Measuring International Inequality Aversion

Richard S.J. Tol*

Abstract: I measure the rate of aversion to inequality in consumption as expressed in the development aid given by rich countries to poor ones between 1965 and 2005. Over time, OECD countries have become less concerned about international inequity. Even for a fairly leaky bucket, the consumption rate of inequity aversion is less than the rate of risk aversion, which implies that the pure rate of inequity aversion is negative. That is, rich countries would prefer to see greater inequality between rich and poor countries.

Corresponding Author: Richard.Tol@esri.ie

Key words: Inequity aversion, risk aversion, income distribution, development aid

JEL Classification: D31, D63

*Economic and Social Research Institute, Dublin, Ireland
Institute for Environmental Studies, Vrije Universiteit, Amsterdam, The Netherlands
Department of Spatial Economics, Vrije Universiteit, Amsterdam, The Netherlands
Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, USA

ESRI working papers represent un-refereed work-in-progress by members who are solely responsible for the content and any views expressed therein. Any comments on these papers will be welcome and should be sent to the author(s) by email. Papers may be downloaded for personal use only.
Measuring International Inequality Aversion

1. Introduction

As globalisation intensifies, so does the need for evaluating policies from the perspective of a global planner. There is no global planner, but considering what she would do provides a useful yardstick against which to measure more realistic policy interventions. Policy analyses at the global scale are immediately confronted with income differences that are greater than in any individual country, and with income redistribution policies that are less effective. This paper focuses on the effect of income distribution on policy evaluation. While many analysts consider a strictly utilitarian welfare function with risk-averse agents, this implies that uncertainty and inequality are evaluated with a single parameter – even though they are conceptually and numerically different (Carlsson et al., 2005; Saelen et al., 2008). This spells trouble for policies that are both risky and affect the income distribution. A straightforward generalisation of the welfare function introduces a second parameter, so that inequality aversion and risk aversion can assume different numerical values. In this paper, I seek to measure the rate of inequality aversion.

The procedure for this is as follows. I assume that the global planner has the power to redistribute income from the countries of the OECD to the rest of the world, and that this is a measure of inequality aversion at the global scale. As OECD countries voluntarily disburse development aid, the measured inequality aversion is that of “the OECD”, not that of the world. However, a similar model is followed in problems such as climate change, where it is proposed to spend money on reducing greenhouse gas emissions in the OECD, primarily to the benefit of the poor (Schelling, 1995). The measured rate of inequality aversion can be used to evaluate problems in which rich countries are the donors and poor countries the beneficiaries. Applying the measured inequality aversion in other contexts should be done with great care, if at all.

1 Alternatively, this could be interpreted as altruism (cf. Johansson-Stenman, 2005).
The paper proceeds as follows. Section 2 defines inequity aversion, drawing on previous research. Section 3 presents the exact method of measurement, combining the literature in Section 2 with another literature on income redistribution. Section 4 presents the empirical findings. Section 5 concludes.

2. Defining inequity aversion

Consider a social welfare function in the sense of Bergson (1938) and Samuelson (1975):

\[
W(U_1, U_2, ..., U_I) = \begin{cases} 
\sum_{i=1}^{I} U_i^{1-\omega} & \omega \neq 1 \\
\prod_{i=1}^{I} U_i & \omega = 1
\end{cases}
\]

where \( W \) is social welfare, \( U_i \) is utility of actors \( i = 1, 2, ..., I \), and \( \omega \) is a parameter, that can be interpreted as the pure rate of inequity aversion (see Boadway and Bruce, 1984). At the margin, an increase in utility for a relatively happy actor \( r \) compares to a utility increase for relatively unhappy actor \( p \) (\( U_r > U_p \)) as

\[
\frac{\partial W}{\partial U_r} = \left( \frac{U_p}{U_r} \right)^{\omega} \begin{cases} < 1 & \omega < 0 \\
= 1 & \omega = 0 \\
> 1 & \omega > 0
\end{cases}
\]

