

Land in Europe: prices, taxes and use patterns

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Executive summary

Background

Developments in land-use patterns across Europe are generating considerable concern, particularly in relation to achievement of environmental goals. Land-use trends — such as urban sprawl and land abandonment — are jeopardising the future for sustainable land use. Moreover, these trends endanger the achievement of European environmental goals in areas such as biodiversity protection and water management and also hinder the effectiveness of instruments in these areas, including the Natura 2000 network and the Water Framework Directive.

Conventional instruments for land-use planning are often criticised for their command-and-control approach. Particularly in countries where spatial planning is still a poorly developed instrument, attempts to put in place coordinated land-use planning fail in the face of economic interests and spontaneous (economic) developments.

While the further development of sound spatial planning instruments in Europe is undoubtedly an urgent requirement, the complexity of land-use developments and newly arising challenges to the environment such as climate change necessitate the consideration of unconventional policy approaches. It may be possible to integrate new approaches into a policy mix that can deal more effectively with current and future threats to our natural resources.

The use of economic instruments in a future environmental policy mix could help. Economic processes have a strong self-regulatory power, often revealing at an early stage the outcome of future development tendencies. There is, however, scope for greater efficiency within economic mechanisms to increase the likelihood of achieving specific goals.

Land is far from being a 'homogenous economic good': plots of land differ markedly in terms of their geographic, environmental and other characteristics. Therefore, this market is not a classical one from an economic point of view, and a full understanding of its functioning is needed to ensure that any

economic instruments put in place are appropriate. In terms of land use, changes often occur when land property changes hands. The arrival of a new category of customer can change the market by creating demand. Such new types of owner can instigate broad land-use changes. Because one broad goal of environmental policy is to prevent unsustainable land-use changes, the land market is a focal point of environmental policy.

Why consider land prices as instruments to shape land-use patterns?

At present, conventional instruments for land-use planning often are not able to fully address environmental challenges; undesired land-use developments are the result of these shortcomings. In addition, it may be possible to increase the economic efficiency of policy instruments. Thus new approaches need to be integrated into a policy mix that can address more effectively current and future threats to our natural resources.

For these reasons, a future environmental policy mix might take into account land pricing mechanisms and try to influence them. Price is a key determinant of market mechanisms, and land pricing is relevant to environmental policy for two reasons. First, the price of land could be an indicator of market expectations regarding future land developments. Thus, it may be possible to use this indicator as a sort of early warning system for future land-use changes. Such changes might be environmentally favourable or unfavourable: the indicator would offer an opportunity for a timely policy response, if needed. Second, it might be possible for policy instruments to influence the price of land itself and thus influence future land-use developments.

However, before reaching any conclusions about a new instrument for policy-makers, the market mechanism of land pricing with respect to land-use change must be better understood, in particular the links between land pricing, land-use changes and the environment. One key requirement is to

define the trigger points to processes where land price influences land-use changes with positive or negative effects on the environment. It is important to understand the causality of mechanisms and the underlying factors behind the processes that lead to change. These factors may include, for example, behavioural changes. This study will shed some light on the mechanisms of land pricing and will attempt to set the scene for finding first 'leverage points' for environmental policy; where and how policy efforts or action could be applied in the context of land pricing for the sake of more sustainable land use in Europe.

Purpose of study

This study analyses the interaction between land prices and land-use changes to investigate the possibility of using land prices and hence land pricing policies as instruments for shaping land-use patterns in Europe.

The study examines:

- **Boundaries of land markets.** In order to gain a better understanding of the links between land pricing and the environment, it is important to begin by looking at factors that shape land markets and their boundaries — even though for many of these factors, influencing land markets, land prices and even land use are not their primary goals.
- **Main drivers influencing land prices.** By investigating the main drivers of land prices, the study asks whether natural values are reflected in (higher) land prices, whether the environment can be a driver of land prices, whether land prices are in turn a driver for changes in land use and if so, what these changes are.
- **Interactions between land prices and land-use patterns in Europe.** The study considers whether land prices could be considered an indicator for land-use changes and whether high land prices would be a potential obstacle for environmental measures, such as protecting areas with high natural values.
- **Land prices and taxes — an instrument of environmental policy?** Several approaches and case studies on economic instruments that support environmental policy are presented and discussed, in particular environmentally related taxes, fees and charges; tradable permit systems ('cap and trade'); environmentally motivated subsidies; payments for ecosystem services (PES); and fiscal instruments, including case studies on taxation in the Netherlands

and Germany and a case study on fiscal effect analysis in Germany.

- **Land-price information and databases** — an overview of existing information and data sources and how these should be further developed. Three countries, Italy, Spain and Luxembourg are presented as examples.
- **Conclusions and future research agenda** — overall reflections and conclusions, including recommendations for future work.

Main findings and future research needs

Taxes, tax relief and urban pressure appear to be the main drivers influencing land prices

A very general assessment suggests that the most influential drivers on land prices appear to be taxes, tax relief and urban pressure. These drivers appear to be most appropriate for use as access points for the development of a land pricing policy targeted at a contribution to sustainable land-use development. At the same time, these drivers also have the most potential to induce land-use changes. In this context it is quite difficult to distinguish between the inherent effect on land-use change of the driver itself and the effects of land prices.

One important conclusion is that for the most part, the drivers for agricultural and urban land are different. As an intermediate result, drivers of land prices have to be differentiated between drivers of urban land (and real estate) prices and drivers for agricultural land prices. Natural values may be reflected in (higher) land prices and thus act as a driver if these values are themselves valued by sellers and buyers (for example, recreational amenities, environmental assets improving the quality of life (health) and environmental assets improving production for agriculture). Environmental quality is not relevant for price determination if it is not important for the current or intended use of land.

Drivers with less impact on land price development, or where the effect differs from region to region, include subsidies, inflation, commodity prices, land productivity and amenities. Apart from inflation these drivers apply more to agricultural land in rural areas than to urban or semi-urban zones. In addition they may not have direct consequences on significant changes in land use, except possibly changes in agricultural use, which becomes more intensive because of an increase in commodity prices. It appears unlikely that agricultural land could be abandoned due to these factors, but prices

are likely to rise or to fall. This, however can differ from region to region; disadvantaged rural areas in remote regions might be more vulnerable to these factors.

Drivers such as subsidies and tradable permits need further research. For example, we need to determine whether the cap-and-trade market is actually leading to a systemically sustainable outcome. There are good intuitive reasons to believe that cap and trade will hinder this aspiration. Unfortunately, cost-benefit analysis fails to represent the real social consequences of subsidies, so it is not possible to assert with confidence the outcomes in terms of creating sustainable systems. A case in point is the effects of subsidies within the agricultural sector.

Land prices can function as an early warning indicator for environmental degradation

There is some evidence that land prices have the potential for use as indicators. Especially in situations where future land changes and development are expected, prices have changed significantly. Price could thus take on the function of an early warning indicator. In order to support environmental protection and sustainable development, more research is needed to estimate the value of ecosystems and their services, which should be better reflected in land market prices.

The concept of ecosystem services could be beneficial in this context. Further development and specification of the approach is needed in order to understand how this concept could be applied for land markets. Further analysis is required to investigate if interactions between land prices, environmental quality, land use and infrastructure are strong enough and to identify differences in the relationships between land prices and land-use changes in order to develop possible indicators or even tools. Also, a distinction between urban and rural areas is important here, and there is a need for better a understanding of the underlying reasons for price changes.

Land prices and land-use patterns to be used as indicators in processes such as urban sprawl

Land prices and land-use patterns are interconnected and have high potential for use as indicators, especially of processes such as urban sprawl. However, there is no clear evidence that land prices can initiate land-use changes — although in some cases they clearly contribute to these processes, as seen, for example, when looking at the interface between urban and rural areas

and in situations of urban pressure. In transition economies, changes in land prices can imply changes in market prices but also imply changes in land-use patterns, as experiences in eastern Europe show.

However, land pricing is related to the environmental impacts of land-use changes. It has been shown that in some cases high land prices are indeed an obstacle for environmental measures. The example of Conservatoire du Littoral in France shows that a combination of land-use planning (land-use restrictions) and land acquisition can provide an effective approach for nature conservation purposes. This is especially the case if environmental goals compete with other financially strong uses such as tourism development.

In the future more knowledge is needed on the main, significant types of land use changes and conversions: i.e. agricultural to urban (urban and tourism sprawl more generally); abandonment of agricultural land (and its conversion to forest); designation of protected areas; and transformation of high-nature value agricultural land to intensive agriculture. Each of these land uses changes could be treated separately, perhaps in separate studies, primarily because the boundary conditions and driving forces are very different for each type of change and also because this approach will bring the environmental impacts into greater focus. The two areas that appear to be most interesting are sprawl related to the growth of urban areas and sprawl related to tourism.

Taxation used as an instrument to shape land use patterns

This has been debated in at least two countries, though not yet put into practice. The discussions in Germany and the Netherlands provide some insights into how taxation could be used in land use policy. However, its practical application appears problematic.

The results of the debates in Germany and the Netherlands suggest that economic instruments such as taxes could be used as a supplement to traditional land use planning — but that they cannot replace land use planning instruments. One major challenge in the research and application of this type of land taxation instrument is to understand how the value of open space (or other environmental service) could be incorporated into a taxation system. The root problem is that the societal value of open space is not reflected in its market value and would need to be identified through other means.

While the potential effect of land taxation on land use changes continues to be questionable, it would be valuable to further investigate whether land taxation as an instrument for land-use development can be combined with other instruments in such a way that the alterations of price become a more valid argument for landowners and/or buyers and sellers to shift to a more sustainable land use, thus having a more sustainable influence on decision making regarding land use. The use of subsidies could also be an instrument for direct intervention on land markets (for example, the acquisition of land could be subsidised if the new owner agrees to apply a certain land use or unseal land), more research is needed in order to assess the potential effectiveness of such subsidies.

It may also be beneficial to explore further the power of a pricing mechanism like taxation to modify the use of land and nature's resources. It is important in this context to examine reasons for the failure of why the public pricing mechanism (taxation). One reason is that governments wilfully have degraded the land tax as an instrument for raising revenue. Some researchers believe that land taxation can contribute to the justice and sustainability agenda, and this too needs further investigation. Precisely how taxation can do this can only be understood by analysing the way in which income is distributed between all the factors of production, following a shift in the structure of taxation from 'good' economic activity to 'bad' activity.

This study only provides a partial treatment of land taxation, since it focuses on land prices. This should not lead analysts to conclude that this fiscal tool must be coupled with regulations rather than market processes. Further study may reveal that the most efficient charge is a fixed rate applied to the value of all forms of land use, with the charge related to current market rents. The fiscal liability automatically varies as land rents go up or down. Some environmentalists object to the taxation of land, fearing that it might be 'counter-productive' — driving owners to develop spaces that ought to remain open. Understanding how the market in land operates in conjunction with zoning provisions would reassure people that land taxation is not a threat to spaces dedicated as open under the planning provisions.

Underlying driving forces of land prices appear to differ from region to region and from one type of land for another

In agriculture areas, factors such as agricultural and other subsidies, commodity prices and

land productivity appear to be particularly important. They appear to have an important role in disadvantaged and remote areas. In urban or semi-urban zones, however, these factors do not appear to be as important in terms of influencing land use change, even for agricultural land.

It could hence be useful to distinguish between different types of areas across Europe and investigate them separately. A possible differentiation and an initial selection of regional focal points could be: coastal zones with a high potential or occurrence of tourism development (especially in the Mediterranean area), rural areas in southern Europe, highly industrialised urban areas in northern and central Europe, and eastern Europe with its specific challenges of economic transition.

Are land prices a potential instrument for land use and environmental policies?

Land prices require more attention in the context of European environmental policy. Traditional land use planning faces significant challenges to tackle current and newly arising environmental problems, and new approaches for strengthening sustainability in land use are needed urgently. For this purpose a systematic analysis of the shortcomings in land use planning in different parts of Europe should be carried out. The links to spatial planning as well as to policy discussions on territorial cohesion need to be identified and studied.

The specific role of land prices themselves would appear to be important in any further review. Several participants at the EEA workshop in April 2009 were reluctant to consider a separate, specific role for 'land pricing' as a driver of land use change, seeing prices mainly as a 'summarising reflection' of other underlying factors and expectations. While this study discusses the role of pricing, it also considers the possibility that land prices are an important signal to private actors in the market and thus will influence how their choices affect land use and the environment. This signalling function might be of special value for expectations regarding the conversion of agricultural land to urban land, which also has some of the most significant environmental effects. In this sense, land prices could have a similar role to, for example, carbon prices, which provide an important signal that influences the decisions of private actors and thereby affect climate change. However, the two markets are quite different, and further analysis of the influence of land prices is required.

Other promising economic instruments could be applied on land markets

Some of the economic instruments (Payment for Ecosystem Services and environmental subsidies) have not yet been applied to policies of land use planning. They could contribute to a further development of new approaches in this regard. Economic instruments such as payments for ecosystem services, environmentally motivated subsidies and tradable permit systems still need to be adapted in order to be applicable to land markets. A major concern in this regard is that land is a non-homogenous good — it is not easy to compare one parcel with another, in particular in terms of environmental value. Economic instruments, however, often require certain comparability. As a result a first step in this direction would be to create a system that allows for the comparison of land values including the physical and environmental qualities that are the focus of conservation efforts.

To characterise land as a 'non-homogenous good' may simply reinforce the existing academic and institutional prejudice against undertaking research into land markets, and to avoid this it is vital to carry out further research in this area.

Links between financial markets, land markets and the environment need to be investigated

The 2008–2010 global financial crisis is very closely related to problems in real estate finance. The economic consequences of the crisis are particularly strong in those European countries that saw strong real estate speculation in recent years — notably Spain. Here construction led to extensive sprawl that could be termed as unsustainable in both environmental and financial terms. Thus, the finance-land interaction could be studied at macro-national level in perhaps two or three European countries. The work may need to bring in issues related to national macro-economic policy. A further exploration of the links between the financial and real estate markets could also lead to a much broader view of the possible role of land or real estate taxes, possibly as an alternative revenue source for government to taxes on capital and in particular labour (the latter in particular are likely to diminish as a revenue source as Europe's population ages and shrinks). Land or real estate taxes thus might play an important role in future work to 'green the tax base'.

Another key issue that needs to be investigated further is whether efforts to establish payments

for environmental services could be linked to land use prices. This in turn is related to efforts to protect habitats and ecosystems. The designation of protected areas affects land values, which are of great importance to private landowners. Studying these links as well as possible policy responses — such as the actions of the Conservatoire du Littoral in France to purchase land for protection — may be valuable in strengthening the Natura 2000 network and other protected sites in Europe.

To what extent development costs are included in land prices in a European comparison and what effects the minimisation of the (may be not fully recovered) hidden costs could have on the environment are interesting questions and could be important considerations when discussing land pricing. Here, even if further improvement is needed, the tool of fiscal-effect analysis and the transfer of the findings to the European level could improve our understanding.

The link between financial markets, land markets and the environment needs further analysis and requires a distinction between different regions in the European continent. Possible differentiation would be needed among:

- zones and mountain areas with high tourism potential;
- rural areas in southern Europe;
- highly industrialised urban areas in northern and middle Europe;
- eastern Europe with its specific challenges of economic transitions.

Land markets have boundaries

Land markets are determined by a vast variety of factors. For many of these factors, influencing land markets, land prices and even land use are not their primary goals, but to gain a full understanding of how prices are set it is important to understand how these factors interact.

It is important to identify and analyse the boundaries between urban and agricultural land, this will help identify the different pressures and the associated land use changes. A clearer distinction of the relative importance of drivers in the context of urban development and agricultural areas is also needed. Future research is still needed in order to better understand the cause-effect chains of land price developments and land use change. The correlation of economic transition, land prices and land use change needs further investigation.

The complexities of the land market, and the ramifications of that market on the rest of the society, are the result of the coercive privatisation of common rights in the past. The way in which the distribution of land, and the attitudes towards land, affect nations today, may be tested within the EU, with reference to the differential performance in economic activity between, for example, Germany and the United Kingdom. The difference between these two economies cannot be adequately explained without reference to the property market and the different approach to taxation of land values. A comparative study of property rights and attitudes, and how land as an asset differs between the two countries, may illuminate the reasons for the difference in the rates of progress between them in relation to the adoption of green policies at the micro level.

Countries use different methods and indices when presenting land price information

There are many types of land price indices in different countries, making it difficult to decide which index should be analysed. Further problems are the many different sources for land prices based on varying methodologies. In addition, in some countries, 'real' (i.e. market) land prices differ from those declared to the government and thus registered in the official statistics.

In general the work on land prices will require good and comparable data across European countries — and data availability will be crucial if land prices and related data are to be used as indicators related to land use.

There is a need to consider prices of built-up land (if possible the cost of the construction [real estate]

separate from the land), agricultural land and forest land (if separately stored). In addition there is a need to assess alternative data sources.

A database on land prices with consistent information would be valuable

For the potential development of land prices as an indicator, it would be valuable to have a correlated time line of data on land prices together with correlated data on major drivers of land prices, plus data on land use changes. Such time lines could shed some light on whether changes in land prices are responsible for land use change or whether land price would be a feasible indicator that could help identify challenges for sustainable land use planning. The application of geographic information system (GIS) tools in combination with (historic) remote sensing could be an option here.

A good starting point would be the development of a database on the basis of data from the pilot countries presented in this study: Italy, Spain and Luxembourg. In Italy land prices are estimated on the basis of real transactions while in Spain and in Luxembourg they are estimated on the basis of newspaper advertisement. In future efforts should be made to streamline existing databases and develop a coherent system for the European Community.

Future research could use the results from the database research of land prices to seek a more empirical understanding of the links between land prices and land use changes. This work could focus on understanding in what circumstances and how land prices (and perhaps related data, such as the number of land transactions) might be used as indicators of land use change.

1 Introduction: background and aims of the study

Developments in land-use patterns across Europe are generating considerable concern, particularly in relation to achievement of environmental goals. Land use trends — such as urban sprawl and land abandonment — are jeopardising the future for sustainable land use. Moreover, these trends endanger the achievement of European environmental goals in areas such as biodiversity protection and water management and they hinder the effectiveness of instruments in these areas, including the Natura 2000 network and the Water Framework Directive.

Conventional instruments for land use planning are often criticised for their command-and-control approach. Particularly in countries where spatial planning is still a poorly developed instrument, attempts to put in place coordinated land use planning fail in the face of economic interests and spontaneous (economic) developments. Thus, in some cases a country may have a well-developed policy in this field but the implementation of spatial planning at lower policy levels is not ideal or is not sufficiently coordinated.

This study looks at the role of land prices and the possibility of influencing these prices to achieve environmental goals.

While the further development of sound spatial planning instruments in Europe is undoubtedly an urgent requirement, the complexity of land-use developments and newly arising challenges to the environment such as climate change necessitate the consideration of unconventional policy approaches. It may be possible to integrate new approaches into a policy mix that can deal more effectively with current and future threats to our natural resources.

The use of economic instruments in a future environmental policy mix could help. Economic processes have a strong self-regulatory power, often revealing at an early stage the outcome of future development tendencies. But there is scope for greater efficiency within economic mechanisms to increase the likelihood of achieving specific goals.

The case of carbon trading to meet the obligations set down in the Kyoto Protocol is an example of how economic instruments can be more efficient in terms of achieving environment goals.

However, land is far from being a 'homogenous economic good': plots of land differ markedly in terms of their geographic, environmental and other characteristics. Therefore, this market is not a classical one from an economic point of view, and a full understanding of its functioning is needed to ensure that any economic instruments put in place are appropriate. In terms of land use, changes often occur when land property changes hands. The arrival of a new category of customer can change the market by creating demand. Such new types of owner can instigate broad land use changes. Because one broad goal of environmental policy is to prevent unsustainable land use changes, the land market is a focal point of environmental policy.

