

Ciorba, Umberto; Lanza, Alessandro; Pauli, Francesco

**Working Paper**

## Kyoto Protocol and emission trading: Does the US make a difference?

Nota di Lavoro, No. 90.2001

**Provided in Cooperation with:**

Fondazione Eni Enrico Mattei (FEEM)

*Suggested Citation:* Ciorba, Umberto; Lanza, Alessandro; Pauli, Francesco (2001) : Kyoto Protocol and emission trading: Does the US make a difference?, Nota di Lavoro, No. 90.2001, Fondazione Eni Enrico Mattei (FEEM), Milano

This Version is available at:

<https://hdl.handle.net/10419/155253>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



Fondazione Eni Enrico Mattei

**Kyoto Protocol and  
Emission Trading:  
Does the US make a difference?**  
Umberto Ciorba\*, Alessandro Lanza\*\*  
and Francesco Pauli\*  
NOTA DI LAVORO 90.2001

**DECEMBER 2001**

CLIM – Climate Change Modelling and Policy

\*ENEA

\*\*Eni, S.p.A.

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:  
[http://www.feem.it/web/attiv/\\_attiv.html](http://www.feem.it/web/attiv/_attiv.html)

Social Science Research Network Electronic Paper Collection:  
<http://papers.ssrn.com/abstract=XXXXXX>

Fondazione Eni Enrico Mattei  
Corso Magenta, 63, 20123 Milano, tel. +39/02/52036934 – fax +39/02/52036946  
E-mail: [letter@feem.it](mailto:letter@feem.it)  
C.F. 97080600154



Fondazione Eni Enrico Mattei

**Kyoto Protocol and  
Emission Trading:  
Does the US make a difference?**  
Umberto Ciorba\*, Alessandro Lanza\*\*  
and Francesco Pauli\*  
NOTA DI LAVORO 90.2001

**DECEMBER 2001**

CLIM – Climate Change Modelling and Policy

\*ENEA

\*\*Eni, S.p.A.

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:  
[http://www.feem.it/web/attiv/\\_attiv.html](http://www.feem.it/web/attiv/_attiv.html)

Social Science Research Network Electronic Paper Collection:  
<http://papers.ssrn.com/abstract=XXXXXX>

Fondazione Eni Enrico Mattei  
Corso Magenta, 63, 20123 Milano, tel. +39/02/52036934 – fax +39/02/52036946  
E-mail: [letter@feem.it](mailto:letter@feem.it)  
C.F. 97080600154

## SUMMARY

This paper presents an estimate of the costs of reducing CO<sub>2</sub> emissions as agreed in Kyoto by Annex 1 countries. Unlike most of the existing literature, this paper uses an *Almost Ideal Demand System* model for energy products to estimate the role of each country within the Annex 1 market. A major result is the provision of marginal (and total) abatement costs for each. The recent position of the US is also discussed, showing the cost of some alternative outcomes.

**Keywords:** Environmental policy, Kyoto protocol, international agreements, CO<sub>2</sub> emission, emission trading, marginal abatement cost

**JEL:** C13, C21, C53, Q38, Q41, Q48

## CONTENTS

1. Introduction	2
2. Tradable permits: a general framework and survey of existing literature	3
2.1 Estimating demand functions	3
2.2 Obtaining countries MAC curves	4
3. Emission trading and abatement costs	5
3.1 EU Emission trading market	6
3.2 Annex 1	6
3.3 Annex 1 trade without US	7
4. Comparison with the literature: the role of forecasts	7
5. Conclusions	8
Appendix: price and quantities of the carbon market	10
References	12

## 1. Introduction

Since its introduction, international emission trading has been the subject of extensive debate and the outcome of the COP 6 meeting in Le Hague, as well as the new US position, have added more uncertainty to the whole process. One of the major issues in the climate change debate is the GDP cost dimension related to the agreed levels of emission reduction as well as the possibility of reducing such costs through emission trading. Following a growing range of economic literature, this paper addresses this issue from a particular point of view.

Annex 1 countries signed the Kyoto Protocol in 1997, agreeing to reach a fixed level of greenhouse gas emissions by the period 2008-2012 (Table 1 in Appendix). According to the Protocol, most countries accepted a substantial emission reduction, some an emission stabilisation. A few countries were allowed to increase their emissions up to an agreed quantity.

Emissions reductions clearly involve costs. For some countries reducing emissions requires either the implementation of appropriate technological changes in energy consumption or the reduction of energy consumption itself. In any case, reducing emissions involves a social and economic price. In order to reduce the total cost, the Kyoto Protocol allows for the use of flexibility mechanisms, whereby countries can mitigate their compliance costs.

This paper focuses on emission trading and different scenarios are presented that correspond to participants in the market as well as the domestic no trade solution. For each scenario the market price as well as total abatement costs for each country is indicated. While the Kyoto Protocol considers six different greenhouse gases this paper is limited to the most relevant, i.e. CO<sub>2</sub> (Carbon dioxide). It is worth pointing out that not all the countries that signed the Kyoto Protocol are considered in this paper, principally due to a lack of data. However, less than 3% of Annex 1 emissions is not included in this study.

Current literature focuses on the economic implications for large aggregations of countries. The European Union, in particular, is considered as a single area, even though structural differences persist within the region. However, it is worth underlining that aggregations of countries are largely driven by different modelling approaches. For example Computable General Equilibrium Models, that require a large quantity of information, generally do not adopt a country by country approach. This paper is divided into four sections.

Section 2 surveys the current literature, pointing out the importance of the definition of a suitable marginal abatement cost function.

Section 3 describes the econometric approach adopted, while Section 4 reports all relevant results.

Conclusions drawn from the approach adopted are outlined in Section 5.

## 2. Tradable permits: a general framework and survey of existing literature

The Kyoto cost for a single country can be perceived as the difference between two different scenarios. The first scenario can be labelled Business as Usual (BAU), representing a zero-cost situation. On the other hand, an Alternative Scenario (AS) is required in order to set lower emissions according to the Kyoto profile. In this context, total abatement means the difference between BAU emissions and Kyoto requirement emissions by the year 2010, central to the period considered in the Protocol, and used in this paper as a reference year.

The cost of emissions reduction is described by the marginal abatement cost (MAC). Using MAC curves for several countries, demand and supply of emission permits can be calculated. In principle, in order to minimise costs, each country's reduction will be such that the MAC corresponding to that reduction will be equal to the price of the permits. If the obtained reduction is higher than the requirement, the country will sell permits, contributing to the supply in the permits market. On the other hand, if the reduction is lower than that required, the country will contribute to the demand for permits. A market-clearing mechanism determines the market price of emission permits.

In this paper, MAC curves are calculated on the basis of country-specific demand functions for fuels and thus implicitly for carbon. A demand function for each fuel (and country) is estimated following an AIDS (Almost Ideal Demand System) (Deaton and Muellbauer (1980)) specification. A MAC for each fuel and eventually, by aggregation, a MAC curve for each country is also obtained. This approach is similar to Bader (2000) and Ciorba, Lanza, Pauli (2001).

However, an AIDS model explains more rigorously the behaviour of economic agents: demands are derived from the PIGLOG functional form that have the desirable properties of the micro demand functions and can be thought of as deriving from the behaviour of a single representative consumer.

### 2.1 Estimating demand functions

The final expression of a generic AIDS is:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln \left( \frac{x}{p} \right) + \varepsilon_i$$

where  $\alpha_i$ ,  $\gamma_{i,j}$  and  $\beta_i$  are parameters,  $\varepsilon_i$  is a disturbance term,  $p_i$  is the price of good  $j$ ,  $x$  the total expenditure and  $P^*$  is a price index. If we approximate  $P^*$  with Stone's price index we obtain a model that is called *Linear approximate AIDS* (LA/AIDS)<sup>1</sup>.

The model consists of a system of simple demand functions in which the expenditure rates are functions of the logarithms of prices and the logarithm of total expenditure. The AIDS model has been adopted to build a model of energy demand for the countries in Table 1. The demand system is a preliminary step towards the MAC curve for each country.

In this paper the energy system has been divided into four sectors (Households, Transportation, Electricity generation and Industry). In each sector a single representative consumer is considered. The whole model can be derived as:

$$\begin{cases} w_1 = \ln q_1 = \alpha_1 + \gamma_{11} \ln p_1 + \dots + \gamma_{1,n} \ln p_n + \beta_1 \ln x \\ \vdots \\ w_{n-1} = \ln q_{n-1} = \alpha_{n-1} + \gamma_{n-1,1} \ln p_1 + \dots + \gamma_{n-1,n} \ln p_n + \beta_{n-1} \ln x \\ q_n = 1 - \sum_{i=1}^{n-1} q_i \end{cases} \quad (1)$$

where  $X/P^*$  indicates the expenditure in real terms.

## 2.2 Obtaining countries MAC curves

Estimated models are used to evaluate MAC curves for each fuel; curves are then added up to obtain the MAC curve for the whole country.

First, the system (1) is used to compute the variation in carbon emission due to an increase in carbon price. Let us now consider sector  $s$  of country  $k$ . If  $\Delta p$  is the carbon price variation and  $c_i$  represent the carbon contents of the fuels considered ( $i=1, \dots, n$ ), then the new prices implied by this price increase are

$$p_{k,s,i}^* = p_{k,s,i} + c_i \Delta p,$$

that is, the price of each fuel is raised proportionally to its carbon content.

The estimated system (1) allows us to calculate the new quotas implied by this price structure. We only need to substitute the new prices on the right side equations and to compute the left side.

Thus, the abatement obtained in sector  $s$  by an increase  $\Delta p$  in prices is

---

<sup>1</sup> See Blanciforti and Green (1983).



$$\Delta C_{k,s}(\Delta p) = \sum_{i=1}^n c_i (q_{k,s,i}^* - q_{k,s,i}) Q_{0,k,s,i}$$

where  $Q_{0,k,s}$  in this paper is the energy demand in 1997. By adding up sectors we obtain the carbon abatement for the country as a whole:

$$\Delta C_k(\Delta p) = \sum_{s=1}^m \Delta C_{k,s}(\Delta p) \quad (2).$$

Eq. (2) is repeated for different values of  $\Delta p$ . Fitting a simple quadratic curve between these points yields the MAC curves available country by country on request from the authors.

