

THE LEGAL AND ECONOMIC BASES FOR AN EMISSIONS TRADING SCHEME

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I INTRODUCTION

The issues of climate change and global warming demand that something be done. There is a legal imperative that a regulatory regime exist to effect a reduction of greenhouse gas emissions ('GHGE') because there is an evidentiary link between GHGE and warming.

Legal instruments can be drafted to reduce GHGE on the basis of regulatory devices historically used for pollution controls that, for example, yield penalties for a breach or are enforced by way of injunction. Yet this is not the model that has developed for reducing GHGE. Instead, the legal regulatory structures that have become popular to carry out this intervention are different in nature to those used for pollution and are essentially based upon the implementation of economic theories; most prominently, an emissions trading scheme.

In order to understand how an emission trading scheme has emerged, it is important to examine why it has supplanted traditional pollution controls and also the reasons why it has become the primary tool of greenhouse gas abatement.

It is the thesis of this article that the emissions trading scheme is an inevitable consequence of perceiving climate change as requiring a 'top-down' approach where the problem is a global, as opposed to a domestic, issue. For reasons that will be explained, this top-down approach actually tends towards economic instruments and this explains the current approach of an emissions trading scheme to abate GHGE.

II THE CONSEQUENCE OF CLIMATE CHANGE AS A GLOBAL PROBLEM

Issues relating to climate change are perceived as having global significance; this is a natural and intuitive viewpoint as it is not possible to conceive such problems as a local issue. The legal mechanism for solving any global issue is twofold: first, it requires countries to enter into an agreement to cooperate towards a global solution and, secondly, for the constituent country to act domestically by creating policy and legislation to implement the solution. As a relevant example, the first attempt to prevent damage to the climate, the 1985 *Vienna Convention for Protection of the Ozone Layer* ('*Vienna Convention*'), proceeded on the basis that countries would cooperate with each other and join together to formulate agreed

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measures and standards,¹ and then adopt domestic legislative and administrative measures to achieve a solution. The *Montreal Protocol*, which followed the *Vienna Convention*, set out the standards for chlorofluorocarbon ('CFC') emissions,² establishing the global commitment. The United States, a signatory to the treaty, then implemented domestic legislation to restrict CFCs³ that acted as a precedent for other countries. The success of this arrangement clearly fortified the model of a global agreement leading to domestic action as a workable legal structure for climate change problems.

As occurred with the *Vienna Convention*, the domestic legal structures which arise for consideration in relation to climate change, have two bases that result from the perception of the problem as a global issue. The first is a self-evident awareness of the need for worldwide cooperation of each constituent nation on such a crucial issue. The second arises from binding obligations that are created by treaties entered into by member states. The first is, of course, a precursor to the second but it can stimulate solutions independently even in the absence of a treaty. The legal structures for climate change are therefore a result of domestic action undertaken on the part of a nation having as its basis global awareness of the climate change problem or binding treaty obligations.

The breadth of the domestic action may depend upon the extent to which the member state has a duty to cooperate with its treaty obligations or is a participant in climate change solutions, because of internal political imperatives. The express consequence, in the examination of the bases for the legal and economic structures for climate change, is that solutions are based upon a global view and all legislation or policy is directed, even if it is added to by local laws, to the fulfilment of the nation to the global objective of the reduction of GHGE.

III THE THEORETICAL STRUCTURE OF LEGISLATION BASED ON GLOBAL SOLUTIONS

A legislative scheme or policy framework that arises from the satisfaction of a global commitment, either from global awareness or a treaty obligation, dictates a national solution that reflects or mirrors these sources. The national scheme may not be the exclusive solution but it is the primary end product of this commitment, and any other scheme by a state, region or local government must not conflict with the national power being exercised. It follows that in the case of climate change, schemes are primarily national as opposed to state or local, because they are derived from a national commitment.

The global nature of the subject matter also dictates that solutions will attempt to be all encompassing, weighing all possibilities, and the effect on other countries,

1 *Vienna Convention for Protection of the Ozone Layer*, opened for signature 22 March 1985, 1513 UNTS 323, art 2(2) (entered into force 22 August 1988) ('*Vienna Convention*').

2 *Montreal Protocol on Substances that Deplete the Ozone Layer*, opened for signature 16 September 1987, 1522 UNTS 3 (entered into force 1 January 1989).

3 Richard Elliot Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet* (1998).

or otherwise it would not be in keeping with the gravitas of the perceived problem. This preconfigures that the legislation that eventually emerges, to the extent constitutionally possible, is perceived as meeting a global commitment and thus will override any barriers to its acceptance by other institutions that have the power to legislate.

Historically, and as a matter of international law, all treaty conventions are based upon national, domestic schemes for their implementation and are usually given specific directions in that regard in the treaty. The *United Nations Framework Convention on Climate Change* ('FCCC'), the first international convention on climate change, which entered into force in 1994 and was the underpinning of the *Kyoto Protocol* ('Kyoto'),⁴ provided for each signatory to 'adopt national policies and take corresponding measures'⁵ to mitigate climate change. This notion of 'corresponding measures' requires that there must be domestic mechanisms to implement international commitments; a sentiment found in the provisions leading to the League of Nations.⁶ The use of the term 'measures' carries with it the notion that the action to be taken is thus a measureable step in the implementation of the international obligation rather than just any domestic solution, and 'corresponding' indicates that it is directed specifically to achieving the relevant international goals.⁷

The translation process from an international treaty to domestic laws is at the discretion of the signatories, although a requirement of implementation may be subject to constitutional or customary requirements. In some jurisdictions there are 'self-executing' requirements that give force to a treaty in the absence of legislation.⁸ However it can be concluded that the theoretical structure of legislation based on a global solution is one that is comprehensive in scope as it obtains its objects and purpose from the treaty; it not only reflects the goals of the treaty but, in order to operate on a global basis, must take the form of measures and solutions proposed in that treaty. Domestic legislation following a treaty is thus a derivative instrument that may not be inconsistent or needs to be consistent with other forms of legislation.

This legislative structure is not always complete or comprehensive. When a treaty is to be implemented, it may be carried forward gradually leading to partial solutions over time. In the case of treaties where there are specific model provisions or where the subject matter is clear, as with taxation, the model can be adopted

4 *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, opened for signature 16 March 1998, 2303 UNTS 148 (entered into force 16 February 2005) ('Kyoto').

5 *United Nations Framework Convention on Climate Change*, opened for signature 4 June 1992, 1771 UNTS 107, art 4(2)(a) (entered into force 21 March 1994) ('FCCC').

6 Otfried Nippold, *The Development of International Law After the World War* (Amos S. Hershey trans, first published 1923, 2003 ed) 98 [trans of: *Gestaltung des Völkerrechts nach dem Weltkriege*].

7 Discussed in this context in Won-Mog Choi and Henry S Gao, 'Procedural Issues in the Anti-Dumping Regulations of China: a Critical Review under the WTO Rules' (2006) 5 *Chinese Journal of International Law* 663.

