Evaluating environment & policy: three domains

Professor Michael Grubb

Senior Research Associate, Faculty of Economics, Cambridge University

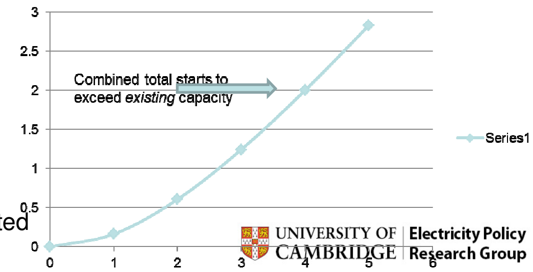
& Editor-in-Chief, *Climate Policy* journal

Senior Advisor, Sustainable Energy Policy

UK Office of Gas and Electricity Markets

Climate impacts from a *public perception* standpoint - still lost in the law of adding 'random variables' ..

- Considerable natural climate variability
- Assume climate change variability adds to this according to the usual maths, total variability is root of sum of squares of inputs
- Most societies (certainly ours) have lots of 'adaptive capacity' to absorb weather variation
  - Eg. suppose natural variability is '3', and our existing adaptive capacity is '5'
  - Adding climate variability
    - At first lost 'in the noise'
    - Only rises sharply as it matches then exceeds the natural variability
    - But lots of inertia (committed change) in all the systems



UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

www.eprg.group.cam.ac.uk

A useful qualitative framing
- the Downing et al 'risk matrix'

		Which kind of impacts?		
		Market	Non-market	**Multiple stresses and socially contingent**
What kinds of climate changes?	Projection (trend)	Coastal protection Dryland loss Energy (heating & cooling)	Heat stress Wetland loss Ocean acidification Ecosystem migration / termination	**Displacement from coastal zones Regional systemic impacts**
	Climate variability & (bounded) extremes	Agriculture Water Storms	Loss of life Biodiversity Environmental services	**Cascading social effects Environmental migration**
	System changes & surprises	**'Tipping point' effects on land, resources**	**Higher order social effects Irreversible losses**	**Regional collapse Famine War**

Figure 2–9 The risk matrix: an assessment framework for evaluating the social cost of climate change
Note: 'Socially contingent' costs may be understood as those that may be amplified by the inability of society to respond to impacts effectively, such as failures of governance , inability to act collectively, or the frictions associated with migration or deeper disturbances
Source: Developed by the author from Downing et al. (2005), Jones, R. and G. Yohe (2006), Downing and Dyszynski (2010).

Stern review underlined ways in which climate change could result in serious costs with significant NPV, yet ..

.. Weitzman argued Stern was basically 'right for the wrong reasons' because it is *even more* uncertain

- Uncertainty is key
- Traditional economic treatments, where they have considered uncertainty at all, have *assumed 'thin-tailed' distributions* for mathematical convenience
- *But* a rigorous statistical analysis clarifies that we are dealing with 'probability distributions of probability distributions' , arising from the (inevitably) finite data available on extremes
- => Actual impact is a '*thick tailed'* distribution, in which the *welfare damage* of impacts rises faster than their *probability* declines
- Weitzman (2007): the 'Dismal Theorem'
  - 'No finite sample can assess probability of magnitudes of the most extreme disasters lurking in the distant tails of distributions – expected (impacts) will be driven to an arbitrarily large extent by this unavoidable limitation.. …
  - 'climate change generally and climate sensitivity specifically are prototype examples of this general principle, because we are trying to extrapolate inductive knowledge far outside the range of our limited experience'
  - 'the debate about discounting may be secondary to a debate about the open-ended catastrophic reach of climate disasters'
- The 'economics of the precautionary principle'

Three domains of challenges

	Basic belief	Strategy	Associated timescale
Don't see, don't know, or don't care	Not proven, or 'What you don't know can't hurt you'	Don't worry, be happy Environmental group campaigning *vs* resistance lobbying	'First few decades' of climate change
Tangible and attributed costs	Weigh up costs & benefits	Act at costs up to 'social cost of carbon' what, where and how do we measure it?	As impacts rise above the noise – next few decades
Disruption and securitization	Running unquantifiable planetary risk and/or climate as a 'threat multiplier'	'Containment and defence' (mitigate as much as practical and adapt to the rest)	**Ultimately** for all (systemic or global risk) M**ost vulnerable,** much sooner, with internatl spillovers

Inertia in both climate system and response (energy) systems links the levels

Is 'securitisation' language helpful?