### 3. Emissions trading and abatement costs

Estimated MAC curves are different for each country. In general, the US has a MAC curve lower than those of the other industrialised countries, but still higher than those of Eastern European countries (Poland, Czech Republic, Hungary). The MAC curve for the FSU, is zero for an abatement less than 111 Mton, which corresponds to *hot air* and then grows sharply for abatements above that amount. Considering the cost of Kyoto requirements, starting from MAC curves we should evaluate first a target emission by 2010 with a zero cost scenario. In this respect, forecasts are provided by IEA (1998) for all countries except the Czech Republic, Poland and Spain for which forecasts are taken from the country's «Second national report to the conference of the parties to the United Nations Framework Convention on Climate Change» and Japan, whose forecasts are provided by EIA «International Energy Outlook 2001». The costs are compared in Table 1 where MAC and total abatement costs corresponding to Kyoto compliance are reported. According to these results Greece, France and Italy show the highest costs among EU countries in an autarkic solution. Total costs for European countries are generally higher than for other industrialised countries given the high level of energy efficiency and the important role played by energy taxes. MAC curves define a supply and a demand curve of emission permits and so can be used to determine the equilibrium price of permits and, consequently, the number of permits each country sells or buys at equilibrium price. This analysis has been performed under various hypotheses on the countries that participate in the market.

### 3.1 EU emission trading market.

The market price obtained using this hypothesis is US\$96.5, whereas the total abatement cost is \$6.7 billion, saving approximately \$4 billion with respect to the no trading case. A comparison of the cost distribution within the EU shows that Greece's share of the cost is dramatically reduced (from \$2.8 billion, corresponding to 27% of total EU expenditure, to \$1.03 million, corresponding to 15%). In fact, Greece buys permits to cover 76.6% of the commitment. In contrast, Denmark and Luxembourg, thanks to their low MACs and commitments, are able to obtain a net income by selling permits.

To our knowledge only Bader considers a closed EU market, but the comparison between our results and his is difficult due to a difference in methodology. Bader estimates the parameters of the MAC curve for the whole of Europe, so that the same shape applies to all EU countries. This means that differences in the MACs are given only by differences in the commitments and in the starting value of the ratio C/GDP. Moreover, the forecasts for 2010 emissions are widely different, so the great differences in final results should not be a surprise. Nevertheless, the market price determined by Bader is \$81/tC, less than our estimate but not dramatically different, and the same can be seen for total abatement costs.

### 3.2 Annex 1

Opening the market to Annex 1 countries results in a reduction of the market price of \$59.9/t. Since the FSU commitment is higher than BAU forecasted emissions (Tab. 1), the MAC of this country is zero for abatement below the difference between commitment and BAU emissions. In practice, a supply of 111 Mton is introduced (the, so called, «*hot air*»), leading to an important reduction of costs as can be seen in Table 3: the FSU earns \$7.2 billion from trading while the EU (except Germany and Denmark), Japan, Australia and the USA buy permits. In this market, supply is highly concentrated: the most important suppliers are the FSU (with a market share of 70.7%), the Czech Republic (14%) and Canada (6.8%). Demand is less concentrated, only USA (45.8%), Italy (11.5%), Japan (12%) and Australia (10.5%) show market shares above 10%.

Price estimates for the Annex 1 market are easy to find in literature, and our results are in line with the values obtained by other authors. In general, papers consider the European Union as a whole and do not conduct analysis on separate European countries.

### **3.3 Annex 1 trade without US**

The refusal of US President Bush to ratify Kyoto Protocol has cast some shadows on the implementation process of the Protocol. It is still not clear whether the US intends to renegotiate targets and mechanisms of implementation or to quit the process. In the latter case, Annex 1 countries face two alternatives: reduce their emissions by the amount fixed in Kyoto for each country; or proportionally increase their commitments in order to cover the share of reductions attributed to the US in the Protocol. In both cases, a system of tradable permits should help to reduce drastically the costs of abatement.

A global trade scenario without the US and with the commitments fixed by Kyoto, produces a market price of US\$38.8/tC and a total abatement cost of \$3.7 billion. (Table 4)

The FSU earns US\$4.8 billion from trading while the EU (except Denmark with a market share of 0.37%), Japan and Australia buy permits. The supply side of the market is almost completely represented by the FSU (with a market share of 83%), the Czech Republic (13%), Hungary (2.3%) and Canada (1%). The demand is less concentrated, only Italy (15.6%), Japan (26.2%) and Australia (14.6%) show market shares above 10%.

If the US commitment is proportionally distributed between the other Annex 1 countries, in order to maintain the total reduction levels agreed in Kyoto, the market generates a price of US\$120.8/tC and a higher total abatement cost of US\$25.05 billion (but still 30% lower than the autarkic solution). (Table 5)

The FSU earns US\$15 billion from trading, the Czech Republic earns US\$15 billion while the EU (except Denmark and Germany), Japan and Australia buy permits. The supply is almost completely represented by FSU (with a market share of 67.4%), the Czech Republic (17.9%), Hungary (4%) and Canada (1%). The demand side of the market is less concentrated, only Greece (10.1%), Italy (19.6%), Japan (22.8%) and Australia (18.8%) show market shares above 10%.

### **4 Comparison with the literature: the role of forecasts**

The relevant discrepancies between our results and those that can be found in literature require some comment. In Table 6 we compare results in terms of costs and MAC. Apart from what Table 8 reveals, it should be pointed out that the behaviour of some countries is different in this paper and the prevailing literature. In particular, for Bader, Denmark and Germany are heavy buyers of permits, while in our simulation of EU trade Denmark and Germany sell permits (see table 3). We realised that these differences are mainly due to the (wide) variation in the forecasts for 2010 (the

zero cost baseline). To show this result we simulate the market using our MAC curves together with the forecast proposed by Bader. In this case Austria, Denmark, Finland, France, Germany, Italy and Sweden are the suppliers, that is, the same as Bader with the exception of France, due to a discrepancy in 1990 CO<sub>2</sub> emissions (France in Bader has a target equal to forecasts and so clearly does not buy permits).

In the comparison with the Ellerman and Decaux results (Table 6), the surprising fact is that the role of Japan and the USA is inverted (Japan demands and the USA supplies in Ellerman and Decaux, the opposite is true for us). If we examine the 2010 forecasts we note that the forecast for the USA is quite similar (1838 v. 1800) while the forecast for Japan is quite different: 424 Mton of C in Ellermann, 310 Mton of C for IEA. Eventually, if we substitute the Ellerman forecast for Japan, the roles of Japan and the USA change and our model agrees with that of Ellerman.

More recent projections for Japan (330 Mton of C in 2010) are provided by EIA «International Energy Outlook» and are adopted in our model.

## **5. Conclusions**

It should be noted that the results we present are no more than an indication of what might happen in a market of permits. The wide range of results that can be found in the literature on the equilibrium price of a permits market (from \$20 to \$177 per ton of carbon) is itself a caveat on the reliability of the numerical results. Nevertheless, general tendencies can be detected, and the fact that different studies offer similar considerations makes us reasonably confident in our conclusions. With these considerations in mind, we observe that the empirical simulations in this report show that, without any transaction costs, a market of permits should help to reduce the individual and total costs of emissions abatement.

According to economic theory, a trading permits scheme should help to attain an efficient allocation, but is completely neutral with respect to any equity consideration. In fact, a country would be a net demander or a net supplier of permits depending on its endowment, that is, on its initial commitments. Since commitments are basically political agreements, it is useful to underline that commitments should be defined carefully: the definition of commitments may produce a redistribution of income (*via* tradable permits) from countries that have adopted mitigation measures to countries that have not. In fact, it is probable that the latter can still implement cheaper measures, whereas the former have only expensive options to reduce emissions. In this sense, Kyoto commitments seem to lead to a paradox: countries with lower levels of emissions per GDP and emissions per capita pay (through the purchase of permits) developed countries, that have significantly higher levels of emissions per capita and per GDP. The result of a tradable market

system, in fact, is that EU countries and Japan buy permits from Russia and the Czech Republic if trade is open to Annex 1 countries (see Table 4), while the Czech Republic and Russia have the highest ratios of emissions per unit of GDP and per capita (see Table 9) and those of Japan are similar to those in Europe and lower than the FSU, the Czech Republic or the US.

It should be noted that these indicators can be misleading and must be broken down by sector. Indicators are, in fact, influenced by the productive specialisation of a country and the structure of the economy will necessarily affect emissions levels. When sectors that are intrinsically polluting represent a high share of GDP, aggregate indicators are influenced by their effect, even if sector indicators show optimal performance. Moreover, the geographical aspects of each country must be taken into account. For instance, countries with a low population density will register high levels of emissions per capita in the transportation sector because of the distance that workers, goods and raw materials are obliged to travel. Climate conditions and temperature also influence the level of emissions.

Sector indicators confirm the results shown by aggregate ratios of the countries considered. With the exception of the Russian transportation sector, per capita emissions are always higher in the USA and Russia than in Europe and Japan.

Many aspects of our methodology are susceptible to improvement. From an economic point of view a primary issue is given by the role of the FSU. The market position of the FSU, which sells about 70% of permits, suggests that it may behave as a monopolist, and so its aim might not be to minimise costs, as in this model. For example the FSU could wait until the deadline fixed by the Kyoto Protocol to sell permits at a higher price to countries at risk of non-compliance. It is also true that the FSU comprises a number of countries and this may mitigate the monopoly, but there is a reasonable possibility that they may still act as a group.

The absence of transaction costs is a second main defect of our model. The market with transaction costs would allow fewer savings than the no friction market we assumed.

A more important limitation is that we consider a price variation (tax) as the only way in which countries can encourage an abatement of emissions. In fact, incentives for sensible investment may represent a valid alternative, and technological improvements would generate environmental, as well as an economic, returns.

## **Appendix: price and quantities of the carbon market.**

Historical fuel consumption and price data (1970-1997) for the countries involved in the analysis are provided by the International Energy Agency<sup>2</sup>. For each country fuel consumption and price data are divided into three sectors by end use: industry, electricity generation and households, the latter is then split between domestic and transport.

Price data are always end user prices and include energy or CO<sub>2</sub> taxes, set at different levels in each country. These are expressed in terms of US\$ PPP in order to consider differences in the general price level of EU countries.

Fuel consumption data by sector were extracted from the IEA database. The fuel classification by type considered in this database is less refined than the one used for prices.

