to obtain the Atkinson index for 55 countries over time. We have not exhausted the research on the estimation of inequality aversion. Further research could utilise more countries employing the Luxembourg Income Study (LIS) Database, which is frequently updated with new country-year data. This database is so far the most complete and comparable across time and space.

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Annex

Table 1. The geographic distribution of the Luxembourg Income Study (LIS) data

Region	*N*	*%*
Latin America & Caribbean	61	15.72
Europe & Central Asia	231	59.54
South Asia	2	0.52
Sub-Saharan Africa	7	1.80
The Middle East & North Africa	25	6.44
East Asia & Pacific	32	8.25
North America	30	7.73
All Regions	388	100.00

Table 2. Estimates of the parameters of the Generalised Beta of the second kind [GB2(a,b,p,q)] distribution (standard errors are under estimates)

Country	Year	a	b	p	q	N
Australia	1981	2.73453	35232.02	0.84540	2.74908	42211
		0.12516	1492.08	0.05064	0.30293	
Australia	1985	3.00767	29914.79	0.75179	1.83266	20408
		0.18091	1132.70	0.05950	0.21619	
Australia	1989	2.83104	29252.31	0.81629	1.75688	39022
		0.12513	777.35	0.04846	0.14598	
Australia	1995	2.48179	26513.81	1.02422	2.01520	17915
		0.15120	1138.95	0.08736	0.24085	
Australia	2001	2.51393	28084.61	0.99704	1.78305	16820
		0.15813	1084.39	0.08832	0.20587	
Australia	2003	2.60437	30478.10	0.91512	1.84740	24560
		0.12872	991.13	0.06254	0.17343	
Australia	2004	3.04685	28705.48	0.79419	1.27101	28492
		0.14752	624.07	0.05226	0.10122	
Australia	2008	3.09511	32475.17	0.79251	1.06499	22874
		0.18086	680.82	0.06395	0.09338	
Australia	2010	2.74966	34606.17	0.89515	1.31753	42164
		0.10870	638.94	0.04929	0.08549	
Australia	2014	3.82382	35227.20	0.59427	0.83488	33786
		0.17522	508.26	0.03521	0.05501	
Austria	1987	3.68339	28350.48	0.97230	1.65429	24799
		0.24403	583.46	0.09031	0.18595	
Austria	1994	5.12467	28395.76	0.50150	0.70782	7978
		0.55384	718.13	0.06654	0.10728	
Austria	1995	3.66196	32537.52	0.59854	1.59302	47753
		0.15982	725.46	0.03251	0.13228	
Austria	1997	4.45533	28369.26	0.61133	0.93804	7285
		0.49881	879.44	0.08699	0.15923	
Austria	2000	4.71063	28634.00	0.63199	0.87474	6175
		0.59485	836.65	0.10292	0.16070	
Austria	2004	5.51891	28851.55	0.52819	0.62374	13039
		0.49090	480.66	0.05801	0.07449	

Table 2. Continued

Country	Year	a	b	p	q	N
Austria	2007	4.84126	33046.02	0.48657	0.76279	13618
		0.38032	673.19	0.04632	0.08668	
Austria	2010	5.29707	34288.59	0.45266	0.68515	13928
		0.40683	602.83	0.04177	0.07339	
Austria	2013	5.42436	33018.41	0.45816	0.66149	12979
		0.42463	562.03	0.04339	0.07104	
Austria	2016	6.70906	35325.09	0.31984	0.52474	12827
		0.58185	561.88	0.03136	0.05968	
Belgium	1985	3.64808	20340.88	1.06815	1.51927	18293
		0.24768	487.02	0.10326	0.17710	
Belgium	1988	4.34554	20579.28	0.82819	1.11028	11096
		0.36626	497.32	0.09618	0.14626	
Belgium	1992	3.07468	24465.30	1.34125	2.20647	10703
		0.31040	1108.16	0.19774	0.42249	
Belgium	1995	4.66632	25930.47	0.58831	0.88581	6637
		0.52218	692.34	0.08674	0.13937	
Belgium	1997	3.53914	29433.02	0.81547	1.64332	12243
		0.29152	1097.35	0.08937	0.24884	
Belgium	2000	4.63761	25515.38	0.62648	0.77052	5083
		0.57754	735.75	0.10577	0.12796	
Belgium	2004	2.95317	25396.51	1.29198	1.48846	12112
		0.23497	741.60	0.16351	0.18369	
Belgium	2007	3.59311	29368.74	0.84790	1.23557	15104
		0.24761	632.52	0.08461	0.12740	
Belgium	2010	3.16145	34666.61	0.92040	1.81353	14289
		0.24022	1146.62	0.09887	0.24128	
Belgium	2013	2.80256	35654.36	1.09014	2.15653	14340
		0.21053	1383.67	0.11907	0.29850	
Belgium	2016	2.93838	33321.82	1.10277	1.85558	14019
		0.21991	1050.68	0.12230	0.23789	
Brazil	2006	1.80161	4926.41	1.14097	1.06822	397969
		0.03927	46.92	0.03623	0.03455	
Brazil	2009	1.96455	6047.66	1.03789	1.04163	386715
		0.04127	52.74	0.03095	0.03254	
Brazil	2011	2.51937	7106.34	0.69468	0.79661	338597
		0.05481	53.80	0.01969	0.02433	
Brazil	2013	2.33054	7592.10	0.83882	0.90073	342720
		0.05310	57.61	0.02625	0.02903	
Brazil	2016	3.17920	7747.90	0.47547	0.60402	437103
		0.06135	44.63	0.01104	0.01547	
Canada	1971	4.67766	24829.62	0.36088	0.89637	77744
		0.20343	333.18	0.01822	0.05919	
Canada	1975	4.41606	30592.29	0.45152	1.09116	78795
		0.18718	425.02	0.02303	0.07395	
Canada	1981	3.29300	34925.35	0.69243	1.70300	41845
		0.16850	931.50	0.04557	0.16350	
Canada	1987	2.91645	33700.16	0.89770	1.83003	30722
		0.18830	1106.19	0.07797	0.21887	
Canada	1991	2.99834	32341.44	0.90245	1.70683	53222
		0.13151	653.43	0.05434	0.13280	
Canada	1994	2.68708	33922.90	1.02146	2.05048	97858
		0.09008	619.70	0.04785	0.12863	
Canada	1997	3.52385	33702.54	0.62435	1.36862	86600
		0.11045	475.72	0.02488	0.07480	

Table 2. Continued

Country	Year	a	b	p	q	N
Canada	1998	3.91895	31602.55	0.53728	0.98373	79432
		0.12781	339.70	0.02214	0.04849	
Canada	2000	3.79521	29827.19	0.59240	0.93991	72850
		0.12533	317.98	0.02521	0.04610	
Canada	2004	3.53568	32314.75	0.63192	1.02481	68541
		0.12594	383.15	0.02931	0.05512	
Canada	2007	3.55839	33917.80	0.65944	0.99665	64783
		0.12334	393.53	0.03001	0.05204	
Canada	2010	3.58606	35400.29	0.63708	0.99916	60362
		0.13063	422.06	0.03045	0.05433	
Canada	2012	3.48763	38507.39	0.61940	1.09394	57539
		0.13309	523.71	0.03059	0.06464	
Canada	2013	3.06507	42277.20	0.68095	1.35293	54483
		0.11629	777.88	0.03341	0.08808	
Canada	2014	3.77479	38942.11	0.57155	0.99123	55551
		0.14531	499.13	0.02791	0.05804	
Canada	2015	3.78380	39485.55	0.54368	0.95894	59727
		0.14855	496.22	0.02670	0.05662	
Canada	2016	3.72657	39142.70	0.59053	1.02625	62148
		0.13435	483.50	0.02706	0.05717	
Canada	2017	3.54774	39975.23	0.62551	1.05909	91884
		0.10132	414.59	0.02302	0.04713	
Chile	1990	2.63741	3236.21	0.73039	0.63620	103840
		0.10336	46.67	0.03770	0.03357	
Chile	1992	2.37515	3396.30	0.97195	0.70947	141853
		0.07540	46.72	0.04421	0.03072	
Chile	1994	1.88154	4479.87	1.08215	1.00024	175871
		0.05745	65.99	0.04729	0.04549	
Chile	1996	2.16883	4841.72	0.92791	0.81805	133376
		0.07353	71.97	0.04371	0.03948	
Chile	1998	2.18759	5062.10	0.91030	0.79733	186878
		0.06217	62.51	0.03579	0.03207	
Chile	2000	2.87496	5199.50	0.63175	0.54893	250869
		0.07527	44.48	0.02122	0.01857	
Chile	2003	2.51611	5286.30	0.78546	0.67895	255114
		0.06135	48.47	0.02566	0.02255	
Chile	2006	2.28633	6004.75	0.97777	0.82493	267421
		0.05442	57.24	0.03292	0.02774	
Chile	2009	3.17419	6313.39	0.65909	0.54072	245032
		0.07550	46.82	0.02021	0.01671	
Chile	2011	3.01946	6681.56	0.72071	0.58731	199413
		0.07901	56.26	0.02495	0.02019	
Chile	2013	2.97390	7661.27	0.78608	0.60641	217666
		0.07415	61.83	0.02660	0.01987	
Chile	2015	2.74948	8100.11	0.90036	0.68004	266057
		0.06000	62.56	0.02758	0.01998	
Chile	2017	2.88903	8546.37	0.83262	0.63105	215517
		0.06819	68.76	0.02707	0.01977	
China	2002	0.65767	2294.18	8.41365	8.15257	61692
		0.09517	285.27	2.27458	2.29266	
China	2013	1.36063	12146.45	1.69430	3.43492	61138
		0.08064	790.31	0.15196	0.42003	
Colombia	2004	2.26789	3140.82	0.73055	0.76066	34559
		0.18865	87.67	0.08090	0.08607	

Table 2. Continued

Country	Year	a	b	p	q	N
Colombia	2007	2.00723	4757.00	0.72872	0.86306	825029
		0.02851	32.51	0.01352	0.01782	
Colombia	2010	1.97062	4815.01	0.87256	0.94622	817501
		0.02814	31.39	0.01694	0.01992	
Colombia	2013	2.06305	6117.58	0.79266	0.98499	792514
		0.02875	40.07	0.01475	0.02052	
Colombia	2016	2.38391	6178.48	0.71695	0.87393	773923
		0.03213	34.19	0.01273	0.01702	
Czech Rep.	1992	5.82284	8877.31	0.88490	0.76209	43234
		0.27354	73.48	0.06021	0.04814	
Czech Rep.	1996	3.77619	10339.49	1.15338	1.00225	71821
		0.13344	96.83	0.06074	0.05210	
Czech Rep.	2002	3.58074	10246.59	1.41141	1.02730	18962
		0.26835	210.03	0.16845	0.11077	
Czech Rep.	2004	3.99155	12325.92	0.96038	0.90570	10333
		0.38119	274.84	0.12967	0.12477	
Czech Rep.	2007	4.48653	15007.78	0.83545	0.85180	26931
		0.24592	188.63	0.06263	0.06729	
Czech Rep.	2010	4.30860	15644.65	0.84270	0.88242	20627
		0.28871	230.29	0.07729	0.08518	
Czech Rep.	2013	4.63687	14639.88	0.82552	0.76938	18210
		0.35519	208.26	0.08746	0.08033	
Czech Rep.	2016	4.00647	17123.16	0.95322	1.00211	19205
		0.26215	272.39	0.08806	0.09726	
Denmark	1987	11.47900	26958.57	0.19133	0.35257	25536
		1.27210	209.15	0.02287	0.04478	
Denmark	1992	8.81499	27262.78	0.26508	0.56126	25694
		0.59738	223.93	0.02053	0.04735	
Denmark	1995	4.50457	27951.35	0.78719	1.31094	173097
		0.09112	146.46	0.02223	0.04128	
Denmark	2000	4.21645	29271.56	0.85179	1.34812	175368
		0.08661	155.66	0.02504	0.04255	
Denmark	2004	4.33780	31129.47	0.78295	1.28874	176996
		0.08468	162.90	0.02144	0.03874	
Denmark	2007	5.85983	31813.40	0.50155	0.81044	179423
		0.12203	121.64	0.01343	0.02281	
Denmark	2010	5.50176	32372.70	0.51478	0.81343	180266
		0.10214	132.19	0.01230	0.02095	
Denmark	2013	5.33582	30978.69	0.54072	0.80579	183962
		0.09338	130.04	0.01214	0.02004	
Denmark	2016	5.32903	31836.09	0.52931	0.78003	187596
		0.09269	133.55	0.01172	0.01922	
Dominican Rep.	2007	2.37612	4807.99	0.68673	0.75563	30817
		0.18722	136.29	0.07039	0.08232	
Egypt	1999	4.11048	4088.63	1.60592	0.60360	113139
		0.17190	74.14	0.12562	0.03156	
Egypt	2004	3.55288	3928.64	1.60530	0.73451	207316
		0.10760	51.68	0.08803	0.02885	
Egypt	2008	3.71767	4134.61	1.50977	0.74388	109685
		0.16005	68.13	0.11373	0.04185	
Egypt	2010	4.00680	4429.02	1.28334	0.69956	34051
		0.30443	105.93	0.16015	0.06901	
Egypt	2012	4.13311	4702.99	1.26486	0.69802	32717
		0.30798	100.11	0.14940	0.06900	