8 Gillian Triggs, *International Law: Contemporary Principles and Practices* (2006) 122–8. The concepts are discussed comprehensively in Carlos Manuel Vazquez, 'The Four Doctrines of Self-Executing Treaties' (1995) 89 *American Journal of International Law* 695.

easily as a whole. In the case of a subject matter as broad as climate change, it is not possible for the legislation to be comprehensive as the solutions proposed are not themselves complete, as will be discussed. This is why the *FCCC* was clear that domestic legislation was necessary but was deliberately vague as to methods of implementation and did not list final or comprehensive solutions.

IV THE DUTY TO COOPERATE

The ‘duty to cooperate’ in international law is the legal basis for the adoption of global solutions by domestic legislation. It may not even be necessary, in the case of climate change, to invoke this principle as the sentiment to find a solution may yield the same effect. However legally, this principle is the source of the legislative imperative and has the effect of driving climate change legislation in a particular form bolstered by the provisions of *Kyoto*.

The obligation to cooperate with other signatories arising from the act of entering into a treaty is derived from the concept in international law of a ‘duty of cooperation’ that is recognised generally in the United Nations Charter, but is expressly stated as a principle of international law in the General Assembly’s 1970 *Declaration of Principles of International Law*.⁹ The principle is also given specific form in the wording of treaties which provides that the signatories shall cooperate in stated ways.

The ‘duty of cooperation’ can be classed more accurately as a power and not a duty because it is coupled with a requirement that the signatory act to the advantage of its citizens, thus making it less than a duty. The degree that domestic legislation approaches fulfilment of that duty can be measured easily when the solutions are clear. For example, in copyright breaches of intellectual property rights specific measures can be analysed for success.¹⁰ However, the degree to which the global solution will be advanced, and the duty discharged, cannot be measured when the solutions are not clear, as with climate change.

There is, of course, no duty of cooperation which requires a country to sign a treaty. A country may decide not to sign and then no duty emerges that is created by the treaty to which they must adhere. In fact, the refusal to sign equates to a specific rejection of cooperation under the treaty, such as refusal to sign the *Treaty on the Non-Proliferation of Nuclear Weapons* or the refusal of the United States to sign *Kyoto*.

The treaty and the corresponding duty to cooperate only extend to measures to achieve the goals of the agreement. There may, however, be key areas which do not fall within the treaty and that may be ignored even though they may

9 *Declaration of Principles of International Law Concerning the Friendly Relations and Cooperation Among States in Accordance with the Charter of the United Nations*, GA Res 2625, 25 UN GAOR, 25th sess, Supp No 28, 123, UN Doc A/8028 (1970).

10 See, eg, *World Intellectual Property Organisation Performances and Phonograms Treaty*, opened for signature 20 December 1996, 36 ILM 76, ch 4 (entered into force 20 May 2002).

provide a more robust solution. *Kyoto*, for example, makes no mention of the use of subsidies for climate change initiatives, or trade and non-trade barriers such as intellectual property laws to more easily distribute GHGE abatement technology. In addition, some aspects of a treaty may be left to other policy initiatives falling into subject matters arising from different treaties, or commitments such as the establishment of a global green technology fund,¹¹ or World Trade Organisation rounds.¹²

It is clear that what emerges from the duty of cooperation in international law is the need for a nation to conceive of a solution that goes beyond domestic interests and that fulfils a global obligation that is derived from the content of the treaty. However, solutions are also measured against those same domestic interests and other commitments and thus a treaty obligation can remain unfulfilled in spite of a duty of cooperation.

V JOINT IMPLEMENTATION

It is possible for a signatory to carry out duties under a treaty by working with other signatories towards a solution. Although, it is doubtful if the international law duty of cooperation extends to entering into arrangements with other signatories to implement solutions jointly. This form of cooperation is mentioned here as it is a basis for one formal aspect of the legal structure for climate change, known as Joint Implementation ('JI'), where signatories work jointly to implement a specific aspect of *Kyoto*. Equally as important, JI has had a profound effect on the rationale for all other solutions.

The concept of JI originates from climate change issues. It is attributed to the *FCCC*¹³ and does not appear to have any earlier precedent. Under the *FCCC*, developed countries were permitted to join together to undertake a project in developing countries if it was cost effective, such that the cost per tonne of saved GHGE in the developing country was less than the cost per tonne of GHGE in the home country.

The rationales for the use of JI accentuate the global nature of the climate change problem and, as will be discussed, also underpin economic theories and domestic instruments. The first rationale underlying this device, which was carried forward in *Kyoto*, is that the global impact of climate change makes it equally valid to abate GHGE in a developing country as in a developed country. Linked to this is the second rationale: developed countries have more economic power to cause abatement, and therefore should take the lead. Concomitantly, from an

11 President George W Bush, 'State of the Union' (Speech delivered at the Chamber of the United States Representatives, United States Capitol, Washington, 28 January 2008).

12 See Ernst-Ulrich Petersmann, *International and European Trade and Environmental Law after the Uruguay Round* (1995).

13 Analysed in Onno Kuick, Paul Peters and Nico Schrijver (eds), *Joint Implementation to Curb Climate Change* (1994).

economic viewpoint, JI projects¹⁴ in developing countries could be the most cost effective method to reduce GHGE. This role of developed countries is, in fact, made explicit in the *FCCC* which requires developed countries to create national policies for GHGE abatement and '[t]hese policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention'.¹⁵

These two rationales for JI have shaped all subsequent debates as to the proper regulatory devices to abate GHGE, by making it clear that domestic legislation should consider the effect on other countries, especially developing nations. In addition, developed countries have pushed ahead with solutions without waiting for domestic legislation in developing countries.

The use of JI as a means for abatement of GHGE was not always clear because of the same rationale of the effect on other countries. The Conference of Parties ('COP'), the organisation created from the *FCCC* to carry out the implementation of the Framework, set out criteria for JI but was concerned with the issue of whether credit was to be given to developed countries undertaking such projects. The hesitation in bestowing credits was that using JI as a method to reduce GHGE in developing countries would foster their dependence on developed countries and might also conflict with their development priorities.¹⁶ There was also considerable debate and concern over 'carbon leakage' where the obligation of the developed country to reduce emissions is shifted to developing countries. Further, the initial JI concept was not concerned with targets to be set for such projects, or the sharing of burdens between developed countries that participated and those that did not.

The first COP in 1995, the Berlin Conference of Parties, calling these projects 'activities implemented jointly', decided, as a consequence, that they should operate only in a pilot phase with no country receiving credit but only experience. Nevertheless, there were a substantial number of activities that tested, and refined, the concept of JI.¹⁷ The impetus to commence JI projects was, prior to *Kyoto* recognising their existence and offering credit for their implementation, only one of good will.

The global nature of climate change issues, coupled with the commitment of developed countries to action arising from the *FCCC*, led to the introduction of specific cooperation agreements among developed countries to implement projects in developing countries. This global abatement strategy, the rationale for JIs, is also the *liet motiv* of possible solutions to GHGE. It underpins the

14 Pier Vellinga et al, (1992) *The Climate Convention: Criteria and Guidelines for Joint Implementation* Policy Note 1992/2 CICERO, Oslo, Norway.

15 *FCCC*, opened for signature 5 August 1992, 1771 UNTS 107, art 4(2) (entered into force 21 March 1994).

16 Discussed in Reinhard Loske and Sebastian Oberthür, 'Joint Implementation under the Climate Change Convention' (1994) 6 *International Environmental Affairs* 45.