That is, for \( \omega = 0 \), the social planner is indifferent between the actors, regardless of their initial utility. For \( \omega > 0 \) (\( \omega < 0 \)), the social planner prefers an increase in the utility of the relatively unhappy (happy) actor over an increase in the utility of the relatively happy (unhappy) actor. The strength of this preference is larger for a larger absolute value of \( \omega \), so that \( \omega \) is indeed a measure of aversion against inequity in the distribution of utility. This is underlined if one considers that

\[
\lim_{\omega \to \infty} \min_i \{ U_i \} = \lim_{\omega \to -\infty} \max_i \{ U_i \}
\]

That is, in the limits, the welfare function equals either the Rawlsian maximin welfare function or the Nietzschean maximax welfare function.

Now consider a CRRA utility function

\[
U_i = \begin{cases} 
\frac{C_i^{1-\eta}}{1-\eta} & \eta \neq 1 \\
\ln C_i & \eta = 1
\end{cases}
\]

where \( C \) is consumption and \( \eta \) is the rate of risk aversion.
Then the social planner evaluates a relative shift in consumption as

\[
\frac{\partial W}{\partial C_r} = \left( \frac{C_p}{C_r} \right)^{\eta + \omega(1-\eta)} \begin{cases} > 1 & \eta + \omega(1-\eta) < 0 \\ = 1 & \eta + \omega(1-\eta) = 0 \\ < 1 & \eta + \omega(1-\eta) > 0 \end{cases}
\]

Note that (5) introduces the consumption rate of inequity aversion: \( \eta + \omega(1-\eta) \). For \( \eta = 0 \), the pure rate of inequity aversion (\( \omega \)) equals the consumption rate of inequity aversion (\( \eta + \omega(1-\eta) \)). For \( \omega = 0 \), the (social) consumption rate of inequity aversion equals the (individual) rate of risk aversion. For other values of \( \eta \) and \( \omega \), pure inequity aversion, consumption inequity aversion, and risk aversion are numerically different.

3. Measuring international inequity aversion in the OECD

Okun’s (1975) “leaky bucket” is a frequently used method to estimate inequity aversion within countries (e.g., Amiel et al., 1999). The basic thought is that an inequity-averse social planner would take from the rich and give to the poor. If it were costless to redistribute income, then everyone would have the same income (or the social planner would be inequity-neutral). However, if only a fraction of the income taken from the rich reaches the poor, then it is possible to have both an unequal income distribution and an inequity-averse social planner. The metaphor arises because the social planner uses a “leaky bucket” to transfer income. The leakier the bucket, the more unequal is the optimal income distribution given a degree of inequity aversion. Vice versa, the degree of inequity aversion, implied by the assumption that the observed income distribution is optimal, increases as the bucket gets leakier.

I here measure the degree of inequity aversion of countries in the OECD, implied by the official development aid given to developing countries. Note the leap of faith. I assume that the OECD collectively acts as a global planner when deciding to aid developing countries. I need one additional assumption, namely that the global planner is only interested in distributional issues between countries, but not within countries. Note that there are few data on how aid is distributed across the income distribution in developing countries. Then, the global welfare function becomes:

\[
W = \sum_{i=1}^{I} P_i \frac{\left( c_i^{1-\eta} \right)^{1-\omega}}{(1-\omega)(1-\eta)^{1-\omega}}
\]
where \( c_i \) is average per capita consumption in country \( i \) and \( P_i \) is the number of people in that country. Equation (6) follows from assuming that the global planner considers each individual separately but evaluates each individual in a country at the country average per capita income.

With this assumption, for any level and pattern of aid, for any degree of leakiness, and for any degree of risk aversion, the degree of inequity aversion follows from (7a)

\[
\sum_{i \in \text{OECD}} P_i (c_i)^{(1-\eta)(1-\alpha)} - P_i (c_i + a_i)^{(1-\eta)(1-\alpha)} = \sum_{i \in \text{OECD}} P_i (c_i + a_i)^{(1-\eta)(1-\alpha)} - P_i (c_i)^{(1-\eta)(1-\alpha)}
\]

with

\[
(7b) \quad \lambda \sum_{i \in \text{OECD}} A_i = \sum_{i \in \text{OECD}} A_i
\]

where \( a \) is per capita aid received, \( A \) is total aid received, and \( \lambda \) is the degree of leakiness. Note that \( a \) and \( A \) are negative in donor countries. That is, aid is given up to the point that the welfare loss of the OECD exactly equals the welfare gain of the non-OECD.