In particular, all gasoline and diesel for motors are grouped in the household sector, and high-sulphur fuel oil (hsfo) and low-sulphur fuel oil (lsfo) are grouped in the industrial sector. The aggregate fuel oil consumption for households has been split into diesel and gasoline according to the observed ratios of gasoline/diesel consumption derived from «Energy Statistics of IEA Countries». That is, diesel consumption is  $\alpha \times (\text{total motor fuels})$  where  $\alpha$  is the share of diesel consumed as motor gasoline as well as diesel used in households. Gasoline is calculated analogously.

While quantities in the original databases are in different units (litres, tons of oil equivalent, cal), all quantities in our output are expressed in Mtoe. Conversion factors are provided by «CO<sub>2</sub> Emissions from Fuel Combustion» edited by the IEA. Prices in the database are in US\$ PPP relative to various units of fuels. The carbon price we calculated is expressed in US\$ PPP per tonne of carbon. As mentioned above,  $P_C$  depends on the prices of fossil fuels as well as their market shares.

This paper does not consider total fossil fuel consumption, but a share (in broad terms, the percentage of fossil fuels for which corresponding price and quantities are available), and, moreover, a share that varies over time. The fuels considered in the  $P_C$  calculation represent a share of total consumption<sup>3</sup> of about 60%, starting from a minimum value of 40% for Luxembourg, to a level of about 80% for France, Italy and Denmark. The total coverage is relatively stable from 1978 to 1997. In fact, in many countries the quantities recorded in the original database are constant over a number of years, which is a clear sign of their reliability. Apart from the share of consumption covered by the fuels, the share of carbon emissions covered by our selection can also be considered. This is the ratio of carbon emissions to each fuel (expressed as  $\sum C_i F_i$ ) and total carbon emissions as

---

<sup>2</sup> IEA, Energy Prices and Taxes, several issues.

recorded in «CO<sub>2</sub> Emissions from Fuel Combustion» (2000). The average share of carbon emissions covered is about 70%, starting from a minimum coverage of about 40% for Luxembourg, to levels near 80% for France, Denmark, Belgium and Italy.

If we examine the coverage level of carbon emission and the coverage level of consumption for Italy we see again that the level has been essentially stable over the past 20 years and that the coverage level of carbon emission is uniformly higher. In other words 75% of the fuel consumed in Italy produces 85% of carbon emissions, this means that we tend not to use the less carbon-intensive fuels.

The lowest consumption coverage levels are registered by Sweden and France. Both countries have a percentage of TPES covered by hydro and nuclear close to 46%. In both cases a significant amount of end-use demand is not considered in our calculation, but its contribution to carbon emissions is near zero.

Analogously, the lowest emission coverage levels are registered by Germany and Greece. Both countries show 25% to 35% of TPES covered by brown coal. Since the IEA database does not contain data on brown coal, but only on bitcoal and cokecoal, we are not able to consider this substantial amount of fossil fuel end-use.

---

<sup>3</sup> As reported in «Energy Statistics for OECD countries», IEA, 2000.

## References

- [1] American Petroleum Institute – Policy Analysis and Strategic Department, *The Kyoto protocol: implications of emissions trading scenarios* Research Paper n° 095, July 1999.
- [2] Bader, P., *Emissions trading in the EU: the economic costs of fulfilling the Kyoto commitment*, Augsburg University, Augsburg, 2000.
- [3] Blanciforti, L. and R. Green. *The Almost Ideal Demand System: A comparison and application to food groups*. *Agricultural Economics Research* 35:3, (1983) 1-9.
- [4] Bollen, J. Et al., *Compliance with the Kyoto protocol*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [5] Ciorba, U., Lanza, A., Pauli, F.. *Kyoto commitment and emission trading: a European Union perspective*, Fondazione Eni Enrico Mattei, Nota di Lavoro 7.2001.
- [6] Capros, P., *Economic and energy system implications of European CO<sub>2</sub> mitigation strategy: synthesis of results for model based analysis*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [7] Cozzi, L., Di Giulio, E., *Il protocollo di Kyoto: contenuti, aspetti critici e implicazioni per i paesi industrializzati*, Scuola Superiore Enrico Mattei, Milano, 1999.
- [8] Deaton, A., and J. Muellbauer. *Economics and Consumer Behaviour*, Cambridge University Press, Cambridge, 1980.
- [9] Deaton, A., and J. Muellbauer. *An Almost Ideal Demand System*, *The American Economic Review*, 70, 1980. Pag. 312-26.
- [10] Edmonds, J., Scott, M., et al., *International emissions trading and global climate change*, Pew Center on Global Climate Change, Battelle, 1999.
- [11] Ellermann, D., Decaux, A. *Analysis of Post-Kyoto CO<sub>2</sub> emissions trading using MAC curves*, MIT Press, Boston, 2000.
- [12] Energy Information Administration, *Impacts of the Kyoto protocol on US energy markets and economic activity- Chapter 7, Comparing Cost estimates for Kyoto protocol*, Washington DC, 1999.
- [13] Energy Information Administration, *International Energy Outlook*, Washington DC, 2001.
- [14] Frankel, J. A., *What kind of research in climate change Economists would be of greatest use to policy makers?* in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [15] Gielen, D.J., Koutstaal, P.R., Kram, T., Van Rooijen, S.N.M., *Effects on the Climate Policy of the EU*, ECN Paper, Netherlands Research Foundation, Amsterdam, 1998.



- [16] Institute for Prospective Technological Studies (IPTS), *Preliminary Analysis of the Implementation of an EU-Wide Permit Trading Scheme on CO<sub>2</sub> Emissions Abatement Costs Results from the POLES model*, 2000.
- [17] Jacoby, H. D., Eckaus, R. S., Ellerman, D., Prinn, R. G., Reiner, D.M., Yang, Z., «CO<sub>2</sub> emissions limits: economic adjustments and the distribution of burdens» in *Energy Journal*, Vol. 18, n°3, 1997.
- [18] Kainuma, M., Matsuoka, Y., Morita, T., *Analysis of post Kyoto scenarios: the AIM model in Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [19] Kram, T., *The energy technology systems analysis programme: history, the ETSAP Kyoto statement and post Kyoto analysis*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [20] Manne, A.S., Richels, R.G., *The Kyoto protocol: a cost effective strategy for meeting environmental objectives*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [21] Mc Kibbin, W.J., Shackleton, R., Wilcoxon, P. J., The potential effects if international carbon emission permit trading under the Kyoto protocol, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [22] Sands, R. D. et al., *The cost of mitigating US carbon emissions in the post 2000 period*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [23] Tulpulé, V. et al., *An economic assessment of the Kyoto protocol using the global trade and environment model*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [24] Van der Mensbrugghe, D., *A (preliminary) analysis of the Kyoto protocol: using the OECD GREEN model*, in *Economic modelling of climate change*, OECD workshop report, OECD Paris, 1998.
- [25] Zhang, ZhongXiang, *An assessment of the EU proposal for ceilings on the use of Kyoto flexibility mechanisms*, *Ecological Economics*, Vol. 37, n. 1, 2001

**Table 1: Kyoto commitments and domestic solutions**

		Carbon Emissions (Mton)				Abatement					
		1990	1997	2010 (forecast)	2010 (commitment)	Comm (% 1990)	BAU - Target	Ab. % of 1997	MAC (US\$/t)	AC (US\$/t)	AC °/° GDP
AUSTRIA	A	16.2	17.5	18.0	14.1	87.0	3.9	22.3%	154.8	0.28	1.88
BELGIUM	B	29.8	33.4	33.1	27.5	92.5	5.5	16.5%	72.4	0.19	1.03
DENMARK	DK	14.4	17.0	12.2	11.4	79.0	0.8	4.8%	21.4	0.01	0.07
FINLAND	FI	14.8	17.5	19.2	14.8	100.0	4.3	24.8%	85.0	0.15	1.70
FRANCE	FR	103.2	99.0	110.9	103.2	100.0	7.7	7.7%	210.2	0.76	0.69
GERMANY	DE	267.7	241.1	244.0	211.4	79.0	32.5	13.5%	52.2	0.79	0.55
GREECE	GR	19.7	22.0	36.8	24.6	125.0	12.2	55.4%	522.8	2.89	25.39
IRELAND	IR	9.1	10.3	12.3	10.2	113.0	2.1	20.4%	167.8	0.16	2.52
ITALY	I	111.3	115.7	132.2	104.1	93.5	28.1	24.3%	225.8	3.18	3.10
LUXEMBOU	LUX	3.0	2.3	2.1	2.1	72.0	0.0	-0.6%	-4.1	0.00	0.01
NETHLAND	NL	44.0	50.3	53.5	41.3	94.0	12.2	24.2%	139.8	0.74	2.52
PORTUGAL	PR	11.3	14.2	18.1	14.4	127.0	3.7	26.3%	83.2	0.13	1.01
SPAIN	S	58.6	69.2	77.0	67.4	115.0	9.6	13.9%	90.7	0.39	0.72
SWEDEN	SW	14.4	14.4	16.8	14.9	104.0	1.9	12.8%	153.0	0.14	0.85
UK	UK	159.9	151.3	169.0	139.9	87.5	29.0	19.2%	66.6	0.87	0.82
<b>Tot EU-15</b>		<b>877.4</b>	<b>875.2</b>	<b>955.2</b>	<b>801.7</b>	<b>91.4</b>	<b>153.5</b>	<b>17.5%</b>		<b>10.67</b>	<b>1.65</b>
AUSTRALI	AUS	71.7	83.5	105.5	77.5	108.0	28.0	33.6%	245.9	3.02	8.74
CANADA	C	116.9	130.2	150.1	109.9	94.0	40.2	30.9%	36.4	0.52	0.88
JAPAN	J	289.6	319.8	310.3	272.2	94.0	38.1	11.9%	36.2	0.66	0.25
NZ	NZ	7.0	9.0	10.3	7.0	100.0	3.3	36.6%	421.2	0.63	11.17
USA	USA	1339.2	1492.0	1800.5	1245.4	93.0	555.0	37.2%	76.5	17.37	2.62
<b>Tot Non European (NE)</b>		<b>1824.4</b>	<b>2034.5</b>	<b>2376.7</b>	<b>1712.0</b>	<b>93.8</b>	<b>664.7</b>	<b>32.7%</b>		<b>22.20</b>	<b>2.17</b>
<b>Tot EU-15 + NE</b>		<b>2701.8</b>	<b>2909.6</b>	<b>3331.9</b>	<b>2513.7</b>	<b>93.0</b>	<b>818.2</b>	<b>28.1%</b>		<b>32.87</b>	<b>1.97</b>
CZECH	CZ	38.7	33.0	41.7	35.6	92.0	6.1	18.6%	1.4	0.00	0.02
HUNGARY	H	18.5	15.9	19.6	17.4	94.0	2.2	13.9%	9.7	0.01	0.14
POLAND	PL	95.2	95.5	117.0	89.5	94.0	27.5	28.8%	48.9	0.57	2.33
SWITLAND	SV	12.1	12.2	11.1	11.1	92.0	0.0	0.1%	0.8	0.00	0.00
<b>Tot Other European (AE)</b>		<b>164.4</b>	<b>156.6</b>	<b>189.4</b>	<b>153.5</b>	<b>93.4</b>	<b>35.9</b>	<b>22.9%</b>		<b>0.58</b>	<b>0.89</b>
<b>EU-15+AE</b>		<b>1041.8</b>	<b>1031.8</b>	<b>1144.6</b>	<b>955.2</b>	<b>91.7</b>	<b>189.4</b>	<b>18.4%</b>		<b>11.26</b>	<b>1.58</b>
<b>EU-15+AE+NE</b>		<b>2866.2</b>	<b>3066.2</b>	<b>3521.3</b>	<b>2667.2</b>	<b>93.1</b>	<b>854.1</b>	<b>27.9%</b>		<b>33.46</b>	<b>1.93</b>
FSU(*)		615.5	985.1				-111		0	0	0