17 Set out in Robert Dixon and Irving Minster, 'Introduction to the *FCCC* Activities Implemented Jointly Pilot' in Richard Dixon (ed), *The UN Framework Convention on Climate Change Activities Implemented Jointly (AIJ) Pilot: Experience and Lessons Learned* (1999) 1.

approach to legal and economic structures and the acceptance of an emissions trading scheme.

VI THE EFFECT OF UNCERTAINTY IN CLIMATE CHANGE SCIENCE

There is evidence, as presented by the Stern Review¹⁸ and the Garnaut Review,¹⁹ that global warming results from the existence of GHGE in excess of that tolerated by the atmosphere. It is not important in this article to analyse the science but there are clearly elements of uncertainty. The primary uncertainty is the exact manner in which GHGE emissions affect the climate.²⁰ The doubt arises in respect of the carbon cycle: the creation of emissions, their rise into the upper atmosphere and 'positive feedback' by carbon absorption sinks of oceans and forests. The Stern Review, after a comprehensive analysis of the evidence linking GHGE emissions to climate change, stated:

There are still many unanswered questions about these positive feedbacks between the atmosphere, land and ocean. The combined effect of high climate sensitivity and carbon cycle feedbacks is only beginning to be explored, but first indications are that this could lead to far higher temperature increases than are currently anticipated ... It remains unclear whether warming could initiate a self-perpetuating effect that would lead to a much larger temperature rise or even runaway warming, or if some unknown feedback could reduce the sensitivity substantially. Further research is urgently required to quantify the combined effects of these types of feedbacks.²¹

Critics of the Stern Review indicated that even this is understated and that there is substantial uncertainty in all aspects of the Stern conclusions.²² However, Stern established this link in a manner that made the nexus clear enough to suggest solutions are urgent. In examining the main source of GHGE, Stern turned to the burning of fossil fuels and coal as the single largest contributor (57 per cent) to GHGE.²³ As this is an obvious source of climate change, even though the direct causation is uncertain, the solution he proposed for climate change was focused on abatement of GHGE from large emitters where the GHGE are clear, such as coal-fired power stations or heavy users of diesel. There are other sources that are less obvious, such as changes in land use arising from deforestation or from agriculture by fertiliser use and livestock but the instruments that followed in the Stern analysis concentrated abatement in the more obvious cases. Although not

18 Nicholas Stern, *The Economics of Climate Change: The Stern Review* (2007).

19 Ross Garnaut, *The Garnaut Climate Change Review* (2008).

20 United States Climate Change Science Program, *Draft White Paper: Carbon Cycle: In Support of Chapter 9 of the Strategic Plan for the Climate Change Science Program* (2002) 5.

21 Stern, above n 18, pt I, p 10.

22 See Robert Carter et al, 'The Stern Review: A Dual Critique' (2006) 7(4) *World Economics* 165.

23 Stern, above n 18, 170.

explicit in Stern, it appears that the role of uncertainty was lessened in importance because the main source of GHGE created a singular target for policy initiatives.

Kyoto did not set out any specific techniques to be used to reduce GHGE in developed countries; there were no tax structures suggested or penalties, just an admonition to reduce by domestic measures or to carry out abatement in developing countries. This is unlike other treaties where the measures for domestic implementation are clearer because the problem is specific, such as those relating to the end of a conflict or piracy or the slave trade. *Kyoto* was also vague in its requirements for abatement. It required reduction by developed countries of their overall GHGE (without distinguishing between sources of GHGE) sometime between 2008 and 2012 (according to a percentage set out in the Protocol), in order to achieve a level of emissions across the globe that is 5 per cent below 1990 levels. This is, of course, a gross level of analysis in that it is merely a generalised approach that just requires signatories to reduce *simpliciter*.

In the absence of a known legal structure to abate GHGE, and in the face of the uncertainty of the link between GHGE and global warming but with a predominant single source, Stern suggested that the policy instrument that would drive the legal structure should be that of pricing: measuring carbon emissions (which can be done)²⁴ and then establishing a price per ton so that the benefit of reducing has economic benefit and the price of not reducing becomes a fixed cost.²⁵

VII THE USE OF ECONOMIC INSTRUMENTS

Pollution has been characterised historically as an economic ‘externality’, which in economic terms is an unintended benefit or cost arising as a by-product of an economic activity that does not accrue to the parties involved in the activity. It can be thus classified as a public interest cost or benefit as it does not attach to a private interest. Classical economic theory attempts to ‘internalise’ the externality from a public interest into a private interest issue by making its removal a matter of a private interest decision. The manner in which this could be accomplished in the case of climate change is to give emitters what are called ‘market signals’ by means of a price for GHGE, so they can assess the costs and benefits of pollution and thereby be encouraged to take steps towards abatement.

Market signals, known generically as ‘economic instruments’, are to be distinguished from specific controls that yield penalties for lack of compliance. The penalty and enforcement regime has often been called ‘command and control’ because it requires polluters to comply with measures and standards set by central government. A market signal relieves government of the need for regulation and enforcement and relies primarily upon the incentive of profit to encourage abatement of the externality by providing benefits to private interests.

24 See Department of Environment, Food and Rural Affairs (UK), *Guidelines for the Measurement and Reporting of Emissions by Direct Participants in the UK Emissions Trading Scheme* (2003).

25 See generally Stern, above n 21, pt VI.

The main advantage of such an instrument is that it allows a flexible approach to abatement, rather than a rigid enforcement regime, which provides constant rewards to the private sector.

Economic instruments based on market signals, including an emissions trading scheme, have become the predominant policy devices for abatement of GHGE and the issue is *why* this has occurred in preference to other methods. The answer is not that clear.

The historical antecedent for creating a market signal and pricing an externality is the 'Pigouvian' or 'externality' tax that provides for a tax on pollution. It is said that this did not receive much attention in 1920 when it was first proposed²⁶ and sat dormant as a policy options for decades. The *Organisation for Economic Co-operation and Development* ('OECD') first revived a 'polluter pays' policy option in 1972, which took the form of a Pigouvian tax. This was adopted as a principle for regulating all forms of pollution by the European Community in 1975.²⁷ However, as late as 1985, the so-called *Villach Statement*,²⁸ one of the first statements from an international conference recognising GHGE effects on climate, did not mention a Pigouvian tax or pricing externalities as a means of providing a form of abatement for GHGE. In 1987 the Brundtland Report, 'Our Common Future', hinted at economic levers for sustainability,²⁹ but fell short of prescribing pricing mechanisms. It appears that it was the OECD in 1991 that first suggested the use of economic instruments as a possible policy initiative to deal with the effects of climate change.³⁰

There was never any substantive opposition to the use of economic instruments in relation to pollution, but its acceptance prior to 1991 was infrequent, primarily because it was foreign to the normal methods of command and control. It perhaps achieved its strongest boost as a regulatory device through the US *Clean Air Act* that was amended in 1990 to use an economic instrument for the Acid Rain Program.³¹ This was a 'cap and trade' permit system and is attributed in part³² to the 1989 work of the economist Robert Hahn who had proposed a strong case for the increased use of economic instruments for environmental problems.³³

26 Nahid Aslanbeigui, 'On The Demise of Pigovian Economics' (1990) 56 *Southern Economic Journal*, 616.

27 See, eg, *Council Directive 75/442/EEC of 15 July 1975 on Waste* [1975] OJ L 194/1 39, 40: the European Council invoked the principle in a directive on waste, which provided that 'the costs ... of treating the waste must be defrayed in accordance with the 'polluter pays' principle'.

