Centre for Climate Change Economics and Policy

Grantham Research Institute on Climate Change and the Environment

Climate Change, Development, Poverty and Economics

Sam Fankhauser[a] and Nicholas Stern[a,b]

[a]Grantham Research Institute and Centre for Climate Change Economics and Policy, London School of Economics

[b]IG Patel Professor of Economics & Government, London School of Economics, and President of the British Academy.

The State of Economics. The State of the World.

World Bank, June 2016

The Grantham Foundation for the Protection of the Environment

LSE The London School of Economics and Political Science

Structure

1. Prosperity and the environment in history of thought
2. Why climate change is different: scale of change, risks, and dangers of delay
3. Analytical challenge: beyond the marginalist approach
4. Policy challenge: beyond incremental action
5. Conclusion

Environment and development: a history of thought

- Economists have long recognised the link between environment and development:
  - Ricardo on land quality as a source of rent.
  - Malthus and Jevons (and later the Club of Rome) on resource constraints.
  - Hotelling on the management of natural resources.
  - The Brundtland Commission pioneering Sustainable Development.
- Environmental services were introduced into welfare economics:
  - Pigou on environmental externalities.
  - Samuelson, Arrow and Meade developing modern welfare economics.
  - Leading into economic valuation, green accounting and the economics of ecosystem services (e.g. TEEB).
- Economics has long informed environmental policy:
  - Pigou on corrective taxes.
  - Coase on (tradeable) property rights.

Environment and development: policy history

- Environmental economics **emerged as a discipline in the 1970s**, pioneered by organisations like Resources for the Future.
- The World Bank established an **environmental advisory unit in 1970**, which gradually grew into the Sustainable Development Vice Presidency of today.
- Pioneering work at the Bank and elsewhere on green accounting, genuine savings, pollution prevention and carbon trading and environmental policy.
- In the **Global Environment Facility**, there has been a dedicated financial mechanism for the global environment since 1991.
- But the natural environment continues to be underpriced and overexploited; poor people are both the victims and a cause of these trends.

Structure

1. Prosperity and the environment in history of thought
2. Why climate change is different: scale of change, risks, and dangers of delay
3. Analytical challenge: beyond the marginalist approach
4. Policy challenge: beyond incremental action
5. Conclusion

Climate change differs from the environmental problems of the past

- The structure of the science of climate change creates four major difficulties for public understanding and collective action:
  - **Immense scale**
  - **Large risk/uncertainty**
  - **Long lags**
  - **'Publicness' of the causes and effects**

The science is robust and GHG concentration rising rapidly

- **Climate science is built on two centuries of theory and evidence.**
- **CO_2e concentrations now around 450ppm** (Kyoto gases).
  - **Adding CO_2e at a rate of over 2.5ppm per year** (likely to accelerate with little or weak action).
  - This is up from 0.5ppm per year 1930-1950, 1ppm 1950-1970 and 2ppm 1970-1990.
- **Inaction could take us to 750ppm CO_2e** over a century: strong possibility of **eventual temperature increase of more than 4°C or 5°C** increase in global average surface temperature above second half. of the 19th century

The risks are unprecedented for humankind

- **Damage from climate change intensifies as the world gets warmer:**
  - Already 1°C at edge of experience of Holocene and civilisation.
  - Seeing strong effects now; yet small relative to what we risk.
  - Beyond 2°C is "dangerous" – risk of tipping points.
- Temperature increase of 4 or 5°C or more not seen for **tens of millions of years** (homo sapiens, 250,000 years):
  - Likely be **enormously destructive**.
  - **The reasons we live where we do, would be redrawn** (e.g. too much or too little water).
  - Potentially causing **severe and sustained conflict** with migration of hundreds of millions, perhaps billions of people.

What to do to hold warming below 2°C

- **Stabilising temperatures requires net zero emissions**. The lower the target temperature, the earlier the necessary achievement of net-zero.

- Necessary emissions path for 50-50 chance of 2°C:
  - **under around 35Gt** in 2030; **under around 20Gt** in 2050; zero before end century.

- Can do a little more earlier and a little less later and vice versa but shape of feasible paths similar, and **costly to catch up if we postpone action** (e.g. sometimes find 40Gt for 2030 for 2°C). It is integral of emissions that matters.

