



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**SUSTAINABLE AGRICULTURE - GETTING
THE INSTITUTIONS RIGHT**

LOUIS H.G. SLANGEN

**CEESA Discussion Paper No. 1, 1/2001
ISSN 1616-9166**

ABSTRACT

In most countries of the world, a sustainable agriculture is both an important and difficult issue. The agricultural sector in Central and Eastern European is confronted by two large problems at the same time: transition processes and sustainability. The purpose of this paper is, in the first place, to make clear that the institutional setting is very important. Second, it gives an overview of the literature on sustainability, institutions and institutional innovation. The phenomenon sustainability encompassing three dimensions: economic, social and environmental. Institutions are not always exogenous and right so that economic agents will behave in the 'correct' (that is efficient) manner. The non-marketable attributes of agricultural land use such as wildlife and landscape and the quality of soil, water and air create market failure. However, they are important for sustainability. With a lack of markets to realise sustainability, there is a strong incentive to develop institutions capable of changing the farmer's behaviour in ways that will achieve the unachievable via market signals alone.

Direct government production is likely to be superior, if the government may not know what it wants and if the contract party has a strong tendency to reduce costs, but this is accompanied by a reduction in (non-contractable) quality. However, in general, both situations do not apply to sustainable agriculture. Type of government intervention has consequence for property rights. Under influence of changes in the institutional environment, the opinion about the protection of the property rights is shifting. The economic valuation of changes in the quality of soil, water, wildlife and landscape depends on if the change taking place either below or above the *reference level*. From the actual behaviour of the government, it can be concluded that the *reference level* is being used more and more as a watershed to the question of the allocation of property rights and the use of charges or compensation.

Dr. ir. Louis H.G. Slangen

has been working for Wageningen University since 1976; presently as Associate Professor. He has knowledge and qualifications in: environmental economics for agriculture, economics of land use, agricultural economics, cost benefits analysis, new institutional economics and economic organisation theory, valuation methods for wildlife and landscape, and environmental co-operatives for farmers.

Wageningen University

Social Science

Agricultural Economic and Rural Policy Group

P.O. Box 8130

6700 EW Wageningen

Tel. +31 317482621

Fax +31 317484736

E-mail louis.slangen@alg.aae.wag.-ur.nl

CEESA Discussion Papers are reports prepared by members of the CEESA research network or external authors working on similar topics. The papers have received limited reviews. Views and opinions expressed do not necessarily represent those of the CEESA research project. Comments are highly welcome and should be sent directly to the authors.

ISSN 1616-9166

CONTENTS

| | |
|---|-----------|
| <u>ABSTRACT</u> | 1 |
| <u>SUMMARY</u> | 4 |
| <u>1 INTRODUCTION</u> | 6 |
| <u>2 DIMENSIONS OF SUSTAINABLE AGRICULTURE</u> | 7 |
| <u>3 SUSTAINABILITY AND INSTITUTIONS</u> | 10 |
| <u>4 PROPERTY RIGHTS AND THE CHARACTERISTICS OF GOODS</u> | 13 |
| <u>5 GOVERNMENT INTERVENTION; AIMS AND INSTRUMENTS</u> | 15 |
| <u>5.1 RESEARCH, EXTENSION AND EDUCATION</u> | 16 |
| <u>5.2 STATUTORY REGULATIONS OR DIRECT REGULATION</u> | 17 |
| <u>5.3 FISCAL FACILITIES</u> | 17 |
| <u>5.4 SUBSIDIES/COMPENSATIONS AND CHARGES/LEVIES</u> | 18 |
| <u>5.5 GOVERNMENT FACILITIES</u> | 20 |
| <u>6 PUBLIC PROVISION OR DIRECT GOVERNMENT PRODUCTION</u> | 21 |
| <u>7 TAKINGS OR TAKING OFF OF PROPERTY RIGHTS</u> | 23 |
| <u>8 PRIVATE PROVISION WITH COMPENSATION OR CHARGES</u> | 25 |
| <u>8.1 THE IMPORTANCE OF THE INSTITUTIONAL ENVIRONMENT</u> | 25 |
| <u>8.2 POSITIVE AND NEGATIVE EFFECTS</u> | 26 |
| <u>8.3 NATURE OF FINANCIAL INSTRUMENT: CHARGE OR COMPENSATION</u> | 27 |
| <u>8.4 THE NATURE OF THE COMPENSATION</u> | 28 |
| <u>8.5 CONCLUDING REMARKS</u> | 29 |
| <u>9 CONCLUSIONS</u> | 29 |
| <u>LITERATURE</u> | 31 |

SUMMARY

The phenomenon sustainability encompassing three dimensions: economic, social and environmental. On the one hand these three dimensions of sustainable agriculture are complementary and to some extent overlapping. On the other hand, there are also trade-offs. Price of input and output do not include the cost of the environment, and farmers do not have any harmful environmental externalities that their activities cause taken into account. Farmers can have insufficient knowledge about the effects of their activities on the environment and the use of natural resources.

The institutions are often considered as exogenous and the problem become one of *getting the prices right* so that economic agents will behave in the 'correct' (that is efficient) manner. However, institutions are not always exogenous and right. There is a distinction between the institutional environment and institutional arrangements. The institutional environment consists of informal and formal rules in the society; they are the rules of the game within which human actions take place. Institutional arrangements, which are also called governance structures, are mechanisms for co-ordinating economic transactions. The three main governance structures are markets, hybrids and organizations. Hybrid forms concern third way solutions, like environmental co-operatives.

In a modern constitutional state and a parliamentary democracy in which the monopoly of violence of the government is limited by laws and rules, the government protects and enforces property rights. The position and status of property rights in an economy influence the allocation and utilisation of resources and goods. Lack of property rights hampers the allocation and an efficient use of resources and goods. Non-marketable goods of land use like the quality of soil, water and air, and wildlife and landscape have the properties of non-rivalry and (to some extent) non-excludability. Wildlife and landscape are non-rival (or indivisible) and (partially) non-excludable goods. Non-rivalry in consumption and in production characterizes the benefits derived from wildlife and landscape. Non-rivalry in consumption means indivisibility of the benefits. Non-excludability is a characteristic which arises from a lack of property rights. From the institutional point of view, it is clear that in order to set a price for a commodity, it must be possible to exclude those who do not pay a price. For some goods, like many environmental goods, exclusion is possible but very costly.

In a modern constitutional state and a parliamentary democracy in which the monopoly of violence of the government is limited by laws and rules, the government protects and enforces the property rights, takes care of the institutional environment (rules of the game) and stimulates the development of efficient governance structures (markets, organization and third way solutions). The non-marketable attributes of agricultural land use, such as wildlife and landscape, and the quality of soil, water and air, have the properties of non-rivalry and (to some extent) non-excludability. These properties create market failure. With missing markets to realize sustainability, there is a strong incentive to develop institutional adjustments capable of changing a farmer's behaviour so as to achieve the unachievable via market signals alone. It involves institutional innovation in the form of instruments that constrain the damage to wildlife and landscape, and the quality of soil, water and air.

Government intervention does not necessarily mean that the government will deal with all the aspects that can be distinguished in the production of goods and services. For purely public goods it is reasonable to expect that ownership, management, financing and production are in the hands of government. In cases of quasi-public goods, the actual method of provision should depend on efficiency and income redistribution motives. A sustainable agriculture produces not only private goods, but also (impure) public goods. Analysing government intervention involves: (1) the formulation of operational or testable objectives for the measures to realize a sustainable agriculture; (2) the testing of the instruments employed; and (3) the institutional effects. The instruments can consist of knowledge-enhancing and communicative instruments, financial instruments, physical regulations and public or government provision. The type of intervention has consequence for property rights.

There are two situations in which direct government production is likely to be superior. In the first situation, the government may not know what it wants. In that case a contract will be very incomplete and the costs associated with renegotiations are considerable, so that contracting is very expensive. The second situation arises if the contract party has a strong tendency to reduce costs, but this is accompanied by a reduction in (non-contractable) quality. However, in general, both situations do not apply to sustainable agriculture.

Strong direct regulation to realize environmental friendly farming practices is a form of (regulatory) takings, This which means a loss of a part of the property rights and the regulation causes a fall in the value of the asset. Compensated and uncompensated takings have different incentive effects. If the government need not to compensate for titular takings and regulatory takings, then it will impose too many of them. If there are too many restrictions, resources will be incompletely utilized. In practice, governments regularly change their policies on sustainability and land use. Uncertainty about these changes will be internalized in the investment level. Full compensation means that the risks are low or zero. Then, the investment level will be the highest. It is even possible that full compensation provide incentives for strong private efforts or investments. However, non-compensation of restrictions/takings gives government officials an incentive to overregulate, whereas the compensation of takings makes government officials internalize the full cost of expropriating private property rights.

Under influence of changes in the institutional environment, the opinion about the protection of the property rights is shifting. Farmers say that it is their land, and therefore they have the property rights. However, civilians say it is their environment. Because of the environment or environmental goods, public goods are taking an increasingly larger part of the agricultural land (including the amenities) and are becoming part of the public domain. This has consequences for specification and protection of the property rights and, by that the right, for compensation of farmers. It should be stressed that for common goods there are no individual rights, but common rights.

As well as reason of equity considerations, there are also reasons of efficiency why a government should be careful with taking or reducing of property rights without compensation. First, the lack of property rights or the threat to affect them exerts a negative incentive on productive activities or investment behaviour of people. Second, if a government does not have to compensate, it will tend to make frequent use of the instrument of takings.

The economic valuation of changes in the quality of soil, water, wildlife and landscape depends on the change taking place either below or above the *reference level*. This is (besides the argument that in the case of negative external effects subsidies are neither effective nor efficient) an extra argument for applying the PPP or regulation for negative external effects of environmental goods, which are below the *reference level*. To stimulate providing positive external effects above this level, compensation based on the opportunity principle is an appropriate incentive both from efficiency and equity considerations. Finally, from the actual behaviour of the government, it can be concluded that the *reference level* is being used more and more as a watershed to the question of the allocation of property rights and the use of charges or compensation.