28 United Nations Environment Programme, World Meteorological Organisation and the International Council for Science, 'Villach Statement' (At the International Conference on the Assessment of the Role of Carbon Dioxide and of Other Greenhouse Gases in Climate Variations and Associated Impacts, Villach, Austria, 9–15 October 1985).

29 Brundtland Commission, *Our Common Future* (1987).

30 See Organisation for Economic Co-operation and Development, *Environmental Policy: How to Apply Economic Instruments* (1991).

31 *Clean Air Act*, 42 USC §§ 7401–7671 (2006).

32 Ted Gayer and John Horowitz, *Market Based Approaches to Environmental Regulation* (2006) 37.

33 Robert Hahn, 'Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders' (1989) 3 *The Journal of Economic Perspectives* 95.

This period in the 1990s, when economic instruments were becoming acceptable as a possible policy option for pollution, coincided with an economic approach to ecological issues that postulated that natural assets could be valued, and the change over time of that value could be measured. This concept,³⁴ known as 'inclusive wealth', proposed that economics should be inclusive in valuing *all* natural assets, including clear air. Accordingly, this theory was an important addition because it allowed a trend to be measured over time and considered as an aspect of economics thus giving an advantage to the use of economic instruments.³⁵

VIII ALTERNATIVE METHODS TO CREATE MARKET SIGNALS

The market signal created by an economic instrument is created by two fundamental methods, though many different forms are possible.³⁶ The first is by setting out the value of a unit of abatement and the second is by creating a market for the trading of units of abatement. Historically, as mentioned, the first is a *price* signal: a Pigouvian tax, a levy, fee, or other tax treatment or subsidy, such as a grant that specifically sets a price for each unit of abatement. The second economic instrument that creates a market for the trading of units is referred to as a *quantity* based instrument, which is referable to the setting of a quantity or level for the externality. Under this system, permits for units of GHGE are issued up to that quantity and trading of the permits between polluters allows those who are under that quantity to obtain a financial benefit by selling permits to those who exceed their allotted quantity and need more permits. It is said to be a 'quantity' based instrument because a fixed number of permits are available (the quantity) representing a maximum of GHGE that are allowable. This is, of course, an emissions trading scheme. There are also so-called 'hybrid' systems, the most well known being the 'McKibbin-Wilcoxon blueprint',³⁷ where a fixed international price for permits is set and the government offers these to GHGE emitters at that price, making the price the equivalent of a tax.

In order to answer the question of whether a price instrument or a quantity instrument was more appropriate for the reduction of GHGE, the Stern Review relied on the economic thesis of Martin Weitzman.³⁸ This is highly significant

34 Attributed to the working paper Kenneth J Arrow, Partha Dasgupta, and Karl-Göran Mäler, 'Evaluating Projects and Assessing Sustainable Development in Imperfect Economies' (Working Paper No 206, Beijer International Institute of Ecological Economies, 2003).

35 For an attempt at such a measure in relation to the Goulburn-Broken Catchment region of Victoria in Australia, see Leonie Pearson et al, 'Incorporating Resilience in the Assessment of Inclusive Wealth: an Example from South East Australia' (Working Paper No 209, Beijer International Institute of Ecological Economies, 2008).

36 Organisation for Economic Cooperation and Development, *Economic Instruments for Environmental Protection* (1989).

37 See Warwick McKibbin and Peter Wilcoxon, *Climate Change Policy After Kyoto: A Blueprint for a Realistic Approach* (2002).

38 See Stern, above n 18, 354.

because the Stern Review, due to its 600 pages of comprehensive analysis, and the weight given to it around the world, was one of the most critical influences on all climate change debates that followed.

In his report, Stern first makes the necessary transition to an economic analysis by classifying GHGE as an externality.³⁹ He then draws on Weitzman, who proposed his thesis in a paper unrelated to climate change,⁴⁰ to ask the question whether it is better to administer GHGE by quotas or targets (a quantity instrument) to achieve a fixed level of GHGE output or whether it is preferable to fix pricing (a price instrument) by way of a fixed cost or tax.

The Weitzman thesis states that the first question to consider in the determination of which economic instrument is applicable is whether a person subject to regulation is to know the exact cost of compliance (in economic terms, the 'marginal cost') or whether they will be allowed to remain uncertain of that cost. When the first situation occurs and the costs are known, either a price or quantity instrument works essentially with the same efficiency, as the person has the same understanding of their marginal cost. However, most significantly for climate change, Weitzman specifically addressed the second situation where there is uncertainty as to cost of compliance. In this situation, he argues when the amount of pollution, and therefore the social benefit to the community of abatement remains more or less the same, it is better to have a price instrument (a tax) because, although the effect on the social cost will remain relatively the same, at least the marginal cost will be certain. Where the social benefits to the community increase more than the marginal cost, then a quantity instrument is important because the social cost of exceeding a given level of pollution is paramount.

Stern applied this theory to climate change where the costs of compliance are uncertain. Stern proposed that, in the short term where there is not a great increase in GHGE, a price instrument (tax) is preferable because the change in the benefits from reducing pollution — the social benefit — are less than the marginal cost of abatement. On the other hand, in the long term, as GHGE continue to accumulate, a quantity instrument (setting a quantity cap and allowing trade in permits) is better because the public interest benefits of abatement increase more than the marginal cost of the abatement as new technologies are made possible. In the end, he suggested a mix of long and short-term goals:

In practical terms, this means that a long-term stabilisation target should be used to establish a quantity ceiling to limit the total stock of carbon over time. Short-term policies (based on tax, trading or in some circumstances regulation) will then need to be consistent with this long-term stabilisation goal. In the short term, the amount of abatement should be driven by a common price signal across countries and sectors, and should not be rigidly fixed.⁴¹

39 Ibid 352.

40 Martin Weitzman, 'Prices v Quantities' (1974) 41 *The Review of Economic Studies* 477.

41 Stern, above n 18, 358.

In a review of the Stern Review,⁴² Weitzman did not challenge the balance of economic instruments suggested but stated that the defect of the Report was that the marginal costs of abatement were too optimistic and the social cost and damage from GHGE were too pessimistic. Others⁴³ have suggested that the Stern Review did not examine the policy versus no policy options and Stern was overly determined to apply either a price signal or a quantity approach.

If Stern had stopped at suggesting a mix of instruments, an emissions trading scheme would be implemented over time but after a tax. However, Stern was driven by the need to examine the instrument to be used according to the top down sentiment discussed in this article, that solutions must be global in nature. He set the means by which this should be accomplished through economic instruments and then set out the concepts that have thereafter driven the climate change implementation debate:

This common price signal could — in principle — be delivered through taxation or tradable quotas. A country can levy taxes without consultation with another, but harmonisation requires agreement. In practice, therefore, it may prove difficult to use taxes to deliver a common price signal in the absence of political commitment to move towards a harmonised carbon tax across different countries. In contrast, to the extent that a tradable quota scheme embraces both different countries, it may be an effective way of delivering a consistent price signal across a wide area — though this, of course, requires agreement on the mechanics of the scheme.⁴⁴

Stern therefore proposed two bases for a quantity instrument. The first is for the purpose of long term stabilisation for which it is a necessary device. The second is that, unlike tax, it has the ability to develop a market signal across different countries, should a single world emissions trading system eventuate. The second reason does not result from the theory of Weitzman, but arises because of the approach that abatement is a global issue and therefore the economic instrument should be designed to mesh with the devices used by other countries in terms of fixing a market signal.