Table 2. Continued

Country	Year	a	b	p	q	N
Egypt	2015	3.52370	4537.43	1.66897	0.76360	52203
		0.20989	120.47	0.18270	0.05931	
Estonia	2000	2.63983	6450.19	1.02566	1.06055	17143
		0.20400	190.11	0.11164	0.12565	
Estonia	2004	2.75728	9899.33	0.83575	1.16637	11843
		0.25352	402.29	0.10170	0.17486	
Estonia	2007	2.43072	17840.63	1.03094	1.94462	13026
		0.20614	986.12	0.12027	0.31669	
Estonia	2010	2.53989	16067.26	0.92041	1.76377	13417
		0.21533	852.98	0.10419	0.28308	
Estonia	2013	2.18761	19414.51	0.96910	1.89082	14741
		0.16511	1148.47	0.09789	0.28116	
Finland	1987	5.05288	21599.30	0.70119	1.23810	34093
		0.29254	290.87	0.05402	0.11285	
Finland	1991	5.56935	23519.78	0.61003	1.04062	32380
		0.32280	288.01	0.04540	0.09190	
Finland	1995	4.97031	18847.82	0.83493	0.96503	25228
		0.30468	235.24	0.07173	0.08550	
Finland	2000	4.00453	20294.92	0.97121	1.02286	27839
		0.21429	294.85	0.07756	0.07858	
Finland	2004	3.88587	23702.19	0.92582	1.05919	29109
		0.20298	341.96	0.07031	0.08121	
Finland	2007	3.76876	26801.30	0.89093	1.11140	26480
		0.22292	412.03	0.07641	0.09549	
Finland	2010	3.48365	27658.95	1.00674	1.26300	23015
		0.20331	495.15	0.08711	0.11218	
Finland	2013	3.56115	27037.39	1.01142	1.20200	27136
		0.19248	434.40	0.08029	0.09884	
Finland	2016	4.36584	25945.77	0.82548	0.87512	24818
		0.24415	349.39	0.06517	0.06884	
France	1978	5.09484	21338.87	0.42672	0.62300	31724
		0.28937	301.53	0.02880	0.04854	
France	1984	8.13299	20010.28	0.25158	0.34904	31603
		0.56904	197.27	0.01958	0.02861	
France	1989	4.93600	20914.82	0.52731	0.71769	23294
		0.31580	310.53	0.04197	0.06403	
France	1994	3.53792	20540.64	0.97496	0.96251	29204
		0.20003	321.79	0.07868	0.07961	
France	2000	3.18537	20893.35	1.17250	1.17992	25743
		0.19099	387.82	0.10247	0.11030	
France	2005	4.15730	23095.08	0.72171	0.86650	25364
		0.26049	339.81	0.06012	0.07771	
France	2010	5.18408	26306.97	0.51437	0.63952	40915
		0.27192	262.90	0.03373	0.04429	
Georgia	2010	1.61854	4005.08	1.19769	1.77366	18988
		0.13111	263.90	0.13724	0.26156	
Georgia	2013	1.42426	4316.89	2.19834	2.30740	9601
		0.19872	390.43	0.50324	0.56647	
Georgia	2016	1.33718	5938.62	2.32841	2.81526	9179
		0.20885	678.91	0.58216	0.82522	
Germany	1973	5.47042	24126.66	0.51938	0.62345	135016
		0.14955	138.94	0.01731	0.02336	
Germany	1978	4.56324	25970.59	0.77834	0.78516	128803
		0.12147	159.53	0.02808	0.02946	

Table 2. Continued

Country	Year	a	b	p	q	N
Germany	1981	4.11408	24069.44	0.86257	1.07273	7356
		0.42689	714.75	0.12277	0.17310	
Germany	1983	2.93178	24590.08	1.59638	1.41701	118366
		0.09615	249.44	0.08427	0.07207	
Germany	1984	5.61109	24544.97	0.48572	0.73219	14654
		0.45466	418.19	0.04855	0.08273	
Germany	1987	4.67533	26064.67	0.64955	0.91521	13067
		0.38671	547.81	0.06918	0.11350	
Germany	1989	5.07375	26328.50	0.60324	0.77711	12486
		0.41019	492.98	0.06277	0.08920	
Germany	1991	2.71105	27242.00	1.31539	1.83468	17918
		0.21334	917.88	0.15142	0.25603	
Germany	1994	4.41778	25898.77	0.66942	0.91550	17804
		0.32764	493.34	0.06354	0.10224	
Germany	1995	5.05981	25973.26	0.57437	0.78049	17418
		0.37624	440.85	0.05293	0.08428	
Germany	1998	4.32191	25698.72	0.76528	0.94066	18097
		0.30992	468.78	0.07138	0.10292	
Germany	2000	4.90915	26884.03	0.62199	0.78833	28887
		0.28383	330.51	0.04583	0.06488	
Germany	2001	6.04235	25029.73	0.49632	0.54362	30256
		0.39711	242.88	0.04013	0.04549	
Germany	2002	5.09817	26645.65	0.57634	0.70657	28930
		0.31485	304.75	0.04528	0.05906	
Germany	2003	6.02091	26602.28	0.45944	0.58355	28057
		0.38634	274.78	0.03595	0.04844	
Germany	2004	4.68994	26157.61	0.64397	0.76665	26819
		0.29863	325.41	0.05338	0.06720	
Germany	2005	4.41286	25169.02	0.67219	0.75269	28785
		0.25698	310.88	0.05194	0.05965	
Germany	2006	3.96023	25401.41	0.79428	0.87893	26735
		0.24526	355.16	0.06733	0.07688	
Germany	2007	4.10118	25398.31	0.76373	0.83366	24997
		0.24331	352.61	0.06235	0.06855	
Germany	2008	4.13499	25847.39	0.72906	0.83509	23332
		0.25490	372.25	0.06062	0.07212	
Germany	2009	3.57883	26997.40	0.85690	1.06130	37575
		0.18899	388.66	0.06337	0.08289	
Germany	2010	3.40928	27410.47	0.90366	1.13062	44131
		0.15610	384.73	0.05824	0.07890	
Germany	2011	3.44916	26139.55	0.94602	1.07161	42526
		0.16436	356.43	0.06380	0.07673	
Germany	2012	3.38716	26408.19	0.92312	1.10529	47805
		0.15736	353.02	0.06061	0.07723	
Germany	2013	3.19310	26095.22	1.02744	1.17676	41650
		0.15325	387.18	0.07192	0.08563	
Germany	2014	3.41749	28291.64	0.84219	1.14494	41236
		0.16480	438.03	0.05517	0.08647	
Germany	2015	3.69300	28063.93	0.76326	0.99827	36940
		0.18587	391.53	0.05255	0.07350	
Germany	2016	3.95268	29070.71	0.66261	0.91421	39742
		0.19469	384.55	0.04261	0.06583	
Greece	1995	3.13152	17213.07	0.61869	1.09574	14054
		0.28184	630.20	0.07076	0.15604	

Table 2. Continued

Country	Year	a	b	p	q	N
Greece	2000	2.20719	21003.32	1.09501	2.02611	11140
		0.23313	1383.29	0.16358	0.39565	
Greece	2004	2.85358	20946.72	0.89429	1.23455	14861
		0.22466	668.46	0.09669	0.15636	
Greece	2007	2.95208	21363.96	0.92083	1.21870	16819
		0.20974	575.91	0.09206	0.13605	
Greece	2010	3.49829	21449.42	0.61748	1.03605	14989
		0.26300	562.22	0.06025	0.11839	
Greece	2013	3.06655	14894.95	0.70759	1.19608	20973
		0.19541	381.15	0.05982	0.12079	
Guatemala	2006	0.98836	3909.35	3.33617	2.79204	68552
		0.07450	260.59	0.46154	0.35907	
Guatemala	2011	2.05640	4416.46	0.74125	0.98956	65561
		0.10526	122.58	0.05030	0.07664	
Guatemala	2014	2.44164	3558.24	1.20588	0.96666	54699
		0.13427	85.94	0.10416	0.07496	
Hungary	1991	4.68425	11921.68	0.55716	0.74243	5803
		0.62044	375.34	0.09323	0.13720	
Hungary	1994	4.63168	8948.14	0.53480	0.58278	5283
		0.72068	297.40	0.10047	0.12190	
Hungary	1999	3.73200	7580.43	0.98045	0.84417	5428
		0.46689	270.71	0.17486	0.15175	
Hungary	2005	4.37296	9991.92	0.82217	0.70385	5161
		0.59146	306.70	0.15378	0.12893	
Hungary	2007	4.43085	10665.33	0.79993	0.79939	4854
		0.58060	325.48	0.14710	0.14376	
Hungary	2009	4.39432	10607.87	0.73062	0.80884	4699
		0.75910	336.47	0.16444	0.19745	
Hungary	2012	3.30494	11919.35	0.84732	1.26280	4727
		0.45917	541.98	0.16270	0.27571	
Hungary	2015	3.28638	13240.82	1.12324	1.23733	6236
		0.36705	460.10	0.18558	0.21401	
Iceland	2004	7.13800	27077.49	0.45108	0.48900	8832
		0.85599	473.77	0.06566	0.07361	
Iceland	2007	5.94870	30758.70	0.56084	0.52211	8643
		0.67668	618.86	0.08165	0.07514	
Iceland	2010	6.44378	28396.44	0.46652	0.62205	8851
		0.66095	538.12	0.05928	0.08467	
India	2004	1.83435	1744.18	1.10158	1.10499	214663
		0.05566	29.38	0.04624	0.05330	
India	2011	1.95569	2384.27	1.00438	0.97514	203967
		0.06291	35.72	0.04469	0.04716	
Iraq	2007	3.89519	7908.00	0.57267	0.60680	127052
		0.17872	95.95	0.03355	0.03657	
Iraq	2012	2.97439	10015.55	0.67067	0.97799	175930
		0.11566	138.44	0.03458	0.05567	
Ireland	1987	2.55779	13226.20	1.11526	1.39970	13166
		0.23189	604.91	0.14458	0.21533	
Ireland	1994	1.96065	13622.76	2.09506	1.72995	10978
		0.18314	805.22	0.32820	0.27453	
Ireland	1995	1.81094	13457.29	2.41449	1.89903	9512
		0.20974	970.61	0.49589	0.36193	
Ireland	1996	1.53218	15277.89	3.09886	2.73718	8746
		0.21096	1442.74	0.78521	0.64845	

Table 2. Continued

Country	Year	a	b	p	q	N
Ireland	2000	2.14851	28281.41	1.39769	2.21297	7515
		0.29815	1871.30	0.30605	0.51723	
Ireland	2004	1.77045	25248.99	2.26115	2.34798	15520
		0.14533	1266.55	0.33821	0.31182	
Ireland	2007	2.37510	29288.26	1.53089	1.72824	12519
		0.18411	1066.40	0.19236	0.21877	
Ireland	2010	3.19767	30242.37	0.78817	1.32609	10944
		0.25566	1150.83	0.08256	0.18539	
Israel	1979	0.63131	9609.62	18.13812	16.17351	8436
		0.37397	5438.30	22.06294	17.99277	
Israel	1986	1.04165	14990.90	5.53665	7.08574	18610
		0.18740	2398.45	1.75209	2.61501	
Israel	1992	1.00666	15806.51	6.44188	7.31827	19132
		0.21238	2280.92	2.49933	3.01044	
Israel	1997	2.03333	18620.68	1.30203	2.10848	17972
		0.15975	1028.32	0.14975	0.31235	
Israel	2001	1.31171	18738.19	2.94151	3.72588	19502
		0.14142	1518.20	0.54747	0.75312	
Israel	2005	1.70612	24100.19	1.32790	2.58990	20985
		0.12585	1602.22	0.14626	0.37298	
Israel	2007	1.24160	33920.70	2.19170	4.95484	20273
		0.12770	5263.39	0.34395	1.19331	
Israel	2010	1.26830	28546.49	2.18739	3.99582	20137
		0.11436	2878.61	0.31951	0.73436	
Israel	2012	1.44130	34397.59	1.67825	3.78986	28751
		0.11571	3240.92	0.20335	0.65552	
Israel	2014	1.45433	45493.47	1.59029	4.65025	27831
		0.12999	6069.81	0.20768	1.00666	
Israel	2016	1.06029	105314.8	2.66204	13.33613	29739
		0.14160	50345.82	0.52450	6.41845	
Italy	1986	2.34604	17922.77	1.36286	1.78488	25064
		0.15949	572.20	0.14075	0.20696	
Italy	1987	3.44244	21174.62	0.57593	0.96858	25027
		0.20220	571.55	0.04101	0.09378	
Italy	1989	1.62100	18849.22	2.93706	3.03538	25145
		0.15240	921.40	0.48333	0.50679	
Italy	1991	2.35806	23845.41	1.35306	2.09595	24886
		0.15607	849.94	0.13451	0.25126	
Italy	1993	3.38210	23888.30	0.54546	1.05502	23926
		0.20713	630.85	0.04173	0.10320	
Italy	1995	3.34031	21898.67	0.60806	1.05131	23867
		0.20717	515.48	0.04908	0.09949	
Italy	1998	4.48801	22764.71	0.40256	0.70531	20699
		0.32200	446.84	0.03472	0.06948	
Italy	2000	3.64663	22592.30	0.58056	0.92771	22051
		0.22941	482.01	0.04684	0.08660	
Italy	2004	3.60320	21574.15	0.62790	0.89838	20556
		0.21362	437.05	0.04883	0.07804	
Italy	2008	3.71054	22786.08	0.60574	0.90705	19802
		0.21669	461.69	0.04590	0.07862	
Italy	2010	4.89196	24246.21	0.36758	0.69787	19685
		0.32298	447.00	0.02846	0.06479	
Italy	2014	4.55463	23449.66	0.38189	0.82581	19056
		0.28570	468.65	0.02855	0.07601	