Price is a key determinant of market mechanisms, and land pricing is relevant to environmental policy for two reasons. First, the price of land could be an indicator of market expectations regarding future land developments. Thus, it may be possible to use this indicator as a sort of early warning system for future land use changes. Such changes might be environmentally favourable or unfavourable: the indicator would offer an opportunity for a timely policy response, if needed. Second, it might be possible for policy instruments to influence the price of land itself and thus influence future land use developments.

But before reaching any conclusions about a new instrument for policy-makers, the market mechanism of land pricing with respect to land-use change must be better understood, in particular the links between land pricing, land use changes and the environment. One key requirement is to define the trigger points to processes where land price influences land use changes with positive or negative effects on the environment. It is important to understand the causality of mechanisms and the underlying factors behind the processes that lead to change. These factors may include, for

example, behavioural changes. This study will shed some light on the mechanisms of land pricing and will attempt to set the scene for finding first 'leverage points' for environmental policy; where and how policy efforts or action could be applied in the context of land pricing for the sake of more sustainable land use in Europe. In regard to environmental protection, several types of land use change are of particular relevance:

- the conversion of agricultural to urban (industrial, commercial and/or residential) land — i.e. urban sprawl (see EEA, 2006b);
- the conversion of land for tourism uses, in particular in coastal zones (see EEA, 2006a) and mountain areas;
- the designation of protected areas, in particular for existing agricultural and forestry land;
- the abandonment of agricultural land;
- the transformation of high-nature value agricultural land (typically with extensive production) to intensive agriculture (EEA, 2004).

This study looks at all these types of land-use changes. While it seems appropriate to focus on the overall process of land pricing in this phase, it is likely that follow-up activities will find it more useful to work on each type of land use change separately, since the boundary conditions and driving forces are likely to be very different in each case; moreover, this approach will bring the environmental impacts into greater focus.

The main background questions for this study on the links between land prices, land use patterns and the environment are:

- What are the main drivers of land prices? Are natural values reflected in (higher) land prices?
- Can environment be a driver of land prices?
- Are land prices in turn a driver for changes in land use? If so, what kinds of change?
- Can land prices be considered an indicator for land use changes?
- Are high land prices a potential obstacle for environmental measures, such as protecting areas with high natural values?
- Can land prices and taxes be potential instruments for land use and environmental policies?
- Which data are important in the context of land pricing?
- What attributes are needed in order to develop appropriate indicators?
- What are the options for (available) land pricing databases?

The study concludes with a discussion and suggestions for future research. As can be seen from the study questions, the work has focused mainly on the micro-economic dimension of land prices. At the same time, land prices can have an important macro-economic dimension. Notably, the 2008–2010 global financial crisis is closely linked to real estate markets (see Box 1.1).

Box 1.1 Case study: links of the 2008–2010 financial crisis to the real estate markets

The 2008–2010 financial crisis has strong links to the real estate market and has had severe consequences. There is considerable evidence that the developments within the real estate markets are not only an early indicator for instabilities in the financial system, but could also be a primary cause of them. As long ago as the 19th century, Henry George called for taxation to focus on land as a way to promote more equitable economic growth. Recent economists, such as Fred Harrison and Mason Gaffney, have worked on this issue and called for greater taxation of land and real estate.

In considering the links within the financial, ecological and energy crises our planet is facing, there is increasing interest in understanding the potential contribution a green budget and taxation reform (ecological tax and subsidy reform) as a cornerstone for solving these crisis. Green budget and taxation reform is seen as an important response to the ageing population in western societies, which will reduce wage-related tax revenue. Proposals to use economic and fiscal instruments in the real estate markets are receiving greater attention. At least one non-governmental organisation (NGO), the UK Land Value Tax Campaign, advocates a shift from taxes on wages, profits, goods and services to a tax on land (www.landvaluetax.org). Several organisations for environment and sustainability are campaigning for a green shift in the taxation system, such as Green Budget Europe/Germany (www.foes.de).

In this context, it needs to be noted that this study focuses on the links between land pricing, land use and sustainability at a 'micro' level (in economic terms); looking at links to spatial planning and land use development; the links between financial and real estate markets suggest instead a 'macro' perspective. The macro and micro are of course linked: land prices are subject to speculative financial 'bubbles', which are thus linked to economic pressures for sprawl. The macro-economic links between land, real estate, finance and sustainability are important and deserve further study.

2 Boundaries of land markets

In order to gain a better understanding of the links between land pricing and the environment, it is important as a starting point briefly to discuss the different factors that shape land markets and their boundaries.

Before starting, it should be noted that this study focuses on land prices, land markets, and land use changes — frequently, however, information is available only for a broader category, real estate (see Box 2.1). The distinction needs to be kept in mind throughout the following chapters.

Land markets are determined by certain boundaries. These are not limited to the neoclassical assumption that in a market a seller and a buyer simply come to terms on the price of a certain good, such as a piece of land. A broader picture is presented by Hurrelmann, who has applied the framework developed by Oliver Williamson, 'Four levels of social analysis', to describe the boundaries of land markets (Hurrelmann, 2002).

The four levels are distinguished by their degree of immediacy in influencing market transactions and their pace of change over time. The highest level, embeddedness, is linked to cultural values such as informal institutions, customs, traditions, norms and religion. Since these settings are unlikely to be influenced by policies, we will not go further into detail here.

The second level, the institutional environment, is subject to gradual change over decades or even centuries. The institutional environment determines the formal 'rules of the game', such as the legal framework of property rights set by national administrations. These rights are influenced by legislation set by the European Union and national governments.

The third level is related to governance structures, and it offers more options for influencing markets and, as a result, land prices. Governance includes a variety of policies that play a part in setting the rules of the market, such as restrictions on the type of land use as well as its trade. Such policies include spatial development plans and regulations, resource management plans, restrictions on property (who can buy how much land), certain European policies such as the Common Agricultural Policy (CAP), and rules on the functioning of land markets such as financial and cadastral security ⁽¹⁾.

The fourth level that determines land markets is called resource allocation and describes the actual transactions of property exchange, thus the interplay of buyers and sellers at the market and finally the determination of land prices.

All four levels need to be considered together, from a holistic perspective. This report focused on level 3 (governance structure) and level 4 (resource

Box 2.1 Background information: Land vs real estate

This study focuses on land prices. However, it also draws on many studies and much existing data refer to a broader category, real estate prices. Real estate, according to one definition, refers to 'land, buildings, and whatever is attached or affixed to the land'. Thus, real estate includes land and other immobile elements on the land (as in the French term for real estate, *biens immobiliers*) — houses, other buildings and industrial facilities that are not specifically buildings, for example wind turbines, dams and other permanent constructions.

⁽¹⁾ Cadastral security applies to two areas, first the security of property rights and second the ease or difficulty of transfer of properties. Financial security of land markets is on the one hand dependent on a well-functioning cadastral system (loans and mortgage require secure property rights and clear rules for mortgaging land) on the other hand all investments, thus including those in land markets, are always dependent on the rules of the financial system, for example stable currency, reasonable interest rates, security of loans and terms of repayments.

allocation), as these can be influenced most effectively by policy.

For example, land-use policy and its instruments not only regulate land use patterns but also have a significant effect on market prices of land. The governance structure creates an important link between land prices, territorial developments, urban planning policies and incentives for developing land. Aspects important to governance are described below.

The following sections of this chapter first describe the background set by the institutional environment and look in more detail at the institutional framework for real estate and land markets (level two). We then follow up with main elements of the European governance structure (level three) regarding land markets: this includes agricultural policy and subsidies as well as related restrictions on ownership and transfer of land. European spatial development policy to some extent plays a part. At level 4 (resource allocation) the determination of the price is the central element. Since land pricing is the core interest of this study, a whole chapter (Chapter 3) is devoted to the analysis of price determination, concentrating on the main drivers that determine prices for real estate and land markets.

2.1 Institutional framework for real estate and land markets

The administration of land use often determines important boundary conditions for land markets. The institutional framework is a crucial factor here (this reflects level two of Oliver Williamson's structure). A weak institutional framework can hinder and even paralyse the efficient functioning of land markets. In some EU-12 Member States for example, the institutional framework is still poorly developed, leading to a lack of transparency in real estate and land markets, unclear land titles and other problems that distort or freeze up these markets.

These obstacles need to be removed in order to guarantee that on the one hand markets are free of unexpected interferences and that on the other they are sensitive to well-targeted governance measures that aim at shaping sustainable land use. The institutional framework thus should set rules for the functioning of land markets that are coherent

and as effective as possible. Sellers and buyers are dependent on the transparency of current land markets and they need to know how the state will react. A sound institutional framework is also crucial for the prevention of corruption, bribery and in the worst case state capture (FAO, 2007).

The components of the institutional framework are:

- legal framework;
- cadastral systems, land registers and tenure security;
- transferability of properties, transaction costs;
- land taxation systems;
- financial markets; especially access to credits, such as options for mortgaging land and real property.

These elements of the institutional framework make up the system that secures the functioning of the market and as a result they are all important.

In more detail, the legal framework provides for the set-up of institutions and land administration authorities and specifies their roles. It defines the form and nature of ownership and the legally recognised forms of tenure and rights associated with the land and other rules related to land property such as land lease, transactions, land use restrictions and arbitration (UNECE, 2005).

Land cadastres provide for detailed information on size, location and attributes of land. In general they consist of maps and other graphic information as well as a written record of land features, types of land use etc. They are a main information source for the actors of land markets and thus for the determination of land values. In addition, cadastres serve as a basis for land taxation. In 2007 the EU Directive on the Establishment of an Infrastructure for Spatial Information in the European Community (INSPIRE) was adopted ⁽²⁾. Among its provisions, this directive calls for the creation of a meta-database on land cadastres (Art. 5, 2007/2/EC).

The **land registers** list the ownership structure, rights or duties related to the land parcel and show whether the land is mortgaged or subject to other burdens. They assure the needed safety and certainty for land transactions, the use of land and the disposal of rights in land. They create security for titles to land and facilitate and support the wider land and mortgage markets (UNECE, 2005).

⁽²⁾ Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007, establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).

While the aspects mentioned above are related to the security of property rights, which are crucial for the sale, acquisition and lease of land, the **transfer of properties** additionally requires the support of public administrations ⁽³⁾. Administrations provide the needed information for transactions and the services related to the legal act. Good governance recommendations postulate that information should be freely available, transparent and consistent. Often different authorisations and licences are needed for a transaction procedure, and sometimes this involves different administrative bodies: these factors can complicate and delay property transfer. Some countries in the European Union have established so-called one-stop-shop offices, where customers can access all services needed. E-governance is also often mentioned as a means for facilitating these administrative processes (FAO, 2007; UNECE, 2005).

Land taxation systems set the basis for taxes charged on land transactions and land property. Often the land cadastre serves for estimating the value of land, if it includes a classification of land quality. The land value can be calculated taking into consideration the potential productivity of each land plot or the expected income from revenue. In many countries, tax is not raised on the basis of the actual sale price of land but on its potential value. Taxation on land is usually levied annually basis and at the time of a transaction. While land taxes put a significant burden on landowners, taxes are important to public administrations for raising revenue. A fair taxation system thus assures the overall basis for a sound institutional framework (UNECE, 2005).

Secure property rights and a sound land registration system are basic requirements for the provision of loans for development and investment on **financial markets**. They facilitate quick and secure procedures for creating and securing mortgages. Mortgages are important for landowners, facilitating the financing of land purchases and other economic activities. For the latter reason land property is a very attractive financial investment, because it secures future financial flexibility (UNECE, 2005).

The legal framework, the systems of land cadastres and registers, and the administrative aspects of land transfer belong mainly to level 2 (institutional environment). Land taxation and regulation of financial markets regulations, whilst important at institutional level, are also important at governance

level as they are powerful instruments used by governments to influence markets.

2.2 Land use and spatial planning (territorial planning)

Planning, both spatial and land use, is an important instrument for land use regulation and can be one of the main guarantees for sustainable development. By determining the possible uses of land, spatial and land use planning can directly influence land prices. It belongs to level 3 of Oliver Williamson's framework (i.e. governance structures), though the institutional environmental (level 2) also has a key role: one key issue is the level of government that has a leading role in planning. Spatial planning can include restrictions on the ownership and transfer of land, as discussed below.

National — and sub-national — approaches to land use and spatial planning can differ significantly in terms of objectives, methods and results, as seen in the Flanders region of Belgium and the Netherlands. Despite a common language and close contacts between these neighbouring areas, Flanders has seen a much greater sprawl of construction than has the Netherlands (Faludi, A. and van der Valk, A. J. (1994). Differences can be even greater when comparing approaches in a larger set of countries.

While a detailed analysis of the single spatial planning strategies of the EU Member States would be desirable in order to fully understand their influence on land markets, this is beyond the scope of this study, which focuses on the principles that have been developed at Community level.

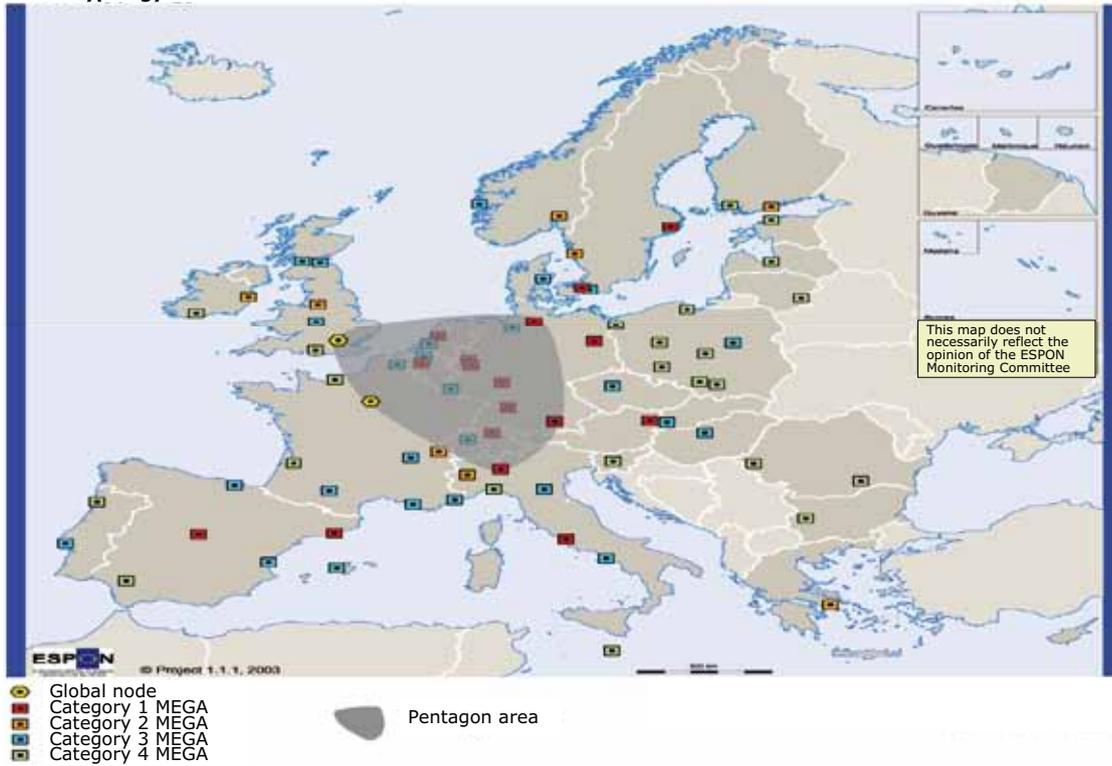
One issue of European concern is the concentration of economic activity. The core of Europe's economic power is demarcated by the urban agglomerations of London, Hamburg, Munich, Milan and Paris, the so-called pentagon (see Map 2.1).

This area generates 46 % of the GDP of the European Union, but covers only 14 % of its territory. While this core is extending along various corridors, the whole territory of Europe shows a rich regional diversity. These territorial potentials of European regions become increasingly important for the competitiveness of the EU at the global market. However, market forces can drive geographical

⁽³⁾ Legal systems of property rights differ within Europe. The framework of the European Convention of Human Rights. (Article 1, protocol 1) is the most frequently applied reference in this matter. (cf. Ploeger and Groetelaers (2007) 'The importance of the fundamental right to property for the practice of planning: an introduction to the case law of the European Court of Human Rights on article 1, protocol 1', *European Planning Studies* 15, 1 423-1 438).

Map 2.1 Economic activity in Europe

MEGA Typology



Source: ESPON Database. Origin of data: Eurostat, National Statistical Offices, National Experts.
 © EuroGeographics Association for the administrative boundaries.

concentration and there is a high risk that disparities between the central part and an increasingly large periphery will increase (ESPON, 2007).

It should be noted that the EU has no formal authority for spatial planning. However, in 1999 the ministers responsible for regional planning in the EU Member States signed the European Spatial Development Perspective (ESDP) (EC, 1999). Although it has no binding status, the ESDP has influenced spatial planning policy in European regions and Member States, and has placed the coordination of EU sectoral policies on the political agenda.

More recent discussions at EU level have revolved around a related term, territorial cohesion, which is enshrined in the new Lisbon Treaty. Box 2.2 reviews both the ESDP and the current discussions on territorial cohesion.

2.3 European cohesion policy

Financial resources from the Structural and Cohesion Funds support investment in construction

of infrastructure, including roads, energy plants and wastewater treatment facilities. Also, by funding training for the unemployed and providing support for small enterprises, the funds help boost the real economy by creating jobs and stimulating economic growth in disadvantaged areas of Europe (4). This support might lead to other effects such as inflation (higher prices of goods and services, higher costs of production factors, among them land, etc.).

Hence, Cohesion Policy can influence local land prices: for example, by reducing travel times to rural areas, the policy may increase demand for land for commuter and second homes. At the same time, plans and financial support for new infrastructure can trigger significant land use changes. In particular, new motorways may fuel urban sprawl around exits that connect rural areas to urban agglomerations. This is seen in many places, for example along the motorway across the Hispanic Peninsula, between Portugal and the border between France and Spain. The motorway, a European-financed project that is one of the Trans-European Networks, has over seven exits near the Spanish city of Valladolid. Urban sprawl in this region takes place predominantly near these exits.

(4) For more information, see: http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion4/index_en.htm.

Box 2.2 Background information: EU policies for spatial development and territorial cohesion

Spatial planning policy in Europe, as declared in the guiding principles of the European Conference of Ministers responsible for Regional/Spatial Planning, aims at a polycentric development.

The ESDP notes that spatial planning involves many different policies in its territorial dimension and benefits from an integrated approach. Since spatial planning is a responsibility of the single Member States, this policy is not directly implemented at European level, though in principle it should be followed at Member State level.

The Lisbon Treaty, signed in December 2007, states that the Union will pursue actions to strengthen 'economic, social and territorial cohesion' (Title XVIII). With these actions the treaty establishes more clearly a territorial dimension to EU policy. Territorial cohesion was first mentioned in the Treaty of Amsterdam in relation to services of general economic interest (a concept dating from the Treaty of Rome).

A further issue is that a commonly agreed definition of 'territorial cohesion' does not exist. The Green Paper on territorial cohesion by the European Commission suggests the following elements for this term:

- balanced development across Europe's regions;
- citizens able to use the inherent features of their territories;
- concentration: overcoming differences in density;
- connecting territories: overcoming distance or 'strengthening' connections;
- cooperation: overcoming division.

These elements, however, lack a strong and clear consideration of environment and sustainable development, which need to be integrated in a much stronger way.

However, seen from a territorial Cohesion Policy perspective (i.e. economic growth and job creation) this motorway was badly needed to join up heavily disconnected rural areas and small towns (both in inland Spain and Portugal), as well as to provide basic health and education services to a very sparse population. Land prices do not seem to have been a major issue in Valladolid province, apart from in the urban area and some very productive agricultural land along the river Duero.