1 INTRODUCTION

In most countries of the world, a sustainable agriculture is both an important and difficult issue. The agricultural sector in Central and Eastern Europe is confronted by two large problems at the same time: transition processes and sustainability. This paper can be considered as the first step toward elaborating the relationship between sustainability and the institutions. Dealing with the concept of sustainability is difficult because of its variety of meanings and very different interpretations given to it by economists and ecologists. The term institutions is also a source of confusion. It is useful to use it in the same way, with the same understanding and interpretation. The purpose of this paper is, in the first place, to make clear that the institutional setting is very important. Second, it gives an overview of the literature on sustainability, institutions and institutional innovation, and third, it outlines a plan of approach to the project.

Section 2 gives an overview of the three dimensions of sustainable agriculture. Until now, the economic and the environmental dimensions got most attention. Less or no attention was given to the role of the institutions. I try to show that institutions are very important to the triptych: economic, environmental and social dimensions of sustainable agriculture. Section 3 deals with the difference between institutional environment and institutional arrangements. Institutional environment consists of the rules of the game in a society, and institutional arrangements or governance structures are the supporting structures that facilitate transaction or activities. In Section 4 I investigate the relationship between property rights and the characteristics of goods: rivalry and excludability.

The non-marketable attributes of agricultural land use such as wildlife and landscape, and the quality of soil, water and air have the properties of non-rivalry and, to some extent, non-excludability. These properties create market failure. Because the services of the amenities are partly or completely non-marketable, economists say that they create market failure. However, they are important for sustainability. With a lack of markets to realise sustainability, there is a strong incentive to develop institutions capable of changing the farmer's behaviour in ways that will achieve the unachievable via market signals alone. In Eastern Europe farm types vary from very large farms to very small part-time ones, which makes the changing of farmer's behaviour complex. Section 5 deals with the question of government intervention in realising sustainability. Even if government intervention is justified, it does not necessarily mean that governments need to deal with all aspects of the provision of goods and services.

Important to government intervention are the objectives, which should operate the targets of sustainability, and the instruments to realise them. These instruments, which

belong to institutional innovation, can take different shapes. Section 6 describes the situation in which public provision or direct government provision is likely to be superior. In general, this is not true for the provision of agricultural products, even for sustainable production.

Section 7 deal with the types of takings or taking off of property rights and the question of whether the owner should be compensated or not. Strong direct regulation to realise environmentally friendly farming practices is a form of takings which means a loss of a part of the property rights. In section 8 I discuss the question of when (financial) instruments are used to improve the quality of water, soil and air, wildlife and landscape, on what principle should the use of the instruments be used. The question seems simple. In case of negative externalities the *polluter pays principle* can be used and in the case of positive externalities, a sort of symmetrically opposite principle such as the PPP. However, the economic valuation of changes in the quality of soil, water, wildlife and landscape depends on either the change taking place below or above the *reference level*. In section 9 I give a summary and some conclusions.

2 DIMENSIONS OF SUSTAINABLE AGRICULTURE

In terms of usage, the concept of sustainability does not possess any single meaning or definition. The concept of sustainability carries a variety of meanings, exemplified by the very different interpretations given to it by economists and ecologists. To structure the discussion on sustainability, it is useful to provide a simple classification of the concept. I use the term sustainable and sustainable development as synonyms.

Perman et al. (1995: 51–67) give an overview of the different concept of sustainability. Based on the definitions of sustainability in table 3.1 in Perman et al. (1995: 57), I can conclude that it encompasses three dimensions: economic, social and environmental. The economic process is carried out by combining and substituting available resources. Farmers are the actors and the co-ordination is carried out by governance structures *markets* or *organizations* (see also section 3). From an economic perspective, which addresses the question of maximizing human welfare, the issue of sustainability is not whether a particular natural resource will be available indefinitely, but whether human ingenuity can continue to find ways of using natural resources to increase welfare. This is often referred to as *weak sustainability*. But from an environmental perspective, which addresses the question of maximizing environmental performance, the issue of sustainability is whether human ingenuity can find ways to prevent the consumption of natural resources more rapidly than they can be replaced, and to conserve those resources that are considered to be irreplaceable. Thus, conserving irreplaceable natural resources is often referred to as *strong sustainability* (Legg, 1997:3).

Sustainable agriculture can be considered as a process in which demand for its output - food, raw materials, ornamental plants and rural amenities - are met from farming practices that are economically efficient, environmentally friendly and socially acceptable. On the one hand, the economic dimension is concerned with the ability to maintain sufficient potential production capacity to meet current and future demands for food, raw materials and ornamental plants through using resources efficiently (producing the maximum output from a given set of inputs). It means that the agricultural sector is able to respond to changing consumer demand and the challenges of the technological developments. On the other hand, farmers have to react to the need of the people for wildlife, the landscape and other rural amenities.

The environmental dimension is concerned with the ability to maintain sufficient natural resources (especially land and water), while reducing the harmful environmental effects of agricultural activities and enhancing the beneficial ones. On the one hand agriculture can cause soil, water and air pollution, soil erosion, acidification, eutrophication and drying up. It contribute to greenhouse gases, and lead to the loss of natural habitat, biodiversity and landscape features. On the other hand, agriculture can contribute to land conservation and flood control, provide carbon uptake, and maintain the natural habitat, biodiversity (wildlife) and landscape. Many of these effects are asset specific. For my purpose the following are relevant.

Site specific, which refers to an asset that, because of its location, becomes committed to a particular use. The land used for preserving wildlife and landscape is asset specific, because of its 'use' but also because of its 'site'. Valuable areas for wildlife and landscape are immobile and local (i.e. tied to a particular area).

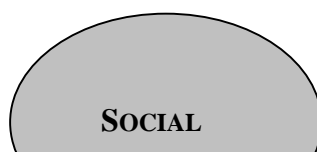
Physical asset specific, such as an investment in machinery, equipment or land, and has a narrowly defined purpose. Investments in land or in machines used for wildlife and landscape preservation have a narrowly defined purpose, and are sunken investments. Human asset specific, that arises through learning-by-doing. Preserving wildlife and landscape is a process of learning-by-doing; it requires an investment in human capital and time.

The social dimension encloses different elements. First, it concerns the institutional environment, which describes the rules of the game in a society (see section 3). It includes formal and informal rules or elements such as motivation, trust, commitment, values and norms or shared codes of conduct in the society, varying in the preferences of the consumers and the shift in property right relations as result of these changes. These elements influence the stability of the social and cultural system, the need for wide participation in making decisions about ethical aspects of food production, such as animal welfare, and the confidence that the general public have in the authorities charged with ensuring food safety and environmental protection.

Second, it concerns elements such as justice and equity in income distribution (within the agricultural sector and between the agricultural sector and the rest of the economy), fair prices of food, raw materials, ornamental plants paid to producers by consumers, and a balance in opportunities between rural and urban areas. The social dimension is not easy to quantify, and there is a strong element of subjectivity in issues of fairness, equity, trust and commitment (cf. Legg, 1999: 3-4).

On the one hand the economic, environmental and social dimensions of sustainable agriculture are complementary and to some extent overlap. A prosperous and economically efficient agriculture sector is able to undertake and invest in environmental friendly practice. It is likely to have the knowledge and incentive (by having the full private property rights) to maintain its resource base, so ensuring that it remains prosperous. An economically efficient sector will be getting the most from the available resources, with prices of agricultural production reflecting their costs of production, which contributes to keeping food prices low. Environmentally friendly production and low prices for agricultural products are positive for the social dimension. Ensuring a clean environment and a varied wildlife, a beautiful and valuable landscape and other rural amenities also enhances social welfare.

Figure 1. Linkages between the economic, social and environmental dimensions of sustainable agriculture



On the other hand, there are also trade-offs among the three dimensions of sustainable agriculture. Producing more food can be at the cost of environmental degradation. This can be the case when input and output prices do not include the costs of environmental, and farmers do not have to take into account any harmful environmental externalities that their activities cause. This can also occur when farmers do not have sufficient knowledge about the effects of their activities on the environment and the use of natural resources, or sufficient financial resources to address such effects, or are not remunerated for any environmental benefits they generate over and above what is expected of them. Moreover, farms in the farming sector, like other businesses in the economy, often have incentives to enlarge their enterprises in order to reap economies of scale. This can be at the expense of wildlife and landscape features (such as stone walls, hedges and coppices), the adoption of monocultures rather than crop rotations, using less labour, more chemicals, and with less dependence on local rural communities (Legg, 1999: 4).

The various linkages between the key dimensions of sustainability agriculture are shown in simplified representation in figure 1 which is partly based on Legg (1999: 5-6).

3 SUSTAINABILITY AND INSTITUTIONS

In many studies about sustainability or sustainable development (which I treat as synonyms) the institutional structure is considered as exogenous and the problem becomes one of 'getting the prices right' so that atomistic agents will behave in a 'correct' (that is, efficient) manner. From this presumption of right economic behaviour human action will help to bring about to bounteous agricultural production, the generation of an economic surplus in rural areas, the creation of new jobs in urban manufacturing, the proper use of natural environment, and the realization of a modern economy in which agricultural is but a minor part of the total economic activities and the national economy. *Getting the prices right* follows logically from the prior problem of *getting the institutions right*. However, institutions are not always right (Bromley, 1999: 3).

It is important to distinguish between institutional environment and institutional arrangements. Institutional environment is the man-made constraints that structure political, economic, and social interactions. These consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct), and formal rules (constitutions, laws, property rights). This definition originates from North (1991: 7), although instead of institutional environment he uses the term institutions. The institutional environment delineates the rules of the game within which the institutional arrangements actually operate. It prescribes/determines the rule of conduct within which human actions take place. For example, what most economists would agree to call an institution, is a framework that defines the ways in which property rights can be implemented and enforced (Ménard, 1995: 164).

Institutional arrangements, which are also called governance structures, are mechanisms to co-ordinate economic transactions. Important contributions in the recent literature on questions about institutional arrangements focus on the polar cases and the 'hybrid forms'. According to Williamson (1987: 16), the polar cases are markets and hierarchies. In markets, co-ordination is based on prices, while in hierarchies, it is based on authority. Hierarchy involves the capacity to supervise and control, including the right to make decisions (cf. Ménard, 1994: 237). Many economists subscribe to Williamson's bipolar distinction between market and 'something else', but for 'something else' they prefer the term *organizations* instead of hierarchies. They argue that Williamson has taken an extremely narrow view of non-market co-ordination. Organizations cannot operate exclusively through command: they also require co-operation by their members. Such co-operation involves their commitment to specific goals, their willingness to endorse or transform existing routines, and their responsiveness to incentives deliberately designed to maintain or improve their participation (cf. Ménard, 1995: 174; Douma and Schreuders, 1998: 140).

