Bulletin

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The times, they're a changin'

USING ECONOMICS TO ADAPT TO CLIMATE CHANGE

Adaptation in climate policy is about reducing the harm, or seizing the opportunities, caused by climate change. Unlike mitigation, which focuses on the reduction of greenhouse emissions, economists have been much slower to focus on adaptation. But adaptation is critical. Economists can help by doing three things: focusing on policy reforms as well as projects; dealing with uncertainty; and preventing unintended consequences.

The "Sea Change" is a very Australian phenomenon. It reflects the desire to swap city living for the coast. But, as more people move towards the sea, the sea is also threatening to move in. Anthropogenic global warming is projected to raise sea levels anywhere between 0.18 and 0.59 metres by the end of the century. Managing the impact of these projected changes falls under the heading of climate change adaptation. Examples include ski resorts that rely more and more on artificial snow, and drawing more on irrigation for agriculture. Adaptation also includes the ability to take advantage of new opportunities resulting from climate change, such as altering crops.

Adaptation is the "other" plank of climate policy, along with mitigation (policies to actually reduce emissions). Adaptation is critical because many of the medium

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term impacts of climate change are already locked-in as a consequence of the existing stock of greenhouse gas emissions; and significant long-term climate change impacts are still predicted.

To date economists have been more interested in the economics of mitigation than adaptation. This is partly because mitigation has the glamour of international treaties and negotiations attached to it. But it is also because the core issues in mitigation – setting a price on something (emissions) and creating markets – is the sort of challenge economists relish. By contrast, adaptation is a much more diffuse subject, dependent on myriad sector-specific and local issues.

This relative neglect is a pity. Economics has much to contribute to adaptation policy. It helps to identify when government policies and leadership in investing in adaptation are needed to make society as a whole better off, and when governments should focus on facilitating adaptation activities undertaken by private economic actors (firm, and businesses). Are economists up to the challenge of climate change adaptation? That depends on their ability to handle three sets of problems.

POLICY BEFORE PROJECTS

When economists have thought about adaptation, they have tended to do so in the same way as they think when choosing between, say, alternative construction projects. This reliance on project appraisal paradigms has led to two biases.

One assumes a centralised decision maker – usually the state –has to decide between alternative projects, when in reality adaptation efforts are driven by many agents, private and public. Individuals and businesses have inherent incentives to adapt because their livelihoods and assets will be affected by climate change. Farmers have a long track record of adapting to variability in, and changes to, climatic trends. The key issue is to understand whether, left to their own devices, agents will adapt in a way that is not just of private benefit to them, but also in the interests of society at large and to develop pro-adaptation policies where this is not the case.

This leads to the second bias, which is a focus on "hard" infrastructure projects over policy reforms. This might reflect that much of the thinking about adaptation has been done by the development cooperation community where haggling over dollars is the norm. Physical projects are by nature easier to see, cost and measure outputs from than are reforms to markets, prices and property rights.

Yet precisely because agents adapt out of self interest, these "soft" aspects of reform can do much to deliver optimal levels of adaptation efforts. For example, irrigation offers a way for farmers to adapt to reduced rainfall. But if water resources are mispriced and over allocated to farmers relative to the needs of ecosystems, then increased irrigation can exacerbate the costs of environmental degradation due to a drier climate. If the true scarcity value of water resources is not reflected in the price of water, adaptation techniques based on irrigation might well constitute "mal-adaptation" from a the point of view of society as a whole.

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Pricing water properly benefits society regardless of future rainfall levels, and is beneficial should water scarcity increase. Economists refer to these as "no-regrets" options. Trade policy provides another example of this. Climate change will affect the relative suitability of different regions for particular types of crops: cereal and rice yields are projected to increase in mid to high latitudes relative to lower ones. Freeing up trade can help to manage the food scarcity concerns in adversely affected regions, and send the right price signals to producers in areas that become more suited to particular types of cropping. Moreover, it should discourage the pursuit of inappropriate adaptation in regions which are no longer at a comparative advantage when it comes to these types of agriculture.