2.4 Agricultural policy and subsidies

Agricultural policy and subsidies belong to level three (governance structures) of the Williamson framework. The CAP is the core instrument for influencing agricultural production in the European Union. The main objectives of the policy are to ensure a fair income for farmers, food production orientated at high quality and product safety and the protection of the environment and animal welfare. In addition, the European policy aims at a global competitiveness of farmers that does not distort world trade, should preserve rural communities and foster sustainable development in rural areas. The CAP has changed significantly since its launch in 1962; at the same time, agricultural subsidies always

have been crucial in order to strengthen agricultural policy.

While in the past these subsidies were provided based on the level of farm production, the CAP reform of 2003 fundamentally revised the rules for payments to support agricultural production. The reform introduced a new system of single farm payments (income support) and cut the link between support and production (decoupling). This Single Payment Scheme (SPS) on the one hand facilitates the application procedure for farmers and on the other requires farmers to implement environmental protection, food safety, phytosanitary and animal welfare standards — a system called cross compliance. Farmers who fail to comply with these requirements face reductions in their direct payments.

Nonetheless, in general the SPS allows farmers to decide what they want to produce in response to demand without losing their entitlement to support. The EU-15 Member States had to introduce the SPS in 2007; the new Member States in 2009. EU Member States can choose between three SPS implementation models: a historical model, a regional model and a hybrid model. Under the historical model, the SPS payment is farm-specific and equals the support the

farm received in the 'reference' period. In contrast, under the regional model an equal per-hectare payment is granted to all farms in the region. The hybrid model is a combination of these two approaches.

Application of the SPS will be reviewed within two years of its introduction by all EU-15 states. In the first years after accession, the new Member States may opt for a different type of direct aid scheme — not on offer in the EU-15. This Single Area Payment Scheme (SAPS) involves payment of uniform amounts per hectare of agricultural land in the Member State concerned, up to a national ceiling resulting from the accession agreements. New Member States using the SAPS may introduce the SPS at any time ⁽⁵⁾.

2.5 Restrictions on the ownership and transfer of land

Restrictions applied to a property itself often directly influence land prices and/or shape existing land use patterns. Restrictions are governance measures (level three of the Williamson framework), which can include the following:

- The size of property may be restricted in urban areas where municipal construction and zoning regulations establish minimum and maximum property sizes to shape urban land use structures;
- Property size restrictions can be applied to agricultural land. For example, the maximum area of land that can be held in single ownership can be fixed by legislation. This also goes for minimum areas, as fragmentation and dispersion of agricultural holdings has been a historical trend in most countries (at least in Western Europe), due to diverse factors such as traditions of inheritance, geographic conditions, etc ⁽⁶⁾;
- Transactions may be restricted by limitations imposed on the subdivision of properties: an owner cannot subdivide the property in pieces smaller than the minimum size established by authorities;

- Owners of agricultural land holdings sometimes have to prove their qualification to maintain the agricultural use of land;
- Similarly, governments may impose restrictions or requirements relating to the cultivation or use of land and real property. Private owners of agricultural land often are obliged to maintain its agricultural use;
- In urban areas, planning and zoning control regulations assign specific uses to certain areas, such as areas for industrial development, agriculture, housing, recreational use, trade, public building and other uses ⁽⁷⁾. Restrictions on the use of property may also be a result of a concern for preservation of historic or natural monuments and sights. Or restrictions could apply to aesthetic requirements such as the shape of buildings or the type of building materials that can be used;
- The transfer of publicly owned land is often restricted. Principally, it cannot be ceded to private owners because the use of land for specific purposes (such as infrastructure, nature conservation sites, public buildings) is in the interest of society;
- In the wider public interest governments may expropriate land from private owners, for example in the case of the construction of major infrastructure, but fair compensation to the landowners must be provided;
- In some countries land transfer to foreigners is restricted. This is often the case in transition economies (UNECE, 2003). However, in some African countries the contrary is happening: large scale land purchase is taking place (FAO, 2009) ⁽⁸⁾.
- Pre-emptive rights to acquire land also restrict the transfer of land. A distinction can be made between systems in which the authorities may take the place of the seller in a contract, and a system in which the owner who wants to sell land must offer the land to the authorities first — only after the authorities have indicated that they do not want to buy the land, can it be sold freely on the open market (see also the case study in Chapter 5: 'Land acquisition as a means for nature conservation — Conservatoire du Littoral in France').

⁽⁵⁾ For more information, see: http://ec.europa.eu/agriculture/markets/sfp/index_en.htm.

⁽⁶⁾ This fragmentation and dispersion is an obstacle to rationalised production and to modernisation and improvement of production. Historically, public policies have tried to offset this trend in several ways (often combined): a minimum area that cannot be further divided set by legislation, changes in inheritance laws (ensuring no partition of holdings), promoting farmers' associations and cooperatives to farm in common. Conversely, the eastern European countries (under planned economies) created huge agricultural holdings; since transition, the trend is dual: coexistence of some of these together with very small farms.

⁽⁷⁾ In the context of the CAP, farmers have to maintain a good status of their land (cross-compliance) in order to receive CAP payments.

⁽⁸⁾ For more information, see: www.fao.org/docrep/011/ak241e/ak241e00.htm.

3 Main drivers influencing land prices

As seen in Chapter 2, the boundaries of land markets are complex and have a variety of effects on market function. In analyses of the drivers of land prices, the following factors are commonly mentioned: taxes, inflation, buyer characteristics, seller characteristics, land size, subsidies, sales regulation, agricultural commodity prices, agricultural productivity, distance to urban centres, urban pressures, existence of infrastructure, option values of future land development and the existence of recreational amenities. These drivers are discussed briefly in this chapter.

One key issue here is the difference between the drivers for agricultural and urban or built-up land. This distinction is important when analysing the conversion of agricultural land for residential, industrial, commercial or infrastructure uses — a process that typically occurs on the periphery of urban areas, though in many parts of Europe the situation is more complex. This chapter gives an overview of how the main drivers are influencing land prices, followed by an analysis of the drivers that have the potential of inducing changes in land use and which are most important to environmental protection and sustainable land-use development.

3.1 Land taxes

Land taxes are an important source of government revenue. Income from these taxes also ensures that a proper land registration system can be maintained and that there is a sound institutional framework for the defence of secured property rights.

Land taxes fall into three categories: land sales tax (capital profit tax), purchase (registration) tax and usage (real estate) tax. While land sale taxes aim to discourage land price inflation by absorbing land sale profits, purchase (registration) tax and usage (real estate) tax affect mainly the behaviour of the buyer or owner of land.

Real estate taxes can be designed in very different ways. Most common are taxes based both on the

land value and the value of the buildings on the land. This implies that land with a high building density, such as in inner city districts, generates the highest tax revenues, and land without any construction, like agricultural or forest land, generates relatively little public income.

Other types of real estate tax are: land value tax, surface area tax and land-use tax. These taxes are designed to have more regulative functions in regard to the land use (see Chapter 5). Land value taxes are imposed on the value of the plot of land; the value of buildings on the plot is not considered. The basis for the land valuation in general is a land cadastre. A surface area tax is applied on the basis of the area of a land property, thus a large area bears higher taxes than a smaller one. This taxation encourages higher housing densities and potentially lowers the prices in high-density areas. A land-use tax is based on the use that is made of the land. In general, less-intensive uses generate lower tax rates; higher tax rates are assessed on intensive uses, for example high-density housing, industrial use or others (BBR, 2007).

Taxes have the greatest influence on the market when tax regulations are changed. At other times taxes are a stable factor. However, taxes can have significant influence at regional level, for example land taxes imposed by municipalities can vary considerably between areas or regions.

3.2 Other taxes

Other taxes can also have an influence on land prices and land-use decisions. In the case study, given below, on sprawl in the Veneto region in Italy, corporate tax breaks helped fuel demand for the construction of small industrial buildings after 2000. In addition, an amnesty that allowed the re-entry of capital illegally sent abroad (a significant form of tax evasion) also helped fuel land acquisition and the conversion of land to residential, commercial and industrial uses. Also, income tax incentives related to the purchase of real estate may boost the market and contribute to a rise in prices of real estate.

Box 3.1 Case study: urban sprawl in the Veneto region in Italy

This case study illustrates an 'extensive patchwork urban sprawl' mixed with agricultural land. In Italy's Veneto region many separate and individual plots of agricultural land have been converted for residential, industrial, commercial and infrastructure use (Tempesta, 2007).

Since the 1960s the Veneto region has seen a diffuse construction of buildings for small industry, often on agricultural land. This construction took off in the 1970s. Though it slowed for several years in the early 1980s, construction of buildings for small industry has continued to the present day, outstripping residential construction. Most new buildings were constructed in the central Veneto plain, away from existing urban centres such as Venice, Padua and Verona. To a lesser degree, Veneto has also seen a diffuse growth of residential and commercial land use.

This pattern derives in part from the region's historical lack of major urban centres and its strong rural character, together with a failure of attempts in the 1950s and 1960s to establish heavy industry. Regional laws put planning in the hands of local authorities, which for the most part preferred to encourage economic development rather than undertake land-use planning. Laws initially made it quite easy to obtain permission to construct small industrial buildings on agricultural land. In a second stage, after 1980, many local governments supported enterprises by expropriating agricultural land for small, local industrial zones: Veneto now has over 11 000 such zones (Tempesta, 2007).

The development of this extra-urban sprawl caused significant environmental damage in the region, most significantly soil degradation, acceleration of the run-off of precipitation and decline in the diversity of landscapes and ecosystems. It has required new infrastructure, and in particular many towns have built new secondary roads to improve access to industrial areas. This pattern of industrial development has also damaged agriculture, making it more difficult for small farms to consolidate into larger and more efficient agricultural enterprises (Tempesta, 2007; Regione del Veneto, 2006). Although land price data have not been available, in general the conversion of agricultural to industrial land has resulted in higher prices.

Tempesta (2007) identifies the following reasons for this pattern, in particular the boom after 2000: land prices in the periphery are much cheaper than in the vicinity of urban nodes, thus investors prefer areas further away from the centres.

In 2000 the central government reduced payment transfers to local communities. This prompted local authorities to seek other sources of funding, and many issued construction licences to increase their revenue from real estate taxes. In 2001 the Italian government introduced tax relief for companies that reinvest their profits, and for many entrepreneurs real estate became an attractive choice for reinvestment. This may not have been economically valuable: Tempesta estimates that as the amount of land consumed increased after 2000, the number of jobs created per hectare fell drastically.

In 2001 the Italian government also provided an amnesty for Italians who had exported capital illegally; many of those bringing capital back to Italy chose to invest it in real estate. Land-use planning is primarily regulated by local communities, with little oversight from provincial or regional levels of government. In the late 1990s the Veneto region started discussions on a new, more restrictive law on urban planning. In order to avoid possible future restrictions, many investors decided to invest at a time when it was still easy to get planning permission.

The case study provides a complex series of lessons. One is the influence of wider macro-economic and financial trends on land prices and land use, as seen in the impact of the re-entry of capital illegally exported from Italy. Another important factor is the role of land-use planning. The Veneto example also suggests that detailed case studies may be necessary to gain a full understanding of the key factors affecting land-use prices and changes.

Tempesta (2007) makes one important comment regarding land-use data: by his estimates, Corine land-use data (and satellite-based data more generally) significantly under-estimates the level of built-up land in Veneto's diffuse pattern of urbanisation. The use of additional indicators, including those based on land prices, may help build a better picture.

The literature reviewed here does not include a detailed analysis of the effects on land prices; nonetheless, these land-use changes in general increased prices.

3.3 Inflation

Inflation can have a significant influence on land prices, because land is often bought by people who do not trust other options on the financial market to secure their finances. Thus economic instability with high inflation rates may make land acquisition more attractive, which then could lead to higher prices. An analysis of farm land market determinants in the United States shows that the large price swings in land markets are largely explained by inflation rates and changes in real returns on alternative uses of capital. If inflation is high investors may acquire land as a hedge against inflation, which was the case in the United States in the 1970s (Just and Miranowski, 1993). Swinnen, however, reports for selected EU study countries that the influence of inflation on land prices significantly varies among countries. In general the report observes that the influence in relation to other drivers is rather low (Swinnen, 2009).

3.4 Subsidies

Subsidies are government instruments that can have a spatial influence if they differ from area to area. An analysis of government payments for commodity support in the United States and their influence on cropland values has concluded that the effect of payments significantly differs among regions, but in general that the elimination of payments would not lead to a significant decline in value. Firstly because there is the expectation that support would continue in some other forms, and secondly the increased production efficiency induced by the United States support programme would offset some of the potential decline. The effect of such programmes also differs between the types of crops produced. Even if farmers are flexible and shift their production schemes, some agricultural areas gain more benefits from government payments and

capitalisation into these areas of farmland is greater (Barnard *et al.*, 1997).

Another study in the United States found a correlation between farm income including subsidies and farm land values, but overall this correlation is rather weak and other influences have to be considered among the factors influencing land values (Clark *et al.*, 1993).

Subsidies also tend to be capitalised into land prices, even when they are intended (by policy-makers) to create jobs or boost productivity. For example, in addition to meeting these latter objectives, the Common Agricultural Policy (CAP) was inadvertently a fund for endowing landowners with unearned capital gains⁽⁹⁾. Low-income tax payers subsidised the high income owners of land⁽¹⁰⁾. This outcome was not identified in the methodology employed by Brussels in the 1980s⁽¹¹⁾.

Support in the 1980s was basically based on price levels, calculated according to average European prices for crops and agricultural products, compared to international prices of commodities in the European commodity markets of reference. More recently, in the 1990s and 2000s the system of payment has changed, becoming progressively decoupled from production levels, and instead based on farmland areas or number of livestock.

Initially, rent was treated as a cost rather than a transfer payment, so farmers could claim that rent rises warranted yet further increases in subsidies. The rent escalator guaranteed that, no matter how much the cost of inputs (wages, fertilisers, etc.) to farming declined, the offsetting increase in rents ensured the never-ending upward spiral in subsidies. This internal mechanism revealed the politicisation of agriculture, which led to (amongst other things) the over-exploitation of farmland. A closer examination of current agricultural subsidies may be warranted, from the point of view of the protection of the rural environment.

A similar process occurred in the urban sector. Tax rebates were supposed to enhance the productive use of land (cf Enterprise Zone initiatives during the

⁽⁹⁾ It should be noted that the CAP has many policy objectives, but is not explicitly intended to create jobs as other EU policies are, for example Cohesion Policy. One may argue that CAP support has also created jobs, but indirectly, as subsidies were intended primarily to boost productivity, ensure income, guarantee provision of food, etc.

⁽¹⁰⁾ Personal statement by Fred Harrison (2010).

⁽¹¹⁾ Personal communication from Fred Harrison (2010) indicates that in the 1980s he attempted to examine the methodology for calculating subsidies (then called the 'objective method'), and found that the methodology was not available in any publication.

Thatcher and Reagan eras). The primary outcome was a rise in the price of land without equivalent benefits in the labour market (Harrison, 1983).

The collateral damage to the environment, caused by subsidies, is illustrated in stark terms in Ireland (see Box 3.2). It is important to note, again, that the failure of the subsidy strategy is not an example of 'market failure'. It is an example of the failure of governance. The subsidies may have been well-meant. But they were pumped into the economy without taking into account the dislocation that would be caused by the capitalisation of the transfer payments into charges exacted by owners from anyone wanting to use their land. Among other effects, this increase in farmland prices prevented young entrants to agriculture; which accelerated the de-population of the countryside ⁽¹²⁾.

These effects are not computed by the cost/benefit analyses that interrogate the effectiveness of subsidies to farming, so the issue of whether there are net gains from the policy cannot yet be resolved.

Another example is the Italian government's amnesty for tax-dodgers. The intent was to attract back capital that had been illegally exported abroad. However the net effect was a rise in land prices as the hot money was re-invested in real estate. So was this bad or good? A full audit would need to take into account the number of people displaced from (or prevented from securing) homes/jobs by the rise in land prices/rents. The rise in the cost of using land may be viewed as a new 'tax' that damages enterprise and productivity at the margin of the economy. This outcome is pre-determined by fiscal policy. The Italian authorities did not investigate the social and environmental impacts of this fiscal policy, so we cannot know whether there were net gains from the decision to offer the amnesty.

This outcome is not an example of 'market failure', but the failure of governance. This is shown clearly by the Veneto case study. The Italian government offered tax relief for companies that reinvested their profits, 'and real estate appears to have been

Box 3.2 Background information: The sprawling Celtic tiger (Ireland)

The implosion of the Celtic tiger is directly related to the subsidies that, since the 1980s, Ireland received from the EU to upgrade its infrastructure. A sum exceeding EUR 60 billion was transferred from the EU common budget. The money was intended to facilitate economic growth.

It was predictable that the net gains would end up in the land market and provoke property speculation. ⁽¹³⁾ This outcome was further compounded when government reduced tax rates on corporate profits, to attract foreign investors. Profits were repatriated, with little lasting local benefit. But commercial property developers made fortunes.

Result: property speculation, with residential construction at random throughout the countryside as urban areas sprawled wildly in response to the money that could be made out of 'land'. But it was not 'land' that yielded those profits: developers exploited the EU common budget or in other words the tax payers of Europe.

Consequence: the implosion of banks and general regression. Meanwhile, the Emerald Isle has lost much of its greenness to concrete.

Unfortunately, there is no record of land prices available from either official or unofficial sources. How, then, can one assess the net effects of public policies ⁽¹⁴⁾? An understanding of the history and politics of the land market would facilitate policy formulation.

Source: Statement from Fred Harrison, 2010.

⁽¹²⁾ Statement from Fred Harrison (2010).

⁽¹³⁾ Statement from Fred Harrison (2010).

⁽¹⁴⁾ As discussed in EEA Technical report No 10/2009, the lack of indicators or data underpinning these indicators (covering many aspects: social, economic and environmental) makes difficult a proper evaluation, for instance of EU-funded public policies — in particular, evaluation of their environmental effects. However, there is evaluation in place. It may not be working ideally but the evaluation exists; it is embedded in the regulations and strategic guidelines. For example: http://ec.europa.eu/regional_policy/sources/docgener/evaluation/evaluation_en.htm; http://ec.europa.eu/regional_policy/sources/docgener/guides/cost/guide2008_evalsed.pdf and for agriculture and http://ec.europa.eu/agriculture/eval/index_en.htm.

for many entrepreneurs an attractive choice for reinvestment'. This replicates what happened as a result of efforts made by the UK and US governments to create jobs by offering tax incentives in Enterprise Zones. The result: 'Tempesta estimates that as the amount of land consumed increased after 2000, the number of jobs created per hectare fell drastically'.

3.5 Commodity prices and land productivity

Agricultural commodity prices have a significant effect on agricultural land prices. However, this effect can diminish if other (state) regulations already settle the land price prior to these developments. Commodity prices are a strong influence on farmers' choices of production scheme. If commodity prices are high, farmers are keener to increase their area of agricultural land, thus the demand for farmland will rise; alternatively they may intensify production, or combine both (more land and more intensive farming). Low commodity prices on the other hand might not have an immediate effect on land prices because farmers still have the option to leave the land fallow or switch to production of alternative products that promise greater revenues (Swinnen, 2009).

There are differing views on the role of farming production in determining agricultural land prices. According to Swinnen (2009) agricultural productivity does not appear to be a major factor influencing land prices, as productivity today is dependent not only on soil quality but also on other inputs and investments, such as the use of agricultural chemicals. Plantinga (2002) on the other hand provides evidence that the most productive agricultural areas in the United States face the least threat of being converted to other land uses, high productivity means that their value as agricultural land is higher than it would be for other land-use options.

In the Netherlands, some forms of very intense agriculture — such as greenhouse farming, in particular for cut flowers — have resulted in high levels of agricultural land prices.

A study of the influence of EU agricultural policy suggests that changes in the CAP have indeed influenced land markets and land prices (see Box 3.3).

