

Eyckmans, Johan; Finus, Michael

Working Paper

An Almost Ideal Sharing Scheme for Coalition Games with Externalities

Nota di Lavoro, No. 155.2004

Provided in Cooperation with:

Fondazione Eni Enrico Mattei (FEEM)

Suggested Citation: Eyckmans, Johan; Finus, Michael (2004) : An Almost Ideal Sharing Scheme for Coalition Games with Externalities, Nota di Lavoro, No. 155.2004, Fondazione Eni Enrico Mattei (FEEM), Milano

This Version is available at:

<https://hdl.handle.net/10419/74061>

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.

**An Almost Ideal Sharing Scheme
for Coalition Games with
Externalities**

Johan Eyckmans and Michael Finus

NOTA DI LAVORO 155.2004

DECEMBER 2004

CTN – Coalition Theory Network

Johan Eyckmans, *Europese Hogeschool Brussel EHSAL
and Katholieke Universiteit Leuven, Centrum voor Economische Studiën*
Michael Finus, *Institute of Economic Theory, Department of Economics, University of Hagen*

This paper can be downloaded without charge at:

The Fondazione Eni Enrico Mattei Note di Lavoro Series Index:
<http://www.feem.it/Feem/Pub/Publications/WPapers/default.htm>

Social Science Research Network Electronic Paper Collection:
<http://ssrn.com/abstract=643641>

The opinions expressed in this paper do not necessarily reflect the position of
Fondazione Eni Enrico Mattei
Corso Magenta, 63, 20123 Milano (I), web site: www.feem.it, e-mail: working.papers@feem.it

An Almost Ideal Sharing Scheme for Coalition Games with Externalities

Summary

We propose a class of sharing schemes for the distribution of the gains from cooperation for coalition games with externalities. In the context of the partition function, it is shown that any member of this class of sharing schemes leads to the same set of stable coalitions in the sense of d'Aspremont et al. (1983). These schemes are “almost ideal” in that they stabilize these coalitions which generate the highest global welfare among the set of “potentially stable coalitions”. Our sharing scheme is particularly powerful for economic problems that are characterized by positive externalities from coalition formation and which therefore are likely to suffer from severe free-riding.

Keywords: Coalition games, Partition function, Externalities, Sharing schemes

JEL Classification: C70, C71

The authors gratefully acknowledge comments and suggestions by Luc Lauwers on an early draft, discussions with Alfred Endres, and research assistance by Carmen Dunsche. This paper has been written while M. Finus was a visiting scholar at the Katholieke Universiteit Leuven, Centrum voor Economische Studiën (Leuven, Belgium). He acknowledges the financial support by the CLIMNEG 2 project funded by the Belgian Federal Science Policy Office.

Address for correspondence:

Johan Eyckmans
Europese Hogeschool Brussel EHSAL and Katholieke Universiteit Leuven
Stormstraat 2
Brussels B-1000
Belgium
E-mail: Johan.Eyckmans@econ.kuleuven.ac.be

1. Introduction

The “*classical approach*” of studying the formation of coalitions assumes a transferable utility (TU)-framework and is based on the *characteristic function*.¹ This function assigns to every coalition a worth which is the aggregate payoff that a coalition can secure for its members, irrespective of the behavior of players outside this coalition. The main focus of the “classical approach” is the division of the worth among coalition members. Important research items include the axiomatic characterization of division rules like Shapley value or Nash bargaining solution (see, e.g., Thomson 1995) and existence proofs of core stable solutions for particular economic environments (see, e.g., Moulin 1988). A strength of the “classical approach” is the generality of results that can be often established using only some standard properties like superadditivity or convexity.²

Recently, most papers on coalition formation follow a “*new approach*” based on the *partition function*.³ This function also assigns a worth to every coalition but this worth depends on the entire coalition structure, i.e., the partition of players inside and outside a coalition. The main focus of the “new approach” is the prediction of equilibrium coalition structures and the analysis how the presence of externalities affects the success of coalition formation. One of the strengths of the “new approach” is that it relates the success or failure of coalition formation to the kind of externality (positive versus negative externality).⁴ For instance, it emerges from the literature that positive (negative) externalities provide an incentive for players to free-ride (cooperate), leading to small (large) stable coalitions. Typical examples of positive externalities are for instance output cartels and international environmental agreements. Firms not involved in an output cartel benefit from lower output by the cartel via higher market prices. Similarly, countries not involved in an international environmental agreement benefit from lower emissions by signatories via lower environmental damages. In

¹ An excellent overview of the “classical approach” and the “new approach” mentioned below is provided in Bloch (2003).

² Roughly speaking, superadditivity means that the joint worth of coalitions is higher when they merge than when they act separately (see section 2 for a formal definition). Convexity means that there are increasing returns to mergers: big coalitions gain more from mergers than small coalitions.

³ For an overview of the “new approach”, see, apart from Bloch (2003), also Yi (1997 and 2003).

⁴ Roughly speaking, positive (negative) externality means that the worth of coalitions increase (decrease) if other coalitions, i.e., outsiders, merge. See section 2 for a formal definition.

contrast, countries forming customs unions that abolish taxes among members but impose a common external tariff on outsiders exhibit a negative externality on non-members.⁵

Until now, however, the literature following the “new approach” has paid little attention to the division of the gains from cooperation. Due to the complexity of the partition function, most papers assume a fixed sharing rule.⁶ One set of papers assumes ex-ante symmetric players in which case equal sharing emerges as “natural” division rule.⁷ However, symmetry is a strong assumption that is difficult to justify in most economic environments. Another set of papers – mainly related to the analysis of international environmental agreements⁸ - allows for asymmetric players but assumes a particular (exogenous) sharing rule of which most are solution concepts of the “classical approach” or modifications of them. Clearly, this alternative is also not satisfactory for at least three reasons. First, sharing rules are ad hoc and mostly lack a sound motivation in the context of the partition function. Second, the prediction of equilibrium coalition structures is sensitive to the specification of sharing rules. Third, no information is available whether there exist other sharing rules that could do better from a global point of view, let alone whether there exists a sharing rule that is “optimal”.

From the discussion of the shortcoming of the “new approach”, two routes for future research seem suggestive. The first route could be in the tradition of a positive analysis, aiming at endogenizing the sharing rule in the process of coalition formation. This route is pursued for instance by Ray/Vohra (1999) and Maskin (2003). The second route could be in the tradition of a normative analysis and therefore also in the tradition of the classical approach (e.g., Chander and Tulkens 1997), searching for an optimal sharing rule.

In this paper, we take one modest step along this second route in the context of the “new approach”. We illustrate our ideas with the well-known cartel formation game and the concept of internal and external stability of d’Aspremont et al. (1983): players have only the choice to remain at the fringe (i.e., singleton coalition) or joining the cartel (i.e., non-trivial coalition) and the cartel is called stable if no cartel member has an incentive to leave (internal stability) and no outsider has an incentive to join (external stability) the cartel.

⁵ See Bloch (2003) and Yi (2003) for details and other examples.

⁶ The individual payoffs derived from a particular sharing rule are called valuations. See section 2 for details.

⁷ See the literature cited in Bloch (2003) and Yi (1997 and 2003).

⁸ See for instance Barrett (1997 and 2001), Bosello, Buchner and Carraro (2003), Botteon and Carraro (1997) and Eyckmans and Finus (2003).

Our analysis proceeds in five steps (relating to five propositions). First, we motivate our “*almost ideal sharing scheme*” (AISS) by introducing the notion of “*potentially internally stable coalitions*” (PISC). “Almost ideal” indicates that - in the presence of externalities - it may only be possible to stabilize a subset of the set of coalitions through a sharing scheme, namely only those that are “potentially internally stable”. This will be particularly relevant for positive externality games in which large coalitions are typically not potentially internally stable due to strong free-rider incentives.⁹ “Sharing scheme” indicates that we do not propose a particular solution but a class of sharing rules that stabilizes all PISC. Second, we demonstrate robustness of our sharing scheme: even though AISS only aims at stabilizing all PISC, the set of stable coalitions (internally *and* externally stable coalitions) will be the same for any sharing solution belonging to AISS. Third, we show optimality of AISS in the context of positive externalities (implying that free-rider incentives are particularly pronounced) and superadditivity. That is, the PISC with the highest global worth will be among the set of stable coalitions. Fourth, we relate AISS to individual rationality and, fifth, we prove existence of stable coalitions under AISS.

From our results in section 3, it will be apparent that they apply to many economic problems where the success of cooperation depends on the burden sharing arrangement among coalition members. Our sharing scheme is particularly useful for improving upon the success of cooperation when coalition formation exhibits positive externalities on outsiders and therefore free-riding is an important problem. Examples of such economic problems are abundant and include for instance international agreements between governments in order to coordinate monetary policy (e.g., Kohler 2002), pollution control (e.g., Hoel 1992, Barrett 2001 and Bosello et al. 2003), the management of high seas fisheries stocks (e.g., Pintassilgo 2003), programs to eradicate contagious diseases (e.g., Arce M. and Sandler 2003) and efforts to combat international terrorism (e.g., Sandler and Enders 2004). However, before turning to our main results in section 3, we introduce some notation and definitions in section 2. Finally, section 4 raps up the main findings and points to some issues of future research.

2. Preliminaries

Let $\Gamma(N, \pi)$ be a coalition game between n (≥ 2) players. A coalition S is a subset of the set of players $N = \{1, \dots, n\}$ and the set of all possible coalitions of N is denoted by 2^N , i.e., the power set of N . In this paper, we restrict attention to coalition structures consisting of no more

⁹ For examples, see the literature cited in footnote 8 and the literature cited in Bloch (2003) and Yi (2003).

than one non-trivial or non-singleton coalition S (the cartel) while all other players $j \in N \setminus S$ are singletons (the fringe). In this setting, a coalition structure is fully characterized by coalition S . We define a partition function π that assigns a single real number $\pi_S(S)$ to coalition S and real numbers $\pi_j(S)$ to every singleton $j \in N \setminus S$ of the fringe:

$$[1] \quad \pi : S \mapsto \pi(S) = (\pi_S(S), \pi_j(S)) \in \mathbb{R}^{1+(n-s)} \quad \text{with } j \in N \setminus S.$$

The domain of this partition function is the power set of N . The image of this mapping is a vector of variable size $(1+(n-s))$, depending on s , i.e., the cardinality of coalition S , and on n , the total number of players. Thus, our partition function is a special case of the general definition of partition functions (see, e.g., Bloch 2003 and Yi 2003) since it disregards all partitions that consist of two or more non-trivial coalitions. In contrast to the characteristic function used in the “classical approach”, the partition function assigns not only a worth to coalition S but also to the outsiders of this coalition. This is an important information for analyzing games with externalities.