The two governance structures 'markets' and 'organizations' are both embedded in an 'institutional environment'. However, there are areas of overlap, which give rise to hybrid forms (Ménard, 1995: 163, 173). A major contribution of the recent literature on transactions is the demonstration of the fundamental importance to "hybrid forms" between the two polar cases of markets and organizations. Hybrid forms are characterized by specific combinations of market incentives and modalities of co-ordination involving some forms of hierarchical relationship (Ménard, 1995: 175). The three main governance structures, *markets*, *hybrids*, and *organizations* (sometimes referred as hierarchies) are called institutional arrangements.

Williamson (1987; 1996; 1998) is a direct descendant of Coase (1937; cf. Putterman and Kosner (eds), 1996: 89-104). In the standard approach on Coase and Williamson, organizations are primarily characterised by authority or 'fiat', the capacity of some agents to give orders. Williamson's original formulation of the markets and hierarchies paradigm has been criticized as a too narrow approach to modern organizations (cf. Milgrom and Roberts, 1992: 291; Hart, 1995: 29-30; Douma and Schreuder, 1998: 140). The criticism pertains to two related points:

- it is too simple to view markets and hierarchies as the only two governance structures for transactions as there is a third way of transacting
- markets and hierarchies should not be viewed as two mutually exclusive governance structures as hybrid forms exist as well.

In contrast to hierarchical co-ordination - that is mostly vertical - the third way of co-ordination consists of forms of horizontal non-market co-ordination, in which more or less equal members have informal communication with each other. Important basic elements of these relationships are motivation, trust and commitment. The co-ordination mechanisms that are used within such an organization are *mutual adjustments* and the *standardization of values and norms*. Mutual adjustment refers to the co-ordination achieved by informal horizontal communication. Standardization of norms and values means shared codes of conduct usually for the entire organization, so that everyone functions according to the same norms of behaviour. The motivation, trust and commitment underlying the operation of this organization can be understood as evolving from the *standardization of values and norms* or shared codes of conduct through selection (cf. Douma and Schreuder, 1998: 140 –143). To work effectively, such a horizontal organization could be partly based on formal rules, but these must be complemented by informal rules (sanctions, conventions, norms or codes of behaviour) that supplement them and reduce enforcing costs (cf. North, 1993: 20).

Standardization of values and norms leads to common values and norms. Common values and norms pertain to a congruent set of preferences within a group of people, guiding co-ordination principles among them. Groups range from a family to a club, from a church to a volunteer group or a team of people working towards a common goal. Repeated interaction promotes solidarity, consensus, trust, and common values and norms in a group. Dasgupta (1991: 75, 79) interprets social norms as implicit social contracts to cooperate, embedded in customs and rituals, and resulting from repeated interactions. If people are not extremely myopic, it is the self-interest of each member of the group to keep the norms; in other words, the norms are self-enforcing. Common values and norms diminish the incidence of opportunistic behaviour between the members of the group. Effective co-ordination based on common values and norms coincides with a strong motivation and high commitment of individual members of a group to achieve their common goal (CPB, 1997: 55).

Nooteboom (1999: 24- 25) emphasizes the role and meaning of trust. Because trusting people are less secretive and more readily supply information, this role has the effect of lowering the cost of search and monitoring. Trust reduces the costs of contracting and control because it decreases fear of opportunism and leads to the acceptance of more influence from the partner. People who trust each other will deliberate and renegotiate on the basis of give and take ('voice') rather than walk out ('exit') when conflicts arise.

Common values and norms, and trust are very important not only as a third way of co-ordination, but also in helping the market mechanism function well. If people do not trust each other or if cheating each other is normal, then the market mechanism can not work. A present example is Russia where the market as a co-ordination mechanism has not managed to get off the ground properly. If people do not keep values and norms, the economy undermine its own basis.

Most people work in an organization of some kind. Almost everyone grows up in an organization called the family. There is a variety of groupings in which people interact for various reasons. The most important characteristic of such an organization is that the members cooperate under some forms of agreements. This agreement may be based on a formal contract, on quite informal contract, mutual expectation, or just on bonds of kinship. Co-operation or interaction inside an organization is often more important than a market exchange, though an organization (like a firm) also has to interact with markets, as when inputs are purchased and outputs are sold (FitzRoy et al., 1997: 1).

An example of the third way of co-ordination is *environmental co-operatives for farmers*. The question is how to typify the institutional arrangement/governance structure *environmental cooperative for farmers*. On the one hand, environmental co-operative is an organization. On the other, it has a relationship with its members who maintain their private property rights and who remain mainly as independent farmers. A number of questions arise regarding these contractual relationships. What are the characteristics of the contracts between members and the organization? How are the property rights of the 'organization' and the 'members' specified? What is the co-ordination mechanism? Who has the power of control or the right over the residual income?

Transactions are co-ordinated by governance structures; such as markets, (hierarchical) organisations and other institutional arrangements. The results of these transactions are strongly influenced by the institutional environment. In the western world this environment has developed from a situation in which monarchs had the monopoly of violence to one with a constitutional state and a parliamentary democracy. In the past the monarchs used their monopoly of power to rob the people, slavery, serfdom and toll collection were the order of the day. People were hesitant to carry out productive activities, as they were afraid that the monarch would seize any returns. Society has a kind of hold-up problem. In other words, lack of property rights or the erosion of these rights create a negative incentive for people to undertake productive activities or investments (cf. Bovenberg and Teulings, 1999: 364 - 367).

In a modern constitutional state and a parliamentary democracy, the monarch has been replaced by the politician, and the count by a civil servant. Robbery, slavery, serfdom and toll collection have been replaced by taxes. In a modern constitutional state and a parliamentary democracy the governmental monopoly of violence is restricted by laws and rules. These form a part of the formal rules of the game of the institutional environment. Together with the informal rules, they form the rules of conduct for the government, firms, households, groups, and individuals.

Getting the institutions right not only means getting the institutional environment right, but also getting the institutional arrangements right. Both are important. One of the salient differences between the institutional environment and the institutions of governance are that the former mainly defines (or acts as a constraint on) the environment of the

latter (Williamson, 1996: 5). A governance structure is a way to implement the 'rules of the game' as they are defined by the institutional environment and make them operational. Governance structures or institutional arrangements are supporting structures for transactions.

A second difference is that the institutional environment operates at a higher level of generalization than do markets and organization. It delineates the rules of the game within which such 'governance structures' actually operate. For example, the legal system, which most economists would agree on calling an institution, is a framework which defines the ways in which property rights can be implemented and enforced (Ménard, 1995: 164). Thus the level of analysis is different. The institutions of governance operate at the level of individual transactions, whereas the institutional environment is more concerned with the composed levels of activity.

4 PROPERTY RIGHTS AND THE CHARACTERISTICS OF GOODS

In a modern constitutional state and a parliamentary democracy in which the government's monopoly of power is limited by laws and rules, the government protects and enforces property rights. The property rights are an important part of the work of the New Institutional Economy (NIE). The origin of the work goes back to Coase (1960), Alchian (1965), Alchian (1967), Demsetz (1967), and Alchian and Demsetz (1972). The central thesis of the property rights view is that the particular structure of the property rights in an economy influences the allocation and utilization of economic goods (resources) in specific and predictable ways (Furuboth and Pejovich, 1972: 1139). As a result, *ceteris paribus*, the value of traded goods depends on how the property rights over these goods are defined. Since individuals try to maximize utility not only as consumers but also as members of organizations (e.g. private firms, government bureau, university), any change in the system of property rights will have a specific and predictable influence on the allocation of resources, the composition of the goods produced and the distribution of income. Therefore, lack of property rights or the taking of them by the government without any compensation influence efficiency and equity.

In addition to marketable products like food, raw materials and ornamental plants the agricultural sector also produces non-marketable goods like the quality of soil, water, air, and wildlife and landscape. These non-marketable goods can be seen as a 'by-product' of land use by farmers or as a result of joint production of agricultural land use. The character of these goods means that they are mostly non-marketable goods. The market fails as co-ordination and price-setting mechanism. There are two important criteria to characterize goods and to investigate the reason for market failure: excludability and rivalry.

These non-marketable goods of land use (like the quality of soil, water and air, and wildlife and landscape) have the properties of non-rivalry and (to some extent) non-excludability. In the case of wildlife and landscape, we have to deal with are non-rival (or indivisible) and (partially) non-excludable goods. Non-rivalry in consumption and in production characterizes the benefits derived from wildlife and landscape. Non-rivalry in consumption means indivisibility of benefits. A good is non-rival or indivisible when a unit of the good can be consumed by one individual without detracting, in the slightest, from the consumption opportunities still available to others from the same unit (Cornes and Sandler, 1996: 8). Non-rivalry in production is often a result of joint production (Boadway and Bruce, 1989: 112-113).

Non-excludability is the property of a good in which the benefits of that good not only can be, but in fact are, made available to all. Non-excludability, because it refers to a lack of property rights, is the crucial factor in determining which goods must be publicly provided. Exclusion may not be feasible for technological reasons, as is the case for national defence, or for an institutional reason, as is the case when property rights cannot be assigned. When exclusion is impossible, the free rider problem and the associated prisoner's dilemma arise (Boadway and Bruce, 1989: 129 - 130).

Once the characteristics *rivalry* and *excludability* of goods are defined, the so-called spectrum of goods can be distinguished. Pure public goods have the properties of *non-rivalry* and *non-excludability*. Pure private goods are fully rival and excludable. The in-between points along this spectrum are occupied by different types of goods (or bads). Goods whose benefits are non-rival and (partially) excludable are called impure public goods. There are also goods whose benefits are (partially) rival and non-excludable. These are called common goods. Table 1 gives an overview of the different types of goods.

An important subclass of goods whose benefits are excludable but partially non-rival are the club goods (Cornes and Sandler, 1996: 9). The essential difference between club goods and pure public goods depends on the existence of an exclusion mechanism. A club is a voluntary group deriving mutual benefits from sharing one or more of the following: production costs, the members' characteristics (e.g., members have land, are farmers) or a good characterized by excludable benefits (Cornes and Sandler, 1996: 33 - 34).

