

# Government

## RETHINKING KYOTO

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*The movement away from climatic constancy represented by global warming has the potential to impose huge costs on the global economy...*

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The Kyoto Protocol to the United Nations Framework Convention on Climate Change – Kyoto Protocol – is a significant attempt at multilateral cooperation to deal with what is considered to be a major threat to global climatic constancy and stability. The movement away from climatic constancy represented by global warming has the potential to impose huge costs on the global economy because much physical infrastructure including productive capacity is designed to operate within surprisingly tight climatic norms and a considerable proportion of human habitation is based on current ocean mass. In the latter case, rising ocean levels could force large-scale relocation of people and widespread abandonment of valuable coastal urban infrastructure. Increased instability in weather patterns and weather intensity can lead to large losses for agricultural production and costly increases in safety tolerances for infrastructure. While very large, these costs will be incurred, for the most part, in the distant future.

The Kyoto Protocol, however, has proved controversial because it will require costly alterations in a wide range of current practices, in particular the consumption of fossil fuels, over the short- and intermediate-run to reduce the greenhouse gas emissions that are altering the parameters that determine climate. As with any major change in policy it will create both losers and winners and those who perceive that they are on the losing end can be expected to actively work against such a policy. Fossil fuel-based industries in developed

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countries, for one, clearly see their interests threatened by the Kyoto Protocol. On the other side of the issue of controlling greenhouse gas emissions are ranged a plethora of environmental NGOs and other civil society groups who see the implementation of the Kyoto Protocol as a key test for the Multilateral Environment Agreements (MEAs) into which they have put so much political energy. With so much at stake, it is probably not surprising that positions have become polarised and science conscripted as an important adjunct to advocacy – so that it is virtually impossible for policy makers to determine what evidence to believe. In any case, the underlying science is sufficiently tenuous that little can be used to legitimately bolster a case for a deterministic environmental outcome.

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Much of the battle over the Kyoto Protocol has been fought over the validity of the scientific evidence presented. Significantly less effort has gone into analysing the likely efficacy of the proposed limits on greenhouse gas emissions from an economic policy perspective. Certainly, considerable effort has been expended by the various signatories to the Protocol regarding the benchmarks to be used as the base from which to calculate their reductions, what should be allowed to constitute reductions and the relative expected efficacy of the components of a reduction strategy. There has been some effort put into examining whether the total Kyoto commitments will lead to sufficient reductions in emissions to achieve the goal of climate constancy.

On a more technical level, research has been undertaken into how to efficiently manage emissions reductions through, for example, the use of tradable permits for the right to emit greenhouse gasses. Concerns have been expressed that, as the United States is not a signatory, sufficient global reductions may not be achieved and that economic competitors with the US will be put at a disadvantage. The absence of commitments in the Kyoto Protocol to reduce greenhouse gas emissions by developing countries has also been the subject of considerable controversy. A more general efficacy question remains, however, as to whether the structure of the Kyoto Protocol creates the correct incentives to achieve significant reductions in greenhouse gas emissions. If this is not the case, then countries that take their commitments to reduce emissions seriously are, at best, engaged in little more than a *grand gesture* that will impose considerable costs on their

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economies, particularly their conventional energy sectors, and at worst will contribute to increased global carbon leakage. If greenhouse gas emissions are a serious threat to climatic constancy and stability, then more than *grand gestures* are required and a return to the international bargaining table may be necessary no matter how painful that may be to both governments and civil society groups that have put so much effort into defending the Protocol.

The key component missing from existing analysis of the Kyoto Protocol is the interaction between sectors, both within developed and developing countries and between them, that are likely to arise as countries take action to realise their Kyoto reduction commitments. If this *general equilibrium* approach is not utilised, then the global efficacy of the Kyoto Protocol cannot be accurately assessed.

While industries clearly lie on a continuum encompassing those that are heavy greenhouse gas emitters such as those that use conventional energy intensively to those that do not contribute significantly to greenhouse gas emissions such as education or health care. For convenience some industries can be considered *dirty*, while others can be considered *clean*. Further, there are some industries whose productivity depends on climatic constancy and thus can be considered as using climate as an input – much of agriculture, forestry and fishing falls into this category. In terms of greenhouse gas emissions, these industries tend to be on the clean end of the spectrum whether they are located in developed or developing countries. It is also likely that greenhouse gas emissions per unit of manufacturing output are higher in developing countries than in developed countries because, to a considerable degree, developed countries place a higher value on environmental amenities than developing countries and have already regulated their firm's emissions. In other words, manufacturing industries in developing countries are dirtier than similar industries in developed countries.

Climate change negatively affects the productivity of the relatively clean climate dependent industries leading to a decline in their output and an increase in their price relative to industrial output. As a result, consumption of manufacturing output increases. Given higher wages and emissions costs in developed countries, much of this expansion in industrial output will take place in developing countries where

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industrial production is dirtier. Thus, there is a downward cycle of increasing emissions from dirty industries leading to increased climate change further reducing productivity in climate dependant industries. If the effect on the productivity of climate dependant industries is sufficiently high, however, incomes may fall and the downward spiral mitigated to some extent.

A central feature of the Kyoto Protocol is that the Annex I countries consisting of developed countries and transition economies (but notably not the United States) have committed to reductions in greenhouse gas emissions. While developing countries may face future limits to emissions, they remain unconstrained under the first round of commitments specified by the Kyoto Protocol.