As mentioned in the Introduction, most papers following the “new approach” base their analysis of coalition formation not on the aggregate payoff to a coalition (i.e., worth) but on the individual payoff to coalition members. A *valuation function* maps coalition structures into a vector of individual payoffs - called *valuations*. In our single coalition setting, a valuation function assigns to every coalition S of N a real-valued vector of length n , $v : 2^N \rightarrow \mathbb{R}^n : S \mapsto v(S)$, such that:

$$[2] \quad \begin{cases} \sum_{i \in S} v_i(S) = \pi_S(S) \\ v_j(S) = \pi_j(S) \quad \forall j \in N \setminus S. \end{cases}$$

For every coalition S , the valuation function v specifies how the worth of coalition S is allocated among its members. By construction, valuations $v_i(S)$ are *group rational*, meaning that the entire worth of coalition S is distributed among its members. For the outsiders to coalition S , the valuations $v_j(S)$ coincide with the worth $\pi_j(S)$ that are assigned by the partition function.

Note the difference between the concept of a valuation and an imputation known from the “classical approach”. An imputation is usually only one vector of length n , listing the payoff to each player in the grand coalition ($S=N$) whereas a valuation function assigns vectors of length n to every possible coalition (structure), specifying individual payoffs to coalition members *and* outsiders. This more comprehensive view is necessary to capture externalities

across coalitions and players (see Definition 2 below) and since - a priori - the “new approach” does not rule out inefficient coalition structures as potential equilibrium candidates. We subsequently turn to two properties that prove helpful for characterizing partition functions.

Definition 1: Superadditivity

A coalition game $\Gamma(N, \pi)$ is superadditive (SA) if and only if its partition function π satisfies: $\forall S \subseteq N, \forall i \in S: \pi_S(S) \geq \pi_{S \setminus \{i\}}(S \setminus \{i\}) + \pi_i(S \setminus \{i\})$.

Superadditivity means that the worth from cooperation cannot decrease. SA is a mild and standard assumption and is often motivated by arguing that “even if two coalitions merge, they always have the option of behaving as they did when they were separate, and so their total payoff should not fall” (Maskin 2003, p. 9).

Definition 2: Positive Externalities

A coalition game $\Gamma(N, \pi)$ exhibits positive externalities (PE) if and only if its partition function π satisfies: $\forall S \subseteq N, \forall j \neq i, j \notin S: \pi_j(S) \geq \pi_j(S \setminus \{i\})$ and $\exists k \neq i, k \notin S: \pi_k(S) > \pi_k(S \setminus \{i\})$.

Positive externalities imply that outsiders to coalition S do not lose from the accession of player i to S . We assume a strictly positive effect for at least one outsider in order to rule out neutral effects of coalition formation. Negative externalities can be defined in a similar way. However, we omit this definition since it is not used in the following. Instead, we introduce the notion of stable coalitions according to d’Aspremont et al. (1983).

Definition 3: Internally and Externally Stable Coalitions

Let v be a valuation function for coalition game $\Gamma(N, \pi)$ and $v(S) \in \mathbb{R}^n$ the vector of valuations for the players in N when coalition S forms. Coalition S is stable with respect to the valuations $v(S)$ if and only if:

- internal stability (IS): $v_i(S) \geq v_i(S \setminus \{i\}) \quad \forall i \in S$
- external stability (ES): $v_j(S) \geq v_j(S \cup \{j\}) \quad \forall j \in N \setminus S$.

Definition 3 says that a coalition S is stable if no insider wants to leave and no outsider wants to join coalition S . Obviously, given a coalition game $\Gamma(N, \pi)$, there are many possible valuation functions which can be derived from its partition function. Consequently, a coalition S may be stable with respect to a particular valuation function v but may not be stable with

respect to another valuation function v' . Therefore, we denote the set of coalitions that are internally stable with respect to valuation function v by $\Sigma^{IS}(v)$, the set of coalitions that are externally stable by $\Sigma^{ES}(v)$ and the set of *stable coalitions* by $\Sigma^S(v) = \Sigma^{IS}(v) \cap \Sigma^{ES}(v)$.

Since it is our ambition to study the impact of coalitional surplus sharing rules on the stability of coalitions in a more general framework, the use of one specific valuation function would be too restrictive. Therefore, we introduce a class of valuation functions and study the stability properties of its members. We call a member of this class of valuation functions an “almost ideal sharing scheme”.

Definition 4: Almost Ideal Sharing Scheme

An *Almost Ideal Sharing Scheme* (AISS) for coalition game $\Gamma(N, \pi)$ is a valuation function v^λ that satisfies:

$$\forall S \subseteq N: \begin{cases} \forall i \in S: & v_i^\lambda(S) = \pi_i(S \setminus \{i\}) + \lambda_i(S) \sigma(S) \\ \forall j \in N \setminus S: & v_j^\lambda(S) = \pi_j(S) \end{cases}$$

with $\lambda(S) \in \Delta^{s-1} = \left\{ \lambda \in \mathbb{R}_+^s \mid \sum_{j \in S} \lambda_j = 1 \right\}$ and $\sigma(S) = \pi_S(S) - \sum_{i \in S} \pi_i(S \setminus \{i\})$

where Δ^{s-1} denotes the set of all possible sharing weights for a coalition of s players and $\sigma(S)$ denotes the surplus (or deficit) of coalition S over the sum of free-rider payoffs $\pi_i(S \setminus \{i\})$ of its members. An AISS allocates to each coalition member its free-rider payoff, plus some share of the remaining surplus. The free-rider payoffs are associated with the scenario in which an individual coalition member leaves coalition S in order to become a singleton while the remaining members of coalition S continue to cooperate. These payoffs constitute lower bounds on the claims of individual coalition members with respect to the coalitional surplus in order *not* to leave the coalition. Thus, the free-rider payoff $\pi_i(S \setminus \{i\})$ may be regarded as the threat point of player i in coalition S and its weight $\lambda_i(S)$ may be interpreted as his bargaining power.

Note that there are as many AISS valuation functions for a coalition game $\Gamma(N, \pi)$ as there are ways to share in every possible coalition S of N the coalition surplus $\sigma(S)$ among its members. The set of all possible AISS valuation functions for game $\Gamma(N, \pi)$ will be denoted by $\mathcal{V}(\Gamma)$. It should also be noted that the surplus $\sigma(S)$ might be negative. That is, free-rider incentives may be so strong that the total sum of the free-rider payoffs is larger than the worth of the coalition. In this case, it is not possible to satisfy the claims of all coalition members and AISS will share the deficit according to weights $\lambda(S)$. We use the sign of $\sigma(S)$ to classify coalitions.

Definition 5: Potentially Internally Stable Coalitions

A coalition S is called *potentially internally stable* (PIS) for partition function π if and only if: $\pi_S(S) \geq \sum_{i \in S} \pi_i(S \setminus \{i\})$, i.e., $\sigma(S) \geq 0$.

We denote the set of coalitions that are PIS for a particular partition function π by $\Sigma^{\text{PIS}}(\pi)$. Note that PIS is a property of the partition function whereas internal stability (IS) - and also external stability (ES) - are properties of a specific valuation function.

3. Results

The construction of AISS valuation functions in Definition 4 suggests that they are designed to remedy free-riding in terms of internal stability. Therefore, Proposition 1 shows that every coalition that is potentially internally stable will be internally stable for any AISS valuation function.

Proposition 1: AISS and Potential Internal Stability

Let $S \subseteq N$ be a coalition that is potentially internally stable, then S is internally stable for any AISS valuation function $v^\lambda \in \mathcal{V}(\Gamma)$.

Proof: Suppose that coalition S was PIS, implying $\sigma(S) \geq 0$ by Definition 5, but assume to the contrary that there existed a valuation $v^\lambda \in \mathcal{V}(\Gamma)$ such that coalition S would not be internally stable with respect to this valuation function. Then, $\pi_i(S \setminus \{i\}) + \lambda_i(S) \sigma(S) = v_i^\lambda(S) < v_i^\lambda(S \setminus \{i\}) = \pi_i(S \setminus \{i\})$ and hence $\sigma(S) < 0$ which contradicts the initial assumption.

QED

The importance of Proposition 1 derives from three facts. First, internal stability is a necessary condition for a stable coalition, but is often violated for larger coalitions in positive externality games (see footnote 8). Second, any AISS valuation function ensures that every coalition that is potentially internally stable will actually be internally stable. As shown in Eyckmans and Finus (2003), other solution concepts may miss this potential substantially. Third, there is some degree of freedom in the choice of the sharing solution (through the choice of weights $\lambda(S)$) when aiming at stabilizing coalitions internally. The last observation is also supported by Proposition 2 below. On the way to this result, we establish first Lemma 1 which will turn out to be useful in the sequel because it establishes an important link between internal and external stability for valuations derived from AISS.

Lemma 1: AISS, Externally and Potentially Internally Stable Coalitions

Consider a coalition game $\Gamma(N, \pi)$ and the class of AISS valuation functions $\mathcal{V}(\Gamma)$. For any valuation function $v^\lambda \in \mathcal{V}(\Gamma)$, coalition S is not externally stable with respect to v^λ if and only if there exists a $j \in N \setminus S$ such that coalition $S \cup \{j\}$ is potentially internally stable.

Proof: Coalition S is not externally stable with respect to v^λ if and only if $\exists j \in N \setminus S: v_j^\lambda(S \cup \{j\}) > v_j^\lambda(S)$. This is equivalent to $\pi_j(S) + \lambda_j(S \cup \{j\}) \sigma(S \cup \{j\}) > \pi_j(S)$ or $\sigma(S \cup \{j\}) > 0$, implying that $S \cup \{j\}$ is PIS. **QED**

An immediate corollary - the negation of Lemma 1 – is that a coalition S is externally stable if and only if for all $j \in N \setminus S$ coalition $S \cup \{j\}$ is not potentially internally stable. Another equivalent way is to say that coalition S is potentially internally stable if and only if for all $j \in S$ coalition $S \setminus \{j\}$ is not externally stable. It is important to note that Lemma 1 is a distinctive property of AISS valuation functions and may not hold for other valuation functions that are not AISS.

We now turn to our second result (Proposition 2) which shows that the set of stable coalitions is independent of the specific weights for any sharing solution in AISS. Hence, it constitutes some kind of invariance or robustness result. It contrasts with some of the literature (see footnote 8) that find different stable outcomes for various sharing rules.

Proposition 2: AISS and Robustness

Consider a coalition game $\Gamma(N, \pi)$ and the class of AISS valuation functions $\mathcal{V}(\Gamma)$. Let v^λ and $v^{\lambda'}$ be two AISS valuation functions in $\mathcal{V}(\Gamma)$, then i) $\Sigma^{IS}(v^\lambda) = \Sigma^{IS}(v^{\lambda'})$, ii) $\Sigma^{ES}(v^\lambda) = \Sigma^{ES}(v^{\lambda'})$ and iii) $\Sigma^S(v^\lambda) = \Sigma^S(v^{\lambda'})$.