3.6 Urban and infrastructure pressures

Distance to urban centres, urban pressures, the existence of infrastructure and the existence of

Box 3.3 Case study: the importance of agricultural policy for land markets

Main insights from the *Study on the functioning of land markets in the EU Member States under the influence of measures applied under the Common Agricultural Policy (CAP)*, carried out by The Centre for European Policy Studies on behalf of the European Commission, Directorate General for Agriculture and Rural Development and presented in November 2008. This case study summarises the report.

This study is of interest, since — beyond specific questions about the effects of Single Payment Schemes (that were to be implemented by the latest in 2007 — it deals with the overall issue of the effects of subsidies on land pricing⁽¹⁵⁾. In this context, the study is important because it is the first comprehensive study that empirically analyses the potential of subsidies for capitalisation into land values. In addition, the study also investigates the effects of this capitalisation on agricultural land use.

The overall objective of the study was to investigate whether, and to what degree, the different means of implementation of the SPS have affected:

- capitalisation of support into land values (sales and rental prices);
- the distribution of this capitalisation to the different owners;
- the effect of the SPS, in combination with the institutional setting of land markets, on structural change in agriculture;
- the reaction of land markets and asset values to changes in policy.

⁽¹⁵⁾ The rationale behind the SPS is to remove links between production and subsidies. The main aims are to: 1. allow farmers freedom to produce to market demand; 2. promote environmentally and economically sustainable farming; 3. simplify CAP application for farmers and administrators; and 4. strengthen the EU's position in World Trade Organization agricultural trade negotiations.

Box 3.3 Case study: the importance of agricultural policy for land markets (cont.)

Empirical analysis in this study is based on a combination of data sources, including insights from comparative data analyses based on data from Eurostat and the Farm Accountancy Data Network (FADN) as well as data analyses and information collected in a series of country studies and (sub-country) regional studies. More specifically, as part of the overall study, 11 country studies and 18 regional studies were undertaken.

The study concludes that land capitalisation occurs when agricultural subsidies are provided both via coupled and in decoupled payments; there was no evidence that the introduction of decoupled payments would lead to lower capitalisation rates. However, the direct effect of the newly introduced SPS on land prices is difficult to identify because other factors are stronger drivers, for example such as urban pressure, agricultural product prices and farm productivity.

One interesting aspect of the introduction of the SPS is that it appears to increase capitalisation in least productive regions, with the clearest evidence of impact on land values in less fertile lands. This could be due to re-allocation of subsidies from more productive to less productive regions because payments are no longer bound to the production of commodities but to the maintenance of good agricultural practice.

The study also investigated effects of the SPS on structural change. Generally it is too early to observe significant impacts of the SPS on structural change in agriculture, as this is a long-term process. Still, the decoupling of subsidies with the introduction of the SPS was identified by most country studies as an important factor that is expected to influence structural changes in agriculture. Preliminary results suggest that key impacts include the following:

- The SPS seems to constrain farm exit and increase part-time farming.
- The hybrid SPS model has stimulated (formal) farm entry, unlike the historical model. There is some evidence that landowners have started farming in order to gain access to the entitlements.

Source: Swinnen; Ciaian and Kancs, 2009.

recreational amenities are also important factors in driving land prices. These are dependent on the specific characteristics of the local area. These factors become more important in areas with a high population density and/or competing land uses. In general these factors are related to the quality of life and influence the individual choice of sellers and buyers.

Urban pressure — which can be caused by population growth, the growth in the number of households as well as economic growth — generally leads to an increase in agricultural land prices in the vicinity of urban centres. In this context the option value is an important factor: the expectation of the conversion of agricultural land into land ready for development is responsible for significant price increase.

Infrastructure expansion — and roads in particular — can increase urban pressure and in the end induce a process of urban sprawl. Infrastructure is relevant, first because it makes a larger area accessible to urban pressure; and second, the typically linear structures that are built divide open areas into compartments.

Furthermore, new infrastructure may attract new development. As described in Chapter 2, urban sprawl often takes place near motorway exits. Infrastructure expansion thus has a high potential for driving up land prices: the construction of new roads and other infrastructure will reduce travel time to urban centres and can make new land uses more attractive. Generally, infrastructure expansion is an important driver of land prices in the EU (Swinnen, 2009). At the same time, research is required to better understand the cause-effect chains among infrastructure, land-use change and land price developments.

Expectations of future land values appear to be an important factor. This is an important issue for agricultural land, as its value is typically much lower than that of urban land (though there can be exceptions, such as intensive greenhouse agriculture and some flower growing). In the Netherlands, for example, farmers near urban areas typically expect to receive higher prices for the potential conversion of their agricultural land into development land in the future. However, current land-use plans limit conversion — and this has led to a near standstill in agricultural land

Box 3.4 Case study: land pricing in France

A major study in France sought to identify the key drivers of urban and residential land prices. The research notes that geographic location has an important overall role at national scale: land prices are higher in departments with major cities and in many cases higher in the regions of southern France.

Sociological analysis revealed that housing is also important for personal representation, cultural and social identity, thus these factors also influence land markets and their prices. Through statistical analysis of real estate prices across France, researchers identified a series of factors that directly influence the price level. Social factors are among these, including the presence of social housing and unemployment in a local area.

Quality of life and landscape amenities are among the drivers for land pricing. Prices for land close to the coastline are very high in comparison to other regions. The presence of polluting industries in general drove down land prices — except in major industrial poles, where prices increased. The authors speculate that here, the effect of higher employment levels increase prices, outweighing the pollution effect. Overall, it would appear that pollution impacts on land prices are minor.

Source: Donzel *et al.*, 2008.

sales in these areas, as farmers wait for a change in planning regulations.

The option value of future land development is also an important factor in the United States, according to Plantinga *et al.* (2002), again mainly in the vicinity of urban centres. Agricultural land prices may also rise if farmers who have sold their land to development companies reinvest this money in the acquisition of other agricultural land.

Also the designation of protected areas can influence land prices. On the one hand, the designation of prized agricultural areas, such as the Chianti wine-growing region in Italy, can raise agricultural land prices. In contrast, Natura 2000 site designations may result in restrictions on landowners and on land use, reducing value. In the United Kingdom, however, land values in some national parks have increased, due to demand from outsiders.

4 Interactions between land prices and land-use patterns in Europe

The previous chapters have focused on the structure of land markets and the essential drivers of land prices. This chapter seeks to better understand interactions between the market mechanism of land pricing and land-use changes, and especially the environmental linkages of these interactions. A key question will be: what are the 'triggering' points in this context that lead to processes where land prices and land price changes determine land-use changes that have positive or negative effects on the environment?

Since 'the environment' is an integral part of what economics classifies as 'land', it will be appreciated that the practice of economics must have been seriously compromised somewhere along the line over the past century (see Box 4.1).

It is important to understand the causality of mechanisms and the underlying factors behind the processes and these mechanisms. For example, behavioural change may be an important element. Some assumptions can already be made in this context, and these need to be further elaborated.

Looking at the set of drivers that determine the development of land prices, it can be seen that some of the drivers themselves have the potential

to trigger land-use changes. In this context it is necessary to differentiate between drivers like urban pressure that derive from societal processes and drivers such as taxes or subsidies that constitute measures of governance control. As a result it is important to understand the underlying cause-effect chains between the drivers, the land prices and the resulting possible land-use change.

At present little research has been done to investigate these processes. However, it seems that the interaction between land prices and changes in land-use patterns is rather loose, and land prices do not really have the potential to be the sole instrument for shaping land-use patterns in Europe. It is likely that the price is only one determinant among others. In preparation for this study, experts participating in an EEA workshop on land prices suggested that land price could be used as an indicator for land changes. Overall, much research is still required to develop reliable indicators, but options include monitoring of actual land price or the volume of transactions, in which case increases in buying and selling activities could be used to predict expected land-use changes.

The indicator function could serve as an early warning system, especially since land prices seem

Box 4.1 Background information: Comparing Germany and the United Kingdom

For the past 100 years the role of land markets in the industrial economy has been neglected in theoretical discourse and empirical research. It would be dangerous to draw sweeping conclusions based on current understanding. An interesting idea for study further would be to compare Germany with the United Kingdom. These two countries have starkly contrasting attitudes towards land as an asset. One hypothesis would be that the more productive, stable German economy may be the result, in part, of a lower propensity to speculate in the land market compared to the Anglo-American countries.

For example, how significant is the fact that in Germany property owners are routinely obliged to defray part of the cost of capital investment in the infrastructure that raises the value of their locations? This compares with the British case, in which the general taxpayer funds the capital costs of infrastructure, resulting in an inequitable burden on low income taxpayers who do not own property.

Further research is needed to test the proposition that land prices do not really have the potential for shaping land-use patterns in Europe. Such research would need to include a review of the history of economic thought.

to have an inherent strong expectation element, thus indicating possible future developments of relevance for the environment. In addition, land pricing could be used as an accompanying instrument among many others (mainly regulative) for shaping land use in specific circumstances. In the case of regulatory instruments, more research would be needed into the effectiveness of 'classical' territorial planning and into which spheres these instruments would need to be supplemented.

Some assumptions can be drawn in this context and the following hypotheses made:

- Urban pressure could result in a requirement for new areas for the construction of settlements outside the city district. This could raise expectation amongst owners of agricultural land that they might be able to sell their land at much higher prices in the near future, and investors might try to buy the land that soon would be designated for new development. The effect would be an increase in the price of agricultural land in the vicinity of the city. Also, the frequency of land transactions would increase. However, it is unlikely that price rises outside the city would exceed those in the inner districts and settlers would be attracted to move to outer spaces. Particularly in countries where controls on land-use planning are weak, owners may start building before land-use plans change the designation of the land, resulting in urban sprawl.
- Local authorities in outlying areas may fuel this process by promoting land conversion for economic development and to raise local revenues — though, apparently, few authorities make serious assessments of the long-term revenue gains or losses (see Box 4.2).
- Sprawl is not inevitable, and alternatives exist, including concentrated development and re-development of urban areas. Proving good and practical alternatives for sprawl must be part of all anti-sprawl policies. This is necessary from a technical perspective and a political perspective; it may be easier to direct development to concentrated areas than to limit sprawl overall by regulation. Such an anti-sprawl policy needs democratic legitimation, which can only work if there is consensus about the main aim of the policy. So, the provision of good alternatives for housing, working and living is essential if such a policy is to have long-term support.
- Aspects that may play a part in making concentrated development attractive include the costs and benefits of development.

Box 4.2 Case study: fiscal effect analysis in Germany, insights from the REFINA project

Another interesting point relating to land prices and land-use change was highlighted by the German research project Research for the Reduction of Land Consumption and for Sustainable Land Management (REFINA). As well as looking at land price, the project investigated the costs to municipalities arising from new land developments. The municipalities are responsible for the provision of the local public infrastructure. For this service, landowners have to pay fees and charges that are dependent on the size of their plot of land. In general, the costs for public infrastructure are shared among the landowners of the development area that the infrastructure supplies.

Some development areas result in higher costs to the municipality than others, especially in the long term. In some cases municipalities remain in deficit. In general, low-density housing is more cost intensive than high-density housing. New developments outside urban areas also require provision of social infrastructure, such as schools and medical facilities. Often local authorities fail to carry out a proper cost-benefit analysis that includes the follow-up costs, and many other factors are involved in the decision-making process for new development sites.

The REFINA project started with the assumption that a thorough fiscal effect analysis (*Fiskale Wirkungsanalyse*) would not only help to improve revenue gains of municipalities but would also contribute to a minimisation of land consumption. The study shows that the integration of such an analysis is helpful to the reduction of land consumption, but that social and environmental costs in particular, for example pollution related to increased commuter traffic, are seldom integrated into such an economic analysis (Henger and Bizer, 2009).

The use of such a fiscal effect analysis tool at European level could be extremely useful, and could help determine the extent to which development costs are included in land prices across Europe and how minimising hidden costs could limit impact on the environment.

Box 4.3 Case study: land pricing in countries in economic transition

Eastern European countries have undergone or are undergoing a transition from centrally planned to market economies. This transition requires land market liberalisation coupled with measures to ensure socio-economic justice. The status quo of these countries at the beginning of transition was characterised by the following:

- Weak property rights due to the socialist policy that discouraged or inhibited trading in land and property combined with the fact that land-use policy had put greater emphasis on the rights of the user of the land than those of the landowner. The state as owner/occupier or user of land was the dominant model in these countries (Dale and Baldwin, 1999);
- Land reform was hampered by the fact that historic field boundaries had disappeared due to the socialist scheme of large production state farms. This made it difficult to return land to original owners. The land reform process has created a class of new, sometimes absentee, landowners, while land is used by a mixture of smaller individual farms and large-scale corporate farms. These corporate farms are mostly successor organisations of the former collective and state farms after farm privatisation and land reform, and their shareholders may include former workers as well as the heirs of those who owned the land prior to central planning. New owners of the land face significant transaction costs if they want to withdraw their land from the large corporate farms for their own use or reallocate it to other small farmers. These costs include those incurred in bargaining with farm management, in obtaining information on land and tenure regulations, in delineating the land and dealing with inheritance and co-owners. The domination of large corporate farms also leads to imperfect competition in the land market, and the combination of imperfect competition and transaction costs has a strong impact on land prices (Ciaian and Swinnen, 2006);
- Generally, the urban land markets were more flexible, especially in the capital cities, although progress is still hampered by incomplete reform of the administration (such as technical delays in the land registration process). Property investment is still perceived as high risk, especially where bankruptcy or mortgage laws are considered inadequate to safeguard an investor's interest, or where the valuation system is perceived as weak or inconsistent (Ciaian and Swinnen, 2006);
- In order to assure social justice in the transition process many countries established rules that excluded foreign investors from national land markets; foreigners are not allowed to buy land until the transition process is complete (Dale and Baldwin, 1999).

Land market reform was one of the important prerequisites for the countries to access the European Union. This comprised the establishment of a functioning land administration including a valid land registration process and cadastre, a market-based valuation of land property, and the delivery and regulation of financial services. A market economy requires that adequate financing mechanisms are in place to support the buying, selling, leasing and development of property assets, and it is essential that these financing mechanisms are regulated and supported by appropriate law.

In most countries land prices are much higher after the transition process, but they have stabilised and are no longer subject to excessive oscillations. Market liberalisation has also led to a shift to more effective agricultural production schemes, although it is not known whether these production schemes are more environmentally friendly (Ciaian and Swinnen, 2006; Dale and Baldwin, 1999). There is some evidence that changes in market prices in the region signify changes in land-use patterns, but more research is needed to confirm this.

However, in many inner city areas, while there is physical space for development, development is difficult for environmental reasons. This may result in extra costs (for example, for remediation of soils, measures against noise), for others it may be whether norms encourage sprawl and hence spread environmental nuisance to rural areas. Although in some urban areas there is no scope for further development. This may result in debates about

the environmental benefits of differentiating between urban and rural areas. Finally, living and working in the cities and in well-planned urban areas may be linked to a higher quality of life, and market processes will reflect this. Where this is not the case, the market potential is lower.

- In general, the indicator functions of land prices are:
 - prices of agricultural land rise in the vicinity of urban agglomerations;

- land prices within urban districts influence prices in the vicinity of urban centres. An assumption is that high prices in the cities favour urban sprawl; as has occurred in Greater Hamburg, where land prices in the inner district are very high and many city dwellers have relocated to the hinterland;
- the volume of transactions is not necessarily related to the actual price of land, but it does give an indication of changes in land use, in particular urban sprawl.
- All these indicators could provide information on processes that are taking place (for example urban sprawl). And they could give insights on the effectiveness of anti-sprawl policies. It could be assumed that effective concentrated development in urban areas would reverse the tendency of rising land prices in the vicinity. But it could also push prices up even more in the inner districts.

In other cases changes in market prices appear to correlate with environmental and land-use changes, but more research is needed to confirm this.

- Land can command a higher price if it has recreational value. Environmental quality can also influence a buyer's decision to purchase, and the 'amenity' effect is likely to be more influential than environmental factors such as biodiversity. In Great Britain, for example, there are some regions where prices outside cities are higher due to superior environmental quality (Cheshire and Sheppard, 2004; Bastian *et al.*, 2002).
- Both public agencies and private actors such as NGOs seek to ensure protection of important natural sites by buying land for conservation; these efforts are likely to be disadvantaged in

areas with high land prices. This is particularly common in coastal zones, where these effects can be significant in the context of ICZM (Integrated Coastal Zone Management) targets.

- In this context environmental activists need to be aware that acquisition of land for nature conservation purposes may have a rebound effect on land markets, especially where there is a high demand for land development. Armsworth *et al.* (2005) argue that land purchase increases the land demand in areas with higher development activities and as a consequence raises the price. In addition, land acquisition for conservation purposes could displace development activities to areas of a high biodiversity value that otherwise would have been untouched. They conclude that: 'Conservation purchases alter the supply of and demand for land. Taking this principle as a starting point, the laws of supply and demand make clear the value of a comprehensive strategy that targets species on private lands as well as reserves, and that is informed by accurate inventories of species. Continuing to ignore market forces risks making wasteful use of limited conservation resources, and in some circumstances, may even result in conservation investments doing more harm than good. Conservationists need to consider market feedbacks in determining their conservation performance'.
- Low land prices may attract outsiders (from other regions, but also foreigners); this may lead to shifts in land use, for example the introduction of new and/or intensified agricultural production schemes as has occurred in transition countries in eastern Europe (see the case study above on countries in economic transition, Box 4.3) or transformation into other uses (see the case study above on the Veneto region of Italy, Box 3.1).

5 Can land prices and taxes be an instrument of environmental policy?

This section will attempt to identify some initial leverage points that environmental policy might use to influence land pricing in order to promote more sustainable land use in Europe.

In this context, it has to be stressed that sound spatial planning instruments should not be replaced by land pricing policies; rather, approaches that incorporate land pricing mechanisms or land tax policies are needed — in other words, existing mechanisms could be complemented by such new instruments. Taxation on land could also be used as land and real estate are immobile goods, which are easy to control and monitor.

In addition, and based on the knowledge gaps identified in the previous chapters, more work on understanding the causal relationships is needed before more detailed discussion can take place regarding instruments.

It is still too early to come to a comprehensive conclusion on the usefulness of land prices and taxes as an instrument of environmental policy, so this chapter presents several examples of approaches that point in this direction. Even if we are still lacking knowledge for using land pricing as an instrument of environmental policy, the examples given in this chapter show that it will be very useful to examine this issue more closely.

5.1 Using taxes as an instrument for spatial planning: the Dutch debate

The Netherlands has long exhibited very well functioning urban development control along with sufficient provision of areas for new urban development. However, this balance was disrupted by a huge rise in housing prices — 339 % — between 1982 and 2002, that led to a significant price gap between agricultural land and land for urban development. Since then the Netherlands has considered — among other options — using taxes as an instrument for spatial planning (Korthals Altes, 2009). The following options of taxing land were discussed around the year 2000 as part of a

debate that considered many different options for modifying government instruments to allow them to intervene in the land market:

- **Open space tax** paid for construction on an open space, to compensate for the welfare loss resulting from construction. This assumes that the open space has a value to society that is not reflected in the market price. However, it is difficult to estimate the value of open spaces, as this depends on the characteristics of the region: in rural areas, for example, open space is available in abundance and not considered to be a special asset;
- **A development plan change tax** paid by landowners when they buy a plot of land or start to build on it. The tax is based on the added value of the land when the government permits development where formerly construction was forbidden. Again, it is difficult to estimate the change in land value, which could result in landowners appealing against decisions in court. Authorities applying this tax could incur relatively high administrative costs;
- **Development tax to encourage building on previously developed land** by making green areas more expensive. Here a major constraint is that taxes have to be very high in order to achieve a significant incentive effect;
- **Development tax as a way of acquiring money for the public budget.** Calculations of the potential for a gain in public revenue must factor in that a substantial part of the extra income will leak away through reductions in income tax, corporate tax and land transfer tax.