4. Results

I solved in Equation (7) for \( \lambda = 0.05, 0.1, 0.2, \ldots, 0.9, 0.95 \), and consider results for various values of \( \eta \). I took data on population, GNI, and ODA received for 1965-2005 from the World Resources Institute (http://earthtrends.wri.org/). I took data for ODA given from the OECD Development Assistance Committee (http://www.oecd.org/dac/stats). I rescaled aid received per country so that total aid received equals total aid given for each year, time the leakage rate \( \lambda \).

Figure 1 shows selected results per year. Table A1 has the full results. The top line is the consumption rate of inequity aversion, which equals either parameter if the other

---

2 Note that \((1-\alpha)^{(1-\alpha)^{-1}} - (1-\eta)^{(1-\alpha)^{-1}}\) drop out of (6).

3 Note that GNI is measured in dollars as exchanged on the currency market. Using Geary-Khamis dollars would substantially reduce the number of observations. Furthermore, this would imply \( \lambda > 1 \), which does not match the observations below.
equals zero. In 1965, $\omega=0.79$ (for $\eta=0$) and it steadily falls by 0.0060 (s.d. 0.0003) per year to $\omega=0.54$ in 2005. That is, OECD countries have grown less averse to income differences with other countries.

The numerical value of $1-(1-\eta)(1-\omega)$ is also telling. It is lower than commonly assumed values for $\eta$ – which is typically set at unity or higher (Evans, 2005). This implies that, for a reasonable choice of $\eta$, $\omega$ must be negative – that is, OECD countries display equity aversion rather than inequity aversion. This is shown in Figure 1 as well. For $\eta=1.0$, $\omega<0$. For $\eta=0.5$, $\omega>0$, but only barely so in recent years. Figure 1 also shows the sensitivity to the leakiness of the bucket. The leakier the bucket, the greater the implied rate of inequity aversion.

5. Conclusion

I measure the pure rate of inequity aversion as expressed in development aid flows from the OECD to developing countries, parameterised on the effectiveness of such aid. The consumption rate of inequity aversion is smaller than the rate of risk aversion, even if only a small fraction of aid given reaches its target. This implies that the pure rate of inequity aversion is negative, as result that contrasts with other results based on surveys and experiments (Amiel et al. 1999; Saelen et al., 2008). Note, however, that I measure the rate of global risk aversion of the rich countries. An alternative interpretation is therefore that the people at the top end of the global income distribution consider the gap between rich and poor to be fair or indeed not wide enough.

Acknowledgements

I had useful discussions on this subject with David Anthoff. The CEC DG Research FP7 Climate Cost project provided useful financial support.
References


Figure 1. The pure rate of inequity aversion ($\omega$) between 1965 and 2005 for different values of risk aversion ($\eta$) and leakiness ($\lambda$).
Table A1. The value of $1-(1-\eta)(1-\omega)$ for different leakage rates and different years.