Proof: i) Follows from Proposition 1. ii) We show that $S \in \Sigma^{ES}(v^\lambda) \Leftrightarrow S \in \Sigma^{ES}(v^{\lambda'})$. Note that $S \in \Sigma^{ES}(v^\lambda)$ implies $\forall j \in N \setminus S: S \cup \{j\}$ is not PIS according to Lemma 1. Therefore, $\sigma(S \cup \{j\}) \leq 0$ and hence $v_j^{\lambda'}(S \cup \{j\}) = \pi_j(S) + \lambda'_j(S \cup \{j\}) \sigma(S \cup \{j\}) \leq \pi_j(S) = v_j^{\lambda'}(S)$ which implies $S \in \Sigma^{ES}(v^{\lambda'})$. iii) Follows immediately from i), ii) and the definition of stability, i.e., $\Sigma^S(v) = \Sigma^{IS}(v) \cap \Sigma^{ES}(v)$. **QED**

We now establish our main result about the optimality of AISS. Clearly, any analysis about the implication of coalition formation on global welfare requires more structure of the underlying fundamentals of a model. Therefore, we assume apart from superadditivity also positive externalities for the partition function: positive externalities (PE) make the problem interesting since large coalitions are typically not internally stable due to free-rider incentives as mentioned above. Proposition 3 below says that adopting an AISS guarantees that the

coalition which generates the highest global welfare among the potentially internally stable coalitions will not only be internally stable but also externally stable and therefore stable. The remarkable aspect of this result is that a sharing scheme that apparently is designed to foster internal stability is also capable of ensuring external stability for those coalitions that are most desirable in terms of global welfare.

Proposition 3: AISS and Optimality

Let $\Sigma^{\text{PIS}}(\pi)$ be the set of coalitions that are potentially internally stable in coalition game $\Gamma(N, \pi)$ that is superadditive and exhibits positive externalities and let S^* be the coalition with the highest global welfare in $\Sigma^{\text{PIS}}(\pi)$: $\forall S \in \Sigma^{\text{PIS}}(\pi), S \neq S^* : \pi_{S^*}(S^*) + \sum_{j \in N \setminus S^*} \pi_j(S^*) \geq \pi_S(S) + \sum_{j \in N \setminus S} \pi_j(S)$. Then, any valuation $v^\lambda \in \mathcal{V}(\Gamma)$ will make coalition S^* both i) internally and ii) externally stable and, hence, stable.

Proof: i) Follows from Proposition 1. ii) Assume to the contrary that $S^* \in \Sigma^{\text{PIS}}(\pi)$ generated the highest welfare among all coalitions that are PIS but would not be externally stable for some valuation function $v^\lambda \in \mathcal{V}(\Gamma)$. Hence, we know from Lemma 1 that there exists an outsider $j \in N \setminus S^*$ such that coalition $S^* \cup \{j\}$ is PIS. However, due to SA and PE, $\pi_{S^* \cup \{j\}}(S^* \cup \{j\}) + \sum_{k \in N \setminus (S^* \cup \{j\})} \pi_k(S^* \cup \{j\}) > \pi_{S^*}(S^*) + \sum_{k \in N \setminus S^*} \pi_k(S^*)$ which contradicts the initial assumption that S^* generates the highest welfare among all coalitions that are PIS.

QED

Proposition 3 can be interpreted as saying that we cannot do better in terms of global welfare than adopting an AISS if the agreement is required to satisfy stability in the sense of d'Aspremont et al. (1983). Since any AISS is a parametric valuation function depending upon some set of sharing weights $\lambda(S)$, there remains considerable flexibility how to allocate the surplus of the coalition without jeopardizing optimality. Any alternative set of sharing weights among AISS would also stabilize the coalition generating the highest global welfare.

We would like to finish with two more properties of AISS. The first property is individual rationality. That is, we show that for any potentially internally stable coalition every AISS leads to an individually rational solution in a coalition game with positive externalities. That is, every player receives at least her payoff than when all players act as singletons players. Note that this property may be violated for coalitions that are *not* potentially internally stable. However, this seems no problem because these coalitions will not emerge as stable outcomes (internally and externally stable coalitions) anyway.

Proposition 4: AISS and Individual Rationality

Consider a coalition game $\Gamma(N, \pi)$ with positive externalities and the set of AISS valuation functions $\mathcal{V}(\Gamma)$. If coalition S is potentially internally stable, then S is individually rational for all valuations $v^\lambda \in \mathcal{V}(\Gamma)$ and for all players $i \in N$: $v_i^\lambda(S) \geq v_i(\{i\})$.

Proof: If coalition S is potentially internally stable, then for every AISS it holds that $\forall i \in S$: $v_i^\lambda(S^*) \geq v_i^\lambda(S^* \setminus \{i\}) = \pi_i(S^* \setminus \{i\})$ and due to PE $\forall i \in N$: $\pi_i(S^* \setminus \{i\}) \geq \pi_i(\{i\})$. **QED**

The second property is existence. That is, we establish generally (without any particular assumption on the partition function) existence of a stable coalition under AISS. As a corollary, we show that AISS ensures the existence of at least one non-trivial stable coalition S ($s \geq 2$) provided the partition function satisfies superadditivity.

Proposition 5: AISS and Existence of a Stable Coalition

Consider a coalition game $\Gamma(N, \pi)$ and the set of AISS valuation functions $\mathcal{V}(\Gamma)$. For any $v^\lambda \in \mathcal{V}(\Gamma)$, there exists at least one stable coalition.

Proof: By definition, the trivial coalition $S=\{i\}$ is internally stable. If it is also externally stable, we are done. However, suppose the trivial coalition is not externally stable, then there exists at least one two-player coalition that is PIS by Lemma 1. Again, if one of the two-player coalitions is also externally stable, we are done. Continuing with this reasoning, it is evident that some coalition $S \subseteq N$ will be internally and externally stable, noting that $S = N$ is externally stable by definition. **QED**

Corollary 1: AISS and Existence of a Stable Non-Trivial Coalition

Consider a coalition game $\Gamma(N, \pi)$ and the set of AISS valuation functions $\mathcal{V}(\Gamma)$. For any $v^\lambda \in \mathcal{V}(\Gamma)$, there exists at least one stable non-trivial coalition provided $\Gamma(N, \pi)$ is superadditive.

Proof: Due to SA, $\pi_{\{i,j\}}(\{i, j\}) \geq \pi_i(\{i\}) + \pi_j(\{j\})$ holds for all possible pairs (i, j) of players in N which is equivalent to the condition of PIS. Hence, a proof in the spirit of the proof of Proposition 5 can be constructed, except that the starting point is not the trivial coalition but a coalition with two players. **QED**

Note that existence of an internally and externally stable coalition is not automatically guaranteed for other sharing solutions in the cartel formation game as examples for instance in Eyckmans and Finus (2003) demonstrate.

4. Conclusion and Suggestions for Further Research

This paper analyzed internally and externally stable coalitions in the cartel formation game of d'Aspremont et al. (1983). We proposed a sharing scheme for the distribution of the gains from cooperation where any particular solution belonging to this scheme leads to the same set of stable coalitions. Moreover, we showed that this scheme is an “almost ideal sharing scheme” in that it is capable of stabilizing these coalitions which generate the highest global welfare among the set of potentially stable coalitions. Our sharing scheme is particularly powerful for economic problems that are characterized by positive externalities from coalition formation and which therefore suffer from free-riding (see the Introduction for examples). Our results improve in particular upon the existing literature that studied the impact of different sharing rules on the success of coalition formation (see footnote 8). In contrast to this literature, our scheme is robust to different specifications of sharing weights and realizes always the full global welfare potential.

For future research, we see at least three possible extensions. First, we have only considered a particular type of the partition of players with only one non-trivial coalition and all other players are singletons. A more general approach would allow for genuine partitions with several non-trivial coalitions. Of course, this would also imply to consider a more sophisticated stability concept than internal and external stability. A second extension could be to consider different stability concepts than internal and external stability. This could include concepts that define stability in terms of multiple deviation as for instance strong Nash equilibrium and coalition-proof Nash equilibrium. Third, our sharing scheme leaves the choice of surplus sharing weights open. Endogenizing the value of these weights, which may be interpreted as bargaining power, in games with heterogeneous players and externalities seems an interesting but also challenging topic for further research.

References

- Arce M., D.G. and T. Sandler (2003), Health-promoting Alliances. "European Journal of Political Economy", vol. 19 (2), pp. 355–375.
- Barrett, S. (1997), Heterogeneous International Agreements. In: Carraro, C. (ed.), International Environmental Negotiations: Strategic Policy Issues. Edward Elgar, Cheltenham, UK, pp. 9-25.
- Barrett, S. (2001), International Cooperation for Sale. "European Economic Review", vol. 45 (10), pp. 1835-1850.
- Bloch, F. (2003), Non-Cooperative Models of Coalition Formation in Games with Spillovers. In: Carraro, C. (ed.), Endogenous Formation of Economic Coalitions, Edward Elgar, Cheltenham, UK, ch. 2, pp. 35-79.
- Bosello, F., B. Buchner and C. Carraro (2003), Equity, Development, and Climate Change Control. "Journal of the European Economic Association", vol. 1 (2-3), pp. 601-611.
- Botteon, M. and C. Carraro (1997), Burden-Sharing and Coalition Stability in Environmental Negotiations with Asymmetric Countries. In: Carraro, C. (ed.), International Environmental Negotiations: Strategic Policy Issues. Edward Elgar, Cheltenham et al., ch. 3, pp. 26-55.
- Chander, P. and H. Tulkens (1997), The Core of an Economy with Multilateral Environmental Externalities. "International Journal of Game Theory", vol. 26 (3), pp. 379-401.
- d'Aspremont, C., A. Jacquemin, J. J. Gabszewicz and J. A. Weymark (1983), On the Stability of Collusive Price Leadership. "Canadian Journal of Economics", vol. 16 (1), pp. 17-25.
- Eyckmans, J. and M. Finus (2003), Coalition Formation in a Global Warming Game: How the Design of Protocols Affects the Success of Environmental Treaty-making. CORE Discussion Paper 2003-88 (UCL-CORE, Louvain-la-Neuve).
- Hoel, M. (1992), International Environment Conventions: The Case of Uniform Reductions of Emissions. "Environmental and Resource Economics", vol. 2, pp. 141-159.
- Kohler, M. (2002), Coalition Formation in International Monetary Policy Games. "Journal of International Economics", vol. 56 (2), pp. 371-385.
- Maskin, E. (2003), Bargaining, Coalitions, and Externalities. Mimeo, paper presented at the EEA-ESEM Meeting in Stockholm, August 20-24, 2003.
- Moulin, H. (1988), Axioms of Cooperative Decision Making. Econometric Society Monograph 15, Cambridge University Press, Cambridge, UK.