The proposed tax options were designed to increase the cost of building in open areas, thereby creating an incentive to develop in existing built-up areas. Using tax as an instrument is an alternative to planning regulation that imposes too many restrictions. Moreover, a tax is easier to apply than detailed development plans. Environmentalists argued that taxation would be counterproductive as it would not provide a guarantee that important spaces remained open for environmental and recreational purposes.

Box 5.1 Background information: Economic instruments in environmental policy

Environmentally related taxes, fees and charges

An environmental tax is raised on a physical unit that has a proven, specific negative impact on the environment. Fees and charges are compulsory and required payments to general governments or to bodies outside general government, such as environmental funds or water management boards. The rationale behind taxes, fees and charges is to internalise environmental costs into prices of goods and services that cause environmental damage as a result of their production(s) and/or consumption (EEA, 2005).

Taxation, fees and charges could be used in the context of land use. Taxes, fees and charges could be imposed on environmentally undesired land-use practices. The main constraints are that taxes and charges alone would not be sufficient to assure sustainable land-use management, and other instruments, especially spatial planning, would have to be in place. In addition social justice has to be assured; there is the risk that taxes could disqualify socially vulnerable groups from the housing market.

Tradable permit systems ('cap and trade')

The most prominent example of tradable permit systems is emission trading. The rationale behind these systems is that parties agree on a permissible level of emission, or cap, allowed in a specified time frame and a geographical area. This is then allocated to various parties who can trade any allowance they have not used themselves (EEA, 2005).

Cap and trade could be an option for land consumption targets. Parties could agree on an amount of land consumption for land development. An example is given below in the description of the German project REFINA. The biggest constraint in this context is that land, unlike green house gases, is not a uniform good.

Environmentally motivated subsidies

Subsidies are any measure that keeps prices for consumers below market levels, or for producers above market levels, or that reduces costs for consumers and producers (OECD definition, in EEA, 2005). Subsidies can be environmentally harmful or have a positive effect on the environment. The reform of the CAP is an example of how subsidies can shift from being harmful to supportive. Before the reform, agricultural subsidies aimed to maximise production, the 2003 reform introduced payments for farmers based on respect for environmental standards in production schemes and application of agri-environmental measures. The EEA states that subsidies should be well targeted in order to avoid dependency on payments and should provide strong incentives to boost new technologies and practices (EEA, 2005). The effects of subsidies in agricultural policies are discussed in Chapter 2 in the case study on CAP.

Subsidies could also be an instrument for direct intervention in land markets for example the acquisition of land could be subsidised if the new owner agrees to put the land to a specified use or unseal. However, more research is necessary to determine how effective such subsidies might be.

Taxes alone cannot guarantee that open spaces will remain undeveloped; rather, they should be embedded in a comprehensive development strategy of an urban area (Korthals Altes, 2009). Taxes thus can be an add-on to traditional land-use planning. But to achieve this requires a full understanding of how the value of open space could be incorporated into a taxation system; the societal value of open space is not fully reflected in its market value and thus it is unclear how tax interventions could contribute to bridging this gap.

In the end, the Dutch government decided to postpone the implementation of this approach and that the idea needed more research (Korthals Altes, 2009).

5.2 Payments for ecosystem services (PES)

The environment provides many services that assure our well-being today and, if protected, will provide environmental security for future generations. These services include, for example, the role of upstream forests and other natural areas in reducing downstream floods. These services today are rarely compensated in land prices or by other mechanisms. Providing incentives by paying landowners and managers to maintain environmental services is an innovative way of strengthening environmental security. Therefore, finding ways for internalising the external effects (positive) of open space but also of new green field developments (negative) through taxation is one theoretical way forward (Wunder, 2005).

Some examples of PES are:

- carbon sequestration and storage (for example, a northern electricity company paying farmers in the tropics for planting and maintaining additional trees);
- biodiversity protection (for example, conservation donors paying local people for setting aside or naturally restoring areas to create a biological corridor);
- watershed protection (for example, downstream water users paying upstream farmers for adopting land uses that limit deforestation, soil erosion, flooding risks, etc.);
- landscape beauty (for example, a tourism operator paying a local community not to hunt in a forest being used for tourists' wildlife viewing).

Wunder (2005) provides a rather simple definition of how payments of ecosystem services work: A PES is a voluntary transaction where a well-defined environmental service (or a land-use likely to secure that service) is being 'bought' by a (minimum one) buyer from a (minimum one) environmental service provider if, and only if, the provider secures provision of ecosystem services (ES) (conditionality).

The problem of ecosystem services is that they are often considered to be public goods to which it is difficult to assign ownership. Moreover, if an environmental service is a public good, it is also difficult to identify an actor who would be willing to pay for it. The idea of the concept is to identify the correct baseline scenario, that is the situation in which the ES is not provided by the seller of ES. The buyer then can account the costs he would have if the service is not there and which costs would arise should he need to search for a substitute for

the service. The seller on the other hand is able to calculate which benefits he would gain if he is opting for an alternative use (for example, deforestation).

Duraiappah (2007) describes the example of the Catskill Mountains in New York State. As a starting point, the property right of land ownership provided that the ecosystem service was private. Land owners agreed to forgo future development to ensure the quality of water in the Catskill water basin, in return for payments from New York State to change their land-use pattern in order to achieve better water purification of the Catskill watershed.

The research has not identified any analysis of the influence of payments for environmental services on land prices, but this will probably depend on the type of payment. For example, if the payments are ongoing, then the land providing the environmental service will be more valuable, including to possible buyers. On the other hand, if owners accept a one-time payment in return for an agreement to maintain environmental services, this is not likely to change land values (indeed, it might maintain a lower value compared to similar land without such a restriction). Thus, ongoing payments would appear to be more effective in ensuring that both current and future owners maintain the environmental services.

5.3 German research projects on reducing land consumption in urban areas

Two German research projects, see below, have investigated possible instruments to provide incentives to reduce land consumption that are closely linked to land pricing.

Box 5.2 Case study: The project REFINA (Research for the Reduction of Land Consumption and for Sustainable Land Management)

This project investigated the options for tradable planning permits with the aim of reducing land consumption from today's level of 93 ha per day to 30 ha per day in 2020 (which is a target set by the German Government). Municipalities would be entitled to buy or sell their share of land consumption rights to a ceiling of 30 ha per day for the whole territory of the Federal Republic of Germany. The idea derives from a tradable air pollution control system applied in the United States or the system of carbon trade. Unlike carbon in the carbon trading system, land is not only a quantitative but also a qualitative good. Therefore specific roles would need to be defined for a system of tradable planning permits.

The rationale behind this concept is that a municipality in need of larger development areas would acquire land consumption rights from other communities equivalent to refunds from the revenues gained from the development activity. This would assure that plans for land development areas are based on cost-effectiveness. The REFINA project identified the trading-ration system as the most effective and appropriate to fulfil the quantitative objectives of the trading system, and meet the qualitative standards

Box 5.2 The project REFINA (Research for the Reduction of Land Consumption and for Sustainable Land Management) (cont.)

that derive from the fact that land is a qualitative good. Using this system, permits are not traded on a one-to-one basis but at a level equal to the ratio of the different effects on environmental quality of the land consumption involved; trading ratios are determined exogenously by transfer coefficients and determine how much one community must reduce the development of new land when another community wants to develop one unit more and therefore needs a licence from this municipality. This approach is a simplified alternative to an ambient permit system: the spatial dimension is disregarded because the number of markets is set as one. The system cannot guarantee compliance with local quality standards in different geographic areas, but could attain a cost-effective and also ecologically effective realisation of an aggregate national quality target (Henger, Bizer, 2008).

The NABU (the German Nature and Biodiversity Conservation Union) has added the idea that communities should only be eligible for planning permits at the level they have established previously in their urban land-use plans that need to follow best practice in spatial planning. This would prevent a wild flurry of urban development and force authorities to safeguard land (NABU, www.nabu.de/en/index.html).

So far the concept is still at theoretical development stage. The danger of severe pitfalls (for example, neglect of spatial planning requirements) means that the usefulness of the concept needs to be proven.

Box 5.3 Case study: The research project 'Circular land-use management'

In Germany in 2003–2006 the Federal Office for Building and Regional Planning and the Federal Ministry of Transport, Building and Urban Affairs carried out a research project, 'Circular land-use management' (*Fläche im Kreis*), and in the process developed a management game that includes investigation of the influence of land taxes on the designation of urban development areas. The game is designed for government employees, landowners and representatives of the finance, agricultural, scientific and nature conservation sector. It simulates real-life management decisions at municipality level and aims to examine, and trigger discussion about, new instruments in the context of five different German city regions.

The project report states that one driver of land consumption is the preference for planning new developments for the periphery of cities rather than the inner districts and suggests this is largely due to lower land prices in the outskirts. This could be controlled by influencing land prices, which would shift land consumption demand from the outside districts towards the inner districts. One way of doing this would be to introduce taxes that would be reflected in the price of the land. The management game investigates the effects of changing the current land tax system to one of the following: land value tax, surface area tax and land tax. In the game a precondition of the tax system change is that the tax remains constant. The current German land tax imposes a tax on land based on the value of the land and the value of buildings on it.

Land value taxes are based only on the value of the plot. The basis for the land valuation in general is a land cadastre. In the case of land value tax, areas with higher housing density generate lower tax revenue. Were this system to be introduced, it is expected that land prices in high-density areas would decrease.

A surface area tax is based only on the size of the plot. This encourages an increase in housing density, because it is more cost-effective to build more on a smaller surface. This could reduce real estate prices in high-density areas.

A land-use tax is based on the use that is made of the land. In general, low-intensive uses generate less tax and intensive uses, for example high-density housing and industrial developments, generate more tax revenue. Since plots in city centres are often smaller, it is assumed that a change to land-use tax would be felt like a tax relief. The land-use tax appears to be the most appropriate to regulate soil sealing.

The management game has shown that if the tax revenue remains constant, price changes are not large enough to trigger behavioural changes amongst landowners — to achieve this, taxes on land development activities would need to be increased by a factor of ten. However, it could be useful to consider tax changes in combination with other instruments to bring about changes in behaviour that would result in landowners and/or buyers and sellers shifting to more sustainable land use (BBR, 2007).

5.4 French example of how land prices can be influenced by planning requirements

influenced by planning requirements to facilitate the acquisition of land for nature conservation (see Box 5.4).

The case study of Conservatoire du littoral in France provides an example of how land prices can be

Box 5.4 Case study: Land acquisition as a means for nature conservation – Conservatoire du Littoral in France

Conservatoire du Littoral (CdL) is a public organisation in France. Its main objective is to acquire land in coastal zones in France in order to create nature conservation sites. CdL was founded in 1975 and now owns more than 75 000 ha of land for which it has full property rights; moreover, about 30 000 ha of public state land are administered under the auspices of Conservatoire in a special sort of lease contract. Most of the land purchases are based on private agreements (around 85 %), for 10–15 % CdL uses its pre-emptive rights to acquire land and a very small share (less than 3 %) derives from expropriation. Pre-emptive rights only apply in special designated 'pre-emptive' zones, where most contracts are made through private agreement also.

The official designation of the nature conservation areas is often a rather lengthy process that involves many different actors. It is first discussed in the *Conseil de Rivage* (Coastal council) at regional level with the participation of local authorities from department councils and other state administration. The sites then have to be approved at national level by the CdL governing board. In case of an area in western Brittany, the Cap de la Chèvre, this process started in 1979 and came to a first conclusion after local elections in 1983. The site was enlarged in 1988 and again in 1991. After the designation of the nature conservation area, CdL begins by buying the land. In case of Cap de la Chèvre CdL started to buy land in 1982 and concluded its acquisitions in 2006.

The land prices of the plots CdL aims to acquire are based in general on a valuation by the *Service des Domaines* (Service for public real estate): until 2001 the valuations almost matched the prices for agricultural land, but were a little higher. prices for land designated for tourism development such as caravan sites were about 10 times higher. The process of land acquisition took about 20 years, and over this period the prices paid by CdL tended to fall, partly because most land CdL is interested in falls within areas that enjoy environmental protection by law (for example, nature conservation areas), which means that land use in these areas is very restricted. If it is an old protected area or if CdL is active in the area for a long time, the plots become more and more unattractive for the free-market.

'Pre-emptive zone'-effect also has a strong influence on pricing. In the pre-emptive zones CdL is often the only buyer and prices are essentially set by *Service des Domaines*. Such a framework creates an institutional market that follows its own rules, rather than those of an open market with its many buyers and sellers. In the case of Les Evières, a site on the Ré Island on the western coast of France, prices determined by *Service des Domaines* started at about EUR 1.26/m² in 1980 and stabilised more recently at EUR 1.07/m². In comparison, agricultural land prices ranged from EUR 0.75/m² to EUR 0.96/m², and those for caravan sites from EUR 10/m² in 1980 to EUR 20/m² today (Yann Gérard, personal communication).

6 Land-price information and databases

6.1 Data availability for appropriate indicators

Any further, in-depth work on land prices will require good and comparable data across European countries — and data availability will be crucial if land prices and related data are to be used as indicators related to land use.

Land price data could be used to fill existing knowledge gaps identified in the previous chapters. For example, data analysis could help us to gain better understanding of which drivers currently influence land prices. Moreover, data analysis might help us to see if land prices themselves are part of a feedback mechanism and prompt land-use changes.

The previous chapters have also suggested that land prices and related data could be used as indicators of important land-use changes taking place that influence the environment; they may also provide an early warning signal of future land-use changes. This hypothesis needs to be investigated further and tested.

For analysis in these areas, it would be valuable to have time series of data on land prices together with data on major drivers of land prices, plus data on land-use changes. Such time series could shed some light on whether changes in land prices are responsible for land-use change or could help determine whether land prices are feasible indicators that could help identify challenges for sustainable land-use planning.

Further, it is important to identify differences in relationships between land prices and land-use changes, for example between urban and rural areas and between different topographic and socio-economic European regions. A possible differentiation could be made between coastal zones with a high potential or occurrence of tourism development especially in the Mediterranean area; rural areas in southern Europe; highly industrialised urban areas in northern and middle Europe; and eastern Europe with its specific challenges of economic transitions.

For this work, data will be needed. This could be a challenge because of the complexity of land markets and the difficulty of comparing prices at the European level.

Ongoing work by the European Environment Agency and the European Topic Centre on Land Use and Spatial Information (EEA/ETC-LUSI) provides an overview of data availability in different countries.

6.2 Current data situation — examples of existing databases

At European level, only one public database currently exists: Eurostat has some data at NUTSO (national) level on land prices (EUR/ha) and rents, based on the annual questionnaires that National Statistical Offices fill out. This database does not include metadata. Moreover, its data is at too high a scale to provide sufficient detail for geographic analysis, such as a comparison with land-use data.

The EEA/ETC-LUSI are assessing alternative data sources. One problem is that there are many types of land price indices in different countries, making it difficult to decide which index should be analysed. A further problem is the many sources for land prices. Methodologies vary. And in some countries, 'real' (i.e. market) land prices differ from those declared to the government and thus registered in the official statistics.

EEA/ETC-LUSI's current work looks at databases in at least three pilot countries (Italy, Luxembourg and Spain) and is analysing their methodologies for land pricing data production, management and analysis.

In Italy, the national Land Agency, which reports to the Ministry of Finance, has built a database of national real estate prices and is extending this to cover urban and agricultural land. In Luxembourg, the Ministry for Middle Class, Tourism and Housing set up a Housing Observatory in 2003, which is responsible for the monitoring of the prices for housing in order to obtain better knowledge of the

market and its evolution over time. Due to the lack of other information sources, the Observatory has chosen to assess the cost of housing via the screening and collection of real estate advertisements, for example in the press and on the Internet.

In Spain, the Ministry of Housing is responsible for national policy in matters relating to access to housing, construction, urban planning, land use and architecture, as well as public investments in these areas. To carry out its policy role, the ministry is monitoring prices for housing and urban land. The Spanish Autonomous Communities have Regional Ministries for Territorial Planning and Housing that manage policies in these areas as well as gather data. For example, Andalusia's Regional Ministry of Agriculture and Fisheries monitors rural and agricultural land prices and rural land use. Many local authorities in Spain monitor land prices in their territories; an interesting example is the work done by the Barcelona's Office for Renting, which gathered and reviewed real estate rents from 2003 until 2008.

Another example is the data collection approach in Germany. According to the German Federal building code (*Baugesetzbuch*), a copy of each contract and land transaction has to be sent to the valuation committees set up under this law, in order to maintain and update the land transaction databases. This information is then used to determine approximate values for land and bring an urgently needed transparency to the markets.

Examples of data available in Italy, Spain and Luxemburg are presented in the following pages.

Italy

The Territorial Agency of the Government of Italy gathers and produces data on prices related variables in the following areas ⁽¹⁶⁾:

- rural land parcels;
- urban buildings;
- real estate.

The Agency manages the Real Estate Market Observatory (*Osservatorio del Mercato Immobiliare*) (OMI), and evaluates public real estate. OMI's quotation database of transactions consists of about 180 000 values defined for 17 different building typologies observed in about 31 000 homogeneous zones inside the 8 100 municipalities nationally.

This publicly available database can be arranged by region (NUTS2), province (NUTS3) and municipality (NUTS5). An example is shown below:

The database thus provides information on geographic area (national macro-area, area, region, province, municipality), municipality category (in terms of the size of population), number of registered residences, number of residential transactions by year and average price by year.

The OMI database can be accessed online (free of charge), and is updated every six months. It is possible to query the database directly or carry out a map-based consultation through pilot GIS software called GEOPOI. Figure 6.2 provides an example of the results for one part of the city of Taranto; Map 6.1 compares results across Italy's regions.

Maps 6.2 and 6.3 show additional results for Veneto region and the Province of Venice.

The data available on rural and agricultural land prices are the values determined by law for the process of expropriation for public utility. Data are collected on the so-called VAMs (agricultural mean values), which are established yearly by provincial (NUTS3) expropriation commissions.

The VAMs are determined taking into account the crop and the value of the buildings inside the rural parcel, without considering other potential land use. The OMI database has online data on VAMs from 2005. Values refer to each rural area, as defined by the National Institute of Statistics (ISTAT). This data, together with land cadastral data, could be processed in order to produce a statistical overview of rural and agricultural land use and value.

Spain

In Spain, government authorities at several levels gather, hold and produce data on land prices and related variables.

The Spanish Ministry of Housing produces data on urban land urban prices and housing (including new houses, second-hand houses, types of house and socially subsidised houses). Price data are available by the size of the municipality (population) as well as at NUTS3 level.

Over the last few decades i.e. before the financial crisis 2008–2010, the building and purchase of

⁽¹⁶⁾ Osservatorio del Mercato Immobiliare e Servizi Estimativi of the Agenzia del Territorio.