There have been critics of the Stern conclusions on the choice of a quantity instrument arguing that Stern underestimated the degree of impact of climate change and therefore his reasoning on the appropriate instrument is not accurate.⁴⁵ Ignoring the economic debate, what is significant is that the use of carbon pricing in the form of a quantity instrument became thereafter the principle basis for implementation of a climate change solution.

This use of an economic instrument in this form is within the umbrella of accepted economic theory because economists see GHGE as an absence of a

42 Martin Weitzman, 'A Review of the Stern Review on the Economics of Climate Change' (2007) 45(3) *Journal of Economic Literature* 703.

43 Robert Mendelsohn, Thomas Sterner, U Martin Persson and John Weyant, 'Comments on Simon Dietz and Nicholas Stern's Why Economic Analysis Supports Strong Action on Climate Change: A Response to the Stern Review's Critics' (2008) 2(2) *Review of Environmental Economics and Policy* 309.

44 Stern, above n 18, 358.

45 See especially Thomas Sterner and U Martin Persson, 'An Even Sterner Review: Introducing Relative Prices into the Discounting Debate' (2008) 2 *Review of Environmental Economics and Policy* 61.

scarce resource, namely clean air, and they therefore propose surrogate pricing by way of carbon pricing to economise on the use of that resource. This thinking was the origin of the European Union ('EU') Emissions Trading Scheme. It will be discussed in more depth, but was driven by the economists' desire to fix a price since the early 1990s.⁴⁶

Ultimately, Stern did not favour a permit system over a tax because of the Weitzman theory, but because of the difficulty of using a tax as a price signal internationally. This is because, he stated, a tax would have different impacts on developing and developed countries and the rates would have to be different, a consequence of the rationale underlying JIs. If a country does not participate in the tax, there would be carbon leakage from developed countries to that country as companies offset liabilities. In addition, the tax would have a different impact depending on the existing tax structure in each country where its application in conjunction with other taxes could be crippling.

A cap or quota, he implies, reflects a world emissions quota. If a country carries out abatement under the quota, it could be said to own the difference between the abatement amount and the quota. This leap of giving a form of ownership to the difference between the quota and the actual raises the inference that the ownership gives the country the right to trade the difference to a country that needs that difference to meet its quota. The theory, although not expressed in Stern, is that this would equalise abatement costs as a country either abates or buys a quota allowance.

Stern was perhaps forced to this analysis because he was using economic theory which must take into account the impact of GHGE on the entire world because economics as a science is based on the need to promote the traditional elements of 'economic efficiency' and 'distributive justice'. The economic efficiency component, described as 'Kaldor-Hicks efficiency', postulates the possibility that those who benefit most should compensate those who lose. Although, as with any classic theory Kaldor-Hicks is criticised, it stands as the basis for any cost-benefit analysis of a policy instrument.⁴⁷ As efficiency does not ensure equity, 'distributive justice' comes into play as it implies that there be an equal sharing of adaptation to climate change across all those who participate in the process, ideally the entire world.

These notions of distributive justice and economic efficiency match the policy objectives of the *FCCC* as to developed countries taking a lead and overall there should be the lowest cost abatement strategies. Although the economic theory and the *FCCC* objectives are not the same, they dovetail to create the moral compass that is at the heart of *Kyoto* to provide a burden that falls equally around the globe. The effect is that every analysis of the appropriate economic instrument also has to take into account the global nature of the problem, even

46 See Denny Ellerman and Barbara Buchner, 'The European Union Emissions Trading Scheme: Origins, Allocation and Early Results' (2007) 1 *Review of Environmental Economics and Policy* 66.

47 See a comment to this effect in Nick Hanley and Dugald Tinch, 'Cost Benefit Analysis and Climate Change' in Anthony D Owen and Nick Hanley (eds), *The Economics of Climate Change* (2006) 147, 149.

though the instrument will only be working domestically as in the case of a possible Australian emissions trading scheme.

IX GARNAUT AND THE GREEN PAPER

In *Garnaut Climate Change Review Draft Report* of July 2008, the Weitzman theory is accepted as offering the most optimum solution where there are uncertain abatement costs.⁴⁸ However, the use of a price instrument is discounted based on the inability to stabilise a price across countries: the global efficiency issue:

While the introduction of a tax-based mitigation system would take the world significantly forward, the Review has come to the view that only an international agreement that explicitly distributes the abatement burden across countries by allocating internationally tradable emissions entitlements has any chance of achieving the depth, speed and breadth of action that is now required in all major emitters, including developing countries.⁴⁹

The Stern Review was more concerned with the actual economic theory measuring the effect of costs and benefits over time and allowed for a mix of instruments theoretically:

In practical terms, this means that a long-term stabilisation target should be used to establish a quantity ceiling to limit the total stock of carbon over time. Short-term policies (based on tax, trading or in some circumstances regulation) will then need to be consistent with this long-term stabilisation goal.⁵⁰

It appears that Garnaut discounted a price control solely because of economic efficiency on a world scale; it did not address whether it would be an acceptable instrument domestically.

Carbon tax systems are in use in some jurisdictions as an adjunct or principal means of GHGE abatement by setting a price signal. The price signal proposed by a carbon tax can apply to retail consumption. For instance, the Swedish Carbon Tax which was introduced in 1991 had the effect of reducing other energy taxes.⁵¹ The important concept is that a carbon tax is a domestic response to GHGE, but when analysed globally it has the effect of carbon leakage and unfairness in equitable effect.

When Garnaut reasoned away the carbon tax on the global deficiency of the instrument, he introduced a quantity control as the alternative to be preferred for its global qualities. It has, he suggested, several qualities in that respect: there

48 See Ross Garnaut, *Garnaut Climate Change Review Draft Report* (2008), 294.

49 Ibid 196.

50 Stern, above n 18, 315.

51 See Swedish Environmental Protection Agency, *Environmental Taxes in Sweden - Economic Instruments of Environmental Policy*, Report No 4745 (1997).

was an established ‘international architecture and national practice’⁵² in respect of emissions trading and it would yield economic efficiency because ‘[c]rucially for the goal of international cooperation, targets can be differentiated between countries without sacrificing economic efficiency’.⁵³ In addition, it was stated that emissions caps communicate abatement requirements cogently and are more flexible as needs change over years.