- Pintassilgo, P. (2003), A Coalition Approach to the Management of High Seas Fisheries in the Presence of Externalities. "Natural Resource Modeling", vol. 16 (2), pp. 175-197.
- Ray, D. and R. Vohra (1999), A Theory of Endogenous Coalition Structures. "Games and Economic Behavior", vol. 26 (2), pp. 286-336.
- Sandler, T. and W. Enders (2004), An Economic Perspective on Transnational Terrorism. "European Journal of Political Economy", vol. 20 (2), pp. 301–316.
- Thomson, W.L. (1995), Cooperative Models of Bargaining. In: Aumann, R.J. and S. Hart (eds.), Handbook of Game Theory with Economic Applications, vol. 2, Elsevier - North-Holland, Amsterdam, ch. 35, pp. 1237-1284.
- Yi, S.-S. (1997), Stable Coalition Structures with Externalities. "Games and Economic Behavior", vol. 20 (2), pp. 201-237.
- Yi, S.-S. (2003), Endogenous Formation of Economic Coalitions: A Survey of the Partition Function Approach. In: Carraro, C. (ed.), Endogenous Formation of Economic Coalitions, Edward Elgar, Cheltenham, UK, ch. 3, pp. 80-127.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:

<http://www.feem.it/Feem/Pub/Publications/WPapers/default.html>

<http://www.ssrn.com/link/feem.html>

NOTE DI LAVORO PUBLISHED IN 2003

PRIV	1.2003	<i>Gabriella CHIESA and Giovanna NICODANO</i> : <u>Privatization and Financial Market Development: Theoretical Issues</u>
PRIV	2.2003	<i>Ibolya SCHINDELE</i> : <u>Theory of Privatization in Eastern Europe: Literature Review</u>
PRIV	3.2003	<i>Wietze LISE, Claudia KEMFERT and Richard S.J. TOL</i> : <u>Strategic Action in the Liberalised German Electricity Market</u>
CLIM	4.2003	<i>Laura MARSILIANI and Thomas I. RENSTRÖM</i> : <u>Environmental Policy and Capital Movements: The Role of Government Commitment</u>
KNOW	5.2003	<i>Reyer GERLAGH</i> : <u>Induced Technological Change under Technological Competition</u>
ETA	6.2003	<i>Efrem CASTELNUOVO</i> : <u>Squeezing the Interest Rate Smoothing Weight with a Hybrid Expectations Model</u>
SIEV	7.2003	<i>Anna ALBERINI, Alberto LONGO, Stefania TONIN, Francesco TROMBETTA and Margherita TURVANI</i> : <u>The Role of Liability, Regulation and Economic Incentives in Brownfield Remediation and Redevelopment: Evidence from Surveys of Developers</u>
NRM	8.2003	<i>Elissaios POPYRAKIS and Reyser GERLAGH</i> : <u>Natural Resources: A Blessing or a Curse?</u>
CLIM	9.2003	<i>A. CAPARRÓS, J.-C. PEREAU and T. TAZDAÏT</i> : <u>North-South Climate Change Negotiations: a Sequential Game with Asymmetric Information</u>
KNOW	10.2003	<i>Giorgio BRUNELLO and Daniele CHECCHI</i> : <u>School Quality and Family Background in Italy</u>
CLIM	11.2003	<i>Efrem CASTELNUOVO and Marzio GALEOTTI</i> : <u>Learning By Doing vs Learning By Researching in a Model of Climate Change Policy Analysis</u>
KNOW	12.2003	<i>Carole MAIGNAN, Gianmarco OTTAVIANO and Dino PINELLI (eds.)</i> : <u>Economic Growth, Innovation, Cultural Diversity: What are we all talking about? A critical survey of the state-of-the-art</u>
KNOW	13.2003	<i>Carole MAIGNAN, Gianmarco OTTAVIANO, Dino PINELLI and Francesco RULLANI (lix)</i> : <u>Bio-Ecological Diversity vs. Socio-Economic Diversity. A Comparison of Existing Measures</u>
KNOW	14.2003	<i>Maddy JANSSENS and Chris STEYAERT (lix)</i> : <u>Theories of Diversity within Organisation Studies: Debates and Future Trajectories</u>
KNOW	15.2003	<i>Tuzin BAYCAN LEVENT, Enno MASUREL and Peter NIJKAMP (lix)</i> : <u>Diversity in Entrepreneurship: Ethnic and Female Roles in Urban Economic Life</u>
KNOW	16.2003	<i>Alexandra BITUSIKOVA (lix)</i> : <u>Post-Communist City on its Way from Grey to Colourful: The Case Study from Slovakia</u>
KNOW	17.2003	<i>Billy E. VAUGHN and Katarina MLEKOV (lix)</i> : <u>A Stage Model of Developing an Inclusive Community</u>
KNOW	18.2003	<i>Selma van LONDEN and Arie de RUIJTER (lix)</i> : <u>Managing Diversity in a Globalizing World</u>
Coalition		
Theory	19.2003	<i>Sergio CURRARINI</i> : <u>On the Stability of Hierarchies in Games with Externalities</u>
Network		
PRIV	20.2003	<i>Giacomo CALZOLARI and Alessandro PAVAN (lx)</i> : <u>Monopoly with Resale</u>
PRIV	21.2003	<i>Claudio MEZZETTI (lx)</i> : <u>Auction Design with Interdependent Valuations: The Generalized Revelation Principle, Efficiency, Full Surplus Extraction and Information Acquisition</u>
PRIV	22.2003	<i>Marco LiCalzi and Alessandro PAVAN (lx)</i> : <u>Tilting the Supply Schedule to Enhance Competition in Uniform-Price Auctions</u>
PRIV	23.2003	<i>David ETTINGER (lx)</i> : <u>Bidding among Friends and Enemies</u>
PRIV	24.2003	<i>Hannu VARTIAINEN (lx)</i> : <u>Auction Design without Commitment</u>
PRIV	25.2003	<i>Matti KELOHARJU, Kjell G. NYBORG and Kristian RYDQVIST (lx)</i> : <u>Strategic Behavior and Underpricing in Uniform Price Auctions: Evidence from Finnish Treasury Auctions</u>
PRIV	26.2003	<i>Christine A. PARLOUR and Uday RAJAN (lx)</i> : <u>Rationing in IPOs</u>
PRIV	27.2003	<i>Kjell G. NYBORG and Ilya A. STREBULAIEV (lx)</i> : <u>Multiple Unit Auctions and Short Squeezes</u>
PRIV	28.2003	<i>Anders LUNANDER and Jan-Eric NILSSON (lx)</i> : <u>Taking the Lab to the Field: Experimental Tests of Alternative Mechanisms to Procure Multiple Contracts</u>
PRIV	29.2003	<i>TangaMcDANIEL and Karsten NEUHOFF (lx)</i> : <u>Use of Long-term Auctions for Network Investment</u>
PRIV	30.2003	<i>Emiel MAASLAND and Sander ONDERSTAL (lx)</i> : <u>Auctions with Financial Externalities</u>
ETA	31.2003	<i>Michael FINUS and Bianca RUNDSHAGEN</i> : <u>A Non-cooperative Foundation of Core-Stability in Positive Externality NTU-Coalition Games</u>
KNOW	32.2003	<i>Michele MORETTO</i> : <u>Competition and Irreversible Investments under Uncertainty</u>
PRIV	33.2003	<i>Philippe QUIRION</i> : <u>Relative Quotas: Correct Answer to Uncertainty or Case of Regulatory Capture?</u>
KNOW	34.2003	<i>Giuseppe MEDA, Claudio PIGA and Donald SIEGEL</i> : <u>On the Relationship between R&D and Productivity: A Treatment Effect Analysis</u>
ETA	35.2003	<i>Alessandra DEL BOCA, Marzio GALEOTTI and Paola ROTA</i> : <u>Non-convexities in the Adjustment of Different Capital Inputs: A Firm-level Investigation</u>