Table 2. Continued

Country	Year	a	b	p	q	N
Italy	2016	4.98742	24189.77	0.32402	0.70174	16182
		0.36386	487.42	0.02727	0.07174	
Ivory Coast	2002	2.26013	2365.32	0.60568	0.75097	55628
		0.14347	67.17	0.04871	0.06685	
Ivory Coast	2008	1.94579	2428.09	0.83243	1.00253	57740
		0.10493	68.94	0.06196	0.08008	
Ivory Coast	2015	2.26016	2540.97	0.58811	0.74103	43817
		0.13256	68.65	0.04322	0.06122	
Japan	2008	3.51228	28736.62	0.57783	1.03137	11776
		0.37842	1051.34	0.07952	0.16814	
Japan	2010	3.30057	27866.28	0.82580	1.08066	8403
		0.36943	1028.33	0.12731	0.18372	
Japan	2013	5.61541	27319.28	0.36841	0.55718	6136
		0.85827	785.79	0.06647	0.10887	
Jordan	2002	2.16779	6179.06	1.42365	1.23027	16171
		0.26437	350.69	0.27835	0.22460	
Jordan	2006	1.66926	4711.21	2.87180	1.69106	16840
		0.23122	464.34	0.74674	0.36621	
Jordan	2008	2.56334	5872.32	1.40435	0.96293	15351
		0.27901	290.78	0.24784	0.14964	
Jordan	2010	2.79358	7009.47	1.12573	0.87782	15362
		0.28768	294.91	0.17868	0.12651	
Jordan	2013	2.79808	7640.70	0.93463	0.96765	25771
		0.25775	232.20	0.12051	0.13089	
Lithuania	2010	2.56218	12698.96	0.88634	1.69492	12211
		0.20137	650.58	0.09203	0.25400	
Lithuania	2013	2.19584	11548.81	1.27156	1.53179	11816
		0.18926	494.83	0.15877	0.22465	
Luxembourg	1985	2.42502	22624.74	2.14073	2.47142	6042
		0.40427	1563.82	0.56202	0.76277	
Luxembourg	1991	1.57401	23172.45	6.14204	4.21817	5498
		0.42159	4290.64	3.45759	1.90246	
Luxembourg	1994	2.53906	31552.05	2.22408	2.11720	4981
		0.42669	1929.75	0.60998	0.62075	
Luxembourg	1997	2.40507	31527.05	2.07074	1.95753	6630
		0.34538	1682.14	0.49751	0.46654	
Luxembourg	2000	1.42983	25649.25	6.26083	4.17341	6189
		0.37878	4721.14	3.39968	1.89362	
Luxembourg	2004	3.66456	41668.45	0.92869	1.06006	9661
		0.40723	1157.75	0.14315	0.17765	
Luxembourg	2007	3.50452	38709.48	1.05846	1.03206	10083
		0.35533	1060.40	0.15875	0.15226	
Luxembourg	2010	2.61632	42343.18	1.50287	1.77852	14853
		0.20886	1437.55	0.18523	0.24330	
Luxembourg	2013	2.86217	43460.67	1.15891	1.54243	9965
		0.27104	1637.68	0.16025	0.24476	
Mexico	1984	1.55736	4245.65	1.61854	1.75516	23866
		0.16232	256.97	0.25892	0.30988	
Mexico	1989	1.96487	3920.38	1.15329	1.08544	56916
		0.12343	109.33	0.10820	0.10033	
Mexico	1992	1.80728	3725.57	1.30599	1.07409	50646
		0.12682	124.08	0.14187	0.10935	
Mexico	1994	1.40037	3186.55	2.07263	1.45795	60045
		0.09132	148.56	0.23547	0.14485	

Table 2. Continued

Country	Year	a	b	p	q	N
Mexico	1996	1.66073	2792.64	1.54475	1.23022	64606
		0.09555	89.10	0.14215	0.10668	
Mexico	1998	1.37471	3753.72	1.56894	1.66031	47806
		0.09805	160.82	0.17559	0.19182	
Mexico	2000	1.16731	3723.01	2.32659	2.05008	42341
		0.10103	213.32	0.34541	0.29074	
Mexico	2002	1.29094	3810.44	2.19534	1.88199	72389
		0.08966	153.35	0.26105	0.20881	
Mexico	2004	1.95919	4812.39	1.06022	1.09937	91344
		0.09160	97.04	0.07079	0.07753	
Mexico	2008	1.34307	5470.41	1.93532	1.88450	118721
		0.06318	150.17	0.15149	0.14337	
Mexico	2010	1.94930	5623.15	1.05791	1.20373	107537
		0.08440	105.51	0.06563	0.07990	
Mexico	2012	1.57438	4732.54	1.66705	1.48631	33683
		0.13412	197.52	0.23030	0.19524	
Mexico	2014	2.30935	4490.97	1.01208	0.88331	73494
		0.11417	83.05	0.07293	0.06101	
Mexico	2016	1.98951	5410.69	1.30182	1.18719	257600
		0.05379	61.35	0.05436	0.04757	
Mexico	2018	2.29847	5785.06	1.05727	1.02063	268992
		0.05849	53.84	0.03949	0.03750	
Netherlands	1983	5.91026	20513.43	0.45127	0.68463	13154
		0.48038	384.34	0.04337	0.08012	
Netherlands	1987	3.88007	19182.96	1.11832	1.18859	10711
		0.31308	493.25	0.12685	0.15786	
Netherlands	1990	5.48483	24813.80	0.49338	0.70569	10807
		0.42546	486.33	0.04689	0.07846	
Netherlands	1993	4.92769	27957.85	0.45735	1.06989	12954
		0.35637	735.81	0.03956	0.13145	
Netherlands	1999	4.52217	27528.47	0.74137	1.11168	10408
		0.36979	652.00	0.08001	0.14562	
Netherlands	2004	5.95643	25586.55	0.49175	0.60412	23756
		0.35063	300.36	0.03549	0.04787	
Netherlands	2007	5.23969	25562.07	0.67603	0.61598	25448
		0.29099	296.83	0.04984	0.04534	
Netherlands	2010	4.05325	26379.49	0.94297	0.96479	25461
		0.22331	380.23	0.07303	0.07915	
Netherlands	2013	4.99337	26154.71	0.64061	0.73540	24494
		0.27814	326.85	0.04628	0.05733	
Norway	1979	6.05211	18099.73	0.51053	0.82558	25751
		0.36891	212.23	0.03860	0.07236	
Norway	1986	5.00060	24230.38	0.62206	0.98215	14265
		0.45754	487.01	0.07329	0.13401	
Norway	1991	6.89578	24276.12	0.43080	0.65083	24437
		0.46790	272.63	0.03563	0.05886	
Norway	1995	8.00540	24482.77	0.33455	0.54973	26290
		0.56123	227.40	0.02744	0.04868	
Norway	2000	10.30141	27317.54	0.26446	0.36146	34835
		0.72901	188.98	0.02120	0.02943	
Norway	2004	11.12714	29310.41	0.24048	0.31966	33977
		0.84864	196.89	0.02040	0.02762	
Norway	2007	10.75592	35830.54	0.22349	0.37353	467193
		0.19717	66.16	0.00446	0.00815	

Table 2. Continued

Country	Year	a	b	p	q	N
Norway	2010	11.33424	37801.04	0.20417	0.35741	488558
		0.20597	68.41	0.00400	0.00770	
Norway	2013	10.18085	41316.45	0.22373	0.39158	506423
		0.17142	78.88	0.00409	0.00798	
Palestine	2010	1.13979	5496.50	2.35556	3.71809	22588
		0.17107	787.72	0.57298	1.08728	
Palestine	2017	1.41459	8496.11	1.28895	3.04782	20175
		0.17147	1183.48	0.22799	0.75433	
Panama	2007	0.58856	21075.46	5.13823	9.98204	48838
		0.10743	8824.21	1.56754	4.14801	
Panama	2010	1.28576	10427.24	1.49066	2.29475	48584
		0.09811	582.03	0.17358	0.30796	
Panama	2013	1.05589	11688.91	2.20321	3.16811	43812
		0.10235	948.82	0.34340	0.57181	
Paraguay	2000	1.83479	7636.58	0.75338	1.10346	36944
		0.14126	320.29	0.07728	0.12953	
Paraguay	2004	2.04190	4859.80	0.94987	0.95565	34297
		0.14465	159.09	0.09515	0.09877	
Paraguay	2007	2.17519	6296.92	0.76733	0.93056	20845
		0.21564	254.43	0.10316	0.13203	
Paraguay	2010	1.88166	7592.89	0.87279	1.18496	20277
		0.18258	358.32	0.11901	0.17279	
Paraguay	2013	1.79540	8645.95	1.03789	1.27793	20904
		0.16170	416.80	0.13317	0.18137	
Paraguay	2016	1.59411	8064.99	1.23575	1.49490	37713
		0.11006	305.22	0.12967	0.16185	
Peru	2004	2.24658	6993.85	0.41770	1.04644	82366
		0.13770	236.36	0.03077	0.09685	
Peru	2007	1.47326	10177.65	0.83035	2.09678	91510
		0.07560	563.33	0.05723	0.20387	
Peru	2010	2.58396	9458.40	0.43409	1.00430	86281
		0.12753	236.30	0.02582	0.07547	
Peru	2013	2.51027	10910.01	0.47318	1.15497	115719
		0.10970	260.59	0.02516	0.08058	
Peru	2016	2.44324	10747.93	0.51755	1.17584	128939
		0.09780	227.08	0.02568	0.07454	
Poland	1986	2.08757	12446.45	1.82940	2.97445	34198
		0.17061	519.88	0.23651	0.45198	
Poland	1992	3.40018	8688.15	1.20307	1.15221	18806
		0.24943	186.27	0.13164	0.12919	
Poland	1995	5.22450	7503.08	0.46417	0.59146	103466
		0.18861	53.98	0.02057	0.02778	
Poland	1999	4.65156	8946.59	0.61101	0.73732	99734
		0.16342	68.59	0.02765	0.03570	
Poland	2004	3.94017	8640.58	0.69033	0.77881	98925
		0.13584	74.73	0.03154	0.03731	
Poland	2007	4.42796	10146.44	0.63505	0.66931	111896
		0.13545	74.12	0.02506	0.02791	
Poland	2010	3.63287	11878.34	0.82799	0.86595	107880
		0.11168	101.41	0.03491	0.03825	
Poland	2013	4.22705	12495.69	0.61428	0.72184	102569
		0.13266	96.86	0.02484	0.03119	
Poland	2016	4.98815	14776.52	0.57410	0.65625	99016
		0.16272	99.10	0.02362	0.02896	

Table 2. Continued

Country	Year	a	b	p	q	N
Romania	1995	3.65540	5032.21	0.89453	1.03616	93190
		0.12360	45.98	0.04318	0.05113	
Romania	1997	4.08579	4507.59	0.79613	0.87622	92334
		0.14095	36.40	0.03824	0.04225	
Russia	2000	2.73292	5074.11	0.67172	0.90756	8461
		0.28769	225.66	0.09133	0.14291	
Russia	2004	2.37049	9587.27	0.79675	1.31356	7954
		0.25286	606.16	0.11049	0.24193	
Russia	2007	2.00965	18615.65	1.03888	2.66086	8566
		0.23030	2125.95	0.16134	0.66713	
Russia	2010	3.70597	15110.13	0.55213	0.84167	14994
		0.29645	418.54	0.05381	0.10187	
Russia	2011	1.79394	18385.02	1.59445	1.96125	24900
		0.12137	787.73	0.15813	0.24382	
Russia	2013	2.22842	20335.77	1.27016	1.47539	105592
		0.07042	270.34	0.05968	0.07555	
Russia	2014	2.01226	20855.87	1.50410	1.85500	105084
		0.06886	341.34	0.07748	0.10983	
Russia	2015	1.71173	21180.18	1.93734	2.63812	138387
		0.05632	425.97	0.09883	0.16291	
Russia	2016	1.70436	18781.00	2.08205	2.52488	367080
		0.03415	203.22	0.06687	0.09136	
Serbia	2006	3.26842	9574.76	0.53500	1.23676	14360
		0.29531	402.47	0.06021	0.18617	
Serbia	2010	3.54432	10127.59	0.53422	1.16474	13510
		0.32445	386.13	0.06047	0.17527	
Serbia	2013	4.02104	8469.05	0.47224	0.85156	12980
		0.36690	231.10	0.05342	0.11116	
Serbia	2016	3.54290	10393.06	0.55196	1.15021	17774
		0.27250	305.30	0.05363	0.14039	
Slovakia	1992	5.73382	9403.46	0.90122	0.90645	47712
		0.26885	76.59	0.06085	0.05985	
Slovakia	1996	8.10960	10799.83	0.29257	0.50196	48740
		0.43236	89.93	0.01743	0.03480	
Slovakia	2004	4.47090	10904.00	0.67162	0.88491	15418
		0.39326	212.74	0.07845	0.11043	
Slovakia	2007	4.29028	14740.57	0.73067	1.07543	16541
		0.33192	319.34	0.07489	0.12945	
Slovakia	2010	4.79849	16408.72	0.55560	0.87860	15329
		0.38206	353.63	0.05478	0.10584	
Slovakia	2013	5.57756	15743.32	0.45378	0.68887	15704
		0.45278	283.36	0.04408	0.07866	
Slovenia	1997	5.18852	17370.96	0.59119	0.98746	8639
		0.69691	484.00	0.10138	0.19681	
Slovenia	1999	5.83498	17260.18	0.50486	0.82449	12658
		0.67304	343.25	0.07237	0.13339	
Slovenia	2004	4.46645	19624.34	0.72126	1.17962	11302
		0.46489	563.18	0.09739	0.19874	
Slovenia	2007	4.37878	22441.24	0.70463	1.34066	11094
		0.46614	697.19	0.09855	0.23484	
Slovenia	2010	5.92617	24408.93	0.38328	0.84197	11514
		0.58669	580.99	0.04458	0.12430	
Slovenia	2012	3.76413	24157.65	0.68922	1.27874	10805
		0.36908	844.82	0.08837	0.20643	