The reduction required in developed countries' aggregate emissions will lead to a decline in their aggregate output, particularly in dirty industries, as firms are driven to exit from the manufacturing sector. There will follow an exactly offsetting increase in the aggregate output of developing countries as new manufacturing firms enter the sector to satisfy global demand. As a result, global emissions unambiguously increase as relatively clean firms from developed countries are displaced by relatively dirty ones in developing countries. The exemption of developing countries from emission constraints thus leads definitively to increased global carbon leakage when simple long-run general equilibrium interactions are taken into account.

This leads to the interesting observation that the refusal of the US to ratify the Kyoto Protocol may actually reduce the extent of this global carbon leakage. If the US does not unilaterally tighten its emission constraint, the reduction in the supply of developed country manufactured goods will be lessened. Consequently, the degree of displacement of manufacturing production from the relatively clean developed countries to the relatively dirty developing countries will be reduced and global emissions will increase to a lesser extent.

Another important feature of the Kyoto Protocol, the Clean Development Mechanism (CDM), allows firms in developed countries to buy emission credits from firms in developing countries when the

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latter commit to adopting cleaner production techniques. Discussions are continuing regarding potential quantitative limitations on the use of credits. For example, the ability of the credit market to reach its full potential may be limited by the implementation of somewhat arbitrary credit import restrictions in developed countries resulting in a “partial system” of credits. This “supplementarity” principle, which emphasises direct reductions in developed countries, is favoured by the European Union.

Moving from a no credit system to a full credit system by gradually increasing the ratio of the emissions price in developing countries that transfers to developed countries integrates the world emissions market to a greater degree. Since the developed countries’ emissions price declines, the demand for credits per firm increases, but since the developing countries’ emissions price rises the supply of credits per Southern firm also increases.

If the proportionate magnitude of the former effect is greater (smaller) than the latter, the equilibration of the emissions market will require an increase (decrease) in the number of manufacturing firms in developing countries relative to developed countries. Increasing the ratio of the emissions price of developing countries relative to developed countries also affects the goods market by enhancing the efficiency of manufacturing. This reduces the opportunity cost and long-run equilibrium price of the manufactured good. The lower price, in turn, increases consumption and necessitates entry into the North and/or South. To equilibrate both the emissions and the goods markets, entry into manufacturing must occur in at least one group of countries and may well occur in both groups. This suggests that there is a strong possibility that the implementation of a credit system will lead to entry into manufacturing in developing countries.

The effect of credits on global emissions depends critically on whether there is net entry or exit by manufacturing firms in developing countries; each additional firm adds emissions to the world total either directly by way of its own emissions or indirectly by selling credits that allow firms in developed countries to emit more. The entry of additional firms into the manufacturing sector of developed countries

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does not have a similar effect because entrants, like incumbents, fall under those countries' aggregate cap. The only way that the manufacturing sector in developed countries can increase emissions above this cap is by purchasing credits from firms in developing countries. Since entry into manufacturing industry in developing countries is a likely outcome of the CDM, there is a strong possibility that the credit system in the Kyoto agreement will worsen global carbon leakage.

While the Kyoto agreement has frequently been criticised on economic efficiency grounds, the importance of the climate change issue has convinced many observers that it is time to move forward for environmental reasons notwithstanding any economic shortcomings. Our conclusions strongly question the view that the Kyoto agreement is sufficiently good for the environment that it should be implemented with haste. Ironically, the Kyoto agreement may actually exacerbate the environmental problem that it is intended to mitigate. For the interested reader, a formal representation of the model that supports the arguments in this paper can be found in Pancoast and Gaisford (2003). The underlying model used in this paper is extremely simple and undoubtedly adding details and complications may qualify the strong results concerning global carbon leakage. Even so, the analysis should sound an important note of caution concerning the potential effects of the Kyoto Protocol on climate change.

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Our results do not suggest that attempts to cooperatively reduce emissions of greenhouse gasses multilaterally should be abandoned – the problem of global warming still needs to be addressed. What it does suggest is that the Kyoto Protocol needs to be re-opened for further negotiations. No matter how unpalatable that may be to politicians that have enthusiastically endorsed the Kyoto Protocol or those in the environmental movement that perceive it as a major bulwark of their success, if the structure of the current Protocol will actually increase the likelihood of climate change, then renegotiation must be accepted. While it is probably naïve to believe that the vested interests, particularly in the conventional energy industry, that have opposed the Kyoto Protocol will cease their opposition, if new negotiations take place they should seek to play a positive role shaping the new regime.

Finally, unlike in the Kyoto negotiations, it is crucial that developed countries not take the “easy route” and allow developing countries to escape commitments to reduce emissions. Developing countries will want concessions in other areas if they are to be induced into protecting the environment – because they value it less than developed countries. Climate change is a long run phenomenon but it is rich populations in developed countries that have the most to lose from the dislocations and declining asset values that will inevitably arise if no action is taken. It also seems clear that more resources need to be put into scientific research surrounding the question of mitigating climate change.

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### **Suggested Reading**

Pancoast, R. and Gaisford, J. (2003) Will the Kyoto Protocol be Good for the Environment? – Implication for Agriculture, *Current Agriculture, Food and Resources Issues*, (forthcoming), [www.cafri.usask.ca](http://www.cafri.usask.ca)

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