Non-excludability is a characteristic that arises from a lack of property rights (Boadway and Bruce, 1989: 110). From the institutional point of view, it is interesting to look at circumstances that may constitute obstacles to the establishment of private property rights. It is clear that in order to set a price for a commodity, it must be possible to exclude those who do not pay a price. For some goods, exclusion is possible but costly. The metering of water supplies, and the scrambling of radio and television broadcast are examples of costly, and not universally adopted, exclusion devices. Exclusion might be possible at a cost in a situation involving environmental pollution or congestion. There are, however, other goods for which exclusion is intrinsically impossible. If citizens are excluded from a public park, then it is, by definition, no longer a public park. National defence is another commonly quoted example of a good from which exclusion is not possible. In any event, if exclusion is impossible or too costly to be privately profitable, an essential precondition for the establishment of effective property rights is lacking (Cornes and Sandler, 1996: 43).

Table 1 Characteristics of goods based on rivalry and excludability

| | | |
|--------------------------|---|--|
| Rivalry Excludability | Non rivalry (indivisible goods) 0% | Rivalry (divisible goods) 100% |
|--------------------------|---|--|

| | | | |
|---|------|-------------------------------|---|
| Impossibility of: - exclusion - rejection | 0% | (1) Pure public good | 2) Common goods, common resource, and open access resources |
| Possibility of: - exclusion - rejection | 100% | (3) Impure public goods | (4) Pure private goods |

The failure of property rights to be well defined is, then, an important ingredient of many externality situations. However, such a failure is not reason enough by itself to conclude that there is an inefficiency and hence a scope for government intervention. The government can also fail and this might be even worse than market failure.

The non-marketable attributes of agricultural land use such as wildlife and landscape, and the quality of soil, water and air have the properties of non-rivalry and (to some extent) non-excludability. These properties create market failure. With ‘missing markets’ to realise sustainability, there is an strong incentive to develop institutional adjustments capable of changing the farmer’s behaviour so as to the achieve unachievable via market signals alone. This arises because consumers’ marginal willingness to pay for sustainable agriculture is greater than what is reflected in the market prices. This disequilibrium creates incentives for institutional innovation in the form of instruments that constrain the damage to wildlife and landscape, and the quality of soil, water and air (cf. Runge, 1999: 12 –14).

5 GOVERNMENT INTERVENTION; AIMS AND INSTRUMENTS

In a modern constitutional state and a parliamentary democracy in which the monopoly of power of the government is restricted by laws and rules, the government protects and enforces the property rights, takes care of the institutional environment (rules of the game) and stimulates the development of efficient governance structures (markets, organization and third way solutions).

Even if there is a justification for government intervention, an analysis of this interference is necessary. It casts light on the functioning of the government itself. After all, governments can also fail (non-market failures). The reasons for this can be the lack of information, the nature of the political decision-making process, the bureaucratic way of production or disincentives arising from regulations, taxes, levies and subsidies (Schram et al, 1991: 95). Government intervention does not necessarily mean that the government deals with all the aspects that can be distinguished in the production of goods and services. The most encompassing government intervention takes place when ownership, management, financing and production are in government hands. Ownership and management raise questions about of who the owner is and who manages (including planning). The decision to carry the costs of a facility collectively need not imply that the government should also take on the production. With reference to costs, the question is who takes care of financing, i.e. who pays. The contribution to the costs by the government can vary from zero to hundred percent.

For purely public goods it is reasonable to expect that ownership, management, financing and production are in the hands of government. In the case of quasi-public goods,

the actual method of provision should depend on efficiency and redistribution motives. The characteristics of excludability and rivalry are tangible criteria for economic efficiency. In the end, policy considerations determine the actual supply method: government production or private provision. A sustainable agriculture produces not only private goods but also (impure) public goods.

The most important points to consider when analysing government intervention in order to realize sustainable agriculture can be found in the government's objectives, its measures or instruments. The implementation of this institutional innovation should contribute to achieving an equilibrium between the willingness to pay and the (marginal value) of sustainable agriculture to the society as a whole (Runge, 1999: 13). For judging government measures the following steps can be distinguished: (1) the formulation of operational or testable objectives (of sustainable agriculture) for the measures; (2) the testing of the instruments employed, in terms of their:

- a. effect, i.e. the extent to which they are used (this reveals their acceptability);
- b. effectiveness, i.e. the extent to which the instrument contributes to the realization of the set goals
- c. efficiency, i.e. the ratio between costs and benefits
- d. income distribution aspects, i.e. who profits from the benefits and which group in society bears the burden or costs
- e. legitimacy or (public) support for the instrument.

The targets of a government policy to obtain a sustainable agricultural sector will have to be developed¹. This means that the agricultural policy for the agricultural sector should include environmental objectives. Oskam et al. (1998: 41- 45) give an overview of a set of objects for environmental policy and the criteria for evaluating the instruments useful for research project *Sustainable Agriculture*.

According to this overview, the government has a broad range of instruments for pursuing this goal. Both the targets and the instruments are part of the institutional environment. The instruments can be grouped in several ways: knowledge-enhancing and communicative instruments, financial instruments and physical regulations. The WRR (1992: 67) opts for a matrix with behaviour, transaction and persuasion on one side, and the role of government in public law, in private law and as a participant on the other. The sub-headings below contain a classification based on a combination of influence on behaviour and the role of government.

5.1 RESEARCH, EXTENSION AND EDUCATION

With this knowledge-enhancing and communicative instrument the government tries to achieve a voluntary modification of the behaviour of producers and consumers. One of the key assumptions of the market of full competition is that all information is available to the decision-makers (Boadway and Bruce, 1989: 123). Lack of information can lead to producers and consumers making the wrong decisions. The government can use this instrument to try and augment and correct the functioning of the market as an information supply mechanism. A good information supply can lead to a change in preference and, in that way, to a change in the behaviour of producers and consumers. Individuals

¹ Several approaches are used to compare policy instruments against the background of objectives. Both methodology and the type of objectives are important. From a methodological perspective fixed and flexible target may be used. For an overview see Oskam et al. (1998: 41-45).

can become more aware of their *property rights* in the area of wildlife and landscape and the quality of soil, water and air, which include sustainability.

The triptych *research, extension and education* is largely responsible for the growth which the agricultural sector has experienced in Western countries. For example, in the Netherlands, public expenditures on these items have resulted in a rise in productivity of nearly 5 % per annum for the period 1947 –1987 (Van der Meer et al., 1991: 54). This means that this set of instruments has been effective and efficient. Application of these instruments to realize a sustainable agricultural sector will be efficient and effective as well.

5.2 STATUTORY REGULATIONS OR DIRECT REGULATION

The government prescribes that certain actions be prohibited or compulsory, or allows them provided that prescribed rules of behaviour are observed. Among these are the well-known set of interdictions, obligations and licences. These prescriptions are direct in character. They have a direct and compulsory influence on the behaviour of producers and consumers. A characteristic of statutory regulations is that they impose considerable limitations on property rights. In the Netherlands, for example, we see their application reflected in the instruments the government has employed for the conservation of the quality of soil, water and air. Prohibitions and obligations dominate the policy advocated. Licences have so far hardly been applied as instruments of environmental policy for agriculture and horticulture in the Netherlands. Licences can be seen as property rights. The application of licences or permits is not meaningful in the case of any material or activity that can be lethal to man and environment in very small concentrations. Licences or permits may come in the shape of the right to carry out certain activities like construction, cutting trees, emission rights and the (restricted) use of manure (in the form of restricted use of the minerals N, P and K) on land. In principle, emission and pollution rights can be tradable. Pollution rights, being tradable, bring flexibility in the allocation of the limited quantity of emissions tolerated.

Statutory measures comprise regulations amounting to physical limitations, for example quotas and coupons. A distinction can be made between regulations under public and private law. The government role in public law, combined with the behavioural mechanism of 'compulsion', results in direct regulation. In private law regulations, the role of government is limited to legislation and the role of facilitator for a civic implementation process. In this approach tradable production or pollution rights are a combination of the public and private law role of the government. There is a limitation on total pollution, enforced by public law (the quantity of licences determined unilaterally by government) and private law rules for the trade in licences. As the target group is confronted both with compulsion (not to exceed the volume permitted) and with the opportunity to realize transactions (trade in licences), aspects of both behavioural and transaction play a role.

5.3 FISCAL FACILITIES

Where fiscal facilities are concerned the emphasis is not on the statutory but on the financial aspect. The tax mechanism is used as the steering mechanism through tax rebates or tax benefits for persons or institutions. Among the tax facilities are those given to the owners of woodlands, nature/wildlife areas (for example tax exemption for forestry enterprises). For certain investments aiming at environmental protection, there

can be facilities for accelerated depreciation. Tax benefits are an attempt to exert direct influence on the behaviour of economic subjects.

The advantage of fiscal regulations over subsidies is that they are simpler. No money has to be handed over. Government tax advantages have two types of costs: lost income and costs of implementation. Another objection against tax benefits is that they may give rise to transfers that may change the secondary income distribution. From a financial point of view, enterprises with a high marginal tax rate are in a better position to invest than enterprises with a lower tariff.

5.4 SUBSIDIES/COMPENSATIONS AND CHARGES/LEVIES

By granting subsidies and imposing charges, the government aims at having an indirect influence on the quantity and quality of an activity. The expenditure on subsidies or the income from charges is directly related to certain activities by the person being subsidized or paying a charge. When subsidies are applied to activities with favourable external effects, they can be used as 'compensation' or 'stimulation' premiums. Compensation premiums are paid for income lost as a consequence of a government regulation. An example is the compensation paid to farmers following a management agreement. Income compensation brings the economic subjects back to their original income level. Stimulation premiums are less restrictive. They are not linked to any statutory arrangement, public or private. The government gives financial support to encourage certain activities. Economic subjects are free to use this financial support and there is no compulsion to carry out the activity concerned. Applications are: subsidies for afforestation, maintenance of landscape elements, environmentally friendly manure storage on farms and environmentally friendly production techniques, etc. (Compare EU Environmental Directive 2078/92).