<table>
<thead>
<tr>
<th>Year</th>
<th>$\lambda$</th>
<th>1.00</th>
<th>0.95</th>
<th>0.90</th>
<th>0.80</th>
<th>0.70</th>
<th>0.60</th>
<th>0.50</th>
<th>0.40</th>
<th>0.30</th>
<th>0.20</th>
<th>0.10</th>
<th>0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>1.000</td>
<td>0.982</td>
<td>0.963</td>
<td>0.922</td>
<td>0.875</td>
<td>0.822</td>
<td>0.759</td>
<td>0.682</td>
<td>0.584</td>
<td>0.446</td>
<td>0.213</td>
<td>-0.019</td>
<td></td>
</tr>
<tr>
<td>1966</td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.924</td>
<td>0.879</td>
<td>0.827</td>
<td>0.766</td>
<td>0.691</td>
<td>0.595</td>
<td>0.461</td>
<td>0.234</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>1967</td>
<td>1.000</td>
<td>0.983</td>
<td>0.964</td>
<td>0.925</td>
<td>0.880</td>
<td>0.828</td>
<td>0.767</td>
<td>0.693</td>
<td>0.598</td>
<td>0.465</td>
<td>0.239</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>1.000</td>
<td>0.982</td>
<td>0.963</td>
<td>0.922</td>
<td>0.875</td>
<td>0.822</td>
<td>0.759</td>
<td>0.683</td>
<td>0.585</td>
<td>0.449</td>
<td>0.220</td>
<td>-0.007</td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.926</td>
<td>0.882</td>
<td>0.832</td>
<td>0.773</td>
<td>0.701</td>
<td>0.609</td>
<td>0.481</td>
<td>0.265</td>
<td>0.053</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.926</td>
<td>0.881</td>
<td>0.831</td>
<td>0.771</td>
<td>0.699</td>
<td>0.607</td>
<td>0.479</td>
<td>0.263</td>
<td>0.052</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.926</td>
<td>0.882</td>
<td>0.832</td>
<td>0.773</td>
<td>0.701</td>
<td>0.610</td>
<td>0.482</td>
<td>0.267</td>
<td>0.056</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.925</td>
<td>0.881</td>
<td>0.831</td>
<td>0.771</td>
<td>0.699</td>
<td>0.608</td>
<td>0.480</td>
<td>0.266</td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>1.000</td>
<td>0.983</td>
<td>0.966</td>
<td>0.928</td>
<td>0.885</td>
<td>0.836</td>
<td>0.778</td>
<td>0.708</td>
<td>0.619</td>
<td>0.495</td>
<td>0.287</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>1974</td>
<td>1.000</td>
<td>0.983</td>
<td>0.966</td>
<td>0.928</td>
<td>0.885</td>
<td>0.836</td>
<td>0.779</td>
<td>0.709</td>
<td>0.619</td>
<td>0.494</td>
<td>0.285</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>1.000</td>
<td>0.983</td>
<td>0.964</td>
<td>0.925</td>
<td>0.881</td>
<td>0.830</td>
<td>0.770</td>
<td>0.698</td>
<td>0.606</td>
<td>0.479</td>
<td>0.264</td>
<td>0.054</td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>1.000</td>
<td>0.983</td>
<td>0.964</td>
<td>0.924</td>
<td>0.880</td>
<td>0.829</td>
<td>0.769</td>
<td>0.697</td>
<td>0.605</td>
<td>0.477</td>
<td>0.264</td>
<td>0.054</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>1.000</td>
<td>0.982</td>
<td>0.963</td>
<td>0.922</td>
<td>0.876</td>
<td>0.823</td>
<td>0.762</td>
<td>0.688</td>
<td>0.594</td>
<td>0.463</td>
<td>0.247</td>
<td>0.035</td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.924</td>
<td>0.879</td>
<td>0.828</td>
<td>0.768</td>
<td>0.696</td>
<td>0.604</td>
<td>0.477</td>
<td>0.265</td>
<td>0.059</td>
<td></td>
</tr>
<tr>
<td>1979</td>
<td>1.000</td>
<td>0.982</td>
<td>0.963</td>
<td>0.922</td>
<td>0.876</td>
<td>0.823</td>
<td>0.762</td>
<td>0.689</td>
<td>0.596</td>
<td>0.468</td>
<td>0.256</td>
<td>0.051</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.924</td>