Table 2. Continued

Country	Year	a	b	p	q	N
Slovenia	2015	3.06228	25035.49	0.99198	1.79950	11228
		0.33725	1103.70	0.15444	0.34403	
South Africa	2010	0.51238	774.52	8.84050	4.41856	29206
		0.09100	388.38	3.57553	1.30698	
South Africa	2012	1.14513	2786.01	1.83954	1.38119	32972
		0.09881	170.83	0.25233	0.18801	
South Africa	2015	0.84379	4361.50	2.53305	2.36437	37805
		0.07284	366.51	0.35237	0.36772	
South Korea	2006	3.69173	29553.06	0.53736	1.27168	44842
		0.19753	650.01	0.03550	0.11492	
South Korea	2008	3.50678	30181.56	0.56060	1.29603	38842
		0.19612	750.49	0.03874	0.12468	
South Korea	2010	4.25735	30387.61	0.43238	1.03969	37787
		0.25126	650.80	0.03006	0.09974	
South Korea	2012	4.32915	32310.46	0.42563	1.04948	36005
		0.25401	664.29	0.02963	0.09891	
Spain	1980	2.76175	13230.23	0.94163	1.37004	88413
		0.11504	222.26	0.05412	0.09382	
Spain	1985	3.04564	10987.68	0.98435	1.08303	11582
		0.36203	383.80	0.16562	0.19332	
Spain	1990	2.82647	15974.00	1.02461	1.41772	72018
		0.11526	272.70	0.05849	0.09704	
Spain	1995	2.87496	19246.23	0.73868	1.12320	18318
		0.21755	655.45	0.07241	0.13812	
Spain	2000	2.61001	23472.59	0.92712	1.39550	13650
		0.21182	919.17	0.10460	0.18901	
Spain	2004	2.95650	26946.05	0.70964	1.52674	37032
		0.14682	736.61	0.04580	0.13694	
Spain	2007	2.97218	29250.18	0.75394	1.59602	35903
		0.15445	827.63	0.05101	0.15232	
Spain	2010	2.87757	29832.95	0.64420	1.65626	34587
		0.15365	1057.47	0.04291	0.17256	
Spain	2013	2.79952	28043.81	0.66079	1.51864	31542
		0.15508	931.18	0.04647	0.15381	
Spain	2016	3.55400	28711.08	0.48205	1.10615	34830
		0.17711	614.69	0.02944	0.08924	
Sudan	2009	1.96829	1934.52	0.80776	0.96711	48618
		0.14874	68.36	0.08272	0.10719	
Sweden	1967	12.16343	12499.43	0.15916	0.32804	14282
		1.69953	164.46	0.02332	0.05391	
Sweden	1975	4.98968	19107.12	0.58755	1.45102	29268
		0.28857	362.03	0.04316	0.14741	
Sweden	1981	5.68059	18505.64	0.57683	1.28501	24495
		0.32664	317.83	0.04103	0.13046	
Sweden	1987	7.15285	19413.36	0.39497	0.86389	21588
		0.46055	239.62	0.03021	0.08235	
Sweden	1992	7.50536	21801.94	0.35462	0.64308	28194
		0.44406	215.34	0.02422	0.05224	
Sweden	1995	14.59206	19272.65	0.18008	0.28977	34204
		1.13364	115.94	0.01467	0.02619	
Sweden	2000	6.20043	22099.25	0.47000	0.63002	33139
		0.32779	201.77	0.03035	0.04443	
Sweden	2005	5.15993	25680.59	0.63086	0.88110	36918
		0.23422	250.88	0.03757	0.05743	

Table 2. Continued

Country	Year	a	b	p	q	N
Switzerland	1982	8.15922	29733.86	0.32966	0.32482	16107
		0.70193	343.72	0.03277	0.03231	
Switzerland	1992	6.36056	32408.65	0.41740	0.47221	16745
		0.52513	468.20	0.04032	0.04988	
Switzerland	2000	4.50386	32587.27	0.66171	0.77795	9220
		0.41615	761.90	0.07938	0.10275	
Switzerland	2002	3.04452	35226.46	1.17684	1.42032	9292
		0.27694	1195.16	0.15891	0.21044	
Switzerland	2004	4.26885	35893.31	0.68043	0.98548	7993
		0.42225	1024.23	0.08723	0.15007	
Switzerland	2007	5.31973	36041.82	0.45251	0.56658	16397
		0.42361	561.51	0.04363	0.05865	
Switzerland	2010	4.09262	36655.94	0.69053	0.83510	17602
		0.27152	632.64	0.06165	0.07777	
Switzerland	2013	3.59905	33744.31	0.95590	0.91375	15651
		0.26360	674.66	0.10229	0.09414	
Taiwan	1981	2.42673	9025.50	2.43332	1.66975	73306
		0.14830	226.96	0.26335	0.16102	
Taiwan	1986	3.21490	12421.39	1.48992	1.10816	74441
		0.15640	187.75	0.11409	0.08083	
Taiwan	1991	2.21839	20381.10	2.43686	1.98549	68439
		0.13545	490.50	0.25707	0.19973	
Taiwan	1995	4.74303	31093.34	0.49745	0.72380	57664
		0.22838	418.58	0.02843	0.05128	
Taiwan	1997	2.43725	28149.54	1.65086	1.68238	52491
		0.14828	611.96	0.15787	0.16833	
Taiwan	2000	2.68042	29817.25	1.37651	1.46498	49793
		0.15839	579.73	0.12287	0.13926	
Taiwan	2005	2.78796	30249.66	1.17556	1.28202	46386
		0.16017	568.58	0.09810	0.11630	
Taiwan	2007	2.26342	29151.02	1.55357	1.76465	46230
		0.15004	723.98	0.15661	0.19730	
Taiwan	2010	2.80527	29643.99	0.95551	1.31861	47900
		0.15255	606.48	0.07173	0.11637	
Taiwan	2013	3.43909	29583.72	0.77709	0.99773	50518
		0.18662	458.63	0.05553	0.08197	
Taiwan	2016	2.88552	30817.49	1.07033	1.27249	50569
		0.14698	531.96	0.07723	0.10341	
United Kingdom	1969	2.84566	9370.22	1.61705	1.41243	24748
		0.20222	241.17	0.18270	0.16028	
United Kingdom	1974	2.86485	13981.62	1.30597	1.59896	18973
		0.21798	369.40	0.15356	0.19535	
United Kingdom	1979	2.59624	18119.23	1.24790	2.28606	18313
		0.18550	760.66	0.12904	0.31717	
United Kingdom	1986	3.12211	17201.86	0.81807	1.33220	18320
		0.18068	505.10	0.06271	0.13605	
United Kingdom	1991	2.05189	19560.53	1.36532	2.00049	17089
		0.13188	824.22	0.13274	0.23293	
United Kingdom	1994	2.55848	16105.25	1.20616	1.20642	62804
		0.07648	239.69	0.05310	0.05851	
United Kingdom	1995	2.90267	19234.57	0.76902	1.14311	16580
		0.17260	560.04	0.06117	0.11097	
United Kingdom	1999	2.17537	18690.54	1.42475	1.52617	58994
		0.07271	342.61	0.07333	0.08526	

Table 2. Continued

Country	Year	a	b	p	q	N
United Kingdom	2004	2.89028	20673.55	1.03215	0.98122	64329
		0.09102	256.39	0.04726	0.04611	
United Kingdom	2007	3.37749	25502.05	0.72963	0.87710	56880
		0.11096	301.74	0.03197	0.04262	
United Kingdom	2010	4.00229	23324.96	0.64520	0.68588	57840
		0.13620	232.83	0.02816	0.03270	
United Kingdom	2013	3.37636	22457.49	0.86334	0.85085	46109
		0.12340	286.45	0.04298	0.04608	
United Kingdom	2016	3.89483	24974.43	0.64018	0.72814	44068
		0.14609	294.58	0.03106	0.03872	
United States	1974	4.11041	36242.22	0.45682	1.00953	34165
		0.25748	758.09	0.03453	0.09828	
United States	1979	3.47931	39551.76	0.56788	1.32337	181202
		0.08479	421.10	0.01740	0.05466	
United States	1986	2.57690	45496.38	0.73005	1.87131	155100
		0.06882	787.37	0.02570	0.09351	
United States	1991	2.57319	42545.58	0.74924	1.67807	155538
		0.06738	643.27	0.02609	0.07806	
United States	1994	2.97712	36983.97	0.62781	1.10958	148897
		0.07152	372.40	0.01978	0.04100	
United States	1997	3.31410	37386.98	0.55787	0.94043	130799
		0.08534	346.50	0.01850	0.03531	
United States	2000	3.73680	39437.91	0.48585	0.81689	217017
		0.08072	260.09	0.01321	0.02455	
United States	2004	3.80178	41967.90	0.43850	0.81020	209265
		0.08197	293.80	0.01161	0.02464	
United States	2007	3.29356	42037.62	0.53430	0.92669	204929
		0.07137	329.17	0.01472	0.02927	
United States	2010	2.91624	43533.95	0.60614	1.15298	203351
		0.06061	425.83	0.01618	0.03836	
United States	2013	2.99133	40812.23	0.59039	1.01357	138397
		0.07484	442.27	0.01887	0.03900	
United States	2016	3.55655	43004.71	0.46466	0.78195	184462
		0.08323	347.10	0.01318	0.02629	
Uruguay	2004	1.60071	4650.56	2.16238	1.48098	55508
		0.07715	148.31	0.17856	0.11262	
Uruguay	2007	1.38380	3406.72	4.40148	1.68550	137859
		0.05336	171.14	0.37616	0.09838	
Uruguay	2010	1.37599	4575.93	4.54242	1.95142	126943
		0.05543	223.34	0.40006	0.12154	
Uruguay	2013	1.32818	8493.66	3.52435	2.66195	123867
		0.05847	246.82	0.28732	0.19791	
Uruguay	2016	1.31815	8585.43	3.89410	2.79207	115806
		0.06323	286.64	0.35658	0.22401	
Vietnam	2011	1.64155	4553.39	2.69665	1.94447	36640
		0.13979	248.56	0.43345	0.25633	
Vietnam	2013	1.51761	5921.40	2.65654	2.57427	36057
		0.14797	283.09	0.46124	0.41699	

Notes: symbol N denotes the number of households members.

Source: author's calculations using data on disposable household incomes from the LIS database, adjusted by the equivalence scale of the form of the square root of the household size.

Table 3. OLS Regression Summary: empirical mean ($Mean_{emp}$) and the Gini index ($Gini_{emp}$) predicted by the GB2 estimates

Regressors	***Model 1*** **$Mean_{emp}$**	***Model 2*** **$Gini_{emp}$**
$Mean_{GB2}$	1.007^{***}	
	(0.00112)	
$Gini_{GB2}$		0.948306^{***}
		(0.004934)
Intercept	-136.784^{***}	0.017976^{***}
	(24.75965)	(0.001707)
N	388	388
adjusted R^2	0.9995	0.9896

Notes: Subscript 'emp' denotes empirical characteristics (dependent variables), Subscript 'GB2' denotes GB2 estimates (independent variables), Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: authors' calculations using data from Table 2.