The *Carbon Pollution Reduction Scheme Green Paper*, published by the Department of Climate Change in July 2008, did not carry out any economic analysis nor did it refer to Weitzman or the Garnaut economic analysis. It stated:

An alternative market-based mechanism would be a carbon tax. While the incentives for firms to reduce their emissions would be similar under either mechanism, an emissions trading scheme has the advantage of delivering a defined environmental outcome and can be linked to other scheme’s giving firms access to least cost abatement opportunities internationally. For these reasons, the Government believes that an emissions trading scheme is preferable to a carbon tax.⁵⁴

The difficulty faced by these reviews is that the economic reasoning is based entirely upon a mathematical equation that measures marginal benefit to the community against marginal cost to the polluter. As such, it has a mathematical optimum so that the answer does not allow many variations. In one significant analysis of price versus quantity it was determined that price controls in fact have a distinct advantage over a cap and trade system: ‘[t]he results indicate that an optimal tax policy generates gains which are five times higher than the optimal permit policy — a \$337 billion dollar gain versus \$69 billion at the global level’.⁵⁵ The question remains as to what is the lure of cap and trade and why is it the basis upon which GHGE abatement is focused?

X THE BENEFIT OF A QUANTITY INSTRUMENT

A cap and trade regime is attractive because command and control abatement methods of lowering GHGE involve mandatory compliance costs with no benefits to those abating, other than the social benefit of GHGE reductions to the community. Alternative energy technologies for abatement require expenditure for research and development and there is no accepted sentiment that consumers should bear the expenditure of funds by increased pricing to benefit long-term GHGE reductions. There is also a strong belief that, from a cost perspective, there is no inherent benefit for an industry to cut GHGE; abatement is a cost barrier to the establishment of an industry. It is thus logical to think that by

52 Garnaut, above n 19, 196.

53 Ibid 197.

54 Department of Climate Change, *Carbon Pollution Reduction Scheme Green Paper* (2008) 77.

55 William Pizer, ‘Prices v Quantities Revisited: The Case for Climate Change’ (Discussion Paper No 98-02, Resources for the Future, 1997) ii.

providing an incentive in terms of a tradeable permit the cost of the abatement may be met as well as a profit made by the price obtained from trading a permit. In this way, economic theory in the form of a quantity instrument has a logical basis that can be justified in terms of its effectiveness, more than command and control regulation.

The inevitable consequence is that economic theory, and thus a quantity instrument, form part of all abatement debates because it appears to provide the only incentive for participants to reduce emissions. When it is accepted as an appropriate policy instrument, it brings with it the total package of a quantity system: a full cap and trade scheme with a market mechanism that can be justified on an analysis of costs and benefits according to economic theory.

However, there are substantive issues with a domestic cap and trade system according to pure economic theory. The first issue is that the natural lure of economic theory is that everyone will benefit in the long run, which is the basis for Kaldor-Hicks efficiency. However, the beneficiaries in classic economic theory are those who are living and enjoying the benefit now; with climate change, the beneficiaries are in the future. As a result, some form of 'discounting' must take place to compare present and future generations because economic theory is not concerned with future generations.⁵⁶ The Stern review suggested a negligible rate for discounting,⁵⁷ which has been criticised.⁵⁸

The 'time discounting' problem is a major issue in the framing of economic instruments because it must take into account how an equitable distribution of costs should be applied across generations. It is an issue that cannot be ignored because economic efficiency and equitable distribution are at the heart of economic reasoning that is the basis for these instruments. In the seminal paper by Dr William Cline for the Copenhagen Consensus in 2004, a gathering of well known economists, he stated:

Perhaps the single most important and controversial conceptual issue in analyzing global warming policy is how to discount future costs and benefits to obtain comparable present values for policy judgments.⁵⁹

He indicated that bringing the rate for discounting to a negligible figure as Stern had done trivialises the effects on later generations. It is here that the economic theory behind the choice of instruments is lacking because the issue of intergenerational equity is an ethical one, and not just a mathematical or technical issue. Cline in an earlier paper indicated that three centuries was the period over which the climate change issue required adjustment.⁶⁰

56 See the classic discussion in Amartya Sen, 'Approaches to the Discount Rate in Cost Benefit Analysis' in Robert Lind (ed) *Discounting for Time and Risk in Energy Policy* (1982) 325.

57 Stern, above n 18, 35.

58 See Wilfred Beckerman and Cameron Hepburn, 'Ethics of the Discount Rate in the Stern Review on the Economics of Climate Change' (2007) 8(1) *World Economics* 187.

59 William Cline, 'Meeting the Challenge for Global Warming Challenge Paper' (Paper prepared for the Copenhagen Consensus, Copenhagen, March 2004) 4.

60 See William Cline, 'Scientific Basis for the Greenhouse Effect' (1991) 100 *The Economic Journal* 904.

Economics also has difficulty in analysing distributive justice between countries, and the true effect of a quantity control in that regard. In carrying out this analysis, a ‘representative agent’, a typical individual in a particular society, is used for comparison. The Stern Review again discounted this effect, which one commentator has argued is a ‘fairly indifferent attitude toward equity over the distribution of well-being among people, *qua* people’.⁶¹

The case for a quantity instrument is, in the end, not entirely based on an ethical component within economics where a technical approach to the requisite formula is supposed to yield proper efficiency and equitable distribution. The case for a cap and trade system exists because of the underlying concept that costs can be offset by a price structure of permits and trading in the short term. The economic theory is at the heart of this structure; however, its rationale is not totally economic but is more practical in offering incentives to abate when the issues of cause and effect remain uncertain.

XI SUPPORT FOR A QUANTITY INSTRUMENT IN KYOTO

It is useful to examine the implementation models in the *Kyoto Protocol* because they are economic instruments that further justify the use of a quantity instrument in the abatement of GHGE.

The initial *Kyoto Protocol* of 11 December 1997, which was the second COP of the *FCCC*, established commitments on the part of developed countries, known as Annex 1 countries (and sometimes referred to as North countries), to collectively reduce GHGE to 5 per cent below 1990 levels from January 2008 — 2012. This implies nations placing a cap on emissions that will reduce GHGE emissions to the required level. As this was seen as a global agreement underscored by the needs of developing countries to grow and developed countries to protect their economies (and the fact that reduction anywhere was valid) the concept of ‘flexibility mechanisms’ was introduced whereby Annex 1 countries could reach their commitments to GHGE abatement by obtaining carbon credits from abatement in developing countries.

The manner in which this was to be carried out or the actual mechanisms to be employed were not agreed upon or fully understood at this stage. The Protocol states: ‘The Conference of Parties shall define the relevant principles, modalities, rules and guidelines’.⁶² The rules were first agreed at the second meeting of the sixth COP in Bonn, Germany in July 2001,⁶³ and translated into legal texts to be

61 Sir Partha Dasgupta, ‘Comments on the Stern Review’s Economics of Climate Change’ (Paper presented at a Seminar on the Stern Review’s Economics of Climate Change, London, 8 November 2006) 4.

62 *Kyoto*, opened for signature 16 March 1998, 2303 UNTS 148, art 17 (entered into force 16 February 2005).

63 The details of these meetings are set out in Hermann Ott, ‘The Bonn Agreement to the Kyoto Protocol: Paving the Way for Ratification’ (2001) 4 *International Environmental Agreements: Politics, Law and Economics* 469.

adopted by the COP-7 at Marrakech, Morocco ('Marrakech Accord') in October–November 2001.

There had been much analysis carried out on the financial mechanisms that might be employed to implement *Kyoto* prior to the Marrakech meeting and the preponderance of it that was produced was in relation to the use of economic instruments as a means of abatement. Although the degree of influence cannot be determined, the Columbia Earth Institute, one of the Non-Governmental Organisations at the COP-7, published a paper in 1998⁶⁴ which appears to correspond most with the final modalities that emerged.