Map 6.1 Average housing price EUR/m² in NUTS2 region



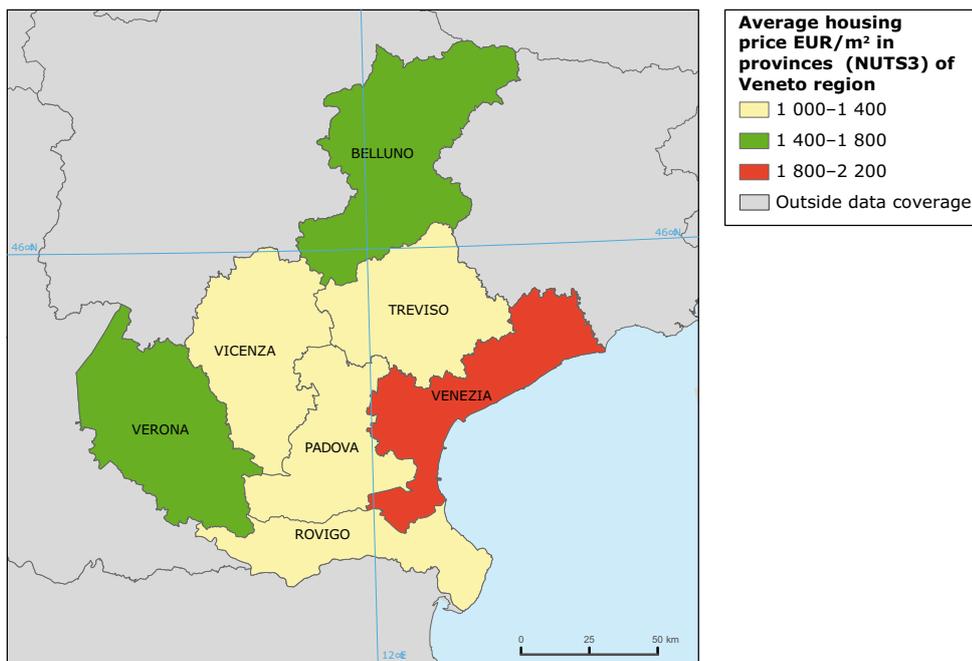
Source: ETC/LUSI, EEA and Italian Territorial Agency, 2009.

housing were one of the driving forces behind the Spanish economy. The housing sector became both the effect and cause of economic growth. Economic growth drove the construction of housing, which, in turn, due to the multiplying effect of this activity on the economic system, became a key element of Spain's economic development. All of this has taken place at a time of favourable circumstances in the financial markets and of growth in the Spanish tourism sector, which has meant major investment flows were diverted towards the construction and purchase of housing, both in Spain and abroad.

In 2005, the housing sector accounted for 16.8 % of Spain's nominal (current-price) gross domestic product (GDP), and provided 15.1 % of contractual employment income ⁽¹⁷⁾. Housing development and construction made up 8.2 % of the GDP, and rentals, both real and subsidised, 6.8 %. Housing construction contributed 59.4 % of the added value of the building sector.

The housing sector also provided a major source of taxation: a total of EUR 11 948.2 million, of which EUR 4 669.7 million was levied on housing construction and EUR 5 417.3 million on changes in ownership of existing houses. Taxation on changes in the ownership of land

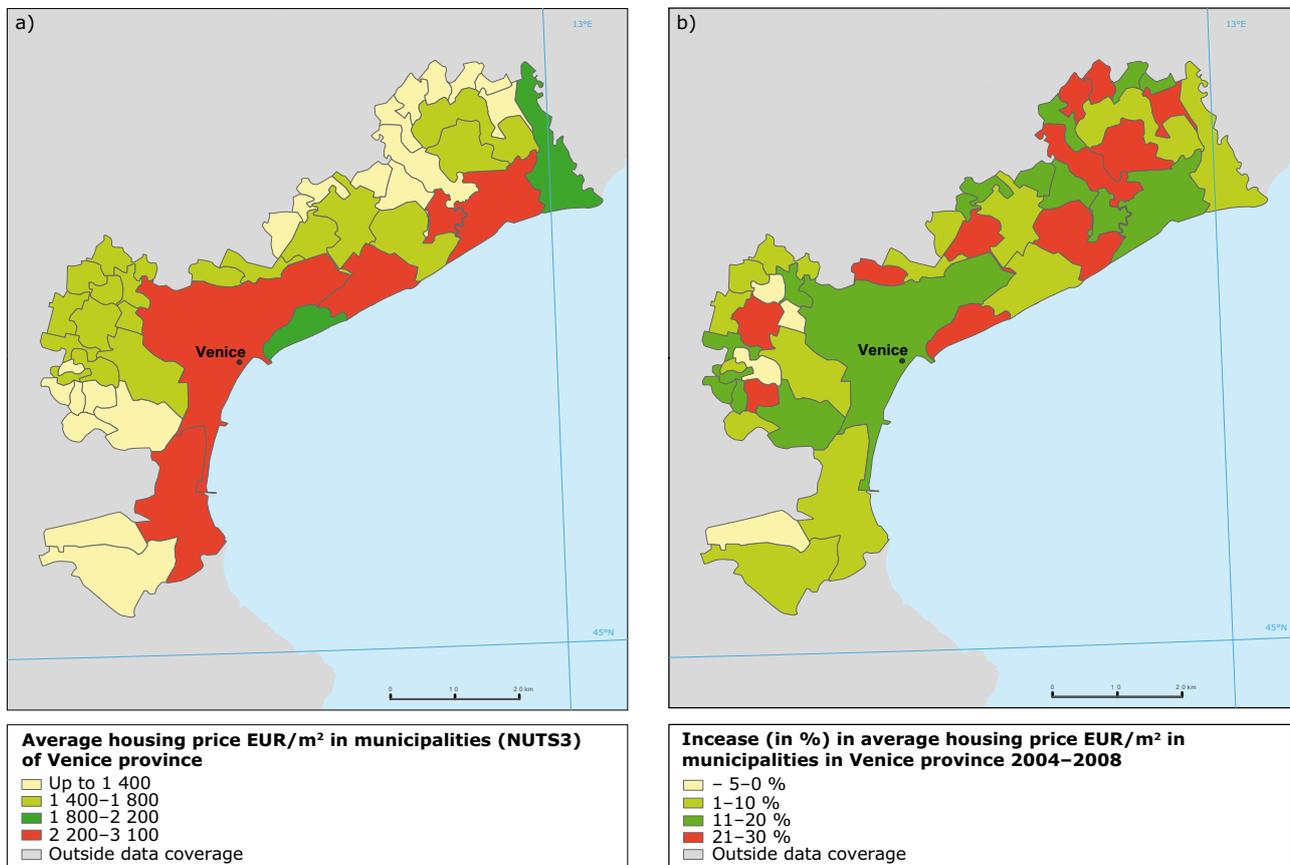
Map 6.2 Average housing price EUR/m² in provinces (NUTS3) of Veneto region



Source: ETC/LUSI, EEA and Italian Territorial Agency, 2009.

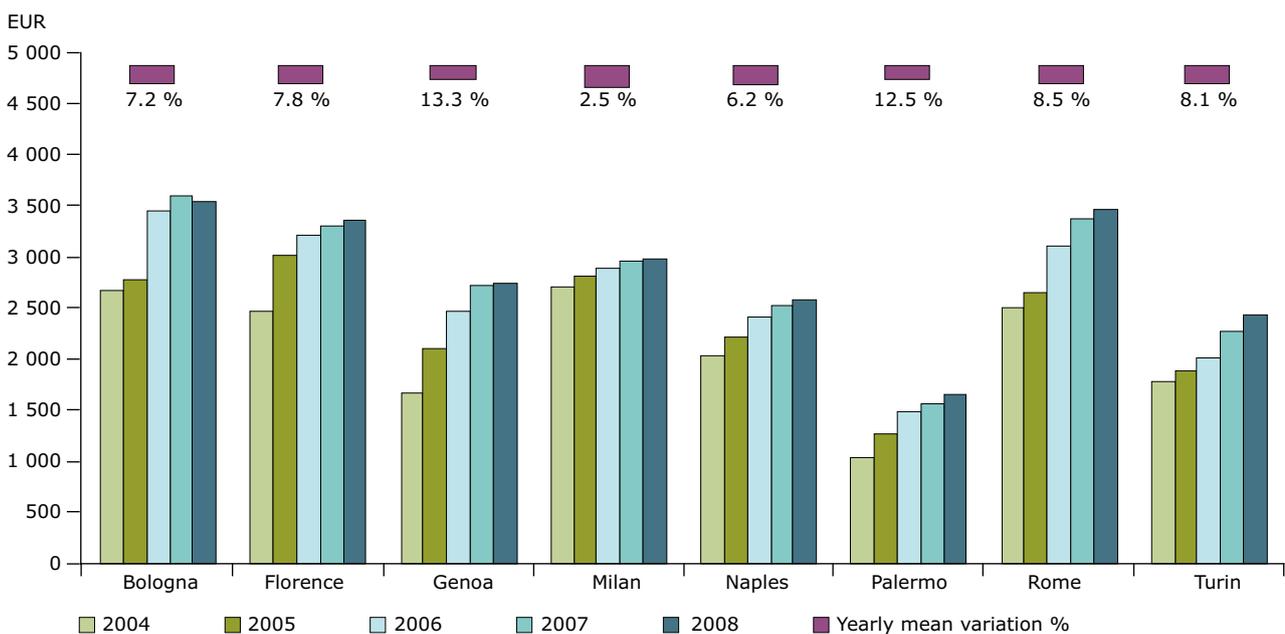
⁽¹⁷⁾ Satellite Housing Account, Ministry of Housing.

Map 6.3 a) Average housing price EUR/m² in the municipalities (NUTS5) of the Province of Venice and b) Increase in urban land prices in the Province of Venice, 2004–2008

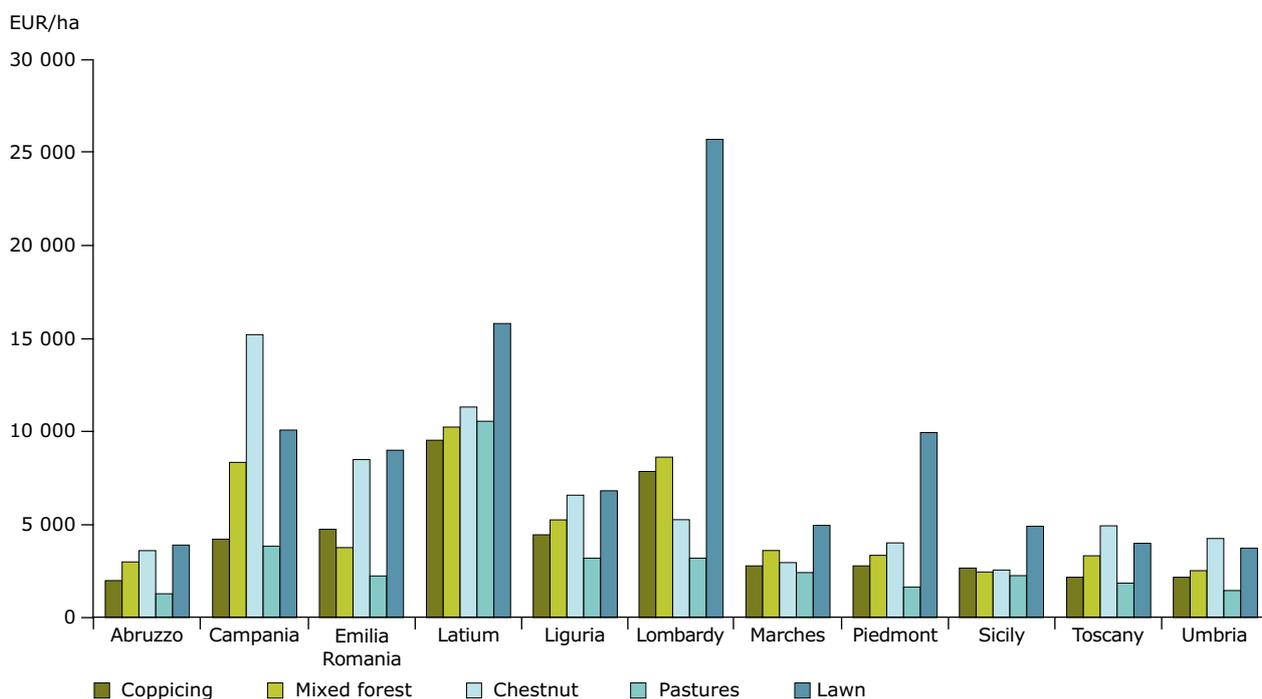


Source: ETC/LUSI, EEA and Italian Territorial Agency, 2009.

Figure 6.3 Housing prices in main Italian cities, 2004–2008



Source: Italian Territorial Agency, 2009.

Figure 6.4 Rural/agricultural land prices in selected regions of Italy

Source: Italian Territorial Agency, 2009.

amounted to EUR 1 348.9 million, and on rentals, EUR 548.3 million. These figures represent 8.9 % of the tax collected on production.

Changes in the price of land per square metre, depending on the size of the town or city, are as follows: during the fourth quarter of 2008, in towns of over 50 000 inhabitants, the price rose by 26.23 % compared to the first quarter of 2004, reaching EUR 632.5; in towns with a population of between 10 000 and 50 000, the price dropped by 18.9 %, to EUR 278.7; in towns of between 5 000 and 10 000 inhabitants, the price rose to EUR 191.4, a 45.7 % increase; in towns of between 1 000 and 5 000 inhabitants, the price per square metre of land was EUR 129.3, an increase of 36.7 %; finally, in towns of under 1 000 inhabitants, the price per square metre of land was EUR 71.7, an increase of 26.7 %.

Map 6.4 uses the Ministry of Housing's database to present the increase in urban land prices from 2004 to 2008, by Spain's autonomous communities (regions).

Figure 6.5 shows the average annual rate of change for land and house prices across Spain in 2005–2008.

In the fourth quarter of 2008, the average price per square metre of free market (unsubsidised) housing in Spain was EUR 2 018.5, an increase of 38.6 % compared to the first quarter of 2004.

Maps 6.5 and 6.6 show average house prices in 2005 and 2008.

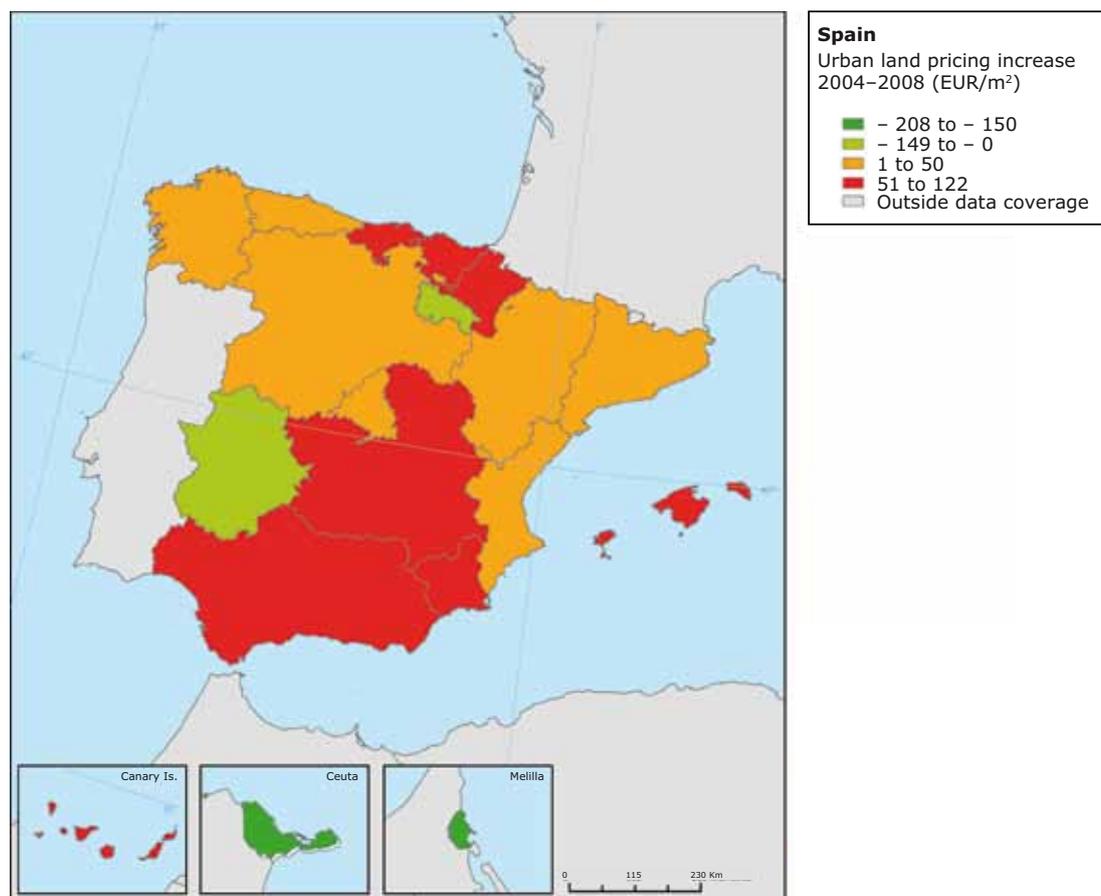
Several of Spain's autonomous communities are developing their own land pricing registers⁽¹⁸⁾. For example, the Ministry of Agriculture and Fisheries of the Government of Andalusia is developing a database on rural land use and land prices by NUTS3 and county level. The register includes data on the price of agricultural land, differentiated by the following major types: dry land, irrigated land, fruit orchards, pastures, olive trees, vineyards and average land price for Andalusia and Spain.

For the whole of Spain from 1970–2000, the amount of agricultural land dropped from 20.5 million hectares to 18.3 million hectares, a 10.8 % decrease. In the same period, the surface area of irrigated land increased from 2 031 300 hectares (9.9 % of the total farmland) to 3 407 700 hectares (18.2 %).

This spectacular increase in the amount of irrigated land is a result of the introduction of farming policies

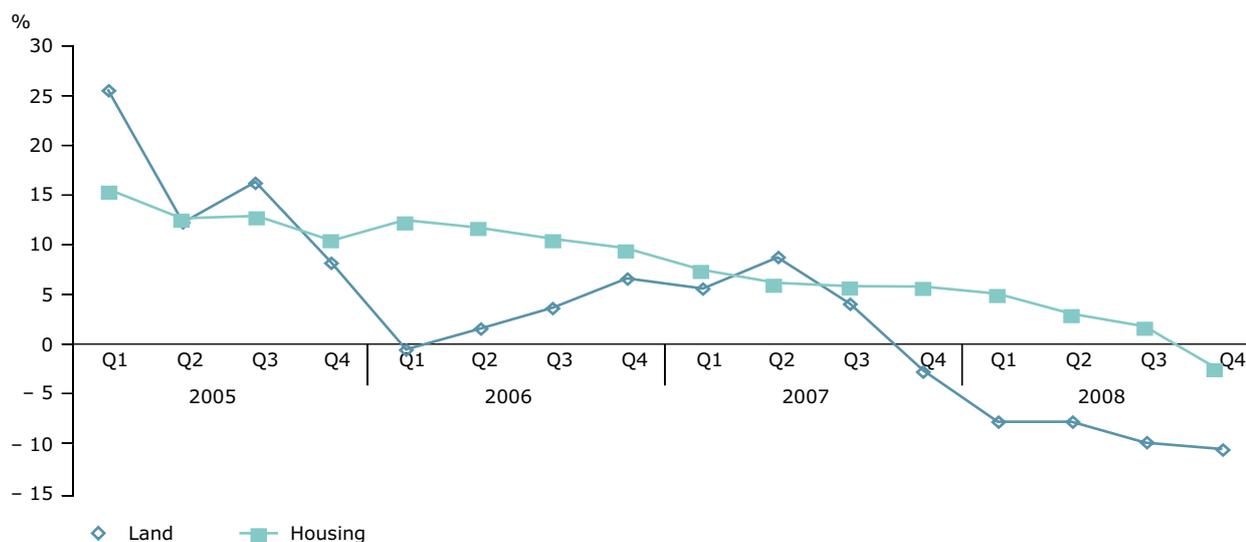
⁽¹⁸⁾ The Ministry of the Environment and Rural and Marine Affairs carries out an annual survey on farmland prices, showing results per region, and crops; here there is also an assessment compared to farm rental prices (in Spanish arrendamientos). www.mapa.es/es/estadistica/pags/preciostierra/Precios_tierra.htm.