Table 4. Estimates of inequality aversion ε and related characteristics

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Australia	1981	1.6559	0.0148	1.6270	1.6848	0.2413	16750
Australia	1985	1.6305	0.0206	1.5902	1.6708	0.2492	16575
Australia	1989	1.6554	0.0159	1.6244	1.6865	0.2625	16805
Australia	1995	1.7708	0.0278	1.7163	1.8254	0.2751	15349
Australia	2001	1.7531	0.0282	1.6978	1.8084	0.2842	17066
Australia	2003	1.6916	0.0210	1.6505	1.7327	0.2744	17607
Australia	2004	1.7098	0.0201	1.6705	1.7491	0.2766	19206
Australia	2008	1.7262	0.0236	1.6800	1.7724	0.2965	23556
Australia	2010	1.7306	0.0174	1.6965	1.7648	0.2977	23566
Australia	2014	1.6361	0.0163	1.6041	1.6680	0.2813	25712
Austria	1987	2.2905	0.0324	2.2270	2.3541	0.2017	19925
Austria	1994	1.7843	0.0377	1.7104	1.8581	0.2344	21566
Austria	1995	1.5959	0.0119	1.5727	1.6191	0.2288	18410
Austria	1997	1.8612	0.0429	1.7772	1.9453	0.2259	20755
Austria	2000	1.9875	0.0524	1.8848	2.0901	0.2196	21978
Austria	2004	1.9566	0.0349	1.8881	2.0251	0.2322	23566
Austria	2007	1.6776	0.0247	1.6292	1.7259	0.2403	23876
Austria	2010	1.6986	0.0243	1.6510	1.7462	0.2355	25348
Austria	2013	1.7423	0.0263	1.6908	1.7938	0.2337	24936
Austria	2016	1.5727	0.0204	1.5327	1.6128	0.2335	25584
Belgium	1985	2.4480	0.0467	2.3565	2.5395	0.2085	15224
Belgium	1988	2.2988	0.0526	2.1957	2.4018	0.2051	16022
Belgium	1992	2.5616	0.0672	2.4298	2.6933	0.2118	16863
Belgium	1995	1.8719	0.0442	1.7854	1.9585	0.2231	19213
Belgium	1997	1.9429	0.0355	1.8733	2.0124	0.2163	18951
Belgium	2000	1.9509	0.0570	1.8391	2.0626	0.2395	20293
Belgium	2004	2.4071	0.0612	2.2872	2.5270	0.2590	19792

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Belgium	2007	2.0230	0.0358	1.9529	2.0931	0.2359	21394
Belgium	2010	1.9548	0.0338	1.8885	2.0210	0.2289	21881
Belgium	2013	2.0274	0.0372	1.9545	2.1003	0.2378	21793
Belgium	2016	2.1200	0.0411	2.0394	2.2005	0.2384	22145
Brazil	2006	1.5278	0.0064	1.5153	1.5403	0.5178	4126
Brazil	2009	1.5195	0.0060	1.5077	1.5313	0.4795	4869
Brazil	2011	1.3751	0.0047	1.3658	1.3843	0.4464	5464
Brazil	2013	1.4774	0.0056	1.4665	1.4884	0.4422	5984
Brazil	2016	1.2558	0.0031	1.2497	1.2619	0.4381	5766
Canada	1971	1.3440	0.0069	1.3306	1.3575	0.2545	14402
Canada	1975	1.4970	0.0084	1.4805	1.5134	0.2334	18357
Canada	1981	1.6401	0.0143	1.6121	1.6680	0.2382	19862
Canada	1987	1.8090	0.0212	1.7675	1.8505	0.2477	20281
Canada	1991	1.8529	0.0167	1.8202	1.8856	0.2465	20299
Canada	1994	1.8724	0.0128	1.8473	1.8974	0.2537	20127
Canada	1997	1.6001	0.0093	1.5819	1.6182	0.2445	20280
Canada	1998	1.5528	0.0092	1.5348	1.5708	0.2581	20681
Canada	2000	1.6241	0.0108	1.6030	1.6452	0.2666	20689
Canada	2004	1.6171	0.0111	1.5953	1.6389	0.2717	21955
Canada	2007	1.6732	0.0123	1.6491	1.6973	0.2718	23846
Canada	2010	1.6423	0.0122	1.6184	1.6661	0.2707	24490
Canada	2012	1.5801	0.0113	1.5579	1.6023	0.2685	25113
Canada	2013	1.5436	0.0113	1.5214	1.5657	0.2750	25398
Canada	2014	1.5787	0.0113	1.5565	1.6009	0.2633	25942
Canada	2015	1.5286	0.0102	1.5086	1.5486	0.2694	25992
Canada	2016	1.6003	0.0110	1.5788	1.6218	0.2610	26057
Canada	2017	1.6096	0.0093	1.5914	1.6277	0.2673	26684
Chile	1990	1.4631	0.0108	1.4419	1.4843	0.5168	2951
Chile	1992	1.6542	0.0125	1.6298	1.6786	0.5340	3356
Chile	1994	1.5180	0.0097	1.4991	1.5369	0.5180	3809
Chile	1996	1.5062	0.0106	1.4854	1.5270	0.5184	4309
Chile	1998	1.4956	0.0088	1.4784	1.5129	0.5246	4536
Chile	2000	1.4081	0.0062	1.3959	1.4203	0.5394	4810
Chile	2003	1.4881	0.0071	1.4742	1.5020	0.5143	4816
Chile	2006	1.6177	0.0084	1.6013	1.6341	0.4868	5432
Chile	2009	1.5460	0.0072	1.5319	1.5601	0.4856	5930
Chile	2011	1.5880	0.0085	1.5714	1.6047	0.4758	6258
Chile	2013	1.6688	0.0090	1.6512	1.6864	0.4713	7329
Chile	2015	1.7377	0.0089	1.7202	1.7553	0.4667	7768
Chile	2017	1.7027	0.0093	1.6844	1.7210	0.4707	8220
China	2002	3.2666	0.0942	3.0821	3.4512	0.6291	1208
China	2013	1.6526	0.0171	1.6192	1.6861	0.3940	5125
Colombia	2004	1.3282	0.0154	1.2980	1.3583	0.5214	2568
Colombia	2007	1.2314	0.0027	1.2262	1.2365	0.5373	3543
Colombia	2010	1.3597	0.0033	1.3532	1.3663	0.5105	3745
Colombia	2013	1.3176	0.0030	1.3118	1.3235	0.4724	4356
Colombia	2016	1.3546	0.0031	1.3486	1.3606	0.4419	4542
Czech Rep.	1992	3.0759	0.0428	2.9920	3.1598	0.1875	8090
Czech Rep.	1996	2.6775	0.0301	2.6185	2.7365	0.2500	9176
Czech Rep.	2002	3.0264	0.0744	2.8806	3.1723	0.2654	9598
Czech Rep.	2004	2.4155	0.0637	2.2906	2.5403	0.2494	10682
Czech Rep.	2007	2.3736	0.0363	2.3024	2.4449	0.2293	12782
Czech Rep.	2010	2.3148	0.0398	2.2369	2.3927	0.2340	13159

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Czech Rep.	2013	2.4131	0.0454	2.3241	2.5021	0.2367	12859
Czech Rep.	2016	2.4089	0.0443	2.3221	2.4957	0.2336	14313
Denmark	1987	1.5981	0.0134	1.5718	1.6244	0.2006	19520
Denmark	1992	1.6683	0.0144	1.6401	1.6965	0.1863	19065
Denmark	1995	2.2730	0.0114	2.2507	2.2952	0.1858	20489
Denmark	2000	2.2957	0.0118	2.2726	2.3189	0.1939	21575
Denmark	2004	2.1981	0.0107	2.1771	2.2192	0.1943	22667
Denmark	2007	1.9695	0.0083	1.9533	1.9856	0.1916	23839
Denmark	2010	1.9161	0.0080	1.9004	1.9318	0.2024	24149
Denmark	2013	1.9426	0.0083	1.9264	1.9588	0.2074	23480
Denmark	2016	1.9103	0.0080	1.8947	1.9260	0.2120	24153
Dominican R	2007	1.3156	0.0153	1.2856	1.3456	0.4973	3803
Egypt	1999	3.8005	0.0602	3.6826	3.9185	0.3602	4613
Egypt	2004	3.3517	0.0353	3.2825	3.4209	0.3536	4264
Egypt	2008	3.3064	0.0463	3.2156	3.3971	0.3294	4378
Egypt	2010	3.0708	0.0685	2.9365	3.2051	0.3111	4560
Egypt	2012	3.1137	0.0702	2.9760	3.2513	0.3006	4816
Egypt	2015	3.4404	0.0733	3.2967	3.5840	0.3478	4913
Estonia	2000	1.8533	0.0363	1.7822	1.9244	0.3480	5189
Estonia	2004	1.6518	0.0321	1.5889	1.7148	0.3166	6899
Estonia	2007	1.7528	0.0328	1.6884	1.8172	0.2837	10453
Estonia	2010	1.6687	0.0289	1.6120	1.7254	0.2852	9419
Estonia	2013	1.5599	0.0250	1.5109	1.6089	0.3191	10626
Finland	1987	2.2714	0.0262	2.2201	2.3227	0.1733	15856
Finland	1991	2.1986	0.0248	2.1501	2.2471	0.1733	17569
Finland	1995	2.5744	0.0414	2.4933	2.6555	0.1919	15661
Finland	2000	2.4442	0.0395	2.3668	2.5215	0.2309	16961
Finland	2004	2.2984	0.0341	2.2316	2.3653	0.2338	19166
Finland	2007	2.1785	0.0319	2.1159	2.2412	0.2355	20899
Finland	2010	2.2532	0.0368	2.1811	2.3254	0.2379	21338
Finland	2013	2.3006	0.0354	2.2311	2.3700	0.2385	21353
Finland	2016	2.3014	0.0361	2.2308	2.3721	0.2321	21755
France	1978	1.5869	0.0156	1.5563	1.6175	0.2616	15756
France	1984	1.5229	0.0132	1.4970	1.5488	0.2618	15372
France	1989	1.8011	0.0227	1.7567	1.8456	0.2397	16039
France	1994	2.2243	0.0346	2.1565	2.2921	0.2724	17334
France	2000	2.3670	0.0416	2.2855	2.4485	0.2703	17333
France	2005	1.9998	0.0277	1.9456	2.0540	0.2474	18358
France	2010	1.8330	0.0178	1.7981	1.8679	0.2450	20921
Georgia	2010	1.4691	0.0247	1.4208	1.5175	0.4297	2342
Georgia	2013	2.0650	0.0759	1.9163	2.2136	0.4416	3054
Georgia	2016	2.0563	0.0756	1.9082	2.2044	0.4323	3702
Germany	1973	1.9205	0.0108	1.8994	1.9417	0.2350	19561
Germany	1978	2.2757	0.0161	2.2443	2.3072	0.2376	22191
Germany	1981	2.2731	0.0645	2.1466	2.3996	0.2197	19046
Germany	1983	2.8400	0.0284	2.7844	2.8957	0.2716	21212
Germany	1984	1.8624	0.0288	1.8060	1.9187	0.2114	18522
Germany	1987	2.0179	0.0370	1.9455	2.0904	0.2156	19907
Germany	1989	2.0296	0.0383	1.9546	2.1046	0.2183	20860
Germany	1991	2.2828	0.0458	2.1929	2.3726	0.2568	19277
Germany	1994	1.9783	0.0311	1.9174	2.0392	0.2273	19801
Germany	1995	1.9527	0.0296	1.8947	2.0107	0.2200	20155
Germany	1998	2.1532	0.0365	2.0818	2.2247	0.2259	20446

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Germany	2000	2.0264	0.0248	1.9778	2.0750	0.2232	21341
Germany	2001	1.9989	0.0236	1.9527	2.0452	0.2332	21070
Germany	2002	1.9688	0.0236	1.9226	2.0150	0.2310	21392
Germany	2003	1.8828	0.0210	1.8416	1.9240	0.2257	21285
Germany	2004	2.0097	0.0260	1.9588	2.0607	0.2370	21091
Germany	2005	1.9827	0.0253	1.9331	2.0324	0.2546	20605
Germany	2006	2.0724	0.0292	2.0151	2.1296	0.2566	20728
Germany	2007	2.0656	0.0298	2.0072	2.1240	0.2560	20891
Germany	2008	2.0069	0.0288	1.9504	2.0634	0.2541	20886
Germany	2009	2.0331	0.0247	1.9848	2.0815	0.2549	20880
Germany	2010	2.0403	0.0230	1.9951	2.0854	0.2583	20985
Germany	2011	2.1313	0.0258	2.0806	2.1819	0.2624	20863
Germany	2012	2.0632	0.0229	2.0182	2.1082	0.2629	20558
Germany	2013	2.1402	0.0269	2.0875	2.1928	0.2694	20542
Germany	2014	1.9389	0.0212	1.8974	1.9805	0.2572	20909
Germany	2015	1.9092	0.0215	1.8671	1.9513	0.2571	21260
Germany	2016	1.8094	0.0181	1.7739	1.8450	0.2551	21672
Greece	1995	1.4686	0.0217	1.4261	1.5110	0.2983	10848
Greece	2000	1.7083	0.0354	1.6389	1.7776	0.3050	11986
Greece	2004	1.7756	0.0320	1.7130	1.8383	0.2959	14830
Greece	2007	1.8588	0.0324	1.7954	1.9223	0.2873	15549
Greece	2010	1.5799	0.0228	1.5353	1.6245	0.2743	14296
Greece	2013	1.5848	0.0199	1.5459	1.6238	0.2867	9652
Guatemala	2006	2.1486	0.0407	2.0688	2.2284	0.5853	3056
Guatemala	2011	1.2621	0.0101	1.2423	1.2819	0.4733	2999
Guatemala	2014	1.9720	0.0281	1.9169	2.0271	0.4064	3228
Hungary	1991	1.8037	0.0473	1.7110	1.8964	0.2459	9168
Hungary	1994	1.7358	0.0490	1.6397	1.8319	0.2934	7390
Hungary	1999	2.3273	0.0893	2.1523	2.5022	0.2809	6757
Hungary	2005	2.2951	0.0841	2.1302	2.4600	0.2685	8999
Hungary	2007	2.2692	0.0814	2.1096	2.4288	0.2419	9126
Hungary	2009	2.1027	0.0701	1.9653	2.2401	0.2429	8743
Hungary	2012	1.8993	0.0582	1.7853	2.0133	0.2538	8436
Hungary	2015	2.3442	0.0785	2.1904	2.4980	0.2546	10651
Iceland	2004	2.1073	0.0485	2.0122	2.2024	0.2124	23124
Iceland	2007	2.1656	0.0555	2.0568	2.2745	0.2421	27300
Iceland	2010	2.0021	0.0423	1.9192	2.0849	0.2019	22659
India	2004	1.5103	0.0091	1.4924	1.5282	0.4952	1394
India	2011	1.4821	0.0088	1.4648	1.4993	0.5051	1974
Iraq	2007	1.6152	0.0117	1.5922	1.6381	0.3435	6531
Iraq	2012	1.4974	0.0084	1.4810	1.5138	0.3283	6877
Ireland	1987	1.9257	0.0461	1.8353	2.0162	0.3078	9628
Ireland	1994	2.5531	0.0974	2.3622	2.7441	0.3748	11689
Ireland	1995	2.6855	0.1183	2.4536	2.9174	0.3931	11716
Ireland	1996	2.8733	0.1423	2.5945	3.1521	0.4008	12059
Ireland	2000	2.0010	0.0614	1.8806	2.1214	0.2989	17564
Ireland	2004	2.5013	0.0717	2.3608	2.6417	0.3593	18758
Ireland	2007	2.3175	0.0608	2.1984	2.4366	0.3013	22166
Ireland	2010	1.7599	0.0335	1.6943	1.8255	0.2593	20083
Israel	1986	3.3834	0.1415	3.1061	3.6608	0.4343	7693
Israel	1992	3.7422	0.1719	3.4053	4.0791	0.4530	8805
Israel	1997	1.8235	0.0349	1.7551	1.8920	0.3215	11157
Israel	2001	2.4290	0.0694	2.2931	2.5649	0.4049	11085