- **Does** provide a language that helps people understand nature of a problem they do not experience daily, with analogy to personal and national security etc
- **Does *not*** provide a 'carte blanche' for drastic emission reductions: is not the same as 'infinite cost'
  - Security of *most vulnerable* could be protected in other ways (eg. Tol/Lomborg: but limited ..)
  - Can be set against context of *other security risks* including at personal level eg. energy access, health risks, 'basic needs' - and thus a context for considering equitable contributions
- **Enables** us to align climate debate with discourse about:
  - *strategic* energy dependence, volatility & security of supply chains
  - *Other* geopolitical challenges around state responsibility, ethics & IR

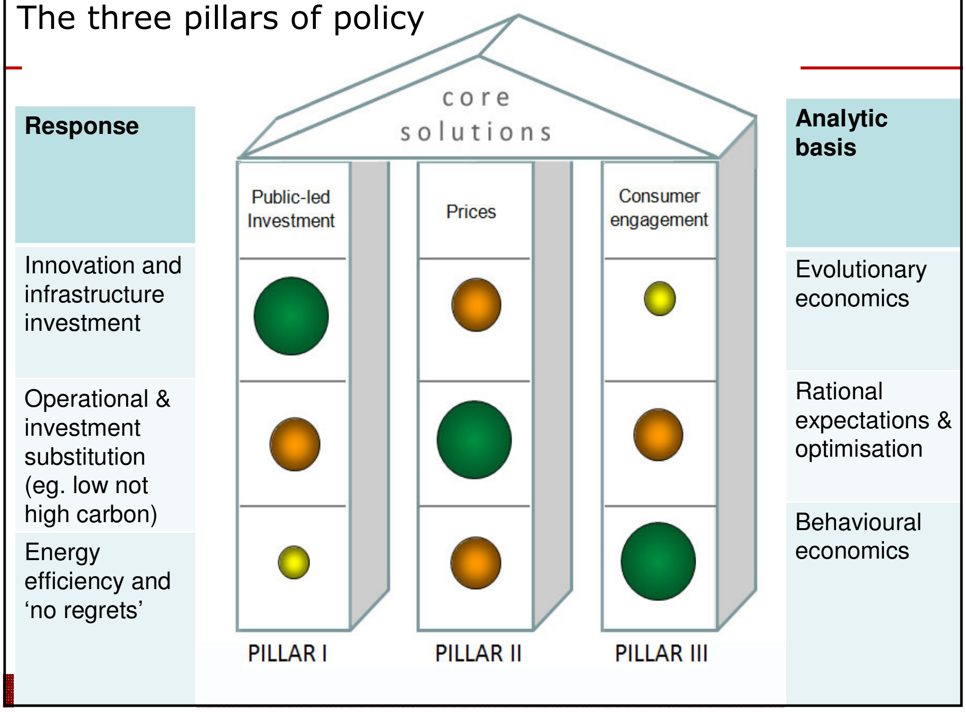
There are different domains of economic/decision/systems analysis to match ..

- Risk & uncertainty
- Evolutionary economics: Infrastructure & innovation
- Rational expectations: foresight & optimisation
- Behavioural economics: psychology & satisficing
- Collective action

UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

www.eprg.group.cam.ac.uk

The three pillars of policy



These three types of response relate to *different actors with different behavioural characteristics* and *interact*

Behavioural mode	Public-led investments	Prices	Consumer & voter behaviour
'Secure'	Public sector infrastructure discount rates to reflect long-term strategic interest, with security as most fundamental state responsibility	Revealed costs and preferences; revenues	Values
'Optimise'	Market rules	Market competition provides optimal allocation of private resources *insofar as sufficient prices with credibility and foresight*	Acceptability & responsiveness
'Satisfice'	Education & options	Motivation & revenues	'Heuristic' behaviour in both individuals and organisations: opportunities for low-cost mitigation

A final teaser:

What do we mean by security?

- When people get upset?
- … enough for governments to fall?
- When government is perceived to fail in prime duty to protect individual security / "basic needs" (hence, social security) – eg. inability to keep lights / heating on
- When people die?
- When social stability collapses?

UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

www.eprg.group.cam.ac.uk