Map 6.4 Increase in urban land prices in Spain, 2004–2008



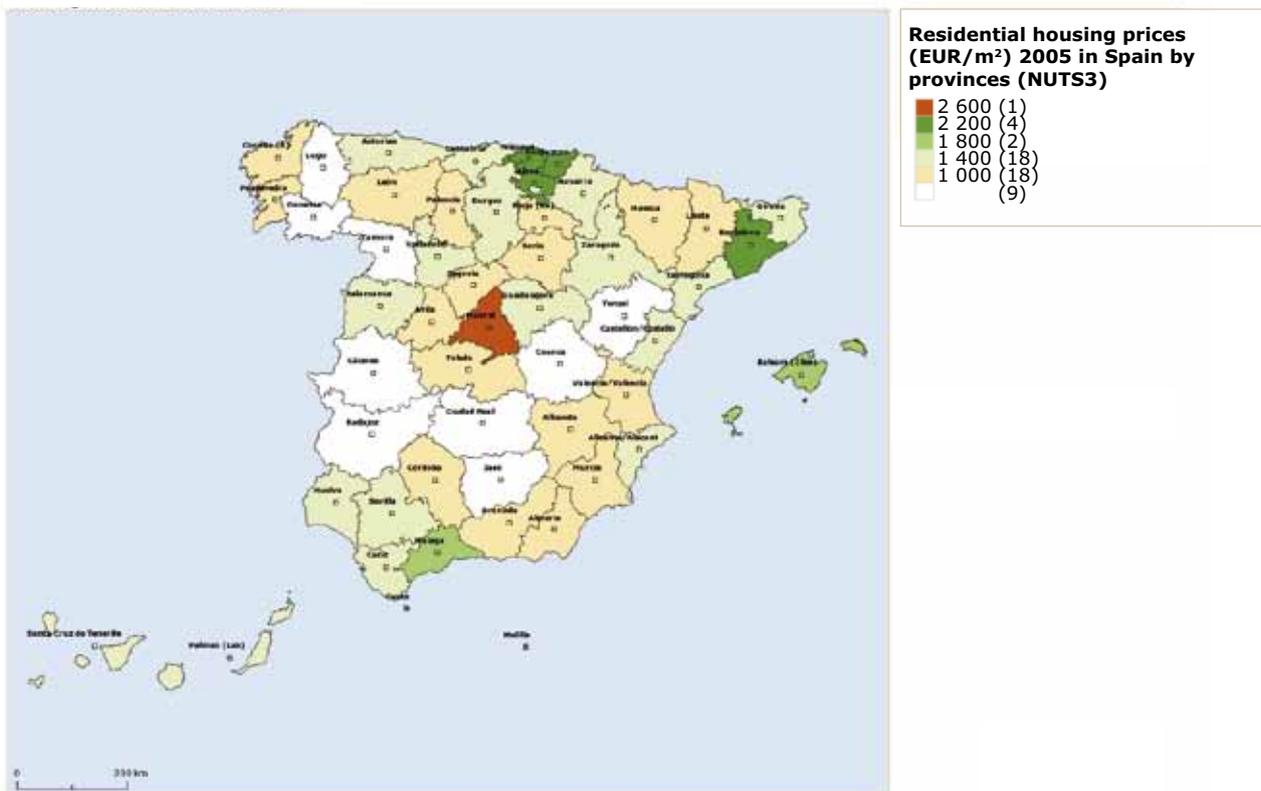
Source: ETC/LUSI, EEA and Government of Spain — Ministry of Housing, 2009.

Figure 6.5 The average annual rate of change for land and house prices in Spain, 2005–2008



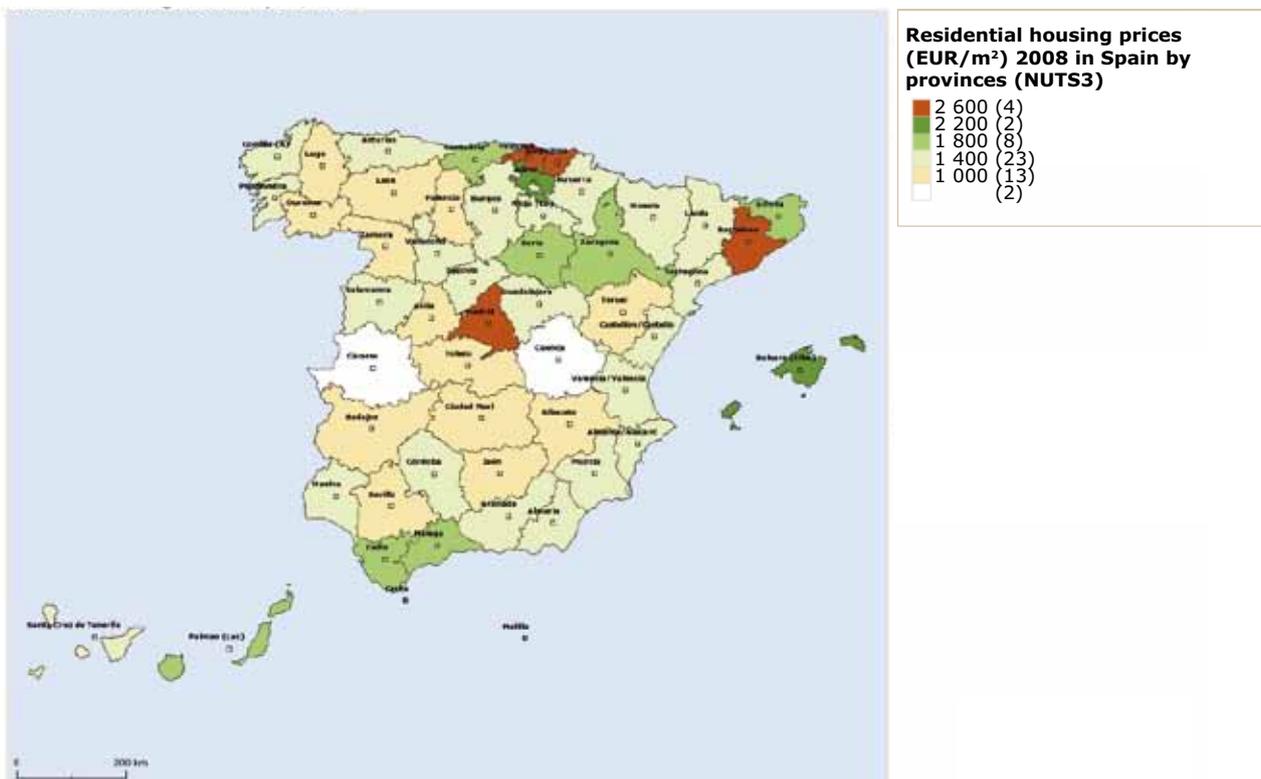
Source: Government of Spain — Ministry of Housing, 2009.

Map 6.5 Residential housing prices in Spain, 2005

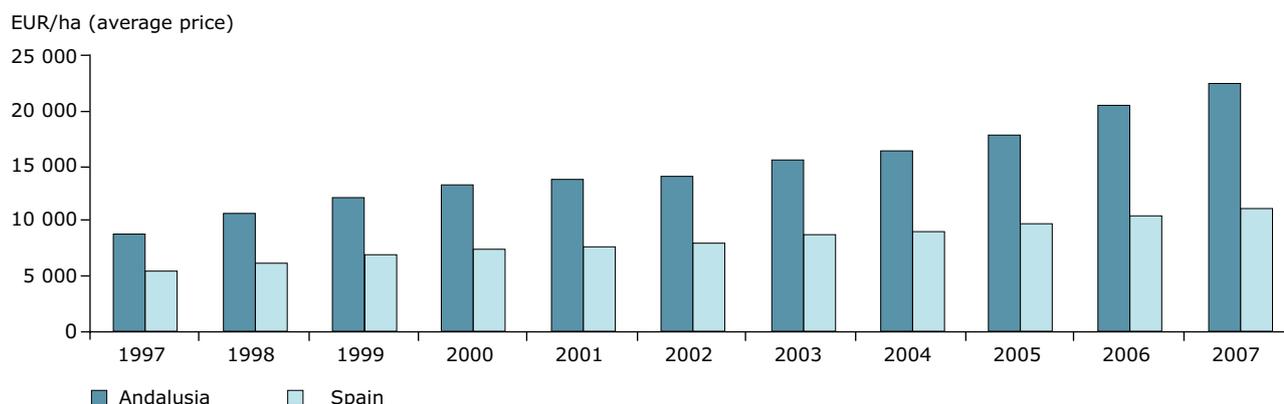


Source: Government of Spain — Ministry of Housing, 2009.

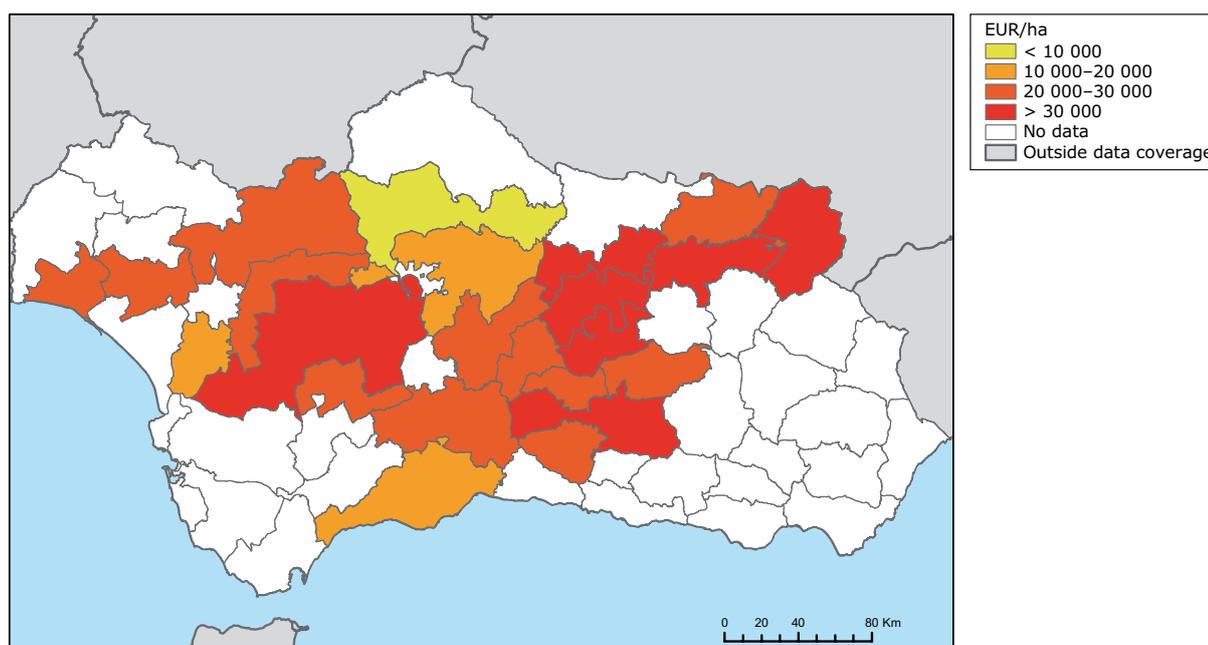
Map 6.6 Residential housing prices in Spain, 2008



Source: Government of Spain — Ministry of Housing, 2009.

Figure 6.6 Increase in rural land prices in Andalusia, 1997–2007

Source: Government of Andalusia (Spain) — Regional Ministry of Agriculture and Fisheries, 2009.

Map 6.7 Price of rural land cultivated with olive trees in Andalusia, 2007

Source: Government of Andalusia (Spain) — Regional Ministry of Agriculture and Fisheries, 2009.

that, through subsidies, give priority to crops that are poorly suited to the land, climate or water supply. This means that certain farming practices have led to an ecological imbalance with the subsequent loss of land, desertification and acidification of the soil, and exhaustion of water resources.

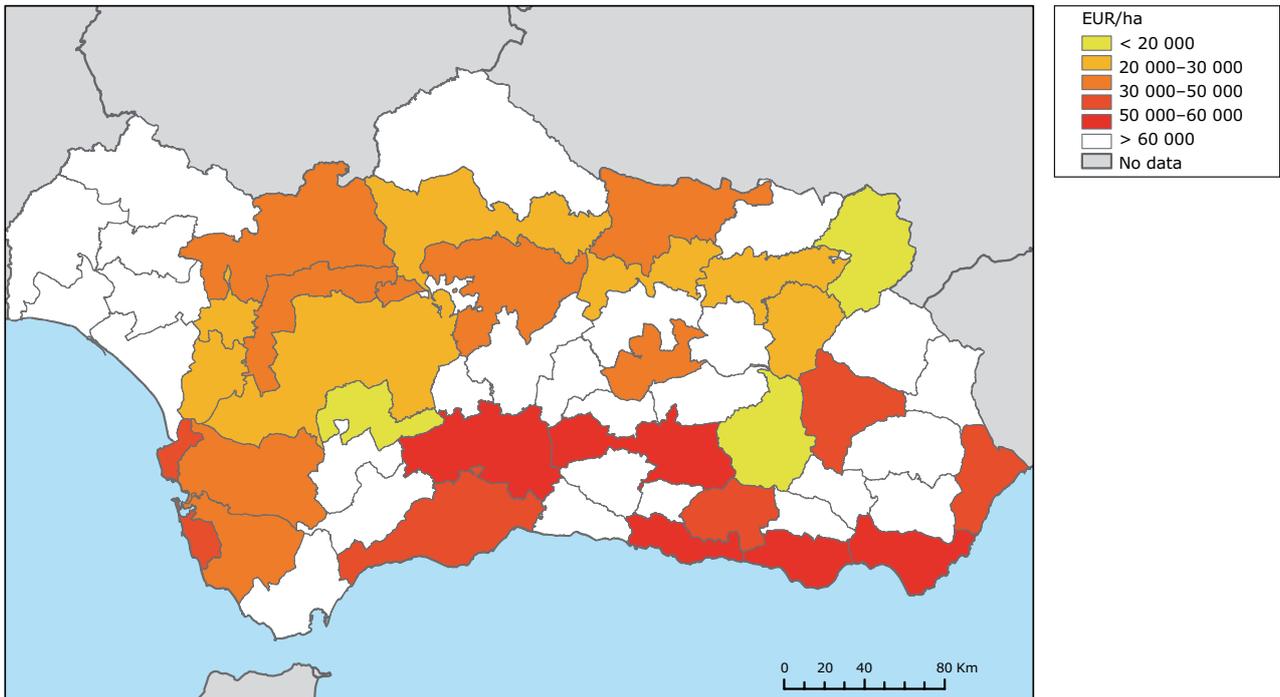
On the other hand, according to the Spanish Farming Census, irrigation techniques that make better use of water, such as drip or spray irrigation, have seen a significant increase in use (1 327 %) between 1982 and 1999.

Overall, as shown, rural land prices increased in Andalusia between 1997 and 2007.

Figure 6.6, Maps 6.7 and 6.8 show data extracted from Andalusia's database.

At local level, Barcelona City Council and Barcelona's Local Institute for Housing have developed statistics on housing rents and land prices by neighbourhood and year since 1996. Figure 6.7 and Map 6.9 provide an overview of the results, showing a constant increase over the last 10 years; this will probably

Map 6.8 Price of irrigated rural land in Andalusia, 2007



Source: Government of Andalusia (Spain) — Regional Ministry of Agriculture and Fisheries, 2009.

stabilise in the coming years because of the effects of the real estate collapse and the effects in Spain of the international economic crisis.

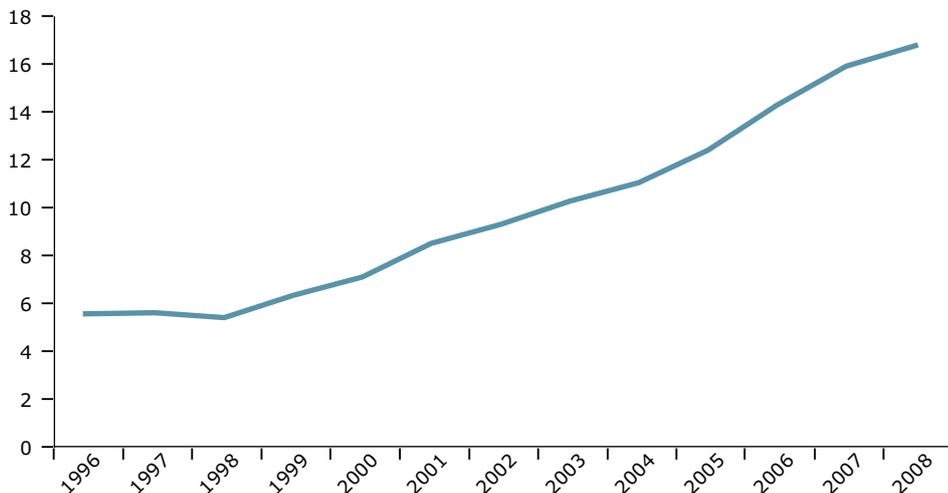
Luxembourg

Since 2003 the Observatory of Housing of the Ministry for Middle Class, Tourism and Housing

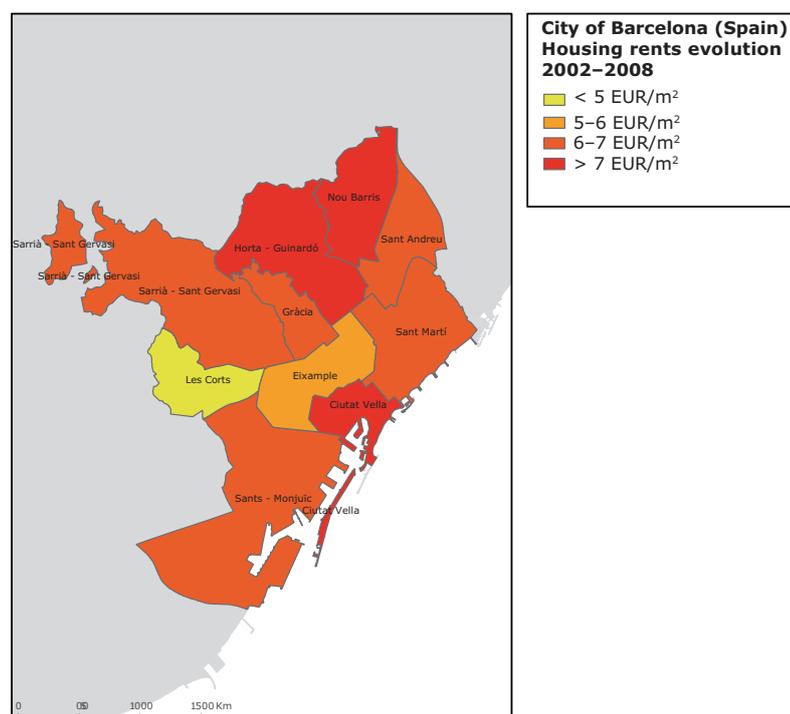
in Luxembourg has collected housing price and rental data using real estate advertisements, surveyed every first week of the month in the country's two main newspapers as well as in specialised real estate papers and on the Internet. The scrutiny of online databases and dedicated press for the establishment of a land price database provides a close link to the actual market situation. A drawback is that the

Figure 6.7 The evolution of housing rents in Spain, 1996–2008 (EUR/m²)

The evolution of housing rents in Spain, 1996–2008 (EUR/m²)



Source: Government of Spain — Ministry of Housing, 2009.

Map 6.9 The evolution of housing rents in the City of Barcelona (Spain), 2002–2008

Source: Government of Catalonia (Spain) — Regional Ministry of Environment and Housing, ETC/LUSI and EEA, 2009.

figures represent 'asking prices' and thus probably slightly exceed final transaction figures.

The database contains:

- date of the announcement;
- location (region, municipality, town);
- type of housing (house, apartment);
- proposed transaction (selling, renting);
- main characteristics of the real estate (number of rooms, surface, garden, etc.);
- reference number.

The information collected by the Observatory is available online (<http://observatoire.ceps.lu/>) and can be accessed as statistics, text and via a series of maps.