The *Kyoto Protocol* flexibility mechanisms provide that 'emission reduction units' can be employed to reduce the Annex 1 countries' target and that there can be trading in these units. The phrase 'emission reduction units' is not specifically defined in *Kyoto* but arises in the operation of the flexibility mechanisms that requires some explanation of the interrelated articles of the *Protocol*.

Article 3 provides⁶⁵ that 'emission reduction units', colloquially referred to as an 'ERUs', arising from the operation of arts 6 and 17 can be used as a deduction in calculation of the assigned amount of reduction. Article 6 provides that one party can obtain from another an ERU arising out of a project both agree upon. This is 'Joint Implementation', a concept already discussed and made explicit in the *FCCC*. Article 17 provides for an emission trading system but without detail, leaving the details to the Conference of Parties, which created these details in Marrakech. However, even though art 17 does not define emission reduction units in relation to an emissions trading scheme, art 3, which defines the units, mentions art 17, giving that term a context in emissions trading.

Article 2(12) refers to 'certified reduction units' (a 'CER') arising from art 12. Article 12 establishes the Clean Development Mechanism ('CDM') whereby an Annex 1 country can use a project it creates in a non-Annex 1 country to establish a CER. Thus, these terms: 'emission reduction units' and 'certified reduction units' arise from a combination of the explanation of the flexibility mechanisms, and the effect of JI and CDMs. *Kyoto* does not provide for a restriction on the use of these mechanisms by Annex 1 countries. However, the reasoning in the Marrakech Accord was that countries should use domestic action for GHGE abatement and this should be a significant effort in addition to the use of the mechanisms, meaning that they were not intended as the sole means of effecting abatement.

Kyoto does not define the content of an individual unit but it does define the 'assigned amount' for each country by using the concept of units so that each unit is equal to one tonne of carbon dioxide equivalent, thereby giving units the formal name of 'assigned amount units' ('AAUs'). The Marrakech Accord, in the Guidelines for the implementation of art 6, provides a formal definition of an ERU

64 Columbia Earth Institute, *Principles, Modalities, Rules and Guidelines for an International Trading Regime* (1998).

65 *Kyoto*, opened for signature 16 March 1998, 2303 UNTS 148, art 3(10)–(11)(entered into force 16 February 2005).

and a CER as both representing one metric tonne of carbon dioxide equivalent.⁶⁶ The expression of emission reductions units as being of a quantifiable amount, as well as the ability to use these reductions to reduce the assigned amount and to transfer them directly or through an emissions trading scheme, creates these reductions as an identifiable interest under international law.

An emissions trading scheme does not arise directly from the Protocol, but rather from two related systems. The first is the imprimatur for trading of ERUs and CERs, and the second is the inevitable market that develops outside these mechanisms arising from a quantity control such as cap and trade where trading in ERUs and CERs occurs. As will be discussed, the European Union developed an Emissions Trading Scheme in 2005, issuing tradeable allowances to those permitted to participate. The cap was thus defined by the assignment of the totality of tradeable allowances. In 2004, the EU adopted a 'Linking Directive' recognising CERs and ERUs as equivalent to EU allowances and made them interchangeable, or as the term is used, 'fungible'⁶⁷ providing an active market for the trade of these units.

Kyoto mechanisms are not, in themselves, pricing or quantity controls, but rather are ways in which the parties can meet their commitments. *Kyoto* does not suggest a tax, a pricing mechanism, nor does it suggest a cap, a quantity mechanism. It also does not set out the basis for an emissions trading scheme but suggests, by its creation of CERs and ERUs, that these are to be traded between parties leaving it to the markets to recognise them as commercial entitlements.

Kyoto and Marrakech left the signatories to take domestic action in order to reduce the effect of GHGE, and imposed restrictions on the degree to which reductions from the flexibility mechanisms can be banked for later use. The Linking Directive of the EU made the *Kyoto* mechanisms part of a cap and trade system and made the connection indelible in terms of the incentive to use a quantity instrument.

Although a quantity instrument is not strictly derived from economic theory or Weitzman's suggestions as to the appropriate policy instrument, it is an acceptable form of control recognised indirectly in *Kyoto* in the form of a flexibility mechanism and given impetus by its recognition in domestic emissions trading schemes. It appears that once these economic instruments are accepted, the theory behind them, or the choice of the most efficacious instrument, is no longer an issue to be debated. In addition, the *FCCC* requirement for reduction of cost and the ability to have abatement occur in any location, made the economic approach and quantity instruments unassailable.

66 Conference of Parties 7, *Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001, Part Two: Action Taken by the Conference of the Parties*, FCCC/CP/2001/13/Add.2 (2001) Annex A, 8.

67 See *Council Directive 2004/101/EC Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Amending Directive 2003/87/EC* [2004] OJ L 338.

XII THE EU AND EMISSIONS TRADING

It is *Kyoto's* establishment of the concept of world emissions trading that was the precursor to the EU Emissions Trading Scheme, even though *Kyoto* was aimed at the trading of CER and ERUs and not at setting up domestic systems. The purpose of art 17 of *Kyoto* was said to be that countries 'may participate in emissions trading for the purposes of fulfilling their commitments under Article 3'. The work leading up to the Marrakech Accord did not assume that this article would create systems of domestic trading, but instead was only a basis for trading CERs and ERUs.⁶⁸

Article 17 also stated:

Any such trading shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article.

Nothing in this article suggested a domestic emissions trading scheme ('ETS'). In fact, unlike the JI and CDM articles, no mention is made of participation of entities in an ETS. The existence of the EU ETS can be seen to have probably two origins, one of which is drawn from *Kyoto*. The first is a Green Paper by the European Commission in 2000 which, citing the success of the Montreal Protocol, recognised an ETS as a successful market mechanism for reducing the cost of GHGE abatement.⁶⁹ In that paper, the justification is not that of economic theory proposing an alternative to command and control mechanisms, but rather that the EU burden of compliance under *Kyoto* would be lessened by an ETS. The second is said to be that the EU had opposed an ETS proposed by the United States in early *Kyoto* negotiations, but the opposition faded generally when the US refused to ratify *Kyoto*.⁷⁰ As well, early experiments by the UK, Denmark and the Netherlands made it a concept that was understood by the EU.

Thus the justification for the EU ETS was not based upon the need to shift to economic theory from command and control due to an analysis of marginal costs and benefits, and therefore, as a consequence, establishing a preference for a quantity control over a pricing control. Instead, it was derived from studies that indicated that it would, by allowing industry to take part, reduce the cost of abatement.

It could be said that the economic rationalisation for the EU ETS is not the theory of Weitzman, nor the issues of economic efficiency or distributive justice, but a supposition that there will be cheaper compliance costs for GHGE abatement. The emphasis shifts away from economic theory because of the success of the ETS by creation of a price and a market for trading. The EU ETS then serves

68 See Conference of Parties 7, *Implementation of the Buenos Aires Plan of Action: Adoption of the Decisions Giving Effect to the Bonn Agreements*, FCCC/CP/2001/L.24/Add.3 (2001).