- Note **Paris COP21** specified **a target of "well-below 2°C" and pursue efforts "to hold to 1.5°C"** (which would require net zero emissions around 1080 and latter around 2050).

Structure

1. Prosperity and the environment in history of thought
2. Why climate change is different: scale of change, risks, and dangers of delay
3. Analytical challenge: beyond the marginalist approach
4. Policy challenge: beyond incremental action
5. Conclusion

The precautionary economics of climate change risks

- Climate change has **yet to enter mainstream economics**, but some economists have engaged with the problem early 1990s (e.g., Nordhaus, Cline, Edmonds, Schelling).

- Their models were mostly concerned with marginal adjustments from a (largely) exogenous growth path. They suffered from a poor evidence base. While helpful in building the logic and aspects of the argument for action, they are **profoundly misleading** in their representation and quantification of risks. This continues today. "Marginal models".

- Traditional empirical analysis based on fairly recent past data cannot do much to help us to quantify historically unprecedented risks. We need to **look further back** into the history of the planet.

What marginal models miss

- On the damage side, marginal models miss the **scale and nature of risks.**
  - Damage functions usually relate GDP loss to current temperature changes (e.g. ignores damages to capital stocks or growth rates).
  - Models are calibrated to absurdly low levels of loss (e.g. only a 50% loss of GDP from 18°C increase above 1900 levels; or 5-10% at 5°C)
  - There is limited incorporation of the ethics of climate change.
  - Models do not value the co-benefits from a low-carbon transition.

- On the policy side, marginal models miss the **dynamic public economics of systemic change.**
  - Marginal abatement cost (MAC) models ignore the inherently systemic nature of transformative change.
  - They fail to model benefits of innovation and impacts on future prices or technology options.

The ethics of intervention

- The effects at issue are not potentially so large and far-reaching that we should go beyond standard economic consequentialism and consider duties, rights, virtues…from across moral philosophy.

- The ethics discourse in economics has **focused heavily on intergenerational equity** (discounting); little room for i**ntra-generational equity** and wider perspectives need for policy making.

- Discounting approaches have to differ between **goods** and **welfare**:

  – **Goods**: how do we value (today) goods consumed in the future? Should we discount the value of future goods because "people in the future will be richer"? It matters *which* goods. And *which* people?

  – **Welfare:** discounting future *welfare* or *lives, given assumption that the life exists,* weights the *welfare* or *lives* of future people lower (irrespective of consumption/income) purely because their lives have begun later (discrimination by date of birth).

Incorporating intra-generational issues

- Equity question for international cooperation – **which countries should do what and when**?

- Context:
  - World must be around or below 2 tonnes CO_2e per capita by 2050 globally for 2°C.
  - **Developed countries**: 1 billion in 7 billion population; Responsible for around half of global emissions since 1850; Average per capita emissions still >15tCO_2e per year.
  - **Developing countries**: Responsible for around 2/3 of current emissions; will be responsible for most of future emissions; but per capita emissions still 1/3 to 1/2 of rich countries.
- Arithmetic implies faster cuts for rich countries. And if few people below 2 tonnes there can be few above.

- **Double inequity** – rich countries major responsibility for past emissions, poor people hit earliest and hardest.

Global Collaboration: The Paris Agreement

- **Remarkable achievement that 195 countries agreed** after years of debate and fundamental disagreements; **signed by 175 countries in April 2016** (most in history); drive to enter into force earlier than planned (2018 versus 2020).

- Compared to Bretton Woods: 44 countries (1 dominant); previous 30 years had 2 world wars and great depression.

- Foundation of agreement was **built on the understanding** of:
  - the **scale of risks and urgency to act**, and
  - **attractiveness of alternative path** as sustainable route to lasting development and overcoming poverty.

- Paris Agreement should be seen as a **turning point** to put the world on a low-carbon climate-resilient path. Forms the basis of **new, international, cooperative, long-term action** on climate change.