**Notation:** in the following scenarios, E stands for EU-15 countries; NE for Non-European countries (Australia, Canada, Japan, New Zealand, USA); AE for other European countries (Czech Republic, Hungary, Poland, Switzerland); FSU is Former Soviet Union.

**Table 2:** Permits market in a EU trading scenario, trading price 96.5 \$/tC.

	TC(*) (billions US\$)	Trade (Mton C)	Trade as % of abatement
AUSTRIA	0.25	-1.30	1.61
BELGIUM	0.17	1.67	-20.46
DENMARK	0	1.97	0.43
FINLAND	0.15	0.37	-1.32
FRANCE	0.55	-3.85	3.71
GERMANY	0.32	20.65	-317.61
GREECE	1.03	-9.32	6.47
IRELAND	0.14	-0.78	0.91
ITALY	2.14	-16.10	14.13
LUXEMBOU	0	0.17	-
NETHLAND	0.68	-2.91	4.23
PORTUGAL	0.12	0.37	-1.37
SPAIN	0.39	0.46	-1.40
SWEDEN	0.12	-0.63	0.80
UK	0.72	9.23	-151.63
<b>Total</b>	<b>6.71</b>	<b>0.00</b>	

(\*) TC = Total Costs

**Table 3:** Permits market in a global (Annex 1) trading scenario, trading price 38.8 \$/tC.

	TC (*) (billions US\$)	Trade (Mton C)	Trade as % of abatement
AUSTRIA	0.18	-2.20	-56.48
BELGIUM	0.19	-0.90	-16.03
DENMARK	0	1.12	139.88
FINLAND	0.14	-0.89	-20.26
FRANCE	0.38	-5.22	-67.84
GERMANY	0.77	3.90	11.97
GREECE	0.67	-10.35	-84.84
IRELAND	0.1	-1.23	-58.75
ITALY	1.46	-20.66	-73.54
LUXEMBOU	0	0.07	-
NETHLAND	0.52	-5.78	-47.40
PORTUGAL	0.12	-0.72	-19.34
SPAIN	0.35	-2.62	-27.28
SWEDEN	0.09	-1.07	-56.43
UK	0.86	-2.28	-7.82
AUSTRALI	1.39	-18.91	-67.53
CANADA	0.37	12.16	30.25
JAPAN	2.87	-21.76	-18.47
NZ	0.18	-2.70	-81.74
USA	16.7	-82.29	-14.82
CZECH	-0.92	25.28	414.35
HUNGARY	-0.14	5.26	239.28
POLAND	0.55	4.09	14.86
SWITLAND	-0.02	0.66	-
FSU	-7.29	127.05	-
<b>Total</b>	<b>19.51</b>	<b>0.00</b>	

(\*) TC = Total Costs

**Table 4:** Permits market in Annex 1 trading scenario w/o USA,  
fixed country abatement,  
trading price US\$ 38.8

	TC (*) (billions US\$)	Trade (Mton C)	Trade as % of abatement
AUSTRIA	0.13	-2.76	4.90
BELGIUM	0.15	-2.46	15.33
DENMARK	0	0.55	0.39
FINLAND	0.11	-1.78	8.78
FRANCE	0.27	-6.05	8.92
GERMANY	0.74	-7.16	-59.79
GREECE	0.45	-10.97	12.93
IRELAND	0.07	-1.52	2.58
ITALY	1	-23.29	31.67
LUXEMBOU	0	0.02	-
NETHLAND	0.38	-7.70	16.23
PORTUGAL	0.09	-1.48	7.66
SPAIN	0.27	-4.68	17.16
SWEDEN	0.06	-1.34	2.37
UK	0.73	-10.06	128.51
AUSTRALI	0.96	-21.80	32.28
CANADA	0.52	1.41	4.65
JAPAN	2.23	-39.18	212.11
NZ	0.12	-2.90	3.55
CZECH	-0.44	19.44	4.69
HUNGARY	-0.05	3.50	1.46
POLAND	0.55	-4.12	-27.73
SWITLAND	-0.01	0.43	-
FSU	-4.64	123.90	-
<b>Total</b>	<b>3.69</b>	<b>0.00</b>	

(\*) TC = Total Costs

**Table 5:** Permits market in Annex I trading scenario w/o USA  
total abatement constant  
trading price 120.8 US\$/tC.

	TC (*) (billions US\$)	Trade (Mton C)	Trade as % of abatement
AUSTRIA	0.66	-3.93	-80.34
BELGIUM	0.66	-1.25	-8.15
DENMARK	0	1.80	461.52
FINLAND	0.56	-2.46	-28.06
FRANCE	1.39	-9.25	-103.65
GERMANY	2.91	3.89	-6.50
GREECE	2.46	-18.63	-144.07
IRELAND	0.36	-2.22	-85.81
ITALY	5.27	-36.08	-113.93
LUXEMBOU	0	0.35	-
NETHLAND	1.93	-11.17	-68.79
PORTUGAL	0.48	-2.07	-27.04
SPAIN	1.3	-5.60	-32.64
SWEDEN	0.31	-1.87	-78.92
UK	3.29	-7.83	-6.09
AUSTRALI	5.09	-34.64	-107.32
CANADA	2.86	2.46	52.99
JAPAN	10.47	-41.84	-19.73
NZ	0.65	-4.85	-136.66
CZECH	-2.26	32.85	700.14
HUNGARY	-0.37	7.32	500.78
POLAND	2.43	-0.10	0.37
SWITLAND	-0.08	1.26	-
FSU	-15.24	133.85	-
<b>Total</b>	<b>25.07</b>	<b>0.00</b>	

(\*) TC = Total Costs

**Table 6:** Comparison of results for EU-only trading scenario.

	<b>Bader</b>	<b>UE</b>	<b>Ciorba, U., Lanza, A., Pauli, F. (2001)</b>	<b>AIDS</b>	<b>AIDS w. EU forecasts</b>	<b>AIDS with Bader forecasts</b>
<b>TAC</b>	3.817	16.2	10	6.7	6.85	5.7
<b>Price</b>	82	161.7	218	96.5	97.9	87.3

**Table 7:** Comparison of results (the column indicated (\*) contains the results of our model implemented using Ellerman and Decaux forecasts , essentially only Japan changes)

	<b>TAC</b>				<b>PRICE</b>			
	<b>Ellerman</b>	<b>Ciorba, U., Lanza, A., Pauli, F. (2001)</b>	<b>AIDS</b>	<b>(*)</b>	<b>Ellerman</b>	<b>Ciorba, U., Lanza, A., Pauli, F. (2001)</b>	<b>AIDS</b>	<b>(*)</b>
EU+NE	101,96	42	25.8	38.76	240	147	75.3	96.9
EU+NE+FSU		40	24.9			130	73.0	
EU+NE+FSU+HA		27	17.6			100	59.0	
EU+AE			5.3				66.3	
EU+AE+NE	69,23		24.7	36.73	150		69.8	89.0
EU+AE+NE+FSU			24.0	35.59			67.7	86.4
EU+AE+NE+FSU+HA		53,96	17.2	26.78			55.2	72.5

**Table 8:** Comparison of 2010 BAU forecast of emission

	<b>IEA</b>	<b>Bader</b>	<b>EIA</b>	<b>Ellerman</b>
J	310.3		330	424
USA	1800.5		1809	1838
Tot EU-12	901.2	879.8	1040	1064

**Table 9:** Emissions Indicators for some Annex 1 countries (1997). Source: IEA.

<b>Country</b>	<b>Japan</b>	<b>EU</b>	<b>USA</b>	<b>CZ</b>	<b>Russia</b>
<b>CO2 / GDP</b>	0,45	0,5	0,83	4,45	2.09
<b>CO2 / Population</b>	9,29	8,58	20,5	11,74	9,89

**NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI**

**Fondazione Eni Enrico Mattei Working Papers Series**

**Our working papers are available on the Internet at the following addresses:**

**Server WWW: [WWW.FEEM.IT](http://WWW.FEEM.IT)**

**Anonymous FTP: [FTP.FEEM.IT](ftp://FTP.FEEM.IT)**

**To order any of these papers, please fill out the form at the end of the list.**

CLIM	1.2000	<i>Claudia KEMFERT</i> : <u>The Impacts of Emissions Trading on World Economies. Contemplation of baseline emissions paths and a ceiling on emissions trading</u>
CLIM	2.2000	<i>Pascal FAVARD</i> : <u>Does Productive Capital Affect the Order of Resource Exploitation?</u>
CLIM	3.2000	<i>Robert T. DEACON</i> (xxxix): <u>The Political Economy of Environment-Development Relationships: A Preliminary Framework</u>
SUST	4.2000	<i>Piet RIETVELD and Roberto ROSON</i> : <u>Joint Costs in Network Services: the Two-way Problem in the Case of Unbalanced Transport Markets</u>
CLIM	5.2000	<i>Robert S. PINDYCK</i> (xxxix): <u>Irreversibilities and the Timing of Environmental Policy</u>
MGMT	6.2000	<i>Domenico SINISCALCO, Stefania BORGHINI, Marcella FANTINI and Federica RANGHIERI</i> (xl): <u>The Response of Companies to Information-Based Environmental Policies</u>
SUST	7.2000	<i>Guy D. GARROD, Riccardo SCARPA and Ken G. WILLIS</i> : <u>Estimating the Benefits of Traffic Calming on Through Routes: A Choice Experiment Approach</u>
CLIM	8.2000	<i>ZhongXiang ZHANG</i> : <u>Estimating the Size of the Potential Market for the Kyoto Flexibility Mechanisms</u>
VOL	9.2000	<i>Jean-Christophe PEREAU and Tarik TAZDAIT</i> (xli): <u>Partial and Global Cooperation with Unilateral Commitment in the Presence of Global Environmental Problems</u>
KNOW	10.2000	<i>Giacomo CALZOLARI and Giovanni IMMORDINO</i> : <u>Hormone Beefs, Chloridric Chicken and International Trade: Can Scientific Uncertainty be an Informational Barrier to Trade?</u>
CLIM	11.2000	<i>Laura MARSILIANI and Thomas I. RENSTRÖM</i> (xxxvi): <u>Imperfect Competition, Labour Market Distortions, and the Double Dividend Hypothesis</u>
KNOW	12.2000	<i>Patrizia BUSSOLI</i> : <u>An Empirical Analysis of Technological Convergence Process and RIVs in Europe at the Firm Level</u>
KNOW	13.2000	<i>Luigi BENFRATELLO and Alessandro SEMBENELLI</i> : <u>Research Joint Ventures and Firm Level Performance</u>
KNOW	14.2000	<i>Nicholas S. VONORTAS</i> : <u>US Policy towards Research Joint Ventures</u>
ETA	15.2000	<i>Y.H. FARZIN</i> : <u>The Effects of Emissions Standards on Industry in the Short Run and Long Run</u>
ETA	16.2000	<i>Francis BLOCH and Stéphane ROTTIER</i> (xli): <u>Agenda Control in Coalition Formation</u>
CLIM	17.2000	<i>Giovanni IMMORDINO</i> : <u>Looking for a Guide to Protect the Environment: the Development of the Precautionary Principle</u>
CLIM	18.2000	<i>Hans W. GOTTINGER</i> : <u>Negotiation and Optimality in an Economic Model of Global Climate Change</u>
VOL	19.2000	<i>Paola MILIZIA and Marialuisa TAMBORRA</i> : <u>Juridical Framework of Voluntary Agreements in Italy and Policy Relevance at the Local Level</u>
CLIM	20.2000	<i>Richard S.J. TOL, Wietze LISE and Bob van der ZWAAN</i> (xli): <u>Technology Diffusion and the Stability of Climate Coalitions</u>
CLIM	21.2000	<i>Pietro TEATINI and Giuseppe GAMBOLATI</i> (xlii): <u>The Impact of Climate Change, Sea-Storm Events and Land Subsidence in the Adriatic</u>
CLIM	22.2000	<i>Emiliano RAMIERI</i> (xlii): <u>An Overview of the Vulnerability of Venice to the Impacts of Climate Change and Sea Level Rise</u>
PRIV	23.2000	<i>Bernardo BORTOLOTTI, Marcella FANTINI and Carlo SCARPA</i> : <u>Why do Governments Sell Privatised Companies Abroad?</u>
ETA	24.2000	<i>Carlo CARRARO and Gilbert E. METCALF</i> : <u>Behavioral and Distributional Effects of Environmental Policy: Introduction</u>
ETA	25.2000	<i>Santiago J. RUBIO and Juana AZNAR</i> : <u>Sustainable Growth and Environmental Policies</u>
KNOW	26.2000	<i>Francesca RECANATINI and Randi RYTERMAN</i> : <u>Disorganisation or Self-Organisation?</u>
KNOW	27.2000	<i>Giorgio BARBA NAVARETTI and David TARR</i> : <u>International Knowledge Flows and Economic Performance. An Introductory Survey of the Evidence</u>
SUST	28.2000	<i>Francesca CODA CANATI</i> : <u>Secondary Raw Materials Market Creation: Waste Stock Exchange</u>
KNOW	29.2000	<i>Giorgio BRUNELLO and Simona COMI</i> : <u>Education and Earnings Growth. Evidence from 11 European Countries</u>
CLIM	30.2000	<i>Michael GRUBB</i> : <u>The Kyoto Protocol: an Economic Appraisal</u>
CLIM	31.2000	<i>Gérard MONDELLO and Mabel TIDBALL</i> (xxxix): <u>Environmental Liability and Technology Choice: A Duopolistic Analysis</u>



KNOW	32.2000	Alberto PETRUCCI and Edmund PHELPS: <u>Capital Subsidies Versus Labour Subsidies: A Trade-Off between Capital and Employment?</u>
VOL	33.2000	Petr ŠAUER, Antonín DVORÁK and Petr FIALA: <u>Negotiation between Authority and Polluters – Model for Support of Decision Making in Environmental Policy: Principles and Experimental Case Test</u>
SUST	34.2000	Riccardo SCARPA, George W. HUTCHINSON and Sue M. CHILTON: <u>Reliability of Benefit Value Transfers from Contingent Valuation Data with Forest-Specific Attributes</u>
CLIM	35.2000	Allen PERRY (xlii): <u>Impact of Climate Change on Tourism in the Mediterranean: Adaptive Responses</u>
CLIM	36.2000	Laura MARSILIANI and T.I. RENGSTRÖM (xxxvi): <u>Inequality, Environmental Protection and Growth</u>
CLIM	37.2000	Massimiliano MONTINI (xlii): <u>Italian Policies and Measures to Respond to Climate Change</u>
CLIM	38.2000	Horst STERR, Richard KLEIN and Stefan REESE (xlii): <u>Climate Change and Coastal Zones. An Overview of the State-of-the-Art on Regional and Local Vulnerability Assessment</u>
CLIM	39.2000	Tullio SCOVAZZI (xlii): <u>Ideas Behind the New or Updated Mediterranean Legal Instruments</u>
CLIM	40.2000	Dimitrios GEORGAS (xlii): <u>Assessment of Climatic Change Impacts on Coastal Zones in the Mediterranean. UNEP's Vulnerability Assessments Methodology and Evidence from Case Studies</u>
SUST	41.2000	Herath M. GUNATILAKE and Ujjayant CHAKRAVORTY: <u>Forest Resource Extraction by Local Communities: A Comparative Dynamic Analysis</u>
PRIV	42.2000	Giancarlo SPAGNOLO: <u>Optimal Leniency Programs</u>
CLIM	43.2000	Paolo BUONANNO, Carlo CARRARO, Efrem CASTELNUOVO and Marzio GALEOTTI: <u>Emission Trading Restrictions with Endogenous Technological Change</u>
CLIM	44.2000	Alan S. MANNE and Richard G. RICHEL: <u>A Multi-Gas Approach to Climate Policy – with and without GWPs</u>
WAT	45.2000	Ujjayant CHAKRAVORTY and Chieko UMETSU: <u>Basinwide Water Management: A Spatial Model</u>
CLIM	46.2000	Don FULLERTON, Inkee HONG and Gilbert E. METCALF (xl): <u>A Tax on Output of the Polluting Industry is not a Tax on Pollution: The Importance of Hitting the Target</u>
PRIV	47.2000	Axel GAUTIER and Dimitri PAOLINI: <u>Delegation and Information Revelation</u>
ETA	48.2000	Andreas PAPANDREOU: <u>Externality, Convexity and Institutions</u>
ETA	49.2000	Cesare DOSI and Michele MORETTO: <u>The Timing of Adoption of Cleaner Technologies: Private Costs and Public Incentives</u>
ETA	50.2000	Michele MORETTO and Roberto TAMBORINI: <u>Liquidity: What can a “Hausbank” do that Other Lenders Cannot Do?</u>
PRIV	51.2000	Michele MORETTO and Paola VALBONESI: <u>Option to Revoke and Regulation of Local Utilities</u>
PRIV	52.2000	Giancarlo SPAGNOLO: <u>Self-Defeating Antitrust Laws</u>
PRIV	53.2000	William L. MEGGINSON and Maria K. BOUTCHKOVA: <u>The Impact of Privatisation on Capital Market Development and Individual Share Ownership</u>
KNOW	54.2000	Giorgio BARBA NAVARETTI, Marzio GALEOTTI and Andrea MATTOZZI: <u>Moving Skills from Hands to Heads: Import of Technology and Export Performance</u>
ETA	55.2000	Elisabetta STRAZZERA, Riccardo SCARPA, Pinuccia CALIA, Guy GARROD and Ken WILLIS: <u>Modelling Zero Bids in Contingent Valuation Surveys</u>
CLIM	56.2000	Paola CONCONI: <u>Can Green Lobbies Replace a World Environmental Organisation?</u>
VOL	57.2000	Paola CONCONI and Carlo PERRONI (xli) : <u>Issue Linkage and Issue Tie-in in Multilateral Negotiations</u>
ETA	58.2000	Fernando JARAMILLO, Hubert KEMPF and Fabien MOIZEAU (xli): <u>Conspicuous Consumption, Social Status and Clubs</u>
SUST	59.2000	Gianni CICIA and Riccardo SCARPA: <u>Willingness to Pay for Rural Landscape Preservation: A Case Study in Mediterranean Agriculture</u>
CLIM	60.2000	Josef JANSSEN: <u>Will Joint Implementation Survive International Emissions Trading? Distinguishing the Kyoto Mechanisms</u>
CLIM	61.2000	Carlo CARRARO: <u>Costs, Structure and Equity of International Regimes for Climate Change Mitigation</u>
KNOW	62.2000	Alberto BUCCI: <u>On Scale Effects, Market Power and Growth when Human and Technological Capital are Complements</u>
KNOW	63.2000	Alberto BUCCI and H.C. SAGLAM: <u>Growth Maximising Patent Lifetime</u>
WAT	64.2000	Michele MORETTO and Paolo ROSATO: <u>The Value of Licences for Recreational Resources Use</u>
WAT	65.2000	Edi DEFRANCESCO and Paolo ROSATO: <u>Recreation Management in Venice Lagoon</u>
KNOW	66.2000	Carlo DELL'ARINGA and Claudio LUCIFORA: <u>Inside the Black Box: Labour Market Institutions, Wage Formation and Unemployment in Italy</u>
CLIM	67.2000	Erkki KOSKELA, Markku OLLIKAINEN and Mikko PUHAKKA: <u>Renewable Resources in an Overlapping Generations Economy without Capital</u>
CLIM	68.2000	A. Lans BOVENBERG and Lawrence H. GOULDER (xl): <u>Neutralising the Adverse Industry Impacts of CO2 Abatement Policies: What Does it Cost?</u>
KNOW	69.2000	Ioanna KASTELLI: <u>Science and Technology Policy in Greece. Policy Initiatives for R&amp;D Cooperation</u>
CLIM	70.2000	Katrin MILLOCK: <u>Contracts for Clean Development – The Role of Technology Transfers</u>
VOL	71.2000	Alberto CAVALIERE and Fabio FRONTOSO SILVESTRI (xliii): <u>Voluntary Agreements as Information Sharing Devices: Competition and Welfare Effects</u>