In the case of activities with negative external effects, for example polluting emissions, the application of the subsidy instrument may be undesirable. Baumol and Oates (1989: 211-233) show that the subsidizing of emission reduction in a situation of full competition decreases the emission per enterprise, but increases total emission. The lower cost resulting from subsidies will lead to a lower market price and, in its wake, to greater sales and the entry of new polluting enterprises (see also WRR, 1992: 133). In this situation subsidies are neither effective nor efficient.

Like subsidies and tax facilities, charges belong to the systems of financial incentives. The influence of charges on the behaviour of economic actors is different from that of subsidies. Charges are taxes that raise the cost price of certain (in this case, polluting) activities. The imposition of a charge can be conceived of as an effort to give a price to negative external effects, which are thus included in the production and consumption decisions of economic subjects. By placing a levy on environmentally polluting activities, the government may try to influence their amount and in this way, the quality of soil, water and air. The legitimacy of this indirect method of managing the environment can be traced back to the 'polluter pays' principle.

A pollution tax is supposed to charge the instigator of the negative external effect with the costs of the damage done. He will bring these costs into the weighing up of the marginal costs and benefits of his production and consumption. The activity that causes the negative external effects will be pushed back to the point where the marginal benefits of

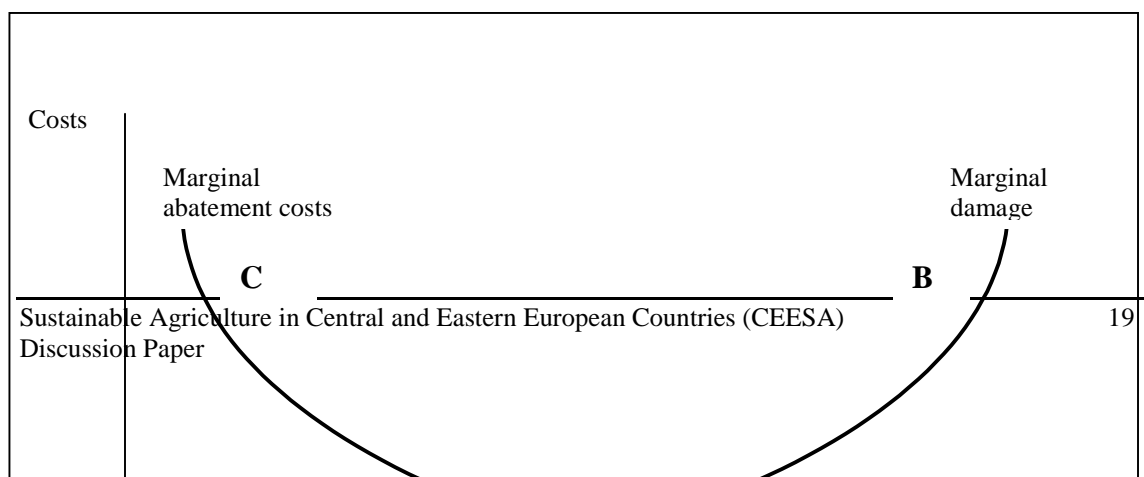
the external effect for the instigator equal the marginal costs of the external effect on account of the damage to be compensated.

Figure 1 shows the course of the marginal costs of the damage reduction curve and of the marginal cost curve. The horizontal axis OS gives the pollution and reasoning from S the damage that is being avoided. The reduction of damage is accompanied by increasing costs. As a consequence, the marginal damage reduction curve (CD) shows a rising course starting from S. This curve gives the marginal costs of damage reduction. From origin (O) the damage rises as an activity increases. This is given by the curve AB. If curve AB is read from B to A, then this curve represents the marginal damage that has been prevented. The optimum is where *marginal cost = marginal benefits*. So Q' gives the optimum level of pollution and Q'S the amount by which pollution must be reduced. Marginal damage of Q' has a corresponding price (P). Then OP is the shadow price per unit of pollution or damage to the environment.

The shadow price for pollution emissions must be set in such a way that the marginal damage prevented equals the marginal costs of abatement. In that case OP is the optimum level of the shadow price for the pollution, SQ' the amount by which it must be reduced and OQ' the quantity of pollution allowed. Figure 2 shows the interchange between the improvement of the environment and the costs connected to it. The shadow price OP forms the theoretical basis for the imposition of a levy.

An argument in favour of levies is that the market is left intact as a transaction mechanism. A bureaucratic apparatus as required for public law regulations, information gathering, legislation, implementation and checks can be omitted. Baumol and Oates (1989: 163 -165) state that the use of charges enables environmental goals to be reached at the lowest cost. A condition for this *lowest cost property* is that firms minimize their costs at every output level and that the market prices of inputs reflect the 'opportunity costs'.

However, a system of charges is not without problems. It also requires information on the existing volume of pollution, the different alternatives to damage limitation, prevented damages and their evaluation and the spread of pollution (Siebert, 1987: 102). Furthermore, various activities or pollutants interact, which means that the consequences of one pollutant cannot simply be added to the consequences of another activity. The problem of deficient ecological knowledge comes on top of this. In many cases no direct link can be constructed/founded between emissions and concentrations of pollutants in the environment. An iterative process of trial and error can be developed to find the suitable and correct level of the tax. This process can be initiated by choosing an arbitrary level for observing the extent of reduction when that tax has been imposed. If the reduction realized differs from the desired level then the tax can be adjusted (Tietenberg, 1992: 372-375).



5.5 GOVERNMENT FACILITIES

Market failure and failure to reach sector or macro-economic goals can be a motive for the government to take property, management, financing and production of certain services into its own hand. This is the most comprehensive form of government intervention. Decision making, financing, implementation and exploitation are in the hands of the government, which thereby secures scarce means with alternative uses: land, labour and capital, and produces goods and services with these. Services which the government takes over may, in practice, cover the whole spectrum from purely public goods to purely individual goods and services.

Traditionally, the existence of market failure provides a rationale for having government intervention. However, market failure is a necessary but not sufficient condition for government intervention. Critics of government intervention use three arguments (Stiglitz, 1998: 5- 6):

- 1) Government is unnecessary because anything the government can do, the private sector can do better or, in terms of Boadway and Bruce (1989: 15), the government may not be able to do any better than the market. However, there one big difference: the government has power that private sector does not have.
- 2) Government is ineffective because anything the government does, the private sector can and will undo. However, whenever government take action or has rules that change relative prices or redistribute income, and whenever the private sector has imperfect information concerning government actions, the state's policies cannot be fully undone.
- 3) The incentive structures inherent in public institutions imply that government actions generally decrease societal welfare, or, at the very least, inhibit productive economic activities by taking resources away from the one group and giving them to another, often less deserving group.

A possible check whether government intervention is preferable is offered by the application of cost-benefit analysis (Laffont, 1990: 27).

Government intervention does not necessarily mean that the government has to deal with all the aspects that can be distinguished in the production of goods and services. The most encompassing government intervention takes place when ownership, planning, management, financing and production are in government hands. If intervention is considered necessary because of market failure, the question arises to what extent? The whole spectrum of possibilities ranges from the polar case 'from ownership to production' (we call this public production) to the other polar case 'only a contribution in cost of the provision by private production'. For purely public goods, it is reasonable to expect that ownership, planning, management, financing and production are in government hands. In case of impure public goods the type of provision should depend on efficiency and redistribution motives (cf. Rosen, 1995: 55).

Stiglitz (1986: 203) distinguishes three major category type of actions: (1) public provision; (2) private provision, with taxes and subsidies aimed at encouraging those activities the government wishes to encourage and discouraging those activities it wishes to discourage; (3) private provision with government regulation, aimed at ensuring that firms act in the desired way. The consequences of any government programme are critically dependent on its nature. If the government decides to bear responsibility for the whole trajectory of the provision, it still has to decide on how the output is to be allocated. It can charge for the good at market prices; it can charge for the good at something approximating the cost of production; it can charge for the good much less than the cost of production; it can provide the good freely. Similarly, if the good is to be privately provided, the government has to decide whether to: (a) contract directly for the production of the commodity and retain responsibility for distributing goods; (b) provide a subsidy to producers, with the hope that some of the benefits will be passed on to consumers through lower prices; or (c) provide a subsidy to consumers (Stiglitz, 1986: 203).

These three types of actions (government interventions) have consequences for property rights. The foundation and functioning of government require a transfer of resources from private to public. Private ownership has to be transferred to public use. The government has the power to take and regulate use of property. This power reduces the clarity and certainty of property rights. The resulting welfare losses represent the economic cost of doing so. Against the economic costs is the benefit of providing public goods.

6 PUBLIC PROVISION OR DIRECT GOVERNMENT PRODUCTION²

Unified ownership or do-it-yourself (by government or nature conservation organizations) can be an alternative to private provision by contracts with farmers. The choice between in-house provision and contracting out has proved to be controversial. Hart et al. (1997: 1127- 1161) have developed a theory of government ownership and contracting that throws light on the cost and the quality of the service under alternative provision schemes. In their model, the provider of the service - whether a government employee or a private contractor - can invest his time either to improve the quality of the service or to reduce its cost.

Both types of improvements prior to implementation require the approval of the owner of the asset. If the provider is a government employee, he or she needs the government's approval to implement either improvement, since the government retains residual control rights over the asset. As a result, the employee receives only a fraction of the return

² Based on Polman and Slangen (1999)

of either the cost reduction or the quality improvement. By contrast, if the provider is a private contractor, he or she has the residual control rights over the asset, and hence does not need to get government approval for a cost reduction. At the same time, if a private contractor wants to improve quality and get a higher payment, he needs to renegotiate with the government since the government is the buyer. As a consequence, the private contractor generally has a stronger incentive to reduce costs as well as to improve quality compared to the government employee (Hart, et al., 1997: 1129).

There are two situations in which direct government production is likely to be superior (Shleifer, 1998: 13; Van Damme, 1998: 811). In the first situation, the government may not know what it wants. In that case, a contract will be very incomplete and the costs associated with renegotiations are considerable, so that contracting become very expensive. The second situation arises if the contract party has a strong tendency to reduce costs, but this is accompanied by a reduction in (non-contractible) quality. The adverse effect of cost reduction on quality is significant (see also Hart et al., 1997: 1142). In both situations government production is likely to be a better solution. However, in general, both situations do not apply to sustainable agriculture. For small parts of it, direct government production can be an alternative.