69 Commission of the European Communities, *Green Paper on Greenhouse Gas Emission Trading in the European Union* (2000). Previously mentioned by the Commission as a possibility in Commission of the European Communities, *Climate Change – Towards an EU Post-Kyoto Strategy* (1998).

70 Ellerman and Buchner, above n 46, 67.

as a recognised model, as Garnaut noted, even though the EU accounts for only about a fifth of GHGE emissions, and the ETS has been described as an act of faith.⁷¹

XIII POLICY INTERACTION

An ETS is only one policy initiative drawing its form, but not necessarily its theory, from quantity based economic instruments. A carbon tax is another form of instrument arising from price based economic instruments. It is difficult to measure which will be more effective in the future. Where outcomes from a policy instrument are clear, such as the use of an infrastructure levy on planning approval, it is possible to gauge its effectiveness and to assess alternatives. When outcomes are not known, as in speculation as to the ultimate effect of an Australian ETS on GHGE abatement, it is more likely that no one instrument will be sufficient or obvious.

Mixing policy instruments is not straightforward. A carbon tax operating at the same time as an ETS means that the reduction units are priced differently, once for the tax and once for the cap. This has the effect of distorting the abatement objectives for each type of instrument and leads to the preference of one form over another. Carbon taxes do raise revenue and therefore are not likely to be abandoned in the long run, even if the only form of world economic efficiency is said to come from an ETS. The use of the ETS also relates to the price of carbon. If the price of carbon for CDM and JI is reduced because of various factors, such as the crediting of carbon sequestration sinks under *Kyoto* or Russian 'hot air' arising from pre-existing GHGE cuts because of industry dormancy during the fall of the Communist Regime, there may be an incentive to rely more heavily on an ETS that provides a dynamic price to set the true market signal.

Using a mix of instruments without particular precision is consistent with the *Kyoto* concept of 'supplementarity'. In 1995, the first COP proposed that activities under the *FCCC* were to be only supplemental to domestic action for GHGE reduction. The EU pushed for a cap on the use of *Kyoto* flexibility mechanisms to meet assigned targets,⁷² but later reversed this position while accepting that domestic policies would, in any event, be the significant element in GHGE abatement. This was later made conclusive in the wording of the Marrakech Accord that reflected that domestic policies would be a substantial element.

The reason that there is no certainty as to the choice of economic instruments, or the appropriate mix, is because it is not possible to attach a specific value to the benefit of GHGE abatement, and therefore assess its effectiveness in actual terms. The 'Nordhaus Optimal Emissions Model', often cited as a main model

71 Frank Convery and Luke Redmond, 'Market and Price Developments in the European Union Emissions Trading Scheme' (2007) 1 *Review of Environmental Economics and Policy* 88, 110.

72 A full analysis of the 'supplementarity' issue and its resolution is contained in Edwin Woerdman, *The Institutional Economics of Market-Based Climate Policy* (2004) ch 8.

for analysis of damage caused by GHGE, uses a steady rate of growth of GHGE to analyse the likely damage in the future, which is the prelude for the costing of benefits of reduction scenarios. As the rate of growth of GHGE is not necessarily steady, a linear damage curve representing the consequences of climate change is not conclusive and the benefits of abatement cannot be assessed accurately. Additionally, the model does not take into account variables such as the decreasing costs of abatement technology that could yield corresponding benefits.⁷³ The main conclusion of Nordhaus,⁷⁴ based on a linear damage curve, was that the advantages of economic growth would, in the short term, outweigh the benefits of abatement and, at least theoretically, little need be done about GHGE abatement in the short term and that controls should be introduced gradually, commencing in ensuing decades. He commented on the resulting policy instruments:

The surprising result of these figures is that the difference between a policy of no controls and the optimal policy is relatively small through the next century.

There is therefore no correct mix of policy instruments, no balance to be had, and no method to adjust the relative weight of policy choices. Multiple instruments, assuming they will be effective, have advantages in certain instances and not in others. Accordingly, there is no legal structure that is capable of standing as the definable direction for climate change. The consequence is that the legal structures flow from whatever policy instrument arises to accommodate market driven directions as contained in cap and trade regimes and an ETS.

XIV LEGAL STRUCTURES OVER TIME

This lack of precision as to the appropriate regulatory response to climate change is a function of the absence of a tradition for dealing with carbon issues as there are no common law or civil law models, no consensus on agreed regulatory devices, and no parallel legal structures or institutions. The development of the legal structures relating to climate change is therefore embryonic. Presently, the structure is most biased towards an ETS which appears as the prime lever in abatement of GHGE. The economic instruments appear as a product of economic theory applied to an uncertain subject matter and also the recognition of these instruments in *Kyoto*. As with many legal structures, the underlying reasoning, such as the analysis of complex economic theories, will be lost and the direction thereafter solidified by a consensus on a workable policy and ensuing legislative instruments.

As stated, the difficulty with defining the legal structures appropriate for a top down approach to climate change is that the subject matter has no legal antecedent,

73 An excellent analysis is found in William Cline, *The Economics of Global Warming* (1992) ch 7, Annex 7A. This model, referred to as DICE, was the basis for the Stern Review's conclusions.

74 William Nordhaus, 'Rolling the "DICE": An Optimal Transition Path for Controlling Greenhouse Gases' (1993) 15 *Resource and Energy Economics* 27.

other than the 'polluter pays' concept of a Pigouvian tax, a concept arising from welfare economics in the 1920s. Structures cannot rely on any common law or civil law precedent, other than standard command and control methods, because the regulatory subject matter is uncertain.

A comparison is the development of bankruptcy laws in Russia.⁷⁵ In 1992, when the state stopped funding industries, many firms were in financial crises. The previous system had made no room for bankruptcy laws as they were unnecessary. In 1997, an amalgam of United States and United Kingdom laws were put into place to allow for liquidation or reorganisation with a debtor in possession. Bankruptcy is an area charged with political issues and economic efficiency, yet the models are hundreds of years old and are limited in the manner in which they vary. However, although they have various origins, they still evolved over time according to trends and views of capitalist debt.⁷⁶

The legal structures for climate change will vary over jurisdictions in the sense that different nations will address the problem with a different mix of instruments. This is especially true of developed and developing countries. The structures are also bound to change depending on the opting in or out of different countries from *Kyoto*, agreement as to binding targets in the future and the timetable for GHGE abatement, the integration of ETS across countries, and the manner in which developing countries will be compensated for the loss of production.

The legal structures will also vary over time as the development of alternative technology will change the cost of reduction, perhaps obviating the need for the economic instruments based as they are on marginal costs. As well, the pressure to reduce global warming as the details of the carbon cycle reveal themselves may call for a strong return to command and control methods to stop the runaway problem. For the moment an ETS is the preferred instrument but will not necessarily remain as the primary instrument over time.

75 Discussed in a wider context in Erik Berglöf, Howard Rosenthal and Ernst-Ludwig von Thadden, 'The Formation of Legal Institutions for Bankruptcy: A Comparative Study of the Legislative History' (Background Paper for the *World Development Report*, The World Bank) (2001).

76 See Jerome Sgard, 'Do Legal Origins Matter? The Case of Bankruptcy Laws in Europe 1808–1914' (2006) 10 *European Review of Economic History* 389.

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