GG	36.2003	<i>Matthieu GLACHANT</i> : <u>Voluntary Agreements under Endogenous Legislative Threats</u>
PRIV	37.2003	<i>Narjess BOUBAKRI, Jean-Claude COSSET and Omrane GUEDHAMI</i> : <u>Postprivatization Corporate Governance: the Role of Ownership Structure and Investor Protection</u>
CLIM	38.2003	<i>Rolf GOLOMBEK and Michael HOEL</i> : <u>Climate Policy under Technology Spillovers</u>
KNOW	39.2003	<i>Slim BEN YOUSSEF</i> : <u>Transboundary Pollution, R&D Spillovers and International Trade</u>
CTN	40.2003	<i>Carlo CARRARO and Carmen MARCHIORI</i> : <u>Endogenous Strategic Issue Linkage in International Negotiations</u>
KNOW	41.2003	<i>Sonia OREFFICE</i> : <u>Abortion and Female Power in the Household: Evidence from Labor Supply</u>
KNOW	42.2003	<i>Timo GOESCHL and Timothy SWANSON</i> : <u>On Biology and Technology: The Economics of Managing Biotechnologies</u>
ETA	43.2003	<i>Giorgio Busetti and Matteo MANERA</i> : <u>STAR-GARCH Models for Stock Market Interactions in the Pacific Basin Region, Japan and US</u>
CLIM	44.2003	<i>Katrin MILLOCK and Céline NAUGES</i> : <u>The French Tax on Air Pollution: Some Preliminary Results on its Effectiveness</u>
PRIV	45.2003	<i>Bernardo BORTOLOTTI and Paolo PINOTTI</i> : <u>The Political Economy of Privatization</u>
SIEV	46.2003	<i>Elbert DIJKGRAAF and Herman R.J. VOLLEBERGH</i> : <u>Burn or Bury? A Social Cost Comparison of Final Waste Disposal Methods</u>
ETA	47.2003	<i>Jens HORBACH</i> : <u>Employment and Innovations in the Environmental Sector: Determinants and Econometrical Results for Germany</u>
CLIM	48.2003	<i>Lori SNYDER, Nolan MILLER and Robert STAVINS</i> : <u>The Effects of Environmental Regulation on Technology Diffusion: The Case of Chlorine Manufacturing</u>
CLIM	49.2003	<i>Lori SNYDER, Robert STAVINS and Alexander F. WAGNER</i> : <u>Private Options to Use Public Goods. Exploiting Revealed Preferences to Estimate Environmental Benefits</u>
CTN	50.2003	<i>László Á. KÓCZY and Luc LAUWERS</i> (Ixi): <u>The Minimal Dominant Set is a Non-Empty Core-Extension</u>
CTN	51.2003	<i>Matthew O. JACKSON</i> (Ixi): <u>Allocation Rules for Network Games</u>
CTN	52.2003	<i>Ana MAULEON and Vincent VANNETELBOSCH</i> (Ixi): <u>Farsightedness and Cautiousness in Coalition Formation</u>
CTN	53.2003	<i>Fernando VEGA-REDONDO</i> (Ixi): <u>Building Up Social Capital in a Changing World: a network approach</u>
CTN	54.2003	<i>Matthew HAAG and Roger LAGUNOFF</i> (Ixi): <u>On the Size and Structure of Group Cooperation</u>
CTN	55.2003	<i>Tajji FURUSAWA and Hideo KONISHI</i> (Ixi): <u>Free Trade Networks</u>
CTN	56.2003	<i>Halis Murat YILDIZ</i> (Ixi): <u>National Versus International Mergers and Trade Liberalization</u>
CTN	57.2003	<i>Santiago RUBIO and Alistair ULPH</i> (Ixi): <u>An Infinite-Horizon Model of Dynamic Membership of International Environmental Agreements</u>
KNOW	58.2003	<i>Carole MAIGNAN, Dino PINELLI and Gianmarco I.P. OTTAVIANO</i> : <u>ICT, Clusters and Regional Cohesion: A Summary of Theoretical and Empirical Research</u>
KNOW	59.2003	<i>Giorgio BELLETTINI and Gianmarco I.P. OTTAVIANO</i> : <u>Special Interests and Technological Change</u>
ETA	60.2003	<i>Ronnie SCHÖB</i> : <u>The Double Dividend Hypothesis of Environmental Taxes: A Survey</u>
CLIM	61.2003	<i>Michael FINUS, Ekko van IERLAND and Robert DELLINK</i> : <u>Stability of Climate Coalitions in a Cartel Formation Game</u>
GG	62.2003	<i>Michael FINUS and Bianca RUNDSHAGEN</i> : <u>How the Rules of Coalition Formation Affect Stability of International Environmental Agreements</u>
SIEV	63.2003	<i>Alberto PETRUCCI</i> : <u>Taxing Land Rent in an Open Economy</u>
CLIM	64.2003	<i>Joseph E. ALDY, Scott BARRETT and Robert N. STAVINS</i> : <u>Thirteen Plus One: A Comparison of Global Climate Policy Architectures</u>
SIEV	65.2003	<i>Edi DEFRANCESCO</i> : <u>The Beginning of Organic Fish Farming in Italy</u>
SIEV	66.2003	<i>Klaus CONRAD</i> : <u>Price Competition and Product Differentiation when Consumers Care for the Environment</u>
SIEV	67.2003	<i>Paulo A.L.D. NUNES, Luca ROSSETTO, Arianne DE BLAEIJ</i> : <u>Monetary Value Assessment of Clam Fishing Management Practices in the Venice Lagoon: Results from a Stated Choice Exercise</u>
CLIM	68.2003	<i>ZhongXiang ZHANG</i> : <u>Open Trade with the U.S. Without Compromising Canada's Ability to Comply with its Kyoto Target</u>
KNOW	69.2003	<i>David FRANTZ</i> (Iix): <u>Lorenzo Market between Diversity and Mutation</u>
KNOW	70.2003	<i>Ercole SORI</i> (Iix): <u>Mapping Diversity in Social History</u>
KNOW	71.2003	<i>Ljiljana DERU SIMIC</i> (Ixi): <u>What is Specific about Art/Cultural Projects?</u>
KNOW	72.2003	<i>Natalya V. TARANOVA</i> (Ixi): <u>The Role of the City in Fostering Intergroup Communication in a Multicultural Environment: Saint-Petersburg's Case</u>
KNOW	73.2003	<i>Kristine CRANE</i> (Ixi): <u>The City as an Arena for the Expression of Multiple Identities in the Age of Globalisation and Migration</u>
KNOW	74.2003	<i>Kazuma MATOBA</i> (Ixi): <u>Glocal Dialogue- Transformation through Transcultural Communication</u>
KNOW	75.2003	<i>Catarina REIS OLIVEIRA</i> (Ixi): <u>Immigrants' Entrepreneurial Opportunities: The Case of the Chinese in Portugal</u>
KNOW	76.2003	<i>Sandra WALLMAN</i> (Ixi): <u>The Diversity of Diversity - towards a typology of urban systems</u>
KNOW	77.2003	<i>Richard PEARCE</i> (Ixi): <u>A Biologist's View of Individual Cultural Identity for the Study of Cities</u>
KNOW	78.2003	<i>Vincent MERK</i> (Ixi): <u>Communication Across Cultures: from Cultural Awareness to Reconciliation of the Dilemmas</u>
KNOW	79.2003	<i>Giorgio BELLETTINI, Carlotta BERTI CERONI and Gianmarco I.P. OTTAVIANO</i> : <u>Child Labor and Resistance to Change</u>
ETA	80.2003	<i>Michele MORETTO, Paolo M. PANTEGHINI and Carlo SCARPA</i> : <u>Investment Size and Firm's Value under Profit Sharing Regulation</u>

IEM	81.2003	<i>Alessandro LANZA, Matteo MANERA and Massimo GIOVANNINI: <u>Oil and Product Dynamics in International Petroleum Markets</u></i>
CLIM	82.2003	<i>Y. Hossein FARZIN and Jinhua ZHAO: <u>Pollution Abatement Investment When Firms Lobby Against Environmental Regulation</u></i>
CLIM	83.2003	<i>Giuseppe DI VITA: <u>Is the Discount Rate Relevant in Explaining the Environmental Kuznets Curve?</u></i>
CLIM	84.2003	<i>Reyer GERLAGH and Wietze LISE: <u>Induced Technological Change Under Carbon Taxes</u></i>
NRM	85.2003	<i>Rinaldo BRAU, Alessandro LANZA and Francesco PIGLIARU: <u>How Fast are the Tourism Countries Growing? The cross-country evidence</u></i>
KNOW	86.2003	<i>Elena BELLINI, Gianmarco I.P. OTTAVIANO and Dino PINELLI: <u>The ICT Revolution: opportunities and risks for the Mezzogiorno</u></i>
SIEV	87.2003	<i>Lucas BRETSCGHER and Sjak SMULDERS: <u>Sustainability and Substitution of Exhaustible Natural Resources. How resource prices affect long-term R&D investments</u></i>
CLIM	88.2003	<i>Johan EYCKMANS and Michael FINUS: <u>New Roads to International Environmental Agreements: The Case of Global Warming</u></i>
CLIM	89.2003	<i>Marzio GALEOTTI: <u>Economic Development and Environmental Protection</u></i>
CLIM	90.2003	<i>Marzio GALEOTTI: <u>Environment and Economic Growth: Is Technical Change the Key to Decoupling?</u></i>
CLIM	91.2003	<i>Marzio GALEOTTI and Barbara BUCHNER: <u>Climate Policy and Economic Growth in Developing Countries</u></i>
IEM	92.2003	<i>A. MARKANDYA, A. GOLUB and E. STRUKOVA: <u>The Influence of Climate Change Considerations on Energy Policy: The Case of Russia</u></i>
ETA	93.2003	<i>Andrea BELTRATTI: <u>Socially Responsible Investment in General Equilibrium</u></i>
CTN	94.2003	<i>Parkash CHANDER: <u>The γ-Core and Coalition Formation</u></i>
IEM	95.2003	<i>Matteo MANERA and Angelo MARZULLO: <u>Modelling the Load Curve of Aggregate Electricity Consumption Using Principal Components</u></i>
IEM	96.2003	<i>Alessandro LANZA, Matteo MANERA, Margherita GRASSO and Massimo GIOVANNINI: <u>Long-run Models of Oil Stock Prices</u></i>
CTN	97.2003	<i>Steven J. BRAMS, Michael A. JONES, and D. Marc KILGOUR: <u>Forming Stable Coalitions: The Process Matters</u></i>
KNOW	98.2003	<i>John CROWLEY, Marie-Cecile NAVES (Ixxiii): <u>Anti-Racist Policies in France. From Ideological and Historical Schemes to Socio-Political Realities</u></i>
KNOW	99.2003	<i>Richard THOMPSON FORD (Ixxiii): <u>Cultural Rights and Civic Virtue</u></i>
KNOW	100.2003	<i>Alaknanda PATEL (Ixxiii): <u>Cultural Diversity and Conflict in Multicultural Cities</u></i>
KNOW	101.2003	<i>David MAY (Ixxiii): <u>The Struggle of Becoming Established in a Deprived Inner-City Neighbourhood</u></i>
KNOW	102.2003	<i>Sébastien ARCAND, Danielle JUTEAU, Sirma BILGE, and Francine LEMIRE (Ixxiii) : <u>Municipal Reform on the Island of Montreal: Tensions Between Two Majority Groups in a Multicultural City</u></i>
CLIM	103.2003	<i>Barbara BUCHNER and Carlo CARRARO: <u>China and the Evolution of the Present Climate Regime</u></i>
CLIM	104.2003	<i>Barbara BUCHNER and Carlo CARRARO: <u>Emissions Trading Regimes and Incentives to Participate in International Climate Agreements</u></i>
CLIM	105.2003	<i>Anil MARKANDYA and Dirk T.G. RÜBBELKE: <u>Ancillary Benefits of Climate Policy</u></i>
NRM	106.2003	<i>Anne Sophie CRÉPIN (Ixiv): <u>Management Challenges for Multiple-Species Boreal Forests</u></i>
NRM	107.2003	<i>Anne Sophie CRÉPIN (Ixiv): <u>Threshold Effects in Coral Reef Fisheries</u></i>
SIEV	108.2003	<i>Sara ANIYAR (Ixiv): <u>Estimating the Value of Oil Capital in a Small Open Economy: The Venezuela's Example</u></i>
SIEV	109.2003	<i>Kenneth ARROW, Partha DASGUPTA and Karl-Göran MÄLER(Ixiv): <u>Evaluating Projects and Assessing Sustainable Development in Imperfect Economies</u></i>
NRM	110.2003	<i>Anastasios XEPAPADEAS and Catarina ROSETA-PALMA(Ixiv): <u>Instabilities and Robust Control in Fisheries</u></i>
NRM	111.2003	<i>Charles PERRINGS and Brian WALKER (Ixiv): <u>Conservation and Optimal Use of Rangelands</u></i>
ETA	112.2003	<i>Jack GOODY (Ixiv): <u>Globalisation, Population and Ecology</u></i>
CTN	113.2003	<i>Carlo CARRARO, Carmen MARCHIORI and Sonia OREFFICE: <u>Endogenous Minimum Participation in International Environmental Treaties</u></i>
CTN	114.2003	<i>Guillaume HAERINGER and Myrna WOODERS: <u>Decentralized Job Matching</u></i>
CTN	115.2003	<i>Hideo KONISHI and M. Utku UNVER: <u>Credible Group Stability in Multi-Partner Matching Problems</u></i>
CTN	116.2003	<i>Somdeb LAHIRI: <u>Stable Matchings for the Room-Mates Problem</u></i>
CTN	117.2003	<i>Somdeb LAHIRI: <u>Stable Matchings for a Generalized Marriage Problem</u></i>
CTN	118.2003	<i>Marita LAUKKANEN: <u>Transboundary Fisheries Management under Implementation Uncertainty</u></i>
CTN	119.2003	<i>Edward CARTWRIGHT and Myrna WOODERS: <u>Social Conformity and Bounded Rationality in Arbitrary Games with Incomplete Information: Some First Results</u></i>
CTN	120.2003	<i>Gianluigi VERNASCA: <u>Dynamic Price Competition with Price Adjustment Costs and Product Differentiation</u></i>
CTN	121.2003	<i>Myrna WOODERS, Edward CARTWRIGHT and Reinhard SELTEN: <u>Social Conformity in Games with Many Players</u></i>
CTN	122.2003	<i>Edward CARTWRIGHT and Myrna WOODERS: <u>On Equilibrium in Pure Strategies in Games with Many Players</u></i>
CTN	123.2003	<i>Edward CARTWRIGHT and Myrna WOODERS: <u>Conformity and Bounded Rationality in Games with Many Players</u></i>
	1000	Carlo CARRARO, Alessandro LANZA and Valeria PAPPONETTI: <u>One Thousand Working Papers</u>