For example, if more wildlife is wanted, agricultural land could be converted into wildlife areas. However, if the government does this, there are important financial and economic consequences (cf. Oskam and Slangen, 1998: 129). This is a very expensive alternative to contracts with farmers, and it creates the problem of government failure, which is the domain of the public choice theory. This theory emphasizes the self-interest of politicians and bureaucrats as an important factor in understanding government failure. However, a complete theory of non-market failure also requires consideration of the internal organization of the government. According to Laffont and Martimort (1998: 674, 683), the regulatory rights and the design of communication channels between the regulatory hierarchy and the interest groups both affect the behaviour of the government agencies. Different institutional arrangements affect economic efficiency and the distribution of rent induced in the economy. [Laffont and Martimort's term 'regulatory rights' has roughly the same meaning as the Hart et al.'s (1997) 'residual rights of control'].

Agreements for preserving wildlife and landscape with farmers are a second-best solution (see also Slangen, 1997: 152). Incomplete contracts involve hidden information and hidden actions. The problem of hidden information can be reduced by 'building-in' self-selection conditions into the contract. For example farmers may have to follow courses about wildlife management, or voluntarily become members of an environmental cooperative with membership dues. The problem of hidden action could be resolved by monitoring or incentive contracts. An alternative solution is to require posting of bonds to guarantee performance, which can be paid back if the performance is satisfactory or if targets are reached. Using such solutions may still lead to incomplete contracts, but some self-enforcing elements could be incorporated.

Most of the contracts for preserving wildlife and landscape are neo-classical contracts. Weak management agreements like the 'less favoured areas' agreements or simple maintenance agreements could have elements of, or have the character of a classical contract. In the case of one precisely defined task (e.g. grazing animals on land for a specified period), classical contracts appear appropriate. However, for packages of tasks, contracts should be neo-classical and the appropriate governance structure have a

hybrid form. Of course, this is a second-best solution, but there are no better alternatives.

Characteristic of neo-classical contracts is the restricted role of prices as a factor of adjustment. This is caused by the presence of specific assets, while complete self-enforcing safeguards are difficult to implement. These characteristics have consequences for the usefulness of the role of the price mechanism to set the price of these contracts. In the case of classical contracts market is suitable as a governance structure and can be used to set the price. Given this, the question arises as to what the best mechanism (regarding price, allocation and co-ordination) is for contracts between government and farmers.

Usually farmers combine assets like land, labour and capital with purchased inputs to produce agricultural products. To maintain the quality of wildlife and landscape it could be necessary to reduce the intensity of some of these inputs while using more of certain other inputs. Depending on the setting, there are different types and levels of opportunity costs (based on dose-response methods, replacement cost, alternative costs, substitute costs). All these opportunity costs have in common that they do not value a commodity via a demand curve (Marshallian or Hicksian) and therefore fail to provide 'true' valuation information and welfare measures. However these methods are still useful heuristic tools in any cost-benefits analysis of projects, policies or course of action (Bateman and Turner, 1993: 122 -113).

7 TAKINGS OR TAKING OFF OF PROPERTY RIGHTS

In many countries, the constitution circumscribes the power of the government to take private property. Such power may only be used may only use if: (1) the private property is taken for a public use, and (2) the owner is compensated (Cooter and Ulen, 1996:149). Two types of takings can be distinguished:

- 1) Titular takings. In this all the property rights are taken off. The government takes land from many owners in order to provide some public goods, such as military basis, airports, highways and nature areas¹.
- 2) Regulatory takings. There is a restriction on the use of the property without taking the title from the owners. This which means a loss of a part of the property rights.

Regulatory takings are a smaller issue than titular takings. The owner keeps the title, only a part of the property rights is taken off, and the regulation causes a fall in the value of the asset. Strong direct regulation to realize environmental friendly farming practices is a form of takings which means a loss of a part of the property rights.

I now want to explain the economic rationale for the condition that *if private property is taken for a public use, the owner should be compensated*.

(1) Takings are a way for the government to have resources to its disposal. They are an alternative to taxes. Taxes are assessed on a broad base, such as income, property, sales or bequest. Everyone subject to a tax faces the same schedule of rates. In contrast, a taking involves a particular piece of the property owned by a particular person. Tyrannical leaders or governments sometimes finance government and enrich officials by tak-

¹ Titular takings are for sustainable agriculture less important than regulatory takings. However, titular takings makes the relationship between loss of property rights and compensation more clear.

ing property from individuals without compensating them. If the private property owner receives compensation equal to the market value of the property, the government could not profit from taking it. So the requirement of compensation can be viewed as a device to channel government finance into taxes and away from takings (Cooter and Ulen, 1996: 149-150).

The economic effects of the incentive of takings provide strong reason for financing the government by taxes rather than by takings. Any kind of expropriation distorts people's incentives and causes economic inefficiency, but taxes distort far less than uncompensated takings. This is especially true if taxes have a broad base (such as TAV). In contrast, takings have a very small base. Individual owners are prepared to go to great expense to prevent the government from taking their property without compensation. The possibility of uncompensated takings would divert effort and resource away from production and towards the policy of income distribution (Cooter and Ulen, 1996:150). If in a project the benefits arising from takings are insufficient to compensate the losers, the project will not be worth carrying out. A strong argument for compensation besides efficiency is that of equity (cf. Epstein, 1985: 4-5)

(2) The requirement for compensation does not preclude another political abuse, which is the government taking one person's property and selling it to someone else (and it gets a private use). Therefore the 'public use' requirement prevents such a practice. However, the public use requirement does not solve the problem of inefficiency in involuntary transfers (Cooter and Ulen, 1996: 151)

(3) The government has to purchase large tracts of land from many owners in order to provide public goods, such as airports, ports, high ways, industry terrains and nature terrains. These projects often demand "contiguity", which means that the parcels of land must touch each other. The last owner can "hold out" when the government wants contiguous parcels of land needed for a public object. Even when owners do not hold out, the possibility of doing so can dramatically increase the transaction costs of purchasing contiguous property. The taking power of the government reduces this problem. However, from (1) and (2) we can conclude that it gives rise to efficiency. Therefore this type of takings should be guided by the principle: *In general, the government should only take private property with compensation to provide a public good when transaction cost preclude purchasing power the necessary property* (Cooter and Ulen, 1996: 151-152).

Compensated and uncompensated takings have different incentive effects. If the government does not have to compensate for titular takings and regulatory taking, then it will impose too many of them. If there are too many restrictions, resources will be incompletely utilized. Thus, uncompensated restrictions result in inefficient use. Conversely, if the government must compensate fully for restrictions, then landowners will be indifferent about whether or not the government restricts them. Landowners (-users) will improve their property as if there were no risk that those restrictions could prevent the use of the improvement. If restrictions subsequently prevent its use, the investment will be wasted.

The effect of titular takings and regulatory takings is quite different for private people compared to government officials. For private people the uncertainty about the conduct over the government plays an important role. The government might change the rules

for land use. Doubts about the credibility of policy statements or the non-fulfilment of a policy plan give rise to *time-inconsistency*. This concept was identified and developed by Kydland and Prescott (1977: 475 - 475). According to them, time-inconsistency occurs when a policy which originally seems optimal, after a time, or when the time comes to put it into practice, or as time goes by, is no longer considered so by policy makers. Without a binding agreement to keep the government to the original plan, the latter has the authority to change to a new policy which appears better under the changed circumstances. The problem, if people realize this, is that they will anticipate a change in policy and will act in a way that results in politicians being unable to reach their original policy objectives. Time-inconsistency in government policies does not only result in strategic behaviour, but also stimulates risk-averse behaviour.

In practice, a government regularly changes its policy about sustainability and land use. Uncertainty about these changes are internalized at the investment level. Full compensation means that the risks are low or even zero. In this case the investment level is the highest. It is even possible that full compensation might provide incentives for strong private efforts or investments. However, non-compensation for restrictions/takings gives government officials an incentive to overregulate, where as compensation for takings makes government officials internalize the full cost of expropriating private property rights (cf. Cooter and Ulen, 1996: 155).

8 PRIVATE PROVISION WITH COMPENSATION OR CHARGES

In most countries of the EU, in the USA and in Canada, it is more or less common practice to give farmers a compensation if they contribute to the preservation of wildlife and landscape. Using (financial) instruments to improve the quality of water soil and air, wildlife and landscape, the question that needs to be asked is on what principle the use of the instrument should be based. The difference between the principle *the polluter pays* and the principle that the one who makes a positive contribution to the preservation of the environment is rewarded seems to be a matter of gradation. Also from the well-known point of view of the *Coase theorem*, it does not matter for efficiency whether the polluter pays or the polluter is paid. The question is, is it really so simple? In this section I discuss (1) the importance of the institutional environment; (2) positive or negative external effects; (3) charge or compensation; and (4) the nature of the compensation.

8.1 THE IMPORTANCE OF THE INSTITUTIONAL ENVIRONMENT

The institutional environment is the humanly devised constraints that structure political, economic, and social interactions. These consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conducts), and formal rules (constitutions, laws, property rights). This definition comes from North (1991: 97), although instead of institutional environment he uses the term *institutions*. The institutional environment delineates the rules of the game within which the institutional arrangements actually operate. It determines the rules of conduct within which human actions take place. The institutional environment is a framework that defines the ways in which property rights can be implemented and enforced, and modifies for how they are specified, implemented and protected. Existing property rights regimes make it difficult to persuade farmers to provide public goods like wildlife and landscape without compensation for the related opportunity costs.

The institutional environment is not an unchanging constant, and by that, nor is the status of the property rights. According to Williamson (1998: 27) the institutional environment changes considerably within a period of 10 - 100 years. This can have consequences for the way in which the government recognizes and protects property rights. Property is a bundle of rights which describe what people may and may not do with the resources they own; the extent to what they may possess, use, transform, transfer, or exclude others from their property. Property rights are not immutable. They may, for example, change from one generation to another (Cooter and Ulen, 1996: 72).