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Israel	2005	1.6327	0.0266	1.5805	1.6849	0.3530	11906
Israel	2007	1.8605	0.0379	1.7862	1.9348	0.3855	12274
Israel	2010	1.8870	0.0402	1.8083	1.9657	0.4007	12511
Israel	2012	1.7094	0.0256	1.6592	1.7596	0.3643	13920
Israel	2014	1.6564	0.0235	1.6103	1.7024	0.3460	15296
Israel	2016	1.9113	0.0321	1.8484	1.9741	0.3679	15490
Italy	1986	2.0984	0.0370	2.0259	2.1710	0.2994	12578
Italy	1987	1.4912	0.0167	1.4585	1.5240	0.2911	13937
Italy	1989	2.8803	0.0768	2.7298	3.0308	0.3616	13677
Italy	1991	2.0952	0.0353	2.0260	2.1643	0.2791	15451
Italy	1993	1.4223	0.0151	1.3928	1.4519	0.2884	14615
Italy	1995	1.5155	0.0174	1.4813	1.5496	0.2860	14198
Italy	1998	1.4033	0.0151	1.3737	1.4328	0.2818	15142
Italy	2000	1.5584	0.0187	1.5217	1.5951	0.2802	15442
Italy	2004	1.6310	0.0214	1.5892	1.6729	0.2850	15503
Italy	2008	1.6236	0.0210	1.5825	1.6648	0.2766	16125
Italy	2010	1.3990	0.0144	1.3709	1.4272	0.2666	15787
Italy	2014	1.3696	0.0137	1.3427	1.3966	0.2632	14324
Italy	2016	1.3080	0.0132	1.2820	1.3339	0.2716	14744
Ivory Coast	2002	1.1843	0.0099	1.1650	1.2037	0.5301	1741
Ivory Coast	2008	1.3098	0.0122	1.2858	1.3337	0.4958	1754
Ivory Coast	2015	1.1645	0.0097	1.1455	1.1835	0.5366	1854
Japan	2008	1.5146	0.0254	1.4648	1.5643	0.2772	18551
Japan	2010	1.8620	0.0466	1.7707	1.9533	0.2747	20747
Japan	2013	1.5338	0.0324	1.4703	1.5972	0.2607	19975
Jordan	2002	2.0424	0.0605	1.9238	2.1610	0.3956	5317
Jordan	2006	2.8964	0.1291	2.6433	3.1495	0.4658	4783
Jordan	2008	2.2993	0.0737	2.1550	2.4437	0.3936	5676
Jordan	2010	2.0717	0.0574	1.9592	2.1842	0.3761	6458
Jordan	2013	1.8071	0.0325	1.7435	1.8707	0.3468	6188
Lithuania	2010	1.6353	0.0282	1.5800	1.6907	0.2883	7453
Lithuania	2013	1.8956	0.0437	1.8100	1.9813	0.3427	8328
Luxembourg	1985	3.0944	0.1473	2.8057	3.3831	0.2589	17077
Luxembourg	1994	3.3217	0.1840	2.9611	3.6824	0.2661	26008
Luxembourg	1997	2.9889	0.1362	2.7220	3.2557	0.2883	25878
Luxembourg	2004	2.2006	0.0565	2.0899	2.3113	0.2480	33441
Luxembourg	2007	2.3535	0.0657	2.2247	2.4823	0.2640	32806
Luxembourg	2010	2.4655	0.0609	2.3462	2.5849	0.2701	31981
Luxembourg	2013	2.1579	0.0550	2.0501	2.2657	0.2627	31631
Mexico	1984	1.7601	0.0378	1.6860	1.8341	0.4515	3047
Mexico	1989	1.6329	0.0203	1.5930	1.6728	0.4681	3259
Mexico	1992	1.6800	0.0240	1.6330	1.7270	0.5189	3357
Mexico	1994	1.9511	0.0330	1.8865	2.0157	0.5684	3075
Mexico	1996	1.7826	0.0244	1.7349	1.8303	0.5214	2527
Mexico	1998	1.5783	0.0219	1.5353	1.6213	0.5218	2716
Mexico	2000	1.8578	0.0350	1.7891	1.9265	0.5613	2955
Mexico	2002	1.9170	0.0276	1.8628	1.9711	0.5329	3127
Mexico	2004	1.5385	0.0133	1.5124	1.5646	0.4636	3779
Mexico	2008	1.7996	0.0181	1.7642	1.8350	0.5071	4119
Mexico	2010	1.5310	0.0117	1.5080	1.5540	0.4395	4144
Mexico	2012	1.8121	0.0327	1.7480	1.8762	0.4908	3912
Mexico	2014	1.6685	0.0169	1.6354	1.7016	0.4562	3957
Mexico	2016	1.7950	0.0106	1.7741	1.8158	0.4385	4534

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Mexico	2018	1.7150	0.0090	1.6974	1.7326	0.4130	4780
Netherlands	1983	1.8332	0.0291	1.7762	1.8902	0.2110	15486
Netherlands	1987	2.6685	0.0733	2.5248	2.8121	0.2197	15982
Netherlands	1990	1.8525	0.0330	1.7880	1.9171	0.2198	18972
Netherlands	1993	1.6268	0.0225	1.5827	1.6708	0.2108	17700
Netherlands	1999	2.1758	0.0453	2.0870	2.2646	0.1997	20715
Netherlands	2004	1.9641	0.0252	1.9147	2.0135	0.2209	20753
Netherlands	2007	2.2704	0.0345	2.2028	2.3381	0.2437	22732
Netherlands	2010	2.4106	0.0396	2.3329	2.4882	0.2360	22272
Netherlands	2013	2.0989	0.0293	2.0416	2.1562	0.2277	21508
Norway	1979	2.0447	0.0239	1.9979	2.0916	0.1832	13684
Norway	1986	2.0550	0.0353	1.9859	2.1241	0.1966	18067
Norway	1991	1.9851	0.0241	1.9379	2.0324	0.1874	18804
Norway	1995	1.8390	0.0189	1.8020	1.8760	0.1886	18510
Norway	2000	1.8619	0.0169	1.8289	1.8950	0.1971	21936
Norway	2004	1.8377	0.0165	1.8054	1.8700	0.2020	23713
Norway	2007	1.7019	0.0036	1.6949	1.7090	0.1957	26935
Norway	2010	1.6571	0.0033	1.6505	1.6636	0.1966	27970
Norway	2013	1.6389	0.0033	1.6325	1.6453	0.2017	30358
Palestine	2010	1.8423	0.0450	1.7541	1.9305	0.4510	2552
Palestine	2017	1.4116	0.0234	1.3657	1.4575	0.4001	3237
Panama	2007	2.0121	0.0409	1.9318	2.0923	0.6120	3777
Panama	2010	1.4583	0.0165	1.4259	1.4907	0.4762	5384
Panama	2013	1.6631	0.0249	1.6144	1.7118	0.5068	5721
Paraguay	2000	1.1911	0.0118	1.1680	1.2141	0.4956	4749
Paraguay	2004	1.4695	0.0203	1.4298	1.5093	0.4887	3947
Paraguay	2007	1.3342	0.0198	1.2954	1.3731	0.4651	4593
Paraguay	2010	1.3210	0.0195	1.2827	1.3592	0.4602	4977
Paraguay	2013	1.4315	0.0234	1.3857	1.4773	0.4603	5977
Paraguay	2016	1.4848	0.0193	1.4471	1.5226	0.4747	5473
Peru	2004	0.9692	0.0041	0.9611	0.9773	0.4515	3031
Peru	2007	1.1117	0.0060	1.0999	1.1234	0.4526	3703
Peru	2010	1.0608	0.0049	1.0513	1.0703	0.4005	4612
Peru	2013	1.0939	0.0044	1.0853	1.1026	0.3813	5148
Peru	2016	1.1322	0.0045	1.1234	1.1411	0.3806	5299
Poland	1986	2.4094	0.0402	2.3306	2.4882	0.2768	7620
Poland	1992	2.5447	0.0563	2.4344	2.6550	0.2566	7394
Poland	1995	1.7124	0.0103	1.6922	1.7327	0.2594	5883
Poland	1999	1.9210	0.0134	1.8947	1.9472	0.2461	7153
Poland	2004	1.8599	0.0135	1.8335	1.8863	0.2804	6968
Poland	2007	1.9059	0.0130	1.8803	1.9314	0.2757	8480
Poland	2010	2.0039	0.0151	1.9742	2.0336	0.2833	9816
Poland	2013	1.7982	0.0118	1.7751	1.8213	0.2757	9964
Poland	2016	1.9317	0.0130	1.9062	1.9572	0.2478	12103
Romania	1995	2.1348	0.0177	2.1002	2.1695	0.2522	4010
Romania	1997	2.1263	0.0172	2.0925	2.1600	0.2488	3699
Russia	2000	1.4174	0.0284	1.3616	1.4731	0.3741	3570
Russia	2004	1.4441	0.0298	1.3857	1.5024	0.3488	5864
Russia	2007	1.5438	0.0317	1.4817	1.6058	0.3093	8413
Russia	2010	1.5229	0.0218	1.4802	1.5656	0.2922	10529
Russia	2011	1.9300	0.0338	1.8638	1.9962	0.3739	12479
Russia	2013	1.9152	0.0151	1.8856	1.9447	0.3443	14997
Russia	2014	2.0133	0.0168	1.9804	2.0462	0.3425	14549

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Russia	2015	2.1581	0.0170	2.1247	2.1914	0.3490	13281
Russia	2016	2.2743	0.0118	2.2511	2.2974	0.3582	12623
Serbia	2006	1.3742	0.0182	1.3385	1.4099	0.2824	5335
Serbia	2010	1.4466	0.0202	1.4071	1.4862	0.2671	5974
Serbia	2013	1.4493	0.0207	1.4088	1.4898	0.2762	5523
Serbia	2016	1.4777	0.0182	1.4420	1.5134	0.2661	6274
Slovakia	1992	3.0833	0.0409	3.0032	3.1634	0.1710	8253
Slovakia	1996	1.6863	0.0123	1.6621	1.7104	0.2033	7937
Slovakia	2004	2.0009	0.0355	1.9314	2.0704	0.2285	8461
Slovakia	2007	2.0671	0.0357	1.9971	2.1370	0.2141	11014
Slovakia	2010	1.8327	0.0286	1.7767	1.8888	0.2203	11971
Slovakia	2013	1.7652	0.0256	1.7150	1.8154	0.2228	11753
Slovenia	1997	2.0332	0.0451	1.9448	2.1217	0.1911	12787
Slovenia	1999	1.9726	0.0344	1.9051	2.0400	0.1907	12895
Slovenia	2004	2.1104	0.0429	2.0264	2.1944	0.1982	14310
Slovenia	2007	2.0425	0.0398	1.9644	2.1205	0.1938	15516
Slovenia	2010	1.6356	0.0242	1.5881	1.6830	0.2034	16192
Slovenia	2012	1.7969	0.0338	1.7307	1.8631	0.2294	16030
Slovenia	2015	2.0186	0.0435	1.9334	2.1038	0.2341	16242
South Africa	2010	2.7648	0.1493	2.4722	3.0573	0.8582	1066
South Africa	2012	1.5531	0.0297	1.4949	1.6113	0.6982	2735
South Africa	2015	1.5686	0.0296	1.5106	1.6266	0.6907	3214
South Korea	2006	1.4919	0.0113	1.4697	1.5141	0.2494	17177
South Korea	2008	1.4829	0.0122	1.4590	1.5068	0.2571	17456
South Korea	2010	1.4204	0.0108	1.3991	1.4416	0.2487	17852
South Korea	2012	1.4213	0.0110	1.3998	1.4428	0.2455	18880
Spain	1980	1.8002	0.0145	1.7719	1.8286	0.2900	9092
Spain	1985	1.9981	0.0505	1.8992	2.0970	0.2962	8730
Spain	1990	1.9479	0.0182	1.9123	1.9836	0.2776	11340
Spain	1995	1.5617	0.0229	1.5168	1.6065	0.3129	12912
Spain	2000	1.7096	0.0317	1.6474	1.7718	0.3045	15621
Spain	2004	1.5490	0.0144	1.5208	1.5772	0.2708	15494
Spain	2007	1.6204	0.0158	1.5895	1.6512	0.2623	17108
Spain	2010	1.4268	0.0122	1.4029	1.4508	0.2775	15432
Spain	2013	1.4249	0.0131	1.3993	1.4505	0.2902	15129
Spain	2016	1.3566	0.0106	1.3359	1.3773	0.2790	16314
Sudan	2009	1.2948	0.0137	1.2680	1.3216	0.5027	1409
Sweden	1967	1.4679	0.0162	1.4361	1.4997	0.2121	8591
Sweden	1975	1.9658	0.0210	1.9247	2.0069	0.1759	12500
Sweden	1981	2.1383	0.0253	2.0888	2.1878	0.1614	12926
Sweden	1987	1.9125	0.0208	1.8717	1.9533	0.1668	13710
Sweden	1992	1.8307	0.0174	1.7967	1.8647	0.1840	15998
Sweden	1995	1.8138	0.0142	1.7860	1.8417	0.1787	14965
Sweden	2000	1.9569	0.0200	1.9178	1.9960	0.2083	17512
Sweden	2005	2.1274	0.0224	2.0835	2.1714	0.1997	19989
Switzerland	1982	1.8429	0.0273	1.7895	1.8964	0.2641	26063
Switzerland	1992	1.8265	0.0273	1.7730	1.8800	0.2494	26914
Switzerland	2000	1.9890	0.0450	1.9007	2.0772	0.2443	26282
Switzerland	2002	2.2906	0.0631	2.1671	2.4142	0.2566	27040
Switzerland	2004	1.9517	0.0443	1.8649	2.0385	0.2264	26776
Switzerland	2007	1.7031	0.0240	1.6560	1.7502	0.2627	28460
Switzerland	2010	1.9126	0.0304	1.8530	1.9721	0.2579	28936
Switzerland	2013	2.2194	0.0459	2.1294	2.3094	0.2765	28868