<td>0.879</td>
<td>0.827</td>
<td>0.768</td>
<td>0.696</td>
<td>0.605</td>
<td>0.479</td>
<td>0.272</td>
<td>0.071</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.923</td>
<td>0.878</td>
<td>0.827</td>
<td>0.767</td>
<td>0.694</td>
<td>0.603</td>
<td>0.476</td>
<td>0.267</td>
<td>0.065</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.924</td>
<td>0.880</td>
<td>0.829</td>
<td>0.770</td>
<td>0.699</td>
<td>0.609</td>
<td>0.485</td>
<td>0.278</td>
<td>0.079</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.982</td>
<td>0.964</td>
<td>0.924</td>
<td>0.879</td>
<td>0.828</td>
<td>0.768</td>
<td>0.697</td>
<td>0.606</td>
<td>0.481</td>
<td>0.274</td>
<td>0.073</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.926</td>
<td>0.882</td>
<td>0.832</td>
<td>0.774</td>
<td>0.705</td>
<td>0.616</td>
<td>0.494</td>
<td>0.290</td>
<td>0.092</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.983</td>
<td>0.965</td>
<td>0.926</td>
<td>0.882</td>
<td>0.832</td>
<td>0.774</td>
<td>0.704</td>
<td>0.616</td>
<td>0.494</td>
<td>0.291</td>
<td>0.093</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.984</td>
<td>0.966</td>
<td>0.929</td>
<td>0.887</td>
<td>0.840</td>
<td>0.784</td>
<td>0.717</td>
<td>0.632</td>
<td>0.514</td>
<td>0.317</td>
<td>0.124</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.984</td>
<td>0.968</td>
<td>0.933</td>
<td>0.893</td>
<td>0.848</td>
<td>0.795</td>
<td>0.730</td>
<td>0.649</td>
<td>0.535</td>
<td>0.345</td>
<td>0.159</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.985</td>
<td>0.970</td>
<td>0.937</td>
<td>0.899</td>
<td>0.856</td>
<td>0.806</td>
<td>0.745</td>
<td>0.667</td>
<td>0.559</td>
<td>0.376</td>
<td>0.198</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.970</td>
<td>0.938</td>
<td>0.901</td>
<td>0.859</td>
<td>0.809</td>
<td>0.749</td>
<td>0.672</td>
<td>0.565</td>
<td>0.386</td>
<td>0.210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.938</td>
<td>0.901</td>
<td>0.859</td>
<td>0.809</td>
<td>0.749</td>
<td>0.672</td>
<td>0.566</td>
<td>0.388</td>
<td>0.213</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.985</td>
<td>0.970</td>
<td>0.937</td>
<td>0.900</td>
<td>0.857</td>
<td>0.807</td>
<td>0.747</td>
<td>0.670</td>
<td>0.563</td>
<td>0.384</td>
<td>0.209</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.939</td>
<td>0.903</td>
<td>0.861</td>
<td>0.813</td>
<td>0.754</td>
<td>0.680</td>
<td>0.576</td>
<td>0.404</td>
<td>0.236</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.938</td>
<td>0.902</td>
<td>0.861</td>
<td>0.812</td>
<td>0.753</td>
<td>0.679</td>
<td>0.576</td>
<td>0.404</td>
<td>0.236</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.972</td>
<td>0.940</td>
<td>0.905</td>
<td>0.865</td>
<td>0.818</td>
<td>0.761</td>
<td>0.689</td>
<td>0.589</td>
<td>0.422</td>
<td>0.260</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.940</td>
<td>0.904</td>
<td>0.863</td>
<td>0.816</td>
<td>0.758</td>
<td>0.685</td>
<td>0.583</td>
<td>0.414</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.985</td>
<td>0.970</td>
<td>0.937</td>
<td>0.900</td>
<td>0.858</td>
<td>0.809</td>
<td>0.750</td>
<td>0.675</td>
<td>0.572</td>
<td>0.400</td>
<td>0.233</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.938</td>
<td>0.902</td>
<td>0.860</td>
<td>0.811</td>
<td>0.752</td>