Under pressure of environmental problems or lack of sustainability, the government can no longer permit, for example: (1) farmers have an unlimited numbers of pigs; (2) farmer use unlimited amount of manure or minerals (such as N,P and K) on their land; (3) farmers spray their (fallow) field margins and ditch-side with pesticides or even with fertilisers. However, has a government the right to take away production rights of farmers (see my discussion over takings) or introduce unsprayed field margins, all without compensation, if the farmer owns or use the land? One argument for unsprayed field margins is that by doing so soil and surface water are protected. This water is an impure public good. Exclusion of use and abuse (misuse) is, because of lack on property rights, very difficult. Polluted water or bad water is *impure bad*, and it is the negative external effect of certain activity. People can only withdraw or protected from this polluted water against high costs.

Property rights are only effective if there is an authority willing to protect them. Generally, that authority is the government. The same government also has the power to make use of titular taking and regulatory takings. As well as equity considerations there are also reasons of efficiency for why the government should be reserved with takings without compensation. First, the lack of property rights or the threat to affect them exerts a negative incentive on productive activities or investment behaviour of people. Second, if the government does not compensate, it will tend to make more frequent use of the instrument of takings.

8.2 POSITIVE AND NEGATIVE EFFECTS

In addition to marketable goods such as food, raw materials, and ornamental plants, the agricultural sector also produces *non-marketable goods*. These are also called positive and negative external effects. They are the result of a specific way of using agricultural land. Agricultural landscape such as 'small-scale landscapes' (these are characterized by small fields surrounded by hedges or wooded banks) or peatland areas with narrow plots and wide ditches are the *by-product* of farming. Other amenities, open spaces and the rurality also belong to the positive external effects of the agricultural sector.

To the negative effects belong the harmful effects on the quality of soil, water and air. Examples of these effects are acidification, eutrophication, drying up, and greenhouse gases. To offer subsidies for activities with negative external effects can be undesirable. Baumol and Oates (1989: 211 - 233) show that subsidizing of emission reduction in a situation with full competition decreases the emission per firm, but increases total emission. The lower cost resulting from subsidies leads to a higher production per firm and/or the entry of new (polluting) firms. In this situation, subsidies are neither effective nor efficient (see also WRR, 1992: 133). Moreover, such an incentive structure sends out a wrong signal. Causing negative effects requires adaptation of the behaviour of farmers. The imposition of charge is an effort to attach a price to negative external ef-

fects, through which they are included in the production and consumption decision of economic subjects. The legitimacy of this method can be traced back to the polluter pays principle (PPP).

8.3 NATURE OF FINANCIAL INSTRUMENT: CHARGE OR COMPENSATION

The border between negative and positive external effects is neither absolute nor constant. It is more a matter of a sliding scale. One example is the management of road verges in the Netherlands. In the past, they were usually regularly mowed, to make them look like lawns. Many people liked it. Nowadays they are rarely mowed. According to some people, this change in management is a positive external effect, and according to others a negative external effect.

The border between negative external effects and positive external effects, and the judgement about whether if a certain change in the environment is positive or negative does not depend on personal preferences alone, but also on the *reference level*. Hanley et al. (1998:103) define the *reference level* of the environment as the level of the quality of the environment society finds it should be. According to Hanneman (1999:75) people have relative rather than absolute preferences for items, and they judge a situation not in terms of absolute levels of attributes but, rather in relation to some *reference level*. This can be the *status quo*, the pre-existing level of the item, or it can be a *norm* or an *expectation* regarding the item's level.

When a new factory, which pollutes soil, water and air, is established the *reference level* is the situation before there was pollution, before there was a factory. In practice, the determination of a clear *reference level* is often controversial. If such a level could be determined for wildlife and landscape, and if society find that the quality level of wildlife and landscape by farmers is brought under the *reference level*, then farmers will cause external costs. Conversely, if the present level is higher than the *reference level* and farmers increase the volume and quality of these public goods, they will produce external benefits.

Bromley and Hodge (1990: 208-209) have a somewhat different view of the *reference level*. They connect the *reference level* with the allocation of the individual property rights of the farmers, i.e. the allocation of the power of these rights between them and the government. This allocation can change with time. How do shifts in the allocation of property rights come about? An important influence on the changes is the shifting of people's preferences. Changing preferences lead to change in the *optimal level* of environmental quality. This means that by changing preference the *reference level* also changes. The status quo property rights arrangements which have served agriculture so well, exist for historical reasons and may not necessarily be appropriate for the future. Shifting values and changing perceptions of the role of agriculture will surely bring about at least marginal shifts in property rights and policy entitlement (Bromley and Hodge, 1990: 212).

However, because of the economic valuation of changes, caution is needed in using a sliding transition between negative and positive external effects. According to Knetsch (1999: 9) the economic valuation of a change strongly depends on the level at which the change take place, under or above the *reference level*. Positive changes are often seen as a gain, but given the nature of the change relative to the *reference level*, individuals may

see some positive changes as being a reduction of loss. Similarly, negative changes can be either losses or, if in the domain of gains, may be viewed as foregone gains.

The distinction between whether a change is in the domain of gains or in the domain of losses is important for the following reason. A positive change that results in reducing a loss will normally be more valuable than one that provides a gain. And a negative change, which imposes a loss, will be far more averse than one that results in just foregoing a gain. Reducing pollution levels, for example, is likely to be more valuable, and is more likely to be economically justified if viewed by people as something that reduces the harm of pollution than if considered by them to be a gain in environmental quality. This makes it important to distinguish between gains and reductions of losses, and between losses and foregone gains, and to use the correct measure to assess them. Losses and reduction of losses are most appropriately assessed by using the WTA measure, and gains and foregone gains by using the WTP measure (Knetsch, 1997, cited in Knetsch, 1999: 9).

With and without comparison. The determination of whether an activity causes the reduction of a negative externality or an increase in positive externality can also be based on a *with and without* comparison. If farmers use excessive amount of manure and/or fertilizers (= with situation), the quality of water decreases. This can cause extra high costs for water supply companies. A reduction of the use of both to a *balanced fertilization* (= without situation) involves a reduction of negative external effect. For wildlife and landscape it is important to preserve the characteristic and valuable agricultural landscapes, interesting natural elements and small nature areas. The presence of meadow birds, but also the preservation of characteristic landscapes are dependent on a special type of farming (= with situation). Farmers who farm in this way provide public goods. Without these farmers and this type of farming that type of wildlife and landscape would not be there (= without situation)

Both with the *reference level* concept and with the *with and without* concept it depends on guiding principles (such as PPP, regulation or direct government intervention like titular takings) in a society, if farmers are forced or stimulated by direct regulation, charges or compensations to preserve the quality of soil, water and air and wildlife and landscape. On the one hand such principles reflect the view of the society over the trade-off between a fair income distribution and providing public goods. On the other hand, compensation means a recognition of the property rights. In spite of shifting preferences and property rights relations, at the moment in the Western countries there is a certain consensus to compensate farmers for activities which provide external benefits.

8.4 THE NATURE OF THE COMPENSATION

For private agents such as farmers who produce positive external effects like varied wildlife, beautiful and valuable landscapes, or other environmental goods there should be a symmetric opposite principle to the PPP. The government as the representative of consumers could bring about an optimal level of the supply of such public goods (cf. Hanley et al., 1998: 102). The nature of the compensations could be based on demand or supply side. Demand assumes that those who benefit from such public goods should pay a marginal value-based fee to the providers of such goods (such as day trippers to scenic rural areas, or hunters in wetlands) This fee could be on a per trip or annual basis, or could be implemented through land purchase or leasing (Hanley et al., 1998: 103). It is

similar to the well-known benefit-received principle from the public finance. In that case, we have to do with individualized public goods.

This demand-approach is hardly applied in the EU countries and in the USA. More application is to be found for the supply oriented approach (cf. Hanley et al., 1998: 104). This involves the government identifying an appropriate level of supply for rural public goods. The providers of these goods get a compensation based on the opportunity costs. The amount and the (quality) level is determined *de facto* by the budget of the government. This is the approach mostly used in EU countries and USA this approach is mostly used. An important argument for this supply approach, instead of the demand side approach, is the reduction of the transaction costs.

8.5 CONCLUDING REMARKS

Under the influence of changes in the institutional environment the meaning about the protection of property rights is shifting. Farmers will say: *it is my land, and therefore I have the property rights*. Civilians will say: *it is our environment*. Because of the environment or environmental goods, public goods are taking an increasingly larger part of the agricultural land (including the amenities) and are becoming part of the public domain (cf. Barzel 1997: 5). This has consequences for the specification and protection of property rights, and with that the right, for compensation of farmers. It should be stressed that for common goods, there are no individual rights, only common rights.

As well as reasons of equity considerations, there are also reasons of efficiency why a government should be careful with taking or reducing of property rights without compensation. First, the lack of property rights or the threat to affect them exerts a negative incentive on productive activities or investment behaviour of people. Second, if a government does not have to compensate, it will tend to make frequent use of the instrument of takings.

The economic valuation of changes in the quality of soil, water, wildlife and landscape depends on the change taking place either below or above the *reference level*. This is (besides the argument that in the case of negative external effects subsidies are neither effective nor efficient) an extra argument for applying the PPP or regulation for negative external effects to environmental goods, which are below the *reference level*. To stimulate providing positive external effects above this level, compensation based on the opportunity principle is an appropriate incentive both from efficiency an equity considerations. Finally, from the actual behaviour of the government, can be concluded that the *reference level* is being used more and more as a watershed to the question of the allocation of property rights and the use of charges or compensation.

9 CONCLUSIONS

Important research questions can be divided into several groups.

(1) Environmental policy

- What should be the targets of the government policy to get a sustainable agricultural sector: fixed or flexible?
- Can they be developed in a interactive process?
- What the instruments should be or can be used (based on effect, effectiveness, efficiency, income distribution aspects and legitimacy)? The approach of Oskam et al., (1998) could be very useful here.

(2) Institutional environment

- What is the initial situation?
 - What are the most important formal and informal rules regarding food, sustainability, agriculture and land use, and what changes can be expected?
 - What will be the long term trends for food consumption and production?
 - How will change the preferences of consumers regarding food production, land use and what will be the effect on property rights?
 - What do we know about the reference level?
 - What type of institutional innovation is necessary?
- (3) Institutional arrangements
- What will be most efficient governance structure?
 - Which third way solutions are possible and necessary for impure public goods like wildlife and landscape, quality of soil, water and air?
- (4) What is the meaning and direction of process of institutional reform (innovation) of the EU, the so-called *Acquis Communautaire*? Could it be used as a guideline?