NOTE DI LAVORO PUBLISHED IN 2004

ITEM	1.2004	<i>Anil MARKANDYA, Suzette PEDROSO and Alexander GOLUB: <u>Empirical Analysis of National Income and So2 Emissions in Selected European Countries</u></i>
ETA	2.2004	<i>Masahisa FUJITA and Shlomo WEBER: <u>Strategic Immigration Policies and Welfare in Heterogeneous Countries</u></i>
PRA	3.2004	<i>Adolfo DI CARLUCCIO, Giovanni FERRI, Cecilia FRALE and Ottavio RICCHI: <u>Do Privatizations Boost Household Shareholding? Evidence from Italy</u></i>
ETA	4.2004	<i>Victor GINSBURGH and Shlomo WEBER: <u>Languages Disenfranchisement in the European Union</u></i>
ETA	5.2004	<i>Romano PIRAS: <u>Growth, Congestion of Public Goods, and Second-Best Optimal Policy</u></i>
CCMP	6.2004	<i>Herman R.J. VOLLEBERGH: <u>Lessons from the Polder: Is Dutch CO2-Taxation Optimal</u></i>
PRA	7.2004	<i>Sandro BRUSCO, Giuseppe LOPOMO and S. VISWANATHAN (lxv): <u>Merger Mechanisms</u></i>
PRA	8.2004	<i>Wolfgang AUSSENEGG, Pegaret PICHLER and Alex STOMPER (lxv): <u>IPO Pricing with Bookbuilding, and a When-Issued Market</u></i>
PRA	9.2004	<i>Pegaret PICHLER and Alex STOMPER (lxv): <u>Primary Market Design: Direct Mechanisms and Markets</u></i>
PRA	10.2004	<i>Florian ENGLMAIER, Pablo GUILLEN, Loreto LLORENTE, Sander ONDERSTAL and Rupert SAUSGRUBER (lxv): <u>The Chopstick Auction: A Study of the Exposure Problem in Multi-Unit Auctions</u></i>
PRA	11.2004	<i>Bjarne BRENDSTRUP and Harry J. PAARSCH (lxv): <u>Nonparametric Identification and Estimation of Multi-Unit, Sequential, Oral, Ascending-Price Auctions With Asymmetric Bidders</u></i>
PRA	12.2004	<i>Ohad KADAN (lxv): <u>Equilibrium in the Two Player, k-Double Auction with Affiliated Private Values</u></i>
PRA	13.2004	<i>Maarten C.W. JANSSEN (lxv): <u>Auctions as Coordination Devices</u></i>
PRA	14.2004	<i>Gadi FIBICH, Arieh GAVIOUS and Aner SELA (lxv): <u>All-Pay Auctions with Weakly Risk-Averse Buyers</u></i>
PRA	15.2004	<i>Orly SADE, Charles SCHNITZLEIN and Jaime F. ZENDER (lxv): <u>Competition and Cooperation in Divisible Good Auctions: An Experimental Examination</u></i>
PRA	16.2004	<i>Marta STRYSZOWSKA (lxv): <u>Late and Multiple Bidding in Competing Second Price Internet Auctions</u></i>
CCMP	17.2004	<i>Slim Ben YOUSSEF: <u>R&D in Cleaner Technology and International Trade</u></i>
NRM	18.2004	<i>Angelo ANTOCI, Simone BORGHESI and Paolo RUSSU (lxvi): <u>Biodiversity and Economic Growth: Stabilization Versus Preservation of the Ecological Dynamics</u></i>
SIEV	19.2004	<i>Anna ALBERINI, Paolo ROSATO, Alberto LONGO and Valentina ZANATTA: <u>Information and Willingness to Pay in a Contingent Valuation Study: The Value of S. Erasmo in the Lagoon of Venice</u></i>
NRM	20.2004	<i>Guido CANDELA and Roberto CELLINI (lxvii): <u>Investment in Tourism Market: A Dynamic Model of Differentiated Oligopoly</u></i>
NRM	21.2004	<i>Jacqueline M. HAMILTON (lxvii): <u>Climate and the Destination Choice of German Tourists</u></i>
NRM	22.2004	<i>Javier Rey-MAQUIEIRA PALMER, Javier LOZANO IBÁÑEZ and Carlos Mario GÓMEZ GÓMEZ (lxvii): <u>Land, Environmental Externalities and Tourism Development</u></i>
NRM	23.2004	<i>Pius ODUNGA and Henk FOLMER (lxvii): <u>Profiling Tourists for Balanced Utilization of Tourism-Based Resources in Kenya</u></i>
NRM	24.2004	<i>Jean-Jacques NOWAK, Mondher SAHLI and Pasquale M. SGRO (lxvii): <u>Tourism, Trade and Domestic Welfare</u></i>
NRM	25.2004	<i>Riaz SHAREEF (lxvii): <u>Country Risk Ratings of Small Island Tourism Economies</u></i>
NRM	26.2004	<i>Juan Luis EUGENIO-MARTÍN, Noelia MARTÍN MORALES and Riccardo SCARPA (lxvii): <u>Tourism and Economic Growth in Latin American Countries: A Panel Data Approach</u></i>
NRM	27.2004	<i>Raúl Hernández MARTÍN (lxvii): <u>Impact of Tourism Consumption on GDP. The Role of Imports</u></i>
CSRM	28.2004	<i>Nicoletta FERRO: <u>Cross-Country Ethical Dilemmas in Business: A Descriptive Framework</u></i>
NRM	29.2004	<i>Marian WEBER (lxvi): <u>Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: an Application to Canada's Boreal Mixedwood Forest</u></i>
NRM	30.2004	<i>Trond BJORN DAL, Phoebe KOUNDOURI and Sean PASCOE (lxvi): <u>Output Substitution in Multi-Species Trawl Fisheries: Implications for Quota Setting</u></i>
CCMP	31.2004	<i>Marzio GALEOTTI, Alessandra GORIA, Paolo MOMBRINI and Evi SPANTIDAKI: <u>Weather Impacts on Natural, Social and Economic Systems (WISE) Part I: Sectoral Analysis of Climate Impacts in Italy</u></i>
CCMP	32.2004	<i>Marzio GALEOTTI, Alessandra GORIA, Paolo MOMBRINI and Evi SPANTIDAKI: <u>Weather Impacts on Natural, Social and Economic Systems (WISE) Part II: Individual Perception of Climate Extremes in Italy</u></i>
CTN	33.2004	<i>Wilson PEREZ: <u>Divide and Conquer: Noisy Communication in Networks, Power, and Wealth Distribution</u></i>
KTHC	34.2004	<i>Gianmarco I.P. OTTAVIANO and Giovanni PERI (lxviii): <u>The Economic Value of Cultural Diversity: Evidence from US Cities</u></i>
KTHC	35.2004	<i>Linda CHAIB (lxviii): <u>Immigration and Local Urban Participatory Democracy: A Boston-Paris Comparison</u></i>
KTHC	36.2004	<i>Franca ECKERT COEN and Claudio ROSSI (lxviii): <u>Foreigners, Immigrants, Host Cities: The Policies of Multi-Ethnicity in Rome. Reading Governance in a Local Context</u></i>
KTHC	37.2004	<i>Kristine CRANE (lxviii): <u>Governing Migration: Immigrant Groups' Strategies in Three Italian Cities – Rome, Naples and Bari</u></i>
KTHC	38.2004	<i>Kiflemariam HAMDE (lxviii): <u>Mind in Africa, Body in Europe: The Struggle for Maintaining and Transforming Cultural Identity - A Note from the Experience of Eritrean Immigrants in Stockholm</u></i>
ETA	39.2004	<i>Alberto CAVALIERE: <u>Price Competition with Information Disparities in a Vertically Differentiated Duopoly</u></i>
PRA	40.2004	<i>Andrea BIGANO and Stef PROOST: <u>The Opening of the European Electricity Market and Environmental Policy: Does the Degree of Competition Matter?</u></i>
CCMP	41.2004	<i>Micheal FINUS (lxix): <u>International Cooperation to Resolve International Pollution Problems</u></i>
KTHC	42.2004	<i>Francesco CRESPI: <u>Notes on the Determinants of Innovation: A Multi-Perspective Analysis</u></i>