VOL	72.2000	Na Li DAWSON and Kathleen SEGERSON (xliii): <u>Voluntary Agreements with Industries: Participation Incentives with Industry-wide Targets</u>
VOL	73.2000	Patricia M. BAILEY (xliii): <u>The Application of Competition Law and Policy to Environmental Agreements in an Oligopolistic Market</u>
VOL	74.2000	Joanna POYAGO-THEOTOKY (xliii): <u>Voluntary Approaches and the Organisation of Environmental R&amp;D</u>
VOL	75.2000	Scott C. MATULICH, Murat SEVER and Fred INABA (xliii): <u>Cooperative Bargaining to Internalise Open Access Externalities: Implications of the American Fisheries Act</u>
VOL	76.2000	Allen BLACKMAN and James BOYD (xliii): <u>Tailored Regulation: Will Voluntary Site-Specific Environmental Performance Standards Improve Welfare?</u>
VOL	77.2000	Vincenzo DENICOLA' (xliii): <u>A Signaling Model of Environmental Overcompliance</u>
VOL	78.2000	Markus A. LEHMANN (xliii): <u>Voluntary Environmental Agreements and Competition Policy. The Case of Germany's Private System for Packaging Waste Recycling</u>
VOL	79.2000	Hans H.B. VEDDER (xliii): <u>Voluntary Agreements and Competition Law</u>
VOL	80.2000	Thomas P. LYON and John W. MAXWELL (xliii): <u>Self-Regulation, Taxation and Public Voluntary Environmental Agreements</u>
VOL	81.2000	Paola MANZINI and Marco MARIOTTI (xliii): <u>A Bargaining Model of Voluntary Environmental Agreements</u>
VOL	82.2000	Alain NADAI and Benoit MOREL (xliii): <u>Product Ecolabelling, Competition and the Environment</u>
CLIM	83.2000	Simone BORGHESI: <u>Income Inequality and the Environmental Kuznets Curve</u>
KNOW	84.2000	Giorgio BRUNELLO and Massimo GIANNINI: <u>Stratified or Comprehensive? The Economic Efficiency of School Design</u>
KNOW	85.2000	Giorgio BRUNELLO, Simona COMI and Claudio LUCIFORA: <u>The College Wage Gap in 10 European Countries: Evidence from Two Cohorts?</u>
ETA	86.2000	Michael FINUS: <u>Game Theory and International Environmental Co-operation: A Survey with an Application to the Kyoto-Protocol</u>
CLIM	87.2000	Clare GOODESS, Jean PALUTIKOF and Maureen AGNEW (xlii): <u>Climate Change Scenarios for the Mediterranean: A Basis for Regional Impact Assessment</u>
CLIM	88.2000	Ian COXHEAD: <u>Tax Reform and the Environment in Developing Economies: Is a Double Dividend Possible?</u>
SUST	89.2000	Peter BARTELMUS and André VESPER (xliv): <u>Green Accounting and Material Flow Analysis. Alternatives or Complements?</u>
SUST	90.2000	Mark DE HAAN and Steven J. KEUNING (xliv): <u>The NAMEA as Validation Instrument for Environmental Macroeconomics</u>
SUST	91.2000	Jochen JESINGHAUS (xliv): <u>On the Art of Aggregating Apples &amp; Oranges</u>
SUST	92.2000	Jan KOLAR (xliv): <u>Land Cover Accounting in the Czech Republic</u>
SUST	93.2000	Anil MARKANDYA, Alistair HUNT and Pamela MASON (xliv): <u>Valuing Damages for Green Accounting Purposes: The GARP II Approach</u>
SUST	94.2000	Anil MARKANDYA, Pamela MASON and Marialuisa TAMBORRA (xliv): <u>Green National Accounting: Synthesising and Extending the Welfare Based and Sustainability-standard Based Approaches</u>
SUST	95.2000	Martin O'CONNOR (xliv): <u>Towards a Typology of "Environmentally-Adjusted" National Sustainability Indicators: Key Concepts and Policy Application</u>
SUST	96.2000	Anton STEURER (xliv): <u>Towards an Environmental Accounting Framework for the EU</u>
SUST	97.2000	Cesare COSTANTINO, Federico FALCITELLI and Angelica TUDINI (xliv): <u>New Developments in Environmental Accounting at Istat</u>
CLIM	98.2000	Stefan BAYER and Claudia KEMFERT: <u>Reaching National Kyoto-Targets in Germany by Maintaining a Sustainable Development</u>
CLIM	99.2000	ZhongXiang ZHANG: <u>An Assessment of the EU Proposal for Ceilings on the Use of Kyoto Flexibility Mechanisms</u>
KNOW	100.2000	Maria Rosa BATTAGGION and Patrizia BUSSOLI: <u>Italian Policy towards Cooperation in R&amp;D</u>
KNOW	101.2000	Giorgio BARBA NAVARETTI, Patrizia BUSSOLI, Georg VON GRAEVENITZ and David ULPH: <u>Information Sharing, Research Coordination and Membership of Research Joint Ventures</u>
WAT	102.2000	Cesare DOSI and William K. EASTER: <u>Water Scarcity: Institutional Change, Water Markets and Privatisation</u>
WAT	103.2000	Cesare DOSI and Naomi ZEITOUNI: <u>Controlling Groundwater Pollution from Agricultural Nonpoint Sources: An Overview of Policy Instruments</u>
KNOW	104.2000	Alberto PETRUCCI: <u>On Debt Neutrality in the Savers-Spenders Theory of Fiscal Policy</u>
SUST	105.2000	Roberto ROSON and Stefano SORIANI: <u>Intermodality and the Changing Role of Nodes in Transport Networks</u>
CLIM	106.2000	Alain BOUSQUET and Pascal FAVARD: <u>Does S. Kuznets' Belief Question the Environmental Kuznets Curves?</u>
CLIM	107.2000	Ottavio JANNI: <u>EU Biodiversity Conservation in Tropical Countries</u>

VOL	108.2000	<i>Katrin MILLOCK and François SALANIE: <u>Collective Environmental Agreements: An Analysis of the Problems of Free-Riding and Collusion</u></i>
VOL	109.2000	<i>Katrin MILLOCK: <u>The Combined Use of Taxation and Voluntary Agreements for Energy Policy</u></i>
VOL	110.2000	<i>Markus A. LEHMANN: <u>The Impact of Voluntary Environmental Agreements on Firms' Incentives for Technology Adoption</u></i>
SUST	1.2001	<i>Inge MAYERES and Stef PROOST: <u>Should Diesel Cars in Europe be Discouraged?</u></i>
SUST	2.2001	<i>Paola DORIA and Davide PETTENELLA: <u>The Decision Making Process in Defining and Protecting Critical Natural Capital</u></i>
CLIM	3.2001	<i>Alberto PENCH: <u>Green Tax Reforms in a Computable General Equilibrium Model for Italy</u></i>
CLIM	4.2001	<i>Maurizio BUSSOLO and Dino PINELLI: <u>Green Taxes: Environment, Employment and Growth</u></i>
CLIM	5.2001	<i>Marco STAMPINI: <u>Tax Reforms and Environmental Policies for Italy</u></i>
ETA	6.2001	<i>Walid OUESLATI: <u>Environmental Fiscal Policy in an Endogenous Growth Model with Human Capital</u></i>
CLIM	7.2001	<i>Umberto CIORBA, Alessandro LANZA and Francesco PAULI: <u>Kyoto Commitment and Emission Trading: a European Union Perspective</u></i>
MGMT	8.2001	<i>Brian SLACK (xlv): <u>Globalisation in Maritime Transportation: Competition, uncertainty and implications for port development strategy</u></i>
VOL	9.2001	<i>Giulia PESARO: <u>Environmental Voluntary Agreements: A New Model of Co-operation Between Public and Economic Actors</u></i>
VOL	10.2001	<i>Cathrine HAGEM: <u>Climate Policy, Asymmetric Information and Firm Survival</u></i>
ETA	11.2001	<i>Sergio CURRARINI and Marco MARINI: <u>A Sequential Approach to the Characteristic Function and the Core in Games with Externalities</u></i>
ETA	12.2001	<i>Gaetano BLOISE, Sergio CURRARINI and Nicholas KIKIDIS: <u>Inflation and Welfare in an OLG Economy with a Privately Provided Public Good</u></i>
KNOW	13.2001	<i>Paolo SURICO: <u>Globalisation and Trade: A "New Economic Geography" Perspective</u></i>
ETA	14.2001	<i>Valentina BOSETTI and Vincenzina MESSINA: <u>Quasi Option Value and Irreversible Choices</u></i>
CLIM	15.2001	<i>Guy ENGELN (xlii): <u>Desertification and Land Degradation in Mediterranean Areas: from Science to Integrated Policy Making</u></i>
SUST	16.2001	<i>Julie Catherine SORS: <u>Measuring Progress Towards Sustainable Development in Venice: A Comparative Assessment of Methods and Approaches</u></i>
SUST	17.2001	<i>Julie Catherine SORS: <u>Public Participation in Local Agenda 21: A Review of Traditional and Innovative Tools</u></i>
CLIM	18.2001	<i>Johan ALBRECHT and Niko GOBBIN: <u>Schumpeter and the Rise of Modern Environmentalism</u></i>
VOL	19.2001	<i>Rinaldo BRAU, Carlo CARRARO and Giulio GOLFETTO (xlili): <u>Participation Incentives and the Design of Voluntary Agreements</u></i>
ETA	20.2001	<i>Paola ROTA: <u>Dynamic Labour Demand with Lumpy and Kinked Adjustment Costs</u></i>
ETA	21.2001	<i>Paola ROTA: <u>Empirical Representation of Firms' Employment Decisions by an (S<sub>s</sub>) Rule</u></i>
ETA	22.2001	<i>Paola ROTA: <u>What Do We Gain by Being Discrete? An Introduction to the Econometrics of Discrete Decision Processes</u></i>
PRIV	23.2001	<i>Stefano BOSI, Guillaume GIRMANS and Michel GUILLARD: <u>Optimal Privatisation Design and Financial Markets</u></i>
KNOW	24.2001	<i>Giorgio BRUNELLO, Claudio LUPI, Patrizia ORDINE, and Maria Luisa PARISI: <u>Beyond National Institutions: Labour Taxes and Regional Unemployment in Italy</u></i>
ETA	25.2001	<i>Klaus CONRAD: <u>Locational Competition under Environmental Regulation when Input Prices and Productivity Differ</u></i>
PRIV	26.2001	<i>Bernardo BORTOLOTTI, Juliet D'SOUZA, Marcella FANTINI and William L. MEGGINSON: <u>Sources of Performance Improvement in Privatised Firms: A Clinical Study of the Global Telecommunications Industry</u></i>
CLIM	27.2001	<i>Frédéric BROCHIER and Emiliano RAMIERI: <u>Climate Change Impacts on the Mediterranean Coastal Zones</u></i>
ETA	28.2001	<i>Nunzio CAPPUCCIO and Michele MORETTO: <u>Comments on the Investment-Uncertainty Relationship in a Real Option Model</u></i>
KNOW	29.2001	<i>Giorgio BRUNELLO: <u>Absolute Risk Aversion and the Returns to Education</u></i>
CLIM	30.2001	<i>ZhongXiang ZHANG: <u>Meeting the Kyoto Targets: The Importance of Developing Country Participation</u></i>
ETA	31.2001	<i>Jonathan D. KAPLAN, Richard E. HOWITT and Y. Hossein FARZIN: <u>An Information-Theoretical Analysis of Budget-Constrained Nonpoint Source Pollution Control</u></i>
MGMT Coalition	32.2001	<i>Roberta SALOMONE and Giulia GALLUCCIO: <u>Environmental Issues and Financial Reporting Trends</u></i>
Theory Network	33.2001	<i>Shlomo WEBER and Hans WIESMETH: <u>From Autarky to Free Trade: The Impact on Environment</u></i>
ETA	34.2001	<i>Margarita GENIUS and Elisabetta STRAZZERA: <u>Model Selection and Tests for Non Nested Contingent Valuation Models: An Assessment of Methods</u></i>