Plan of approach

- (1) Use the Brundtland definition of sustainability as a guideline.
- (2) Develop indicators for the relevant or most important environmental goods. For this purpose we can make use of e.g. recent OECD-studies.
- (3) Develop indicators for the economic and social dimension of sustainable agriculture.
- (4) Formulate objectives for the environmental, economic and social dimension of sustainable agriculture (We have to make a choice between fixed or flexible target. It might be preferable to use a interactive approach)
- (5) Analyse which instruments could be used. The characteristics of the environmental problem, the institutional environment and the institutional arrangements determine which type of institutional innovation is necessary and which instruments could fit in effective and efficient sustainable policy.
- (6) For the choice between the policy alternatives a cost-benefits analysis (including non-marketable goods or bads) over a long period is very useful.
- (7) The formulation of a sustainable policy means that we have to weighing up material and in-material welfare on the one hand, and on the other weighing up between the interest of different social groups and generations. Both are a part of the institutional environment.
- (8) Use the meaning and direction of process of institutional reforms (innovation) of the EU, the so-called *Acquis Communautaire* as guideline for necessary adaptations
- (9) Analyse institutional environment, looking at:
 - the initial situation;
 - the most important formal and informal rules regarding food, sustainability, agriculture and land use, what changes can be expected, and what institutional innovations are necessary;
 - how the preferences of consumers regarding food production and land use change and what will be the effect on property rights;
 - what is known about the reference level
- (10) Analyse the institutional arrangements, looking at:
 - the most efficient governance structure
 - which third way solutions are possible and necessary for impure public goods like wildlife and landscape, quality of soil, water and air.

LITERATURE

- Alchian, A.A. and H. Demsetz, 1972
Production, Information Costs, and Economic Organisation. *American Economic Review*, Vol 62 (December 1972): 777 - 795
- Barzel, Y., 1997
Economic Analysis of Property Rights. Second Edition, Cambridge University Press, Cambridge, 161 p.
- Baumol, W.J. and W.E. Oates, 1988
Theory of environmental policy . Second Edition, Cambridge University Press, Cambridge, 299 p.
- Boadway, R.W. and N.Bruce, 1989
Welfare Economics. Basil Blackwell, Cambridge, Massachusetts, 344 p.
- Bovenberg, A.L. en C.N. Teulings, 1999
Concurrentie als alternatief voor rechtsprincipes. *Economisch Statistische Berichten*, 84, no. 4204, p.364- 367
- Bromley, D.W. and I. Hodge, 1990
Private property rights and presumptive policy entitlement; reconsidering the premises of rural policy. *European Review Agricultural Economics*, 12: 197 - 214
- Bromley, D.W. , 1991
Environment and Economy; Property Rights and Public Policy. Basil Blackwell, Cambridge, Massachusetts, 247 p.
- Bromley, D.W. , 1999
Sustaining Development: Environmental Resources in Development Countries. Edward Elgar, Cheltenham, 288 p.
- Bateman, I.J. and R.K. Turner, 1993
Valuation of the Environment, Method, and Techniques: The Contingent Valuation Method. In: R.K. Turner (ed.), *Sustainable Environmental Economics and Management; Principle and Practice*. Belhaven Press, London, p.120 – 191
- Cooter, R. and Th. Ulen, 1996
Law and Economics. Second Edition, Addison-Wesley, Reading Massachusetts, 481 p.
- Cornes, R. and T. Sandler, 1996.
The Theory of Externalities, Public Goods and Club Goods. Second edition, Cambridge University Press, Cambridge, 590 p.
- CPB, 1997
Challenging Neighbours: Rethinking German and Dutch Economic Institutions. Springer, Berlin, 592 p.
- Damme, E.E.C. van, 1998
Kruisvaarders met koud water vrees. *Economisch Statistische Berichten*, 83, nr. 4174, p.811
- Demsetz, H., 1967
Toward a Theory of Property Rights. *The American Economic Review*, Vol. 57, nr. 2 (May): 347 -359
- Douma, S.W., and H. Schreuder, 1998.
Economic Approaches to Organizations. Prentice Hall International, London, 238 p.
- FitzRoy, F.R., Z.J. Acs and D.A. Gerlowski, 1998
Management and Economics of Organization. Prentice Hall Europe, London, 598 p.
- Furubotn, E.G. and S. Pejovich, 1972

- Property Rights and Economic Theory: A Survey of Recent Literature. *Journal of Economic Literature*, Vol.10: 1137-1162
- Hanley, N., Hilary Kirkpatrick, I. Simpson and D. Oglethorpe, 1998
Principles for the Provision of Public Goods from Agriculture: Modeling Moorland Conservation in Scotland. *Land Economics*, 74(1): 102- 113
- Hanneman, W.M., 1999
The Economic Theory of WTP and WTA. In: I.J. Bateman and K.G. Willis (eds), *Valuing Environmental Preferences*. Oxford University Press, Oxford, p. 42 –96
- Hart, O., 1995
Firms, Contracts, and Financial Structure. Oxford University Press, Oxford, 228 p.
- Hart, O. and A. Shliefer and R.W. Vishny, 1997.
The proper scope of government: Theory and an application to prison. *The Quarterly Journal of Economics*, 11: 1127 -1161.
- Knetsch, J.L., 1999
Behavioural Economics: Implication for Analysis and Weighing of Environmental Values. Mansholt Lecture. Mansholt Institute, Wageningen, 36 p.
- Kydland, F.W. and E.C. Prescott, 1977.
Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy*, Vol.85 no.3: 473-491.
- Laffont, J.J., 1990
Fundamentals of Public Economics, Third Printing, The Massachusetts Institute of Technology, Cambridge, 275 p.
- Laffont, J-J. and D. Martimort, 1998.
Transaction costs, institutional design and the separation of powers. *European Economic Review*, 42: 673 -684
- Legg, W., 1999
Sustainable Agriculture: An Economic Perspective. OECD, Conference in the UK on sustainable agriculture, 10 p.
- Nooteboom, B., 1999
Inter-firm Alliances: Analysis and Design. Routledge, London, 239
- North, D.C., 1991
Institutions. *Journal of Economic Perspective*, Vol. 5, No. 1, Winter 1991: 97-112
- North, C.D., 1993
Institutions and Credible Commitment. *Journal of Institutional Economics*, 149/1(1993), p.11-23
- Meer, C.L.J. van der, H. Rutten en N.A.Dijkveld Stol, 1991
Technologie in de landbouw; effecten in het verleden en beleidsoverwegingen in de toekomst. Wetenschappelijke Raad voor Regeringsbeleid, SDU-Uitgeverij, s'Gravenhage, 199 p.
- Ménard, C., 1994
Organizations as coordinating devices. *Metroeconomica*, 45 (3), p. 224 - 247
- Ménard, C., 1995
Markets as institutions versus organizations as markets? Disentangling some fundamental concepts. *Journal of Economic Behaviour and Organization*, Vol. 28 (1995), p.161-182
- Milgrom, P. and J. Roberts, 1992
Economics, Organization and Management. Prentice Hall International, Englewood Cliffs, New Jersey, 621 p.
- OECD, 1999

- Environmental Indicators for Agriculture; Issues and Design. OECD Bookshop, Paris, 213 p.
- Oskam, A.J. and L.H.G. Slangen, 1998
The financial and economic consequences of a wildlife and development and conservation plan: a case study for the ecological main structure in the Netherlands. In: S. Dabbert, A. Dubgaard, L.H.G. Slangen and M.C. Whitby (eds), The economics of landscape and wildlife conservation. CAB International, Oxon, p. 113 –133.
- Oskam, A. J., R.A.N. Vijftigschild and C. Graveland, 1998
Additional EU policy instruments for plant protection products. Wageningen Press, Wageningen, 297 p.
- Pelle, E. , 1999
Red het Platteland. Economisch Statistische Berichten, 84, no.4215, p.569
- Perman, R., Y. Ma and J. McGivray, 1996
Natural Resources & Environmental Economics. Longman, London, 396 p.
- Polman, N.B.P. and L.H.G. Slangen, 1999
Wildlife and Landscape preservation, Contributed paper, EAAE IX th Congress, Warsaw, August 24 –28, 1999
- Putterman, L. and R.S. Kroszner (eds), 1996
The Economic Nature of the Firm. Cambridge University Press, Cambridge UK, 390 p.
- Rosen, H.S., 1995
Public Finance, Fourth Edition, Irwin, Chicago, 623 p.
- Runge, C.F., 1999
Induced Innovation and Environmental Value in Economics and Policy. Working Paper WP99-2, Center for International Food and Agricultural Policy, University of Minnesota, Minnesota, 31 p.
- Schram, A.J.H.C., H.A.A. Verbon en F.A.A.M. van der Winden, 1991
Economie van de Overheid. Academic Service Economie en Bedrijfskunde, Schoonhoven, 224 p.
- Siebert, H, 1987
Economics of the Environment. Second Edition, Springer-Verlag, Berlin, 273 p.
- Shleifer, A., 1998
State versus Private Ownership. Department Of Economics, Working Paper 1841, Harvard University, Cambridge Massachusetts, 32 p.
- Slangen, L.H.G., 1997
How to organise nature production by farmers. European Review Agriculture Economics, 24: 508 - 529
- Stiglitz, J.E., 1986
Economics of the Public Sector. Norton & Company, New York, 559 p.
- Stiglitz, J.E., 1998
Redefining the Role of the State: What should it do? How Should it Do it? And How should these decisions be made? Presented on the Tenth Anniversary of MITI Research Institute (Tokyo, Japan), March 17, 1998, World Bank, 34 p.
- Williamson, O.E., 1987
The Economic Institutions of Capitalism. The Free Press, New York, 450 p.
- Williamson, O.E., 1996
The Mechanisms of Governance. Oxford University Press, New York, 429 p.
- Williamson, O.E., 1998
Transaction Cost Economics: How it Works; Where it Headed. De Economist, Vol. 146, No. 1 (April 1998), p.23-58

WRR, 1992

Milieubeleid: Strategie, instrumenten en handhaafbaarheid. Rapport 41, SDU-Uitgeverij, 's-Gravenhage, 299 p.