CTN	43.2004	<i>Sergio CURRARINI and Marco MARINI: <u>Coalition Formation in Games without Synergies</u></i>
CTN	44.2004	<i>Marc ESCRHUELA-VILLAR: <u>Cartel Sustainability and Cartel Stability</u></i>
NRM	45.2004	<i>Sebastian BERVOETS and Nicolas GRAVEL (lxvi): <u>Appraising Diversity with an Ordinal Notion of Similarity: An Axiomatic Approach</u></i>
NRM	46.2004	<i>Signe ANTHON and Bo JELLESMARK THORSEN (lxvi): <u>Optimal Afforestation Contracts with Asymmetric Information on Private Environmental Benefits</u></i>
NRM	47.2004	<i>John MBURU (lxvi): <u>Wildlife Conservation and Management in Kenya: Towards a Co-management Approach</u></i>
NRM	48.2004	<i>Ekin BIROL, Ágnes GYOVAI and Melinda SMALE (lxvi): <u>Using a Choice Experiment to Value Agricultural Biodiversity on Hungarian Small Farms: Agri-Environmental Policies in a Transitional Economy</u></i>
CCMP	49.2004	<i>Gernot KLEPPER and Sonja PETERSON: <u>The EU Emissions Trading Scheme. Allowance Prices, Trade Flows, Competitiveness Effects</u></i>
GG	50.2004	<i>Scott BARRETT and Michael HOEL: <u>Optimal Disease Eradication</u></i>
CTN	51.2004	<i>Dinko DIMITROV, Peter BORM, Ruud HENDRICKX and Shao CHIN SUNG: <u>Simple Priorities and Core Stability in Hedonic Games</u></i>
SIEV	52.2004	<i>Francesco RICCI: <u>Channels of Transmission of Environmental Policy to Economic Growth: A Survey of the Theory</u></i>
SIEV	53.2004	<i>Anna ALBERINI, Maureen CROPPER, Alan KRUPNICK and Nathalie B. SIMON: <u>Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?</u></i>
NRM	54.2004	<i>Ingo BRÄUER and Rainer MARGGRAF (lxvi): <u>Valuation of Ecosystem Services Provided by Biodiversity Conservation: An Integrated Hydrological and Economic Model to Value the Enhanced Nitrogen Retention in Renaturated Streams</u></i>
NRM	55.2004	<i>Timo GOESCHL and Tun LIN (lxvi): <u>Biodiversity Conservation on Private Lands: Information Problems and Regulatory Choices</u></i>
NRM	56.2004	<i>Tom DEDEURWAERDERE (lxvi): <u>Bioprospection: From the Economics of Contracts to Reflexive Governance</u></i>
CCMP	57.2004	<i>Katrin REHDANZ and David MADDISON: <u>The Amenity Value of Climate to German Households</u></i>
CCMP	58.2004	<i>Koen SMEKENS and Bob VAN DER ZWAAN: <u>Environmental Externalities of Geological Carbon Sequestration Effects on Energy Scenarios</u></i>
NRM	59.2004	<i>Valentina BOSETTI, Mariaester CASSINELLI and Alessandro LANZA (lxvii): <u>Using Data Envelopment Analysis to Evaluate Environmentally Conscious Tourism Management</u></i>
NRM	60.2004	<i>Timo GOESCHL and Danilo CAMARGO IGLIORI (lxvi): <u>Property Rights Conservation and Development: An Analysis of Extractive Reserves in the Brazilian Amazon</u></i>
CCMP	61.2004	<i>Barbara BUCHNER and Carlo CARRARO: <u>Economic and Environmental Effectiveness of a Technology-based Climate Protocol</u></i>
NRM	62.2004	<i>Elissaios POPYRAKIS and Reyer GERLAGH: <u>Resource-Abundance and Economic Growth in the U.S.</u></i>
NRM	63.2004	<i>Györgyi BELA, György PATAKI, Melinda SMALE and Mariann HAJDÚ (lxvi): <u>Conserving Crop Genetic Resources on Smallholder Farms in Hungary: Institutional Analysis</u></i>
NRM	64.2004	<i>E.C.M. RUIJGROK and E.E.M. NILLESEN (lxvi): <u>The Socio-Economic Value of Natural Riverbanks in the Netherlands</u></i>
NRM	65.2004	<i>E.C.M. RUIJGROK (lxvi): <u>Reducing Acidification: The Benefits of Increased Nature Quality. Investigating the Possibilities of the Contingent Valuation Method</u></i>
ETA	66.2004	<i>Giannis VARDAS and Anastasios XEPAPADEAS: <u>Uncertainty Aversion, Robust Control and Asset Holdings</u></i>
GG	67.2004	<i>Anastasios XEPAPADEAS and Constadina PASSA: <u>Participation in and Compliance with Public Voluntary Environmental Programs: An Evolutionary Approach</u></i>
GG	68.2004	<i>Michael FINUS: <u>Modesty Pays: Sometimes!</u></i>
NRM	69.2004	<i>Trond BJØRNDAL and Ana BRASÃO: <u>The Northern Atlantic Bluefin Tuna Fisheries: Management and Policy Implications</u></i>
CTN	70.2004	<i>Alejandro CAPARRÓS, Abdelhakim HAMMOUDI and Tarik TAZDAÏT: <u>On Coalition Formation with Heterogeneous Agents</u></i>
IEM	71.2004	<i>Massimo GIOVANNINI, Margherita GRASSO, Alessandro LANZA and Matteo MANERA: <u>Conditional Correlations in the Returns on Oil Companies Stock Prices and Their Determinants</u></i>
IEM	72.2004	<i>Alessandro LANZA, Matteo MANERA and Michael MCALEER: <u>Modelling Dynamic Conditional Correlations in WTI Oil Forward and Futures Returns</u></i>
SIEV	73.2004	<i>Margarita GENIUS and Elisabetta STRAZZERA: <u>The Copula Approach to Sample Selection Modelling: An Application to the Recreational Value of Forests</u></i>
CCMP	74.2004	<i>Rob DELLINK and Ekko van IERLAND: <u>Pollution Abatement in the Netherlands: A Dynamic Applied General Equilibrium Assessment</u></i>
ETA	75.2004	<i>Rosella LEVAGGI and Michele MORETTO: <u>Investment in Hospital Care Technology under Different Purchasing Rules: A Real Option Approach</u></i>
CTN	76.2004	<i>Salvador BARBERÀ and Matthew O. JACKSON (lxx): <u>On the Weights of Nations: Assigning Voting Weights in a Heterogeneous Union</u></i>
CTN	77.2004	<i>Àlex ARENAS, Antonio CABRALES, Albert DÍAZ-GUILERA, Roger GUIMERA and Fernando VEGA-REDONDO (lxx): <u>Optimal Information Transmission in Organizations: Search and Congestion</u></i>
CTN	78.2004	<i>Francis BLOCH and Armando GOMES (lxx): <u>Contracting with Externalities and Outside Options</u></i>
CTN	79.2004	<i>Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE (lxx): <u>Merger Performance under Uncertain Efficiency Gains</u></i>
CTN	80.2004	<i>Francis BLOCH and Matthew O. JACKSON (lxx): <u>The Formation of Networks with Transfers among Players</u></i>
CTN	81.2004	<i>Daniel DIERMEIER, Hülya ERASLAN and Antonio MERLO (lxx): <u>Bicameralism and Government Formation</u></i>

CTN	82.2004	<i>Rod GARRATT, James E. PARCO, Cheng-ZHONG QIN and Amnon RAPOPORT (lxx): <u>Potential Maximization and Coalition Government Formation</u></i>
CTN	83.2004	<i>Kfir ELIAZ, Debraj RAY and Ronny RAZIN (lxx): <u>Group Decision-Making in the Shadow of Disagreement</u></i>
CTN	84.2004	<i>Sanjeev GOYAL, Marco van der LEIJ and José Luis MORAGA-GONZÁLEZ (lxx): <u>Economics: An Emerging Small World?</u></i>
CTN	85.2004	<i>Edward CARTWRIGHT (lxx): <u>Learning to Play Approximate Nash Equilibria in Games with Many Players</u></i>
IEM	86.2004	<i>Finn R. FØRSUND and Michael HOEL: <u>Properties of a Non-Competitive Electricity Market Dominated by Hydroelectric Power</u></i>
KTHC	87.2004	<i>Elissaios POPYRAKIS and Reyer GERLAGH: <u>Natural Resources, Investment and Long-Term Income</u></i>
CCMP	88.2004	<i>Marzio GALEOTTI and Claudia KEMFERT: <u>Interactions between Climate and Trade Policies: A Survey</u></i>
IEM	89.2004	<i>A. MARKANDYA, S. PEDROSO and D. STREIMIKIENE: <u>Energy Efficiency in Transition Economies: Is There Convergence Towards the EU Average?</u></i>
GG	90.2004	<i>Rolf GOLOMBEK and Michael HOEL : <u>Climate Agreements and Technology Policy</u></i>
PRA	91.2004	<i>Sergei IZMALKOV (lxx): <u>Multi-Unit Open Ascending Price Efficient Auction</u></i>
KTHC	92.2004	<i>Gianmarco I.P. OTTAVIANO and Giovanni PERI: <u>Cities and Cultures</u></i>
KTHC	93.2004	<i>Massimo DEL GATTO: <u>Agglomeration, Integration, and Territorial Authority Scale in a System of Trading Cities. Centralisation versus devolution</u></i>
CCMP	94.2004	<i>Pierre-André JOUVET, Philippe MICHEL and Gilles ROTILLON: <u>Equilibrium with a Market of Permits</u></i>
CCMP	95.2004	<i>Bob van der ZWAAN and Reyer GERLAGH: <u>Climate Uncertainty and the Necessity to Transform Global Energy Supply</u></i>
CCMP	96.2004	<i>Francesco BOSELLO, Marco LAZZARIN, Roberto ROSON and Richard S.J. TOL: <u>Economy-Wide Estimates of the Implications of Climate Change: Sea Level Rise</u></i>
CTN	97.2004	<i>Gustavo BERGANTIÑOS and Juan J. VIDAL-PUGA: <u>Defining Rules in Cost Spanning Tree Problems Through the Canonical Form</u></i>
CTN	98.2004	<i>Siddhartha BANDYOPADHYAY and Mandar OAK: <u>Party Formation and Coalitional Bargaining in a Model of Proportional Representation</u></i>
GG	99.2004	<i>Hans-Peter WEIKARD, Michael FINUS and Juan-Carlos ALTAMIRANO-CABRERA: <u>The Impact of Surplus Sharing on the Stability of International Climate Agreements</u></i>
SIEV	100.2004	<i>Chiara M. TRAVISI and Peter NIJKAMP: <u>Willingness to Pay for Agricultural Environmental Safety: Evidence from a Survey of Milan, Italy, Residents</u></i>
SIEV	101.2004	<i>Chiara M. TRAVISI, Raymond J. G. M. FLORAX and Peter NIJKAMP: <u>A Meta-Analysis of the Willingness to Pay for Reductions in Pesticide Risk Exposure</u></i>
NRM	102.2004	<i>Valentina BOSETTI and David TOMBERLIN: <u>Real Options Analysis of Fishing Fleet Dynamics: A Test</u></i>
CCMP	103.2004	<i>Alessandra GORIA e Gretel GAMBARELLI: <u>Economic Evaluation of Climate Change Impacts and Adaptability in Italy</u></i>
PRA	104.2004	<i>Massimo FLORIO and Mara GRASSENTI: <u>The Missing Shock: The Macroeconomic Impact of British Privatisation</u></i>
PRA	105.2004	<i>John BENNETT, Saul ESTRIN, James MAW and Giovanni URGA: <u>Privatisation Methods and Economic Growth in Transition Economies</u></i>
PRA	106.2004	<i>Kira BÖRNER: <u>The Political Economy of Privatization: Why Do Governments Want Reforms?</u></i>
PRA	107.2004	<i>Pehr-Johan NORBÄCK and Lars PERSSON: <u>Privatization and Restructuring in Concentrated Markets</u></i>
SIEV	108.2004	<i>Angela GRANZOTTO, Fabio PRANOVI, Simone LIBRALATO, Patrizia TORRICELLI and Danilo MAINARDI: <u>Comparison between Artisanal Fishery and Manila Clam Harvesting in the Venice Lagoon by Using Ecosystem Indicators: An Ecological Economics Perspective</u></i>
CTN	109.2004	<i>Somdeb LAHIRI: <u>The Cooperative Theory of Two Sided Matching Problems: A Re-examination of Some Results</u></i>
NRM	110.2004	<i>Giuseppe DI VITA: <u>Natural Resources Dynamics: Another Look</u></i>
SIEV	111.2004	<i>Anna ALBERINI, Alistair HUNT and Anil MARKANDYA: <u>Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study</u></i>