DEALING WITH KNOWN UNKNOWNS

Climate change policy operates in a context of pervasive uncertainty. The ranges of values for key variables (such as surface temperature, rainfall or sea-level rise) that drop out of climatic modelling are large and often open-ended. The same applies to projected damages that flow from changes to climatic variables as it is difficult to assign probabilities to future scenarios (as distinct from risk, which involves known variability around a mean). In short, policy must, to quote Donald Rumsfeld, deal with "known unknowns".

Uncertainty complicates the economics of adaptation, but does not make it intractable. After all, many economic decisions involve some degree of uncertainty. When faced with uncertainty it is essential to understand the value of "real options" that are embedded in a policy or set of decisions. A real option is the flexibility to adapt strategy or policy as new information comes to light. In an uncertain environment a policy that allows for future flexibility is better than a policy that does not.

Consider the case of policy targeted at managing the threat of damage and loss due to sea level rises and storm surges. One solution has been to restrict coastal developments, while an alternative could be to acquire land and set foundations for levees, which can then be built upon as more information about possible damage to coastal development becomes available.

Using standard cost benefit analysis based on discounted rates of return, the first option may initially be less expensive, but can impose substantial costs in development opportunities foregone if the flooding risk turns out to be overstated. On the other hand, the more capital intensive approach, which might have been ruled out under standard approaches, could prove to be more valuable because of the flexibility embedded in it.

HAZARDS, HUMAN AND NATURAL

Climatic uncertainty is not the only sort of uncertainty policy makers have to worry about. The ways in which individuals and businesses respond to policies are also unpredictable – and they may respond in ways that can have unintended consequences.

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Consider coastal management again. A policy based on constructing levees can lead people to believe that they will be insulated from flood risks. This can cause more intensive use of the flood prone land than would have otherwise been the case, in turn increasing the possible damage associated with a catastrophic flooding event in which the levees fail. Risk taking behaviour that defeats the intended purpose of policy is an example of "moral hazard". This problem may be further exacerbated if governments cannot pre-commit against providing ex-post disaster compensation to those affected. This perverse outcome is reflected in the experience of flood policy in Australia in the 1970's and 1980s, where there has arguably been less than optimal private investment in flood mitigation as flood victims have been generously dealt with by governments.

The example is also a further illustration of why it is dangerous to consider "hard" adaptation solutions in isolation from "soft" ones. Hard solutions are often only partial and can have unintended consequences; soft solutions can re-align behavioural responses to reduce impacts. In our coastal example, one solution would be a policy to recover the costs of levee construction from inhabitants of the affected area, for example in proportion to the value of their assets at risk. This can curtail reduce the amount of investment that takes place, and reduce the escalation in damages that goes with it. The main challenge for economists lies in modelling behavioural responses – intended and unintended – that flow from the pattern of incentives embedded in policy and in institutional expectations. This requires taking into account limits on the rationality of economic agents, as well as the role of unwritten expectations.

SINK OR SWIM

As with society at large, economists need to adapt to the consequences of climate change. Adaptation will become more politically important as climate change manifests. As it becomes more politicised there is a danger policy will run ahead unchecked by sound economic thinking. In particular, there will be incentives for certain constituencies to ensure that adaptation efforts are geared towards the status quo for them, even if this status quo is not in the general interest.

You might say that climate change throws an uncompromising spotlight on existing policy and market distortions. As we saw in our discussions on water pricing and trade policy, a refusal to address distortions becomes even more costly in the presence of climate change. By contrast, the rewards from addressing distortions are even greater when climate change occurs.

In engaging more deeply with adaptation issues, economists can draw on a particularly rich and varied toolkit to address decision making under uncertainty and incomplete information to cut to the core of the key challenges posed by climate change impacts.

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