Structure

1. Prosperity and the environment in history of thought
2. Why climate change is different: scale of change, risks, and dangers of delay
3. Analytical challenge: beyond the marginalist approach
4. Policy challenge: beyond incremental action
5. Conclusion

Creating the supporting policy environment

- Climate policy is not about incremental initiatives that can be attached to existing development plans; it requires **deep structural and systemic change**, implemented over many decades.
- A long-term view of direction (with all its uncertainties) and instruments for getting there should be in some framework. An old lesson of "prices and quantity" approaches
- Requires policies that support economic dynamism and address multiple market failures: **greenhouse gases; RD&D; imperfection in risk/capital markets; networks, information, and co-benefits**.
- The **"horse-race"** between climate policy and development represents a **false dichotomy**; it is **possible to achieve both**.

Structural transformation and infrastructure investment

- We can see now key elements of structural transformation.
- The investments made now will determine the future development path and climate:
  - Balance of output **shifting away from rich countries**; very rapid urbanisation; **building of energy systems.**
  - Over next 15-20 years, investment of **US$ 90 trillion** will be needed for infrastructure. It **must all be clean** to meet the targets.
  - **US$ 2 trillion** per year in high-income countries, between **US$ 3 - 4 trillion** per year in low- and middle-income countries.
- **Support and investment for R&D** to drive the new "wave of innovation".
- **Energy efficiency** will be close to half of the necessary action.

What about climate resilience?

- Focus is often on mitigation, but what about resilience? Even **moderate amounts of climate change** (e.g. those possible under a 2°C path) could **pose risks to development**, or reversal of development achievements.
- Current development path of many developing countries is **shaping their future vulnerability** to climate change (e.g. development on coastlines, design of infrastructure).
- Mitigation, adaptation, development intertwined: many examples in agriculture, water, transport, energy, buildings, cities…
- The direction and nature of economic development therefore matters, and it makes sense to **tackle climate risks in lockstep with development planning** and investment decisions.

Better Growth, Better Climate

- It is not about static and divisive "burden sharing", **it is about working together** to incentivise, foster and finance change.
- In short-term, **infrastructure investment can boost demand** and growth by investing in the growth story of the future.
- In the medium term the transition to **low-carbon growth offers dynamic benefits**:
  - Potential to stimulate dynamic, innovative and creative growth
  - Great opportunities from most rapid technological change the world has seen: digital, materials, biotech…
- In the long term, zero-net-carbon is **the only growth story** that can be sustained.

Clear direction is needed…

- Spurring low-carbon, climate resilient growth requires the **redirection of financial flows and investment** over long periods.
- The **consistency, clarity and credibility** of development and climate policies are imperative. Policy makers need to set a clear, long-term direction of travel.
- Important to manage constructively dislocation and cost of change.
- If clear direction is provided new investments can lead to:
  - New sources of **growth**, lay the platform for long-term sustainability.
  - Create more **resilient**, **efficient**, less **polluted**, less **congested** cities.
  - Protect **forests**, **land, ecosystems, water sources** and **biodiversity.**

Structure

1. Prosperity and the environment in history of thought
2. Why climate change is different: scale of change, risks, and dangers of delay
3. Analytical challenge: beyond the marginalist approach
4. Policy challenge: beyond incremental action
5. Conclusion

A new development model

- Current development model has had many successes, but also led to exploitation of natural resources and the rise of **new threats to development**.
- The response to those threats is not the cessation of economic growth, but a **departure from development business as usual.**
- The only credible way to address the risks is through **sustainable growth,** advancing economic prosperity and combating climate change at the same time.
- Sustainable growth requires **finance and investment**, and it requires **strong leadership** and **global collaboration**.

A better economics

- The public policy that can deliver this shift needs to be informed by better, more thoughtful economics, indeed a more **"dynamic public economics".**
- We need a **radical deepening of economic analysis**, where we tackle directly issues involving pace and scale of change in the context of major and systemic risks.
- The ethical issues are so large in this context that the arguments for explicit, broad and deep discussions of ethics are still more powerful than usual.
- Standard growth theory, general equilibrium and marginal methods have much to contribute but they are nowhere near sufficient.

A call to action

- Managing climate change and overcoming poverty are the **two defining challenges of our century.** If we fail on one, we fail on the other.
  - If we fail to manage climate change we will create an environment so hostile that lives and livelihoods will be destroyed.
  - If we try to manage climate change in ways which put barriers on poverty reduction we will not have the coalition we need.

- **We have a clear idea of direction, instruments, technology and reforms. Certainly enough to begin urgently and strongly.**
- **The next 20 years are decisive. Delay is dangerous**