ETA	124.2004	<i>Paul MENSINK</i> : <u>Instant Efficient Pollution Abatement Under Non-Linear Taxation and Asymmetric Information: The Differential Tax Revisited</u>
NRM	125.2004	<i>Mauro FABIANO, Gabriella CAMARSA, Rosanna DURSI, Roberta IVALDI, Valentina MARIN and Francesca PALMISANI</i> : <u>Integrated Environmental Study for Beach Management: A Methodological Approach</u>
PRA	126.2004	<i>Irena GROSFELD and Iraj HASHI</i> : <u>The Emergence of Large Shareholders in Mass Privatized Firms: Evidence from Poland and the Czech Republic</u>
CCMP	127.2004	<i>Maria BERRITTELLA, Andrea BIGANO, Roberto ROSON and Richard S.J. TOL</i> : <u>A General Equilibrium Analysis of Climate Change Impacts on Tourism</u>
CCMP	128.2004	<i>Reyer GERLAGH</i> : <u>A Climate-Change Policy Induced Shift from Innovations in Energy Production to Energy Savings</u>
NRM	129.2004	<i>Elissaios PAPYRAKIS and Reyer GERLAGH</i> : <u>Natural Resources, Innovation, and Growth</u>
PRA	130.2004	<i>Bernardo BORTOLOTTI and Mara FACCIO</i> : <u>Reluctant Privatization</u>
SIEV	131.2004	<i>Riccardo SCARPA and Mara THIENE</i> : <u>Destination Choice Models for Rock Climbing in the Northeast Alps: A Latent-Class Approach Based on Intensity of Participation</u>
SIEV	132.2004	<i>Riccardo SCARPA, Kenneth G. WILLIS and Melinda ACUTT</i> : <u>Comparing Individual-Specific Benefit Estimates for Public Goods: Finite Versus Continuous Mixing in Logit Models</u>
IEM	133.2004	<i>Santiago J. RUBIO</i> : <u>On Capturing Oil Rents with a National Excise Tax Revisited</u>
ETA	134.2004	<i>Ascensión ANDINA DÍAZ</i> : <u>Political Competition when Media Create Candidates' Charisma</u>
SIEV	135.2004	<i>Anna ALBERINI</i> : <u>Robustness of VSL Values from Contingent Valuation Surveys</u>
CCMP	136.2004	<i>Gernot KLEPPER and Sonja PETERSON</i> : <u>Marginal Abatement Cost Curves in General Equilibrium: The Influence of World Energy Prices</u>
ETA	137.2004	<i>Herbert DAWID, Christophe DEISSENBERG and Pavel ŠEVČIK</i> : <u>Cheap Talk, Gullibility, and Welfare in an Environmental Taxation Game</u>
CCMP	138.2004	<i>ZhongXiang ZHANG</i> : <u>The World Bank's Prototype Carbon Fund and China</u>
CCMP	139.2004	<i>Reyer GERLAGH and Marjan W. HOFKES</i> : <u>Time Profile of Climate Change Stabilization Policy</u>
NRM	140.2004	<i>Chiara D'ALPAOS and Michele MORETTO</i> : <u>The Value of Flexibility in the Italian Water Service Sector: A Real Option Analysis</u>
PRA	141.2004	<i>Patrick BAJARI, Stephanie HOUGHTON and Steven TADELIS (Ixxi)</i> : <u>Bidding for Incomplete Contracts</u>
PRA	142.2004	<i>Susan ATHEY, Jonathan LEVIN and Enrique SEIRA (Ixxi)</i> : <u>Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions</u>
PRA	143.2004	<i>David GOLDREICH (Ixxi)</i> : <u>Behavioral Biases of Dealers in U.S. Treasury Auctions</u>
PRA	144.2004	<i>Roberto BURGUET (Ixxi)</i> : <u>Optimal Procurement Auction for a Buyer with Downward Sloping Demand: More Simple Economics</u>
PRA	145.2004	<i>Ali HORTACSU and Samita SAREEN (Ixxi)</i> : <u>Order Flow and the Formation of Dealer Bids: An Analysis of Information and Strategic Behavior in the Government of Canada Securities Auctions</u>
PRA	146.2004	<i>Victor GINSBURGH, Patrick LEGROS and Nicolas SAHUGUET (Ixxi)</i> : <u>How to Win Twice at an Auction. On the Incidence of Commissions in Auction Markets</u>
PRA	147.2004	<i>Claudio MEZZETTI, Aleksandar PEKEČ and Ilia TSETLIN (Ixxi)</i> : <u>Sequential vs. Single-Round Uniform-Price Auctions</u>
PRA	148.2004	<i>John ASKER and Estelle CANTILLON (Ixxi)</i> : <u>Equilibrium of Scoring Auctions</u>
PRA	149.2004	<i>Philip A. HAILE, Han HONG and Matthew SHUM (Ixxi)</i> : <u>Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions</u>
PRA	150.2004	<i>François DEGEORGE, François DERRIEN and Kent L. WOMACK (Ixxi)</i> : <u>Quid Pro Quo in IPOs: Why Bookbuilding is Dominating Auctions</u>
CCMP	151.2004	<i>Barbara BUCHNER and Silvia DALL'OLIO</i> : <u>Russia: The Long Road to Ratification. Internal Institution and Pressure Groups in the Kyoto Protocol's Adoption Process</u>
CCMP	152.2004	<i>Carlo CARRARO and Marzio GALEOTTI</i> : <u>Does Endogenous Technical Change Make a Difference in Climate Policy Analysis? A Robustness Exercise with the FEEM-RICE Model</u>
PRA	153.2004	<i>Alejandro M. MANELLI and Daniel R. VINCENT (Ixxi)</i> : <u>Multidimensional Mechanism Design: Revenue Maximization and the Multiple-Good Monopoly</u>
ETA	154.2004	<i>Nicola ACOCELLA, Giovanni Di BARTOLOMEO and Wilfried PAUWELS</i> : <u>Is there any Scope for Corporatism in Stabilization Policies?</u>
CTN	155.2004	<i>Johan EYCKMANS and Michael FINUS</i> : <u>An Almost Ideal Sharing Scheme for Coalition Games with Externalities</u>

- (lix) This paper was presented at the ENGIME Workshop on “Mapping Diversity”, Leuven, May 16-17, 2002
- (lx) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications”, organised by the Fondazione Eni Enrico Mattei, Milan, September 26-28, 2002
- (lxi) This paper was presented at the Eighth Meeting of the Coalition Theory Network organised by the GREQAM, Aix-en-Provence, France, January 24-25, 2003
- (lxii) This paper was presented at the ENGIME Workshop on “Communication across Cultures in Multicultural Cities”, The Hague, November 7-8, 2002
- (lxiii) This paper was presented at the ENGIME Workshop on “Social dynamics and conflicts in multicultural cities”, Milan, March 20-21, 2003
- (lxiv) This paper was presented at the International Conference on “Theoretical Topics in Ecological Economics”, organised by the Abdus Salam International Centre for Theoretical Physics - ICTP, the Beijer International Institute of Ecological Economics, and Fondazione Eni Enrico Mattei – FEEM Trieste, February 10-21, 2003
- (lxv) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications” organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003
- (lxvi) This paper has been presented at the 4th BioEcon Workshop on “Economic Analysis of Policies for Biodiversity Conservation” organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL), Venice, August 28-29, 2003
- (lxvii) This paper has been presented at the international conference on “Tourism and Sustainable Economic Development – Macro and Micro Economic Issues” jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003
- (lxviii) This paper was presented at the ENGIME Workshop on “Governance and Policies in Multicultural Cities”, Rome, June 5-6, 2003
- (lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference “The Future of Climate Policy”, Cagliari, Italy, 27-28 March 2003
- (lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004
- (lxxi) This paper was presented at the EuroConference on “Auctions and Market Design: Theory, Evidence and Applications”, organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004

2003 SERIES

CLIM	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti)
GG	<i>Global Governance</i> (Editor: Carlo Carraro)
SIEV	<i>Sustainability Indicators and Environmental Valuation</i> (Editor: Anna Alberini)
NRM	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
KNOW	<i>Knowledge, Technology, Human Capital</i> (Editor: Gianmarco Ottaviano)
IEM	<i>International Energy Markets</i> (Editor: Anil Markandya)
CSR	<i>Corporate Social Responsibility and Management</i> (Editor: Sabina Ratti)
PRA	<i>Privatisation, Regulation, Antitrust</i> (Editor: Bernardo Bortolotti)
ETA	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)
CTN	<i>Coalition Theory Network</i>

2004 SERIES

CCMP	<i>Climate Change Modelling and Policy</i> (Editor: Marzio Galeotti)
GG	<i>Global Governance</i> (Editor: Carlo Carraro)
SIEV	<i>Sustainability Indicators and Environmental Valuation</i> (Editor: Anna Alberini)
NRM	<i>Natural Resources Management</i> (Editor: Carlo Giupponi)
KTHC	<i>Knowledge, Technology, Human Capital</i> (Editor: Gianmarco Ottaviano)
IEM	<i>International Energy Markets</i> (Editor: Anil Markandya)
CSR	<i>Corporate Social Responsibility and Management</i> (Editor: Sabina Ratti)
PRA	<i>Privatisation, Regulation, Antitrust</i> (Editor: Bernardo Bortolotti)
ETA	<i>Economic Theory and Applications</i> (Editor: Carlo Carraro)
CTN	<i>Coalition Theory Network</i>