<td>0.678</td>
<td>0.574</td>
<td>0.403</td>
<td>0.236</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.970</td>
<td>0.937</td>
<td>0.900</td>
<td>0.858</td>
<td>0.809</td>
<td>0.749</td>
<td>0.673</td>
<td>0.569</td>
<td>0.395</td>
<td>0.226</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.985</td>
<td>0.970</td>
<td>0.937</td>
<td>0.899</td>
<td>0.857</td>
<td>0.807</td>
<td>0.746</td>
<td>0.670</td>
<td>0.564</td>
<td>0.388</td>
<td>0.217</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.971</td>
<td>0.938</td>
<td>0.902</td>
<td>0.860</td>
<td>0.811</td>
<td>0.752</td>
<td>0.677</td>
<td>0.574</td>
<td>0.402</td>
<td>0.236</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.972</td>
<td>0.940</td>
<td>0.905</td>
<td>0.864</td>
<td>0.817</td>
<td>0.759</td>
<td>0.686</td>
<td>0.584</td>
<td>0.414</td>
<td>0.249</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>0.986</td>
<td>0.972</td>
<td>0.941</td>
<td>0.906</td>
<td>0.865</td>
<td>0.818</td>
<td>0.761</td>
<td>0.688</td>
<td>0.587</td>
<td>0.420</td>
<td>0.258</td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>1.000</td>
<td>0.987</td>
<td>0.974</td>
<td>0.944</td>
<td>0.911</td>
<td>0.873</td>
<td>0.828</td>
<td>0.775</td>
<td>0.706</td>
<td>0.611</td>
<td>0.455</td>
<td>0.303</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Number</td>
<td>Title/ Author(s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>-----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>253</td>
<td>Using a Census to Assess the Reliability of a National Household Survey for Migration Research: The Case of Ireland <em>Alan Barrett</em> and <em>Elish Kelly</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>251</td>
<td>The Impact of a Carbon Tax on Economic Growth and Carbon Dioxide Emissions in Ireland <em>Thomas Conefrey</em>, <em>John D. Fitz Gerald</em>, <em>Laura Malaguzzi Valeri</em> and <em>Richard S.J. Tol</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>250</td>
<td>The Distributional Implications of a Carbon Tax in Ireland <em>Tim Callan</em>, <em>Sean Lyons</em>, <em>Susan Scott</em>, <em>Richard S.J. Tol</em> and <em>Stefano Verde</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>249</td>
<td>Measuring Material Deprivation in the Enlarged EU <em>Christopher T. Whelan</em>, <em>Brian Nolan</em> and <em>Bertrand Maître</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>247</td>
<td>Incorporating GHG Emission Costs in the Economic Appraisal of Projects Supported by State Development Agencies <em>Richard S.J. Tol</em> and <em>Seán Lyons</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>246</td>
<td>A Carton Tax for Ireland <em>Richard S.J. Tol</em>, <em>Tim Callan</em>, <em>Thomas Conefrey</em>, <em>John D. Fitz Gerald</em>, <em>Seán Lyons</em>, <em>Laura Malaguzzi Valeri</em> and <em>Susan Scott</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>245</td>
<td>Non-cash Benefits and the Distribution of Economic Welfare <em>Tim Callan</em> and <em>Claire Keane</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>244</td>
<td>Scenarios of Carbon Dioxide Emissions from Aviation <em>Karen Mayor</em> and <em>Richard S.J. Tol</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
243 The Effect of the Euro on Export Patterns: Empirical Evidence from Industry Data
Gavin Murphy and Iulia Siedschlag