Table 4. Continued

Country	Year	$\hat{\varepsilon}$	$D[\hat{\varepsilon}]$	LB	UB	Atk	EDEI
Taiwan	1981	3.4524	0.0649	3.3251	3.5797	0.3188	8451
Taiwan	1986	2.8948	0.0422	2.8121	2.9775	0.2843	11512
Taiwan	1991	3.2028	0.0567	3.0917	3.3139	0.3173	17651
Taiwan	1995	1.6796	0.0138	1.6525	1.7067	0.2511	23011
Taiwan	1997	2.5116	0.0387	2.4357	2.5875	0.2992	22431
Taiwan	2000	2.3446	0.0335	2.2791	2.4102	0.2884	23650
Taiwan	2005	2.1385	0.0286	2.0824	2.1946	0.2956	23861
Taiwan	2007	2.2580	0.0332	2.1931	2.3230	0.3131	21791
Taiwan	2010	1.8401	0.0199	1.8011	1.8792	0.2904	20967
Taiwan	2013	1.8361	0.0185	1.7998	1.8724	0.2763	22304
Taiwan	2016	2.0441	0.0238	1.9974	2.0908	0.2863	23510
United Kingd.	1969	2.8003	0.0661	2.6708	2.9298	0.2807	8112
United Kingd.	1974	2.3703	0.0490	2.2742	2.4664	0.2581	10575
United Kingd.	1979	2.1198	0.0382	2.0450	2.1946	0.2479	11217
United Kingd.	1986	1.7769	0.0266	1.7247	1.8291	0.2636	11533
United Kingd.	1991	1.9005	0.0360	1.8300	1.9711	0.3250	12452
United Kingd.	1994	2.0428	0.0220	1.9998	2.0859	0.3342	13079
United Kingd.	1995	1.6159	0.0243	1.5683	1.6635	0.3059	13108
United Kingd.	1999	2.0496	0.0235	2.0035	2.0956	0.3482	14312
United Kingd.	2004	1.9915	0.0202	1.9520	2.0310	0.3331	17434
United Kingd.	2007	1.7320	0.0149	1.7029	1.7612	0.3047	19669
United Kingd.	2010	1.7909	0.0156	1.7604	1.8215	0.3020	19270
United Kingd.	2013	1.9573	0.0218	1.9145	2.0000	0.3098	18897
United Kingd.	2016	1.7465	0.0168	1.7135	1.7794	0.2982	20011
United States	1974	1.4388	0.0122	1.4150	1.4627	0.2550	21890
United States	1979	1.4879	0.0057	1.4768	1.4991	0.2565	22779
United States	1986	1.4406	0.0061	1.4287	1.4526	0.2884	22698
United States	1991	1.4640	0.0064	1.4514	1.4765	0.2964	22734
United States	1994	1.4345	0.0063	1.4222	1.4469	0.3110	22999
United States	1997	1.4244	0.0065	1.4117	1.4371	0.3084	24250
United States	2000	1.4078	0.0049	1.3982	1.4173	0.3013	26059
United States	2004	1.3335	0.0044	1.3250	1.3421	0.3040	26390
United States	2007	1.3799	0.0049	1.3702	1.3895	0.3150	26742
United States	2010	1.3838	0.0050	1.3740	1.3937	0.3141	25846
United States	2013	1.3830	0.0062	1.3710	1.3951	0.3261	25633
United States	2016	1.3263	0.0047	1.3171	1.3355	0.3268	27923
Uruguay	2004	2.2306	0.0376	2.1569	2.3042	0.4995	4466
Uruguay	2007	3.5454	0.0669	3.4143	3.6764	0.5975	4418
Uruguay	2010	3.6251	0.0691	3.4898	3.7605	0.5590	5518
Uruguay	2013	2.8405	0.0390	2.7641	2.9168	0.4708	7280
Uruguay	2016	3.0665	0.0463	2.9758	3.1571	0.4723	7566
Vietnam	2011	2.7132	0.0671	2.5817	2.8446	0.4333	4129
Vietnam	2013	2.5156	0.0562	2.4055	2.6257	0.4060	4431

Notes:
LB, LU – lower and upper boundaries of 95% confidence interval of $\hat{\varepsilon}$;
Atk – the Atkinson index $A(\varepsilon,\mu)$, where μ is the mean of GB2 estimates;
$D[\hat{\varepsilon}]$ – the standard errors of the estimator $\hat{\varepsilon}$, Eq. (19);
EDEI – the equally distributed equivalent income.

Source: authors' calculations using data from Table 2.

Table 5. Descriptive statistics of inequality aversion in geographic regions

Geographic Region	*Mean*	*Median*	*Min.*	*Max.*	*Std. Dev.*	*Skewness*
Middle East & North Africa	2.38408	2.04238	1.41161	3.80051	0.78528	0.552
East Asia & Pacific	2.00117	1.74186	1.42036	3.45236	0.57064	1.287
Europe & Central Asia	1.99491	1.96880	1.30795	3.32174	0.36181	0.795
Latin America & Caribbean	1.65410	1.53103	0.96919	3.62513	0.51061	2.294
Sub-Saharan Africa	1.54855	1.30975	1.16449	2.76475	0.55993	2.212
North America	1.53567	1.53605	1.32629	1.87235	0.14630	0.657
South Asia	1.49620	1.49620	1.48208	1.51031	0.01996	
All Regions	1.92079	1.85271	0.96919	3.80051	0.48253	1.259

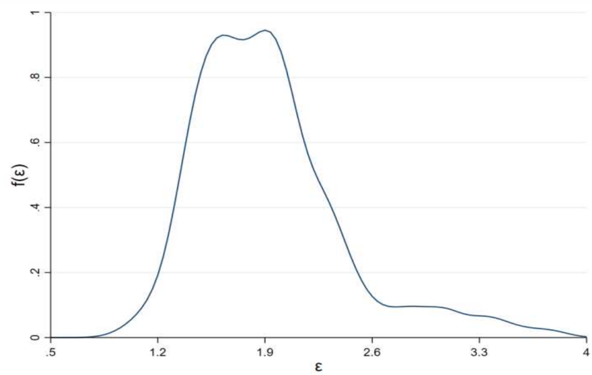
Table 6. Descriptive Statistics of inequality aversion estimates based on the GB2 distribution and the natural rate of subjective inequality (NRSI)

ε	Mean	Median	Min.	Max.	V	Skewness	Kurtosis
ε(GB2)	1.9185	1.9359	1.1911	3.8005	24.76	1.916	6.991
ε(0.20)	1.2116	1.0389	0.3122	4.7469	60.75	1.590	4.421
ε(0.25)	1.6042	1.3594	0.3892	6.8591	64.35	1.818	5.896
ε(0,30)	2.0860	1.7405	0.4669	10.3935	70.77	2.301	9.443
ε(0.35)	2.7512	2.1979	0.5458	19.1351	86.90	3.739	22.451
ε(0.40)	5.4041	2.7034	0.6267	193.3267	361.84	9.539	92.554

Note:
ε(GB2) – estimates based on the GB2 distribution;
ε(0.20) – ε(0.40) estimates based on NRSI from 0.2 to 0.4;
V – coefficient of variation.

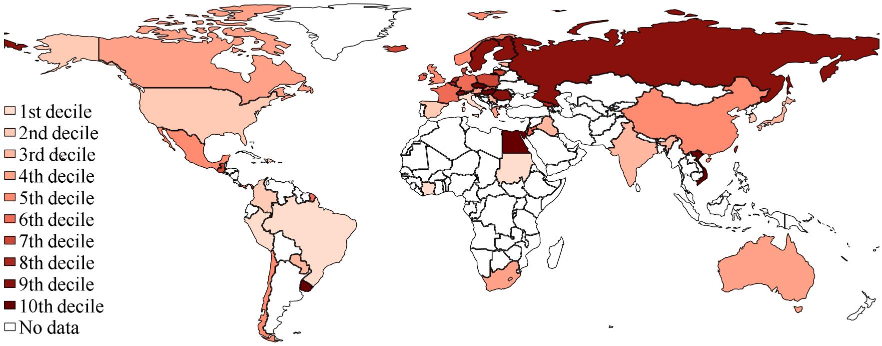
Source: ε(GB2) – own calculations using data from Table 4 from 1998 to 2000; ε(0.20)-ε(0.40) – own calculations using data from Lambert *et al.* (2003).

Figure 1. The density function of inequality aversion



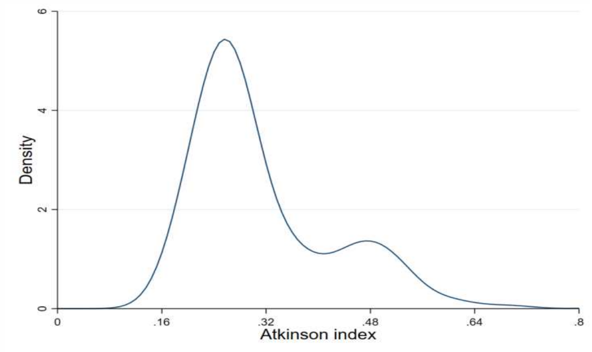
Note: Gaussian kernel, all country-year cases.

Figure 2. The map of inequality aversion



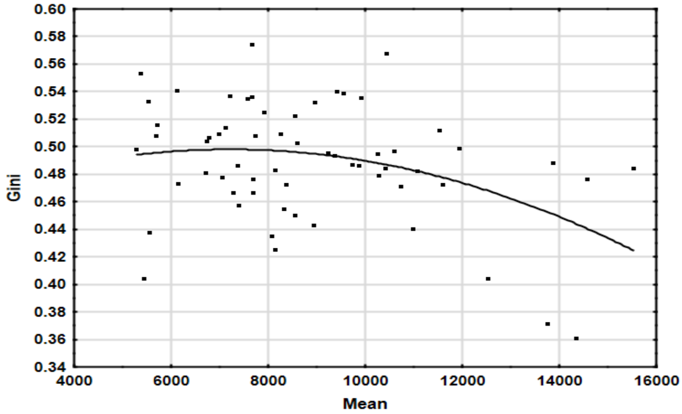
Note: Deciles, all country cases, the latest available year.

Figure 3. The density function of the Atkinson index



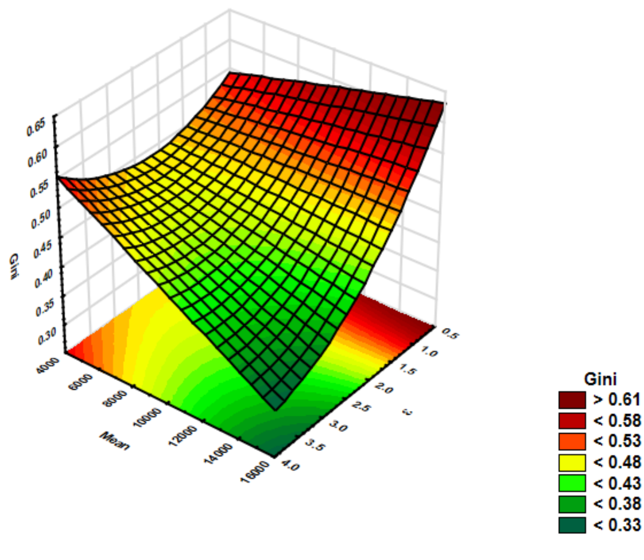
Note: Gaussian kernel, all country-year cases.