NRM	35.2001	Carlo GIUPPONI: <u>The Substitution of Hazardous Molecules in Production Processes: The Atrazine Case Study in Italian Agriculture</u>
KNOW	36.2001	Raffaele PACI and Francesco PIGLIARU: <u>Technological Diffusion, Spatial Spillovers and Regional Convergence in Europe</u>
PRIV	37.2001	Bernardo BORTOLOTTI: <u>Privatisation, Large Shareholders, and Sequential Auctions of Shares</u>
CLIM	38.2001	Barbara BUCHNER: <u>What Really Happened in The Hague? Report on the COP6, Part I, 13-25 November 2000, The Hague, The Netherlands</u>
PRIV	39.2001	Giacomo CALZOLARI and Carlo SCARPA: <u>Regulation at Home, Competition Abroad: A Theoretical Framework</u>
KNOW	40.2001	Giorgio BRUNELLO: <u>On the Complementarity between Education and Training in Europe</u>
Coalition	41.2001	Alain DESDOIGTS and Fabien MOIZEAU (xlvi): <u>Multiple Politico-Economic Regimes, Inequality and Growth</u>
Theory		
Network		
Coalition	42.2001	Parkash CHANDER and Henry TULKENS (xlvi): <u>Limits to Climate Change</u>
Theory		
Network		
Coalition	43.2001	Michael FINUS and Bianca RUNDSHAGEN (xlvi): <u>Endogenous Coalition Formation in Global Pollution Control</u>
Theory		
Network		
Coalition	44.2001	Wietze LISE, Richard S.J. TOL and Bob van der ZWAAN (xlvi): <u>Negotiating Climate Change as a Social Situation</u>
Theory		
Network		
NRM	45.2001	Mohamad R. KHAWLIE (xlvii): <u>The Impacts of Climate Change on Water Resources of Lebanon-Eastern Mediterranean</u>
NRM	46.2001	Mutasem EL-FADEL and E. BOU-ZEID (xlvii): <u>Climate Change and Water Resources in the Middle East: Vulnerability, Socio-Economic Impacts and Adaptation</u>
NRM	47.2001	Eva IGLESIAS, Alberto GARRIDO and Almudena GOMEZ (xlvii): <u>An Economic Drought Management Index to Evaluate Water Institutions' Performance Under Uncertainty and Climate Change</u>
CLIM	48.2001	Wietze LISE and Richard S.J. TOL (xlvii): <u>Impact of Climate on Tourist Demand</u>
CLIM	49.2001	Francesco BOSELLO, Barbara BUCHNER, Carlo CARRARO and Davide RAGGI: <u>Can Equity Enhance Efficiency? Lessons from the Kyoto Protocol</u>
SUST	50.2001	Roberto ROSON (xlviii): <u>Carbon Leakage in a Small Open Economy with Capital Mobility</u>
SUST	51.2001	Edwin WOERDMAN (xlviii): <u>Developing a European Carbon Trading Market: Will Permit Allocation Distort Competition and Lead to State Aid?</u>
SUST	52.2001	Richard N. COOPER (xlviii): <u>The Kyoto Protocol: A Flawed Concept</u>
SUST	53.2001	Kari KANGAS (xlviii): <u>Trade Liberalisation, Changing Forest Management and Roundwood Trade in Europe</u>
SUST	54.2001	Xueqin ZHU and Ekko VAN IERLAND (xlviii): <u>Effects of the Enlargement of EU on Trade and the Environment</u>
SUST	55.2001	M. Ozgur KAYALICA and Sajal LAHIRI (xlviii): <u>Strategic Environmental Policies in the Presence of Foreign Direct Investment</u>
SUST	56.2001	Savas ALPAY (xlviii): <u>Can Environmental Regulations be Compatible with Higher International Competitiveness? Some New Theoretical Insights</u>
SUST	57.2001	Roldan MURADIAN, Martin O'CONNOR, Joan MARTINEZ-ALER (xlviii): <u>Embodied Pollution in Trade: Estimating the "Environmental Load Displacement" of Industrialised Countries</u>
SUST	58.2001	Matthew R. AUER and Rafael REUVENY (xlviii): <u>Foreign Aid and Direct Investment: Key Players in the Environmental Restoration of Central and Eastern Europe</u>
SUST	59.2001	Onno J. KUIK and Frans H. OOSTERHUIS (xlviii): <u>Lessons from the Southern Enlargement of the EU for the Environmental Dimensions of Eastern Enlargement, in particular for Poland</u>
ETA	60.2001	Carlo CARRARO, Alessandra POME and Domenico SINISCALCO (xlix): <u>Science vs. Profit in Research: Lessons from the Human Genome Project</u>
CLIM	61.2001	Efrem CASTELNUOVO, Michele MORETTO and Sergio VERGALLI: <u>Global Warming, Uncertainty and Endogenous Technical Change: Implications for Kyoto</u>
PRIV	62.2001	Gian Luigi ALBANO, Fabrizio GERMANO and Stefano LOVO: <u>On Some Collusive and Signaling Equilibria in Ascending Auctions for Multiple Objects</u>
CLIM	63.2001	Elbert DIJKGRAAF and Herman R.J. VOLLEBERGH: <u>A Note on Testing for Environmental Kuznets Curves with Panel Data</u>
CLIM	64.2001	Paolo BUONANNO, Carlo CARRARO and Marzio GALEOTTI: <u>Endogenous Induced Technical Change and the Costs of Kyoto</u>
CLIM	65.2001	Guido CAZZAVILLAN and Ignazio MUSU (l): <u>Transitional Dynamics and Uniqueness of the Balanced-Growth Path in a Simple Model of Endogenous Growth with an Environmental Asset</u>
CLIM	66.2001	Giovanni BAIOCCHI and Salvatore DI FALCO (l): <u>Investigating the Shape of the EKC: A Nonparametric Approach</u>