242 The Economic Returns to Field of Study and Competencies Among Higher Education Graduates in Ireland
Elish Kelly, Philip O’Connell and Emer Smyth

241 European Climate Policy and Aviation Emissions
Karen Mayor and Richard S.J. Tol

240 Aviation and the Environment in the Context of the EU-US Open Skies Agreement
Karen Mayor and Richard S.J. Tol

239 Yuppie Kvetch? Work-life Conflict and Social Class in Western Europe
Frances McGinnity and Emma Calvert

Alan Barrett and Yvonne McCarthy

237 How Local is Hospital Treatment? An Exploratory Analysis of Public/Private Variation in Location of Treatment in Irish Acute Public Hospitals
Jacqueline O’Reilly and Miriam M. Wiley

236 The Immigrant Earnings Disadvantage Across the Earnings and Skills Distributions: The Case of Immigrants from the EU’s New Member States in Ireland
Alan Barrett, Seamus McGuinness and Martin O’Brien

235 Europeanisation of Inequality and European Reference Groups
Christopher T. Whelan and Bertrand Maitre

234 Managing Capital Flows: Experiences from Central and Eastern Europe
Jürgen von Hagen and Iulia Siedschlag
Charlie Karlsson, Gunther Maier, Michaela Trippl, Iulia Siedschlag, Robert Owen and Gavin Murphy

232 Welfare and Competition Effects of Electricity Interconnection between Great Britain and Ireland
Laura Malaguzzi Valeri

231 Is FDI into China Crowding Out the FDI into the European Union?
Laura Resmini and Iulia Siedschlag

230 Estimating the Economic Cost of Disability in Ireland
John Cullinan, Brenda Gannon and Seán Lyons

229 Controlling the Cost of Controlling the Climate: The Irish Government’s Climate Change Strategy
Colm McCarthy, Sue Scott

228 The Impact of Climate Change on the Balanced-Growth-Equivalent: An Application of FUND
David Anthoff, Richard S.J. Tol

227 Changing Returns to Education During a Boom? The Case of Ireland
Seamus McGuinness, Frances McGinnity, Philip O’Connell

226 ‘New’ and ‘Old’ Social Risks: Life Cycle and Social Class Perspectives on Social Exclusion in Ireland
Christopher T. Whelan and Bertrand Maître

225 The Climate Preferences of Irish Tourists by Purpose of Travel
Seán Lyons, Karen Mayor and Richard S.J. Tol

224 A Hirsch Measure for the Quality of Research Supervision, and an Illustration with Trade Economists
Frances P. Ruane and Richard S.J. Tol

223 Environmental Accounts for the Republic of Ireland: 1990-2005
Seán Lyons, Karen Mayor and Richard S.J. Tol
2007 222 Assessing Vulnerability of Selected Sectors under Environmental Tax Reform: The issue of pricing power
J. Fitz Gerald, M. Keeney and S. Scott

221 Climate Policy Versus Development Aid
Richard S.J. Tol

220 Exports and Productivity - Comparable Evidence for 14 Countries
The International Study Group on Exports and Productivity

219 Energy-Using Appliances and Energy-Saving Features: Determinants of Ownership in Ireland
Joe O'Doherty, Seán Lyons and Richard S.J. Tol

218 The Public/Private Mix in Irish Acute Public Hospitals: Trends and Implications
Jacqueline O'Reilly and Miriam M. Wiley

217 Regret About the Timing of First Sexual Intercourse: The Role of Age and Context
Richard Layte, Hannah McGee

216 Determinants of Water Connection Type and Ownership of Water-Using Appliances in Ireland
Joe O'Doherty, Seán Lyons and Richard S.J. Tol

215 Unemployment – Stage or Stigma?
Being Unemployed During an Economic Boom
Emer Smyth

214 The Value of Lost Load
Richard S.J. Tol

213 Adolescents' Educational Attainment and School Experiences in Contemporary Ireland
Merike Darmody, Selina McCoy, Emer Smyth

212 Acting Up or Opting Out? Truancy in Irish Secondary Schools
Merike Darmody, Emer Smyth and Selina McCoy

211 Where do MNEs Expand Production: Location Choices of the Pharmaceutical Industry in Europe after 1992
Frances P. Ruane, Xiaoheng Zhang

210 Holiday Destinations: Understanding the Travel Choices of Irish Tourists  
Seán Lyons, Karen Mayor and Richard S.J. Tol

209 The Effectiveness of Competition Policy and the Price-Cost Margin: Evidence from Panel Data  
Patrick McCloughan, Seán Lyons and William Batt

208 Tax Structure and Female Labour Market Participation: Evidence from Ireland  
Tim Callan, A. Van Soest, J.R. Walsh

207 Distributional Effects of Public Education Transfers in Seven European Countries  
Tim Callan, Tim Smeeding and Panos Tsakloglou