Figure 4a. The standard Inequality-Development Relationship for the Latin America and Caribbean regions



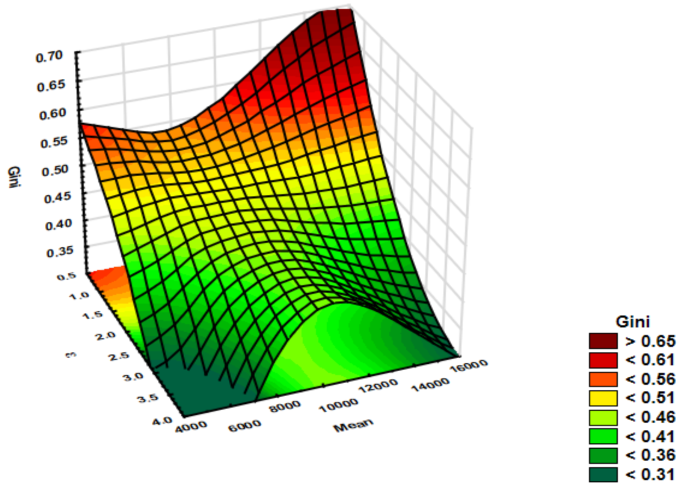
Note: a quadratic polynomial fitted.

Figure 4b. The Augmented Inequality-Development Relationship for the Latin America and Caribbean region



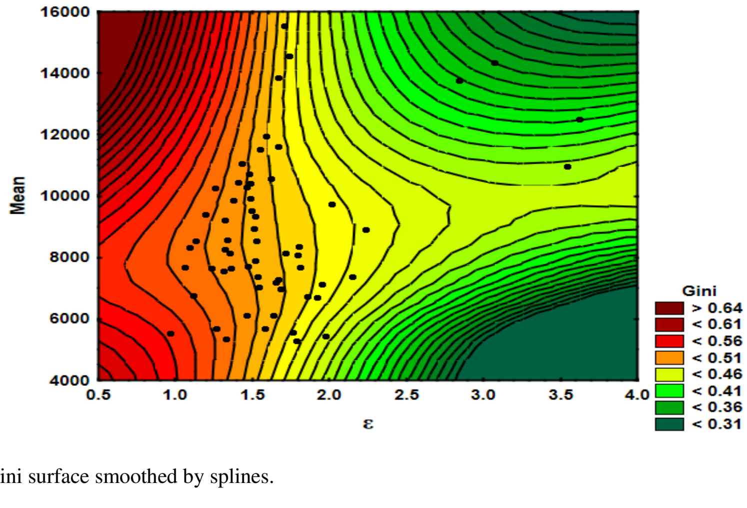
Note: Gini surface smoothed by the quadratic form.

Figure 4c. The Augmented Inequality-Development Relationship for the Latin America and Caribbean Region



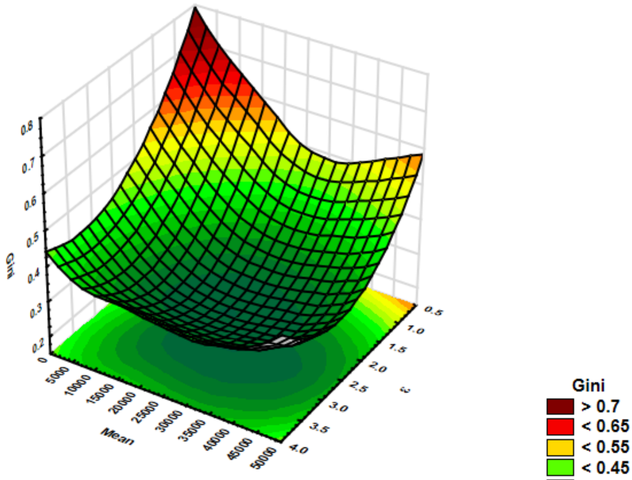
Note: Gini surface smoothed by splines.

Figure 4d. The contours of the Augmented Inequality-Development Relationship for Latin America and the Caribbean region



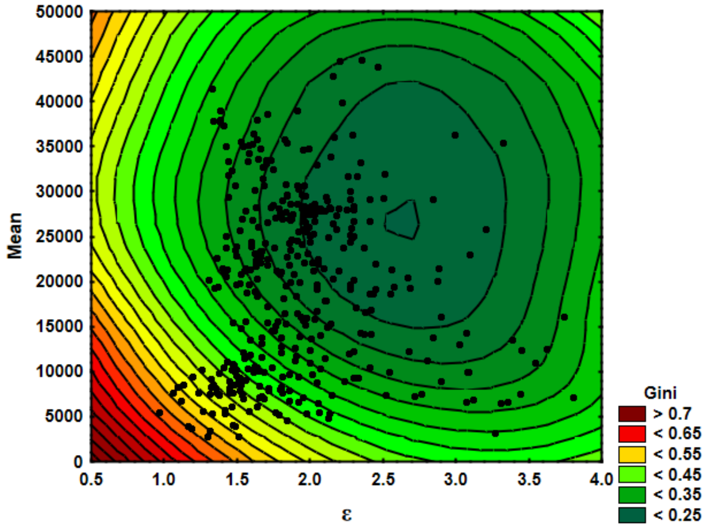
Note: Gini surface smoothed by splines.

Figure 5a. The Global Augmented Inequality-Development Relationship



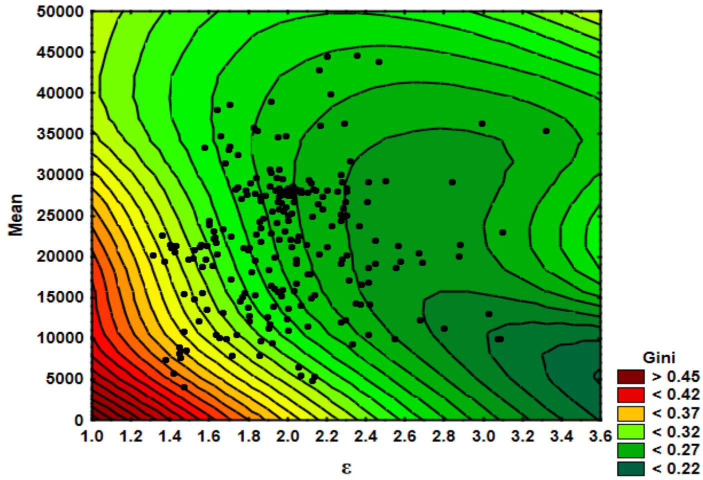
Note: Gini surface smoothed by splines.

Figure 5b. The Contours of the Global Augmented Inequality-Development Relationship



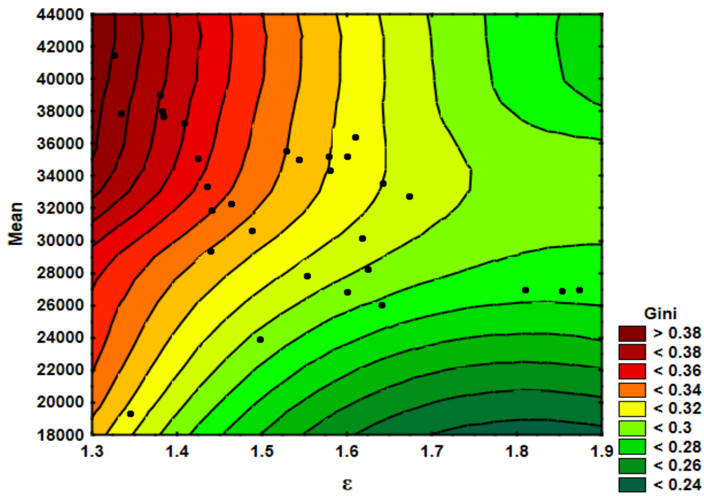
Note: Gini surface smoothed by splines.

Figure 6. The Contours of the Augmented Inequality-Development Relationship for Europe and Central Asia



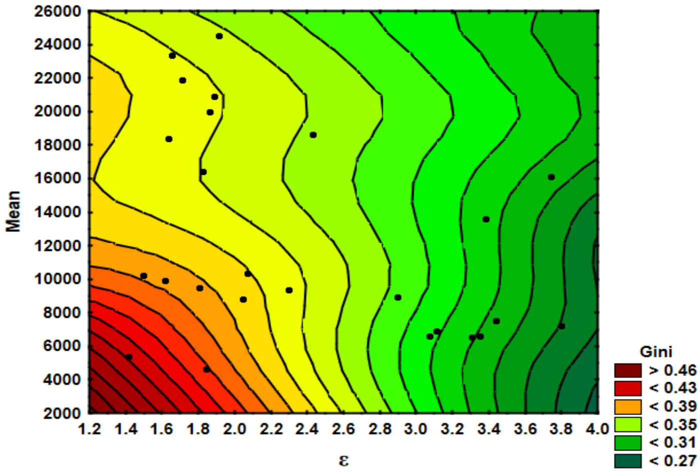
Note: Gini surface smoothed by splines.

Figure 7. The Contours of the Augmented Inequality-Development Relationship for North America.



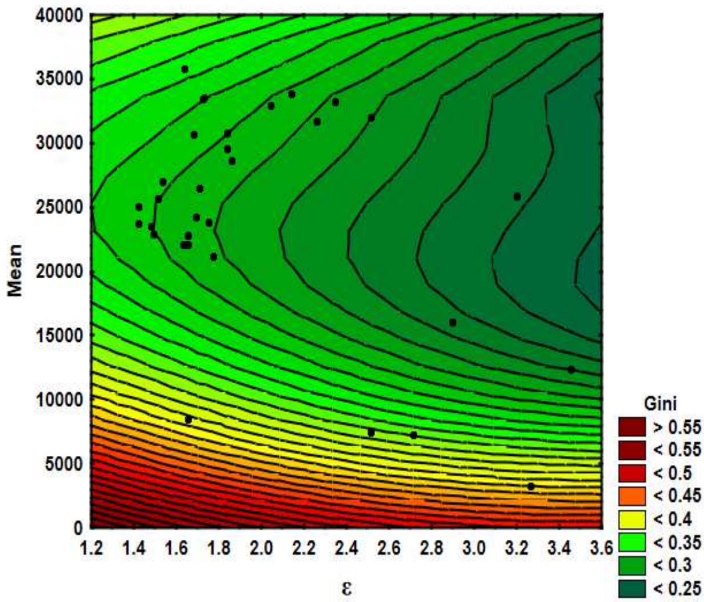
Note: Gini surface smoothed by splines.

Figure 8. The Contours of the Augmented Inequality-Development Relationship for the Middle East and North Africa



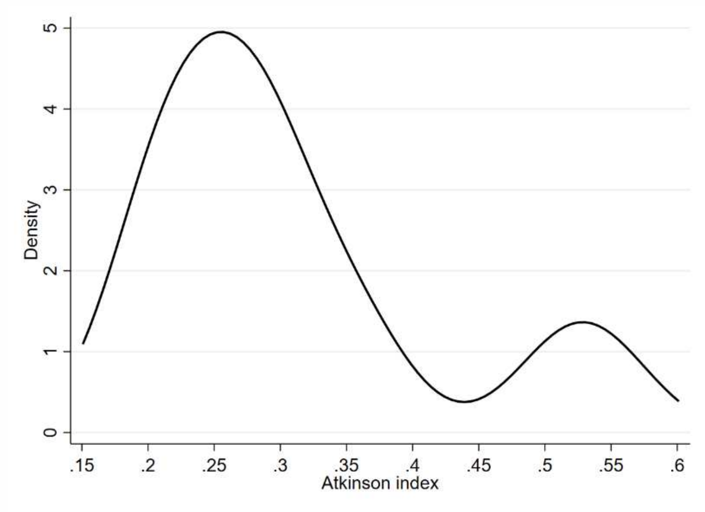
Note: Gini surface smoothed by splines.

Figure 9. The Contours of the Augmented Inequality-Development Relationship for East Asia and the Pacific



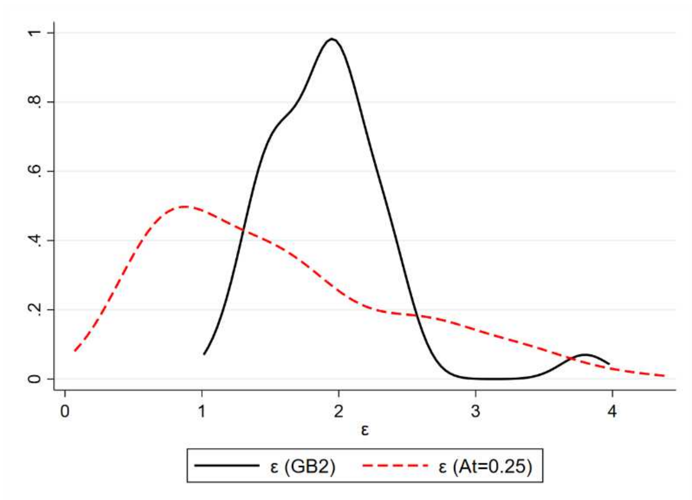
Note: Gini surface smoothed by splines.

Figure 10. The density function of the Atkinson index for the years 1998–2000



Source: authors' elaboration using data from Table 4.

Figure 11. The density functions of ε based on the GB2 for the years 1998–2000 and ε based on NRSI (Atkinson index=0.25)



Note: Gaussian kernels.

Source: authors' elaboration using data from Table 4 and Lambert *et al.* (2003).