CLIM	67.2001	Marzio GALEOTTI, Alessandro LANZA and Francesco PAULI (l): <u>Desperately Seeking (Environmental) Kuznets: A New Look at the Evidence</u>
CLIM	68.2001	Alexey VIKHLYAEV (xlviii): <u>The Use of Trade Measures for Environmental Purposes – Globally and in the EU Context</u>
NRM	69.2001	Gary D. LIBECAP and Zeynep K. HANSEN (li): <u>U.S. Land Policy, Property Rights, and the Dust Bowl of the 1930s</u>
NRM	70.2001	Lee J. ALSTON, Gary D. LIBECAP and Bernardo MUELLER (li): <u>Land Reform Policies, The Sources of Violent Conflict and Implications for Deforestation in the Brazilian Amazon</u>
CLIM	71.2001	Claudia KEMFERT: <u>Economy-Energy-Climate Interaction – The Model WIAGEM -</u>
SUST	72.2001	Paulo A.L.D. NUNES and Yohanes E. RIYANTO: <u>Policy Instruments for Creating Markets for Biodiversity: Certification and Ecolabeling</u>
SUST	73.2001	Paulo A.L.D. NUNES and Erik SCHOKKAERT (lii): <u>Warm Glow and Embedding in Contingent Valuation</u>
SUST	74.2001	Paulo A.L.D. NUNES, Jeroen C.J.M. van den BERGH and Peter NIJKAMP (lii): <u>Ecological-Economic Analysis and Valuation of Biodiversity</u>
VOL	75.2001	Johan EYCKMANS and Henry TULKENS (li): <u>Simulating Coalitionally Stable Burden Sharing Agreements for the Climate Change Problem</u>
PRIV	76.2001	Axel GAUTIER and Florian HEIDER: <u>What Do Internal Capital Markets Do? Redistribution vs. Incentives</u>
PRIV	77.2001	Bernardo BORTOLOTTI, Marcella FANTINI and Domenico SINISCALCO: <u>Privatisation around the World: New Evidence from Panel Data</u>
ETA	78.2001	Toke S. AIDT and Jayasri DUTTA (li): <u>Transitional Politics. Emerging Incentive-based Instruments in Environmental Regulation</u>
ETA	79.2001	Alberto PETRUCCI: <u>Consumption Taxation and Endogenous Growth in a Model with New Generations</u>
ETA	80.2001	Pierre LASSERRE and Antoine SOUBEYRAN (li): <u>A Ricardian Model of the Tragedy of the Commons</u>
ETA	81.2001	Pierre COURTOIS, Jean Christophe PÉREAU and Tarik TAZDAÏT: <u>An Evolutionary Approach to the Climate Change Negotiation Game</u>
NRM	82.2001	Christophe BONTEMPS, Stéphane COUTURE and Pascal FAVARD: <u>Is the Irrigation Water Demand Really Convex?</u>
NRM	83.2001	Unai PASCUAL and Edward BARBIER: <u>A Model of Optimal Labour and Soil Use with Shifting Cultivation</u>
CLIM	84.2001	Jesper JENSEN and Martin Hvidt THELLE: <u>What are the Gains from a Multi-Gas Strategy?</u>
CLIM	85.2001	Maurizio MICHELINI (liii): IPCC “Summary for Policymakers” in TAR. <u>Do its results give a scientific support always adequate to the urgencies of Kyoto negotiations?</u>
CLIM	86.2001	Claudia KEMFERT (liii): <u>Economic Impact Assessment of Alternative Climate Policy Strategies</u>
CLIM	87.2001	Cesare DOSI and Michele MORETTO: <u>Global Warming and Financial Umbrellas</u>
ETA	88.2001	Elena BONTEMPI, Alessandra DEL BOCA, Alessandra FRANZOSI, Marzio GALEOTTI and Paola ROTA: <u>Capital Heterogeneity: Does it Matter? Fundamental Q and Investment on a Panel of Italian Firms</u>
ETA	89.2001	Efrem CASTELNUOVO and Paolo SURICO: <u>Model Uncertainty, Optimal Monetary Policy and the Preferences of the Fed</u>
CLIM	90.2001	Umberto CIORBA, Alessandro LANZA and Francesco PAULI: <u>Kyoto Protocol and Emission Trading: Does the US Make a Difference?</u>

(xxxvi) This paper was presented at the Second EFIEA Policy Workshop on “Integrating Climate Policies in the European Environment. Costs and Opportunities”, organised by the Fondazione Eni Enrico Mattei on behalf of the European Forum on Integrated Environmental Assessment, Milan, March 4-6, 1999

(xxxvii) This paper was presented at the Fourth Meeting of the Coalition Theory Network organised by the Fondazione Eni Enrico Mattei, CORE of Louvain-la-Neuve and GREQAM of Marseille, Aix-en-Provence, January 8-9, 1999

(xxxviii) This paper was presented at the International Conference on “Trade and Competition in the WTO and Beyond” organised by the Fondazione Eni Enrico Mattei and the Department of International Studies of the University of Padua, Venice, December 4-5, 1998

(xxxix) This paper was presented at the 3<sup>rd</sup> Toulouse Conference on Environment and Resource Economics, organised by Fondazione Eni Enrico Mattei, IDEI and INRA and sponsored by MATE on “Environment, Energy Uses and Climate Change”, Toulouse, June 14-16, 1999

(xl) This paper was presented at the conference on “Distributional and Behavioral Effects of Environmental Policy” jointly organised by the National Bureau of Economic Research and Fondazione Eni Enrico Mattei, Milan, June 11-12, 1999

(xli) This paper was presented at the Fifth Meeting of the Coalition Theory Network organised by the Fondazione Eni Enrico Mattei and the CODE, Universitat Autònoma de Barcelona, Barcelona January 21-22, 2000

(xlii) This paper was presented at the International Workshop on "Climate Change and Mediterranean Coastal Systems: Regional Scenarios and Vulnerability Assessment" organised by the Fondazione Eni Enrico Mattei in co-operation with the Istituto Veneto di Scienze, Lettere ed Arti, Venice, December 9-10, 1999.

(xliii) This paper was presented at the International Workshop on “Voluntary Approaches, Competition and Competitiveness” organised by the Fondazione Eni Enrico Mattei within the research activities of the CAVA Network, Milan, May 25-26, 2000.

(xliv) This paper was presented at the International Workshop on “Green National Accounting in Europe: Comparison of Methods and Experiences” organised by the Fondazione Eni Enrico Mattei within the Concerted Action of Environmental Valuation in Europe (EVE), Milan, March 4-7, 2000

(xlv) This paper was presented at the International Workshop on “New Ports and Urban and Regional Development. The Dynamics of Sustainability” organised by the Fondazione Eni Enrico Mattei, Venice, May 5-6, 2000.

(xlvi) This paper was presented at the Sixth Meeting of the Coalition Theory Network organised by the Fondazione Eni Enrico Mattei and the CORE, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, January 26-27, 2001

(xlvii) This paper was presented at the RICAMARE Workshop “Socioeconomic Assessments of Climate Change in the Mediterranean: Impact, Adaptation and Mitigation Co-benefits”, organised by the Fondazione Eni Enrico Mattei, Milan, February 9-10, 2001

(xlviii) This paper was presented at the International Workshop “Trade and the Environment in the Perspective of the EU Enlargement”, organised by the Fondazione Eni Enrico Mattei, Milan, May 17-18, 2001

(xlix) This paper was presented at the International Conference “Knowledge as an Economic Good”, organised by Fondazione Eni Enrico Mattei and The Beijer International Institute of Environmental Economics, Palermo, April 20-21, 2001

(l) This paper was presented at the Workshop “Growth, Environmental Policies and + Sustainability” organised by the Fondazione Eni Enrico Mattei, Venice, June 1, 2001

(li) This paper was presented at the Fourth Toulouse Conference on Environment and Resource Economics on “Property Rights, Institutions and Management of Environmental and Natural Resources”, organised by Fondazione Eni Enrico Mattei, IDEI and INRA and sponsored by MATE, Toulouse, May 3-4, 2001

(lii) This paper was presented at the International Conference on “Economic Valuation of Environmental Goods”, organised by Fondazione Eni Enrico Mattei in cooperation with CORILA, Venice, May 11, 2001

(liii) This paper was circulated at the International Conference on “Climate Policy – Do We Need a New Approach?”, jointly organised by Fondazione Eni Enrico Mattei, Stanford University and Venice International University, Isola di San Servolo, Venice, September 6-8, 2001

## 2000 SERIES

<b>MGMT</b>	<i>Corporate Sustainable Management</i> (Editor: Andrea Marsanich)
<b>CLIM</b>	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti )
<b>PRIV</b>	<i>Privatisation, Antitrust, Regulation</i> (Editor: Bernardo Bortolotti)
<b>KNOW</b>	<i>Knowledge, Technology, Human Capital</i> (Editor: Dino Pinelli)
<b>WAT</b>	<i>Water and Natural Resources Management</i> (Editor: Carlo Giupponi)
<b>SUST</b>	<i>Sustainability Indicators and Impact Assessment</i> (Editor: Marialuisa Tamborra)
<b>VOL</b>	<i>Task Force on Voluntary Agreements</i> (Editor: Rinaldo Brau)
<b>ETA</b>	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)

## 2001 SERIES

<b>MGMT</b>	<i>Corporate Sustainable Management</i> (Editor: Andrea Marsanich)
<b>CLIM</b>	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti )
<b>PRIV</b>	<i>Privatisation, Antitrust, Regulation</i> (Editor: Bernardo Bortolotti)
<b>KNOW</b>	<i>Knowledge, Technology, Human Capital</i> (Editor: Dino Pinelli)
<b>NRM</b>	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
<b>SUST</b>	<i>Sustainability Indicators and Environmental Evaluation</i> (Editor: Marialuisa Tamborra)
<b>VOL</b>	<i>Voluntary and International Agreements</i> (Editor: Carlo Carraro)
<b>ETA</b>	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)

## SUBSCRIPTION TO "NOTE DI LAVORO"

Starting from January 1998 Fondazione Eni Enrico Mattei issues a Periodic E-mail "Note di Lavoro" Bulletin listing the titles and the abstracts of its most recent Working Papers.

All the "Note di Lavoro" listed in the Bulletin are available on the Internet and are downloadable from Feem's web site "www.feem.it".

If you wish to receive hard copies you may choose from the payment options listed in the following table (minimum order: 10 papers)\*.

\*Orders for individual papers should clearly indicate the "Nota di Lavoro" number and can therefore be issued for published papers only.

All orders must be sent by fax to:

"Publications Office" - Fondazione Eni Enrico Mattei: Fax +39+2+52036946

### PAYMENT OPTIONS

How many papers?	What's the price?	How to pay?
10 or more*	US\$ 4.00 each ITL 7,000 each	By Credit card or Bank transfer
Annual subscription (approx. 100 papers/year)	US\$ 250.00 ITL 425,000	By Credit card or Bank transfer

**\*Please fill out the Working Paper Subscription Form indicating your preferences (Periodic E-mail "Note di Lavoro" Bulletin, Annual subscription, Order for individual papers - minimum 10\*)!**

✂.....

### WORKING PAPER SUBSCRIPTION FORM

Name: \_\_\_\_\_

Affiliation(if applicable): \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ E-mail: \_\_\_\_\_

I wish to: \_\_\_\_\_ Amount due: \_\_\_\_\_

☐ receive the Periodic E-mail Working Papers Bulletin

☐ place a full annual subscription for 2001 (US\$ 250.00/ITL 425,000) \_\_\_\_\_

☐ order no.....individual papers (minimum 10 papers at US\$ 4.00/ITL 7,000 each)\* \_\_\_\_\_

Total \_\_\_\_\_

I will pay by:

☐ VISA ☐ American Express Card No. \_\_\_\_\_ Expiration Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Bank transfer in US\$ (or Italian Lire in Italy) to Fondazione Eni Enrico Mattei - account no. 39341-56 -

SWIFT ARTIITM2 - ABI 03512 - CAB 01614 - Credito Artigiano - Corso Magenta 59, 20123 Milano, Italy.

**Copy of the bank transfer should be faxed along with the order.**

**Please return this duly completed form to:**

**"Publications Office" - Fondazione Eni Enrico Mattei - Corso Magenta, 63 - 20123 Milano, Italy**