CO2 emissions are rising rapidly due to growing population and affluence

- Current CO2 emissions will cause major, and perhaps irreversible, impacts.
- Getting emissions to 80% of current levels by 2100 requires reducing emissions by 1.8% per year.
- But emissions are increasing by 2.4% per year.
- Emissions result from three major “drivers” identified in IPAT (or Kaya) Identity: (Ehrlich and Holdren, 1971; Kaya and Yokobori, 1997)

\[ \text{Impact} = \text{Population} \times \text{Affluence} \times \text{Technology} \]

<table>
<thead>
<tr>
<th>Driver</th>
<th>Annual growth rate (1996-2006)</th>
<th>Influence of each driver on CO2 emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact (desired CO2 emissions)</td>
<td>↓-1.8% per year</td>
<td>80% decrease by 2100</td>
</tr>
<tr>
<td>Impact (actual CO2 emissions)</td>
<td>↑2.4% per year</td>
<td>100% increase by 2040</td>
</tr>
<tr>
<td>Population (World population)</td>
<td>↑1.3% per year</td>
<td>100% increase by 2065</td>
</tr>
<tr>
<td>Affluence (GDP/person)</td>
<td>↑1.8% per year</td>
<td>100% increase by 2050</td>
</tr>
<tr>
<td>Economic growth (GDP, P/A)</td>
<td>↑3.1% per year</td>
<td>100% increase by 2035</td>
</tr>
<tr>
<td>Technology (CO2/GDP)</td>
<td>↓-0.7% per year</td>
<td>50% decrease by 2110</td>
</tr>
</tbody>
</table>

“Technological” solutions dominate debate but are not enough

- Technology already helps reduce emissions by 0.7% per year but this is not enough.
- Stabilizing emissions growth due to population and affluence requires technology improvements of 3.1% per year.
- Reducing emissions by 80% of current levels by 2100 requires another 1.8% per year, a total of 4.9% per year.
- High and sustained technological improvements are unlikely.

Political institutions: why they won’t work

- Knowledge: Contested whether climate change is likely.
- Norms: Contested whether averting climate change is desirable.
- Incentives: large costs with uncertain and future benefits. Beneficiaries are from other countries and future generations.
- Strategic interactions: international cooperation requires cooperation but not all states are concerned.
- Implementation: monitoring is challenging and sanctions for violations are unlikely and ineffective.

Structural disadvantages of political institutions:

- Discourse of politics is interests but addressing climate change seems to run counter to our interests.
- People expect democratic governments to reflect their values not influence them.

Political institutions are unlikely to address population and affluence.

Value-based institutions: why they might work

Structural advantages of value-based institutions:

- Discourse of religion and other value-based institutions is values and “right and wrong.”
- People expect religious institutions to guide and inform their values.
- People sacrifice more and are more altruistic in value-based institutions.
- Religions do and can influence population and consumption choices.

Conclusions

- Technology alone will not be enough to stop climate change.
- Population and affluence must be “in the mix.”
- Political institutions are unlikely to address population and affluence.
- Value-based institutions may do so and deserve more research attention.

Sources


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