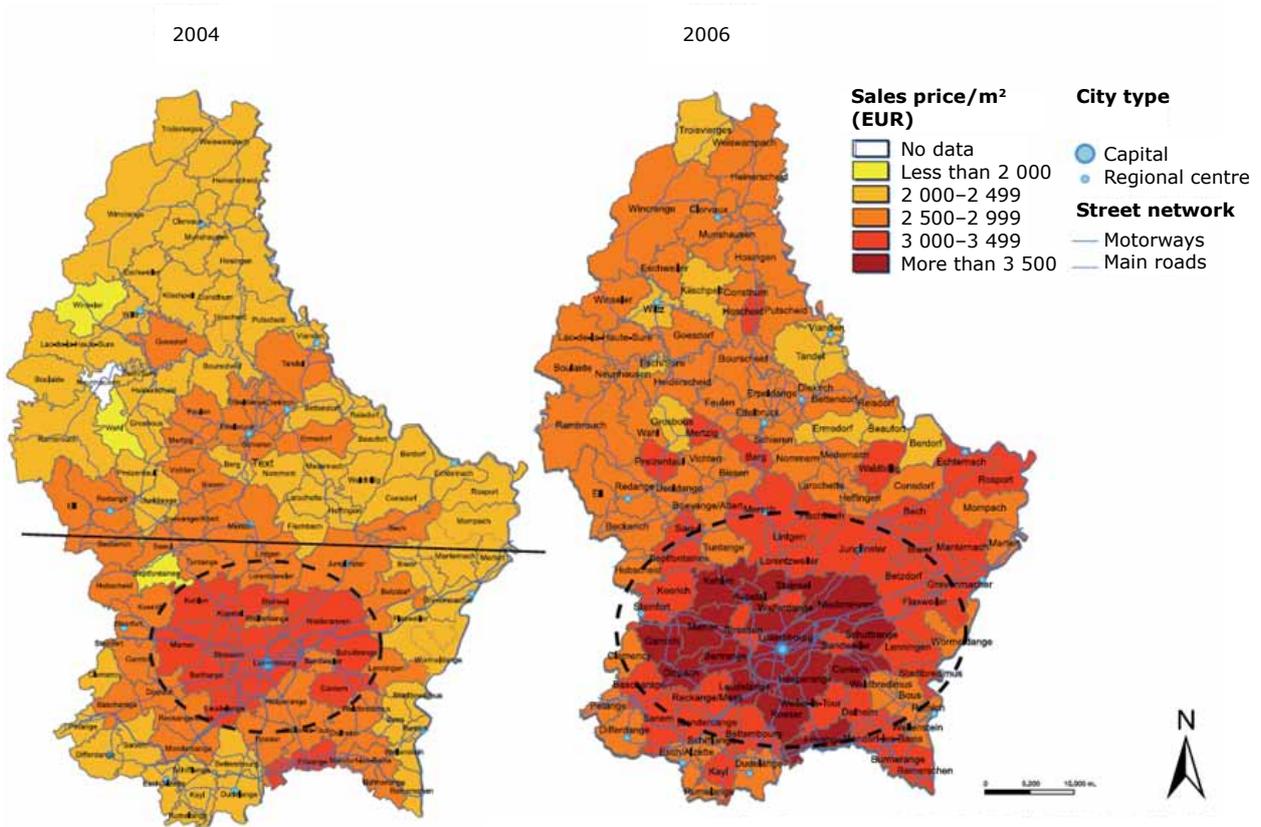
Map 6.10 illustrates changes in 'asking prices' for housing between 2004 and 2006 in the different municipalities of Luxembourg. The general trend shows an overall increase in all municipalities and an enlargement of the most expensive area around the City of Luxembourg caused by a lack of new

building land and the proximity to the economic heart of the country.

Between 2005 and 2009, asking prices for homes increased by 12 % ⁽¹⁹⁾ (see Figure 6.8). The average cost per square metre in 2009 was EUR 3 241, ranging from EUR 2 400 in the north of Luxembourg to around EUR 4 000 in the most expensive municipalities (Luxemburger Wort, 2009).

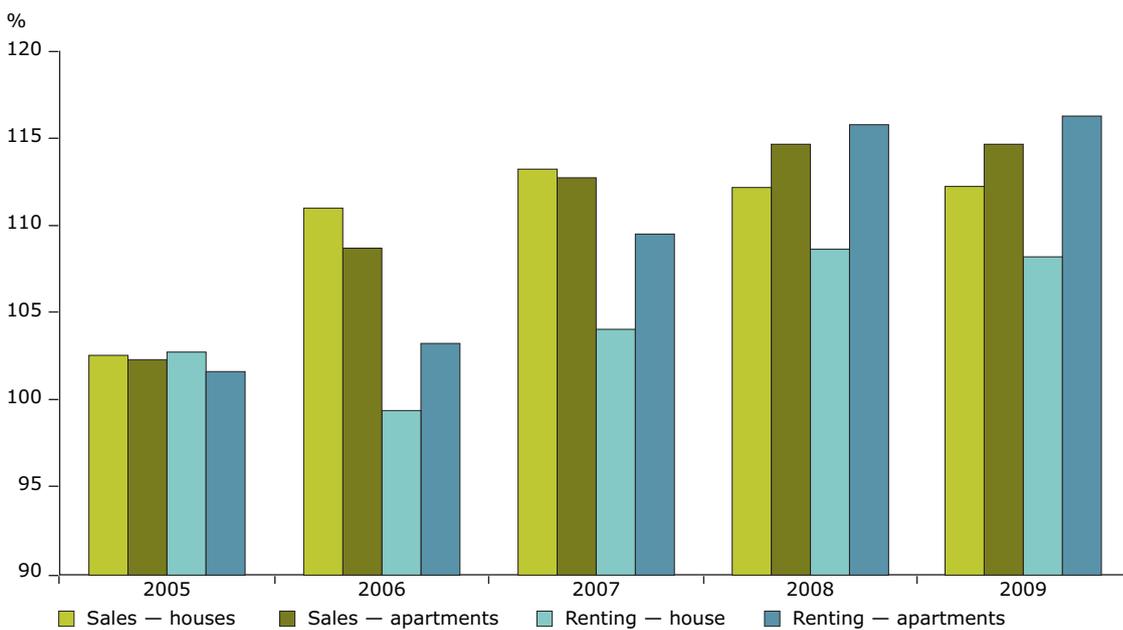
⁽¹⁹⁾ <http://observatoire.ceps.lu/index.cfm?pageKw=serie3>.

Map 6.10 Average proposed sale prices for houses in Luxembourg in 2004 and 2006



Source: Author: Department GEODE, CEPS/INSTEAD, April 2007; Base map: Department GEODE, CEPS/INSTEAD; Statistical data: Observatory of Housing (Advertisements 2004 and 2005).

Figure 6.8 Development of asking prices for housing sales and rents in Luxembourg, 2005–2009



Source: Observatory of Housing (<http://observatoire.ceps.lu/index.cfm?pageKw=serie3>), 2010.

7 Conclusions and future research agenda

7.1 Overall reflections

This study provides an initial review of land pricing. The table in Annex 1 gives an overview of initial answers to the research questions listed in Chapter 1 together with indications for further research. The study has shown that land prices are interconnected with land-use changes, and that they have high potential to be used as indicators especially in regard to processes such as urban sprawl. Moreover, land pricing is related to the environmental impacts of land-use changes. At the same time, further work is required to gain a better understanding of the exact linkages of land pricing, land-use changes and the environment and then to enable identification of the potential leverage points for environmental policy.

This study provides evidence that land prices require more attention in the context of European environmental policy. One major issue is that traditional land-use planning faces significant challenges to tackle current and newly arising environmental problems and that new approaches for strengthening sustainability in land use are urgently needed. For this purpose, however, a systematic analysis of the shortcomings in land-use planning in different parts of Europe should be undertaken. In addition to the specific agenda for future research on land pricing, which is the overarching issue, the gaps in spatial planning and possibly in the current discussion on territorial cohesion also need to be identified.

7.2 Drivers of land prices

The role of the key drivers is probably dependent on the conditions found in the specific region or country, so making general statements about their relative importance is very difficult. Also, studies like this need to take into account the fact that land in economic terms is a 'non-homogeneous good'.

One important reflection is that for the most part, the drivers for agricultural and urban land are different. Nevertheless, making a very general

assessment, the most influential drivers on land prices as described above appear to be taxes, tax relief and urban pressure. These drivers appear to be most the appropriate to be used as access points for the development of a land pricing policy targeted at a contribution to a sustainable land-use development. At the same time these drivers also have the highest potential to induce land-use changes themselves. In this context it is quite difficult to distinguish between the inherent effect on land-use change of the driver itself and the effects of land prices.

Drivers with less impact on land price development or where the effect differs from region to region are subsidies, inflation, commodity prices, land productivity and amenities. Apart from inflation these drivers apply more to agricultural land in rural areas than to urban or semi-urban zones. In addition, they may not bring about significant changes in land use, except possibly changes in agricultural use, which may become more intensive due to a rise in commodity prices. This, however, can differ from region to region; disadvantaged rural areas in remote regions might be more vulnerable to these factors.

One of the key land-use changes, in particular in terms of its environmental impacts, is urban sprawl. As we have seen in the Veneto case study, while this includes the expansion of urban areas at their frontiers, sprawl can also include the growth of urban activities such as industry, commerce and housing across rural land. In most cases, urban uses bring higher land prices than agricultural uses, and thus urban pressures should be reflected in higher land prices.

Another factor is that many of the drivers reviewed above for urban land prices are not the same as those for agricultural land. Table 7.1 provides an overview of drivers that differ, based on the analysis in Chapter 5. Moreover, those drivers that theoretically will influence both urban and agricultural land — for example, land taxes as well as enterprises and other taxes — are likely to have different impacts on the two.

Table 7.1 Key drivers of urban and rural land prices

Key drivers for urban land (and real estate) prices	Key drivers for agricultural land prices (in the absence of urban pressure)
<ul style="list-style-type: none"> - Population density - Growth of total population, of households - Economic growth - Influence of capital markets - Growth in housing stock - Level of employment - Social factors (for example, extent of social housing and unemployment) - Proximity to coast - Tourism pressures (for example, ski resort areas, cities with high tourism) - Existence of polluting industry - Infrastructure, such as new motorways - Proximity to urban centres (travel time) - Land taxes and other taxes - Land-use planning and restrictions (for example, on type of construction, use allowed) - Inflation 	<ul style="list-style-type: none"> - Commodity prices - Land productivity (including improvements — for example, greenhouses, irrigation) - Level and nature of agricultural subsidies - Designation of production areas (for example, wine-growing regions)

Sources: Donzel *et al.*; other sources and analysis cited in this study; inputs from the participants at the EEA workshop (held in April 2009).

Urban development pressure is thus a key topic in terms of the role of prices in land-use change. As noted, there will be a change in price level when agricultural land is converted to urban uses. For example, the increasing demand for land at the outskirts of a city offers the opportunity to landowners to sell their land at a higher price than for agricultural use, even though this may be comparatively low in respect to land prices in urban centres. Thus the price rise increases both the willingness to sell and the interest in buying. Later on, the more the price increases the more owners may withhold their land in expectation of even higher prices. Also, buyers may search for alternatives if the price difference between the city centre and the surrounding countryside decreases. Then the process of sprawl may slow down.

In principle, land-use regulations and planning should moderate this process. However, pressures for urbanisation — including recent and anticipated increases in land prices — could fuel political pressures to modify existing plans. A further concern, is that local authorities may see industrial and residential expansion as a source of economic growth as well as revenue growth.

7.3 Interactions between land prices and land-use patterns in Europe

There is clear evidence that interactions between changes in land use and changes in land prices exist. However, the mechanisms of these interactions are still not fully understood: at present, little research has been done to investigate these processes. Participants at the EEA workshop in April 2009 in Copenhagen stated that land prices would be a very desirable indicator, since unwanted land-use changes often happen slowly and sometimes even go unnoticed. Further research would be required to investigate whether the interactions between land prices and land-use changes are strong and stable enough to allow possible useful indicators to be developed. Here, it will be important to understand the underlying cause-effect chains between the drivers, the land prices and the resulting possible land-use change.

In regard to the development of land pricing policy as a new and complementary tool to other regulatory instruments, more research is needed into the effectiveness of 'classical' territorial planning and in which spheres existing instruments would need to be supplemented. A first analysis of the

potential of land pricing and the use of land taxation as instruments for environmental policy is provided in the next section.

7.4 Can land prices and taxes be instruments of environmental policy?

As argued in Chapter 4, there is still weak evidence for the assumption that land prices have a direct effect on land use or that land prices could trigger land-use changes themselves. Nevertheless, land prices should be considered in environmental policy as alteration in land prices could be an indication of present or future land-use changes. In this context the interrelation of land price drivers, land prices and land-use changes need to be better understood. Another important point is that land is not a 'homogenous good' and land markets often have very specific local characteristics — thus, individual policy instruments may be valuable only in specific contexts.

Further research is also needed to investigate differences in land markets in the various regions of the European Union. In particular, the development of land pricing as an indicator would need to take into consideration regional and local circumstances. The case study of Conservatoire du Littoral in France shows how land prices can be influenced by planning requirements to facilitate the acquisition of land for nature conservation.

Taxation could be used as an instrument to shape land-use patterns. This has been debated in at least two countries, though not yet put into practice. The discussions in Germany and the Netherlands provide some insights into how taxation could be used in land-use policy. Since this field of research is rather new, it is also worth looking at scenarios that are not related to land markets or land pricing, for example in relation to other economic instruments.

The payment scheme for ecosystem services is also a promising concept. This could enable the value of land to be based on ecosystems and other environmental services present in the land, and in doing so could influence land prices.

7.5 Land-price information and databases

The review of databases and subsequent analyses is still at an early stage. The different approaches demonstrate the lack of a homogeneous database on

land and real estate prices for Europe and the need to create one or at least improve the comparability and geographical breakdown of the existing ones, for example Eurostat survey. Efforts are needed to develop methods to generate comparable data on land prices (and related variables) from different countries and regions.

Additional analysis of other countries' databases is needed. In Germany, for example, it is required by federal law (§§ 195, 196 Baugesetzbuch), that the expert committees on valuation (*Gutachterausschüsse*) have to receive a copy of every transaction contract, in order to be able to maintain and update a database of transaction prices (*Kaufpreissammlung*). This database is used for determining 'recommended values' for land (*Bodenrichtwerte*) taking into account the different stages of development of the land. Zones have to be determined. These values are published.

Furthermore, in Lower Saxony in Germany, for example, annual market reports on the land markets at regional level have to be issued, as well as a state-wide annual market report assembled from all the regional ones. The market reports offer information on land parcels where construction of buildings is permitted or can be expected in the near future; parcels with built-up premises (either for business or private use); flats and condominiums; parcels for agricultural use or forests; parcels for public use (for example, infrastructure, including irrigation works); and other land parcels. They also provide information on changes in prices.

Existing (building) land pricing databases in different countries are often based on the following information, which can even be different at different administrative levels within the country:

- proposed sales prices (asking prices) in dedicated Internet and media publications;
- transaction prices (officially registered sales prices);
- evaluation by expert committees of real estate markets;
- land values used for taxation.

One concern is that in some markets the registered prices are similar to the real price — but in a number of countries, there is reportedly a difference between registered and real price due to tax evasion. This will have to be addressed in common methodologies.

In addition, it will be important to identify which authorities currently collect and hold relevant data (governance level: local, regional, state, European)

and which level would need such information in order to be able to apply potential measures. Initial thoughts on this question would facilitate how a unified European database on land prices could be set up and the best way of doing it.

A possible first step could be to perform a robust statistical analysis to identify relationships and areas in Europe that dispose of at least a minimal data set that would be required to undertake an analysis of this character and that could represent a sort of model for other regions. Based on this initial review, it appears that land and real estate prices vary significantly across Europe. For this reason, regional case studies should be used first in analysis of interactions between land prices, land-use changes and the environment.

7.6 Recommendations for future work

It is recommended that in the next phases of work, research should focus on the main, significant types of land-use changes and conversions: i.e. agricultural to urban (urban and tourism sprawl more generally); abandonment of agricultural land (and its conversion to forest); designation of protected areas; and transformation of high nature value agricultural land to intensive agriculture. Each of these land-use changes could be treated separately, perhaps in separate studies. The first reason is that the boundary conditions and driving forces are very different for each type of change; moreover, this approach will bring the environmental impacts into greater focus. The two areas that appear to be most interesting are sprawl related to the growth of urban areas and sprawl related to tourism.

A future research study could seek a more empirical understanding of the links between land prices and land-use changes. This work could focus on understanding in what circumstances and how land prices (and perhaps related data, such as the number of land transactions) might be used as indicators of land-use change.

Several broad questions appear to be important in any further review on the issue. One relates to the specific role of land prices themselves. Several participants at the EEA workshop in April 2009 were reluctant to consider a separate, specific role for 'land pricing' as a driver of land-use change, seeing prices mainly as a 'summarising reflection' of other underlying factors and expectations. While the current study discusses this role of pricing, it also considers the possibility that land prices are an important signal to private actors in the market and

thus will influence how their choices affect land use and the environment. This signalling function might be of special value for expectations regarding the conversion of agricultural land to urban land, which also has some of the most significant environmental effects. In this sense, land prices could have a similar role to, for example, carbon prices, which provide an important signal that influences the decisions of private actors that affect climate change. However, the two markets are quite different, and further analysis of the influence of land prices is required.

One major area for further exploration is the link between financial markets, land markets and the environment. This issue was raised at the workshop, where it was noted that the 2008–2010 global financial crisis is very closely related to problems in real estate finance. The economic consequences of the crisis are particularly strong in those European countries that saw strong real estate speculation in recent years — notably Spain. In Spain, construction led to extensive sprawl that could be termed as unsustainable in both environmental and financial terms. Thus, the finance-land interaction could be studied at macro-national level, perhaps in two or three European countries, Estonia could be one example. The work may need to bring in issues related to national macro-economic policy. A further exploration of the links between the financial and real estate markets could also lead to a much broader view of the possible role of land or real estate taxes, possibly as an alternative revenue source for government to taxes on capital and in particular labour (the latter in particular are likely to diminish as a revenue source as Europe's population ages and shrinks). Land or real estate taxes thus might have an important role in future work to 'green the tax base'.

Another key issue that needs to be investigated further is whether efforts to establish payments for environmental services could be linked to land-use prices. This in turn is related to efforts to protect habitats and ecosystems. The designation of protected areas affects land values, which are of great importance to private landowners. Studying these links as well as possible policy responses — such as the actions of the Conservatoire du Littoral in France to purchase land for protection — may be valuable in strengthening the Natura 2000 network and other protected sites in Europe.

Another important issue is that the underlying driving forces of land prices appear to differ from region to region and from one type of land to another. In agriculture areas, factors such as agricultural and other subsidies, commodity prices

and land productivity appear to be particularly important. They appear to play an important role in disadvantaged and remote areas. In urban or semi-urban zones, however, these factors do not appear to be as important in terms of influencing land-use change, even for agricultural land. It could be useful to distinguish between different types of area across Europe and investigate them separately. A possible differentiation and an initial selection of regional focal points could be coastal zones with a high potential or occurrence of tourism development (especially in the Mediterranean area), rural areas in southern Europe, highly industrialised urban areas in northern and central Europe and Eastern Europe with its specific challenges of economic transition.

While the potential effect of land taxation on land-use changes continues to be questionable, it would be valuable to further investigate whether land taxation as an instrument for land-use development could be combined with other instruments in a such a way that the alterations of price become a more valid argument for landowners and/or buyers and sellers to shift to a more sustainable land use, thus having a more sustainable influence on decision making regarding land use.

While subsidies could also be an instrument for direct intervention on land markets (for example, the acquisition of land could be subsidised if the

new owner agrees to apply a certain land use or to unsealing of land etc.), more research is needed in order assess the potential effectiveness of such subsidies.

To what extent development costs are included in land prices in a European comparison and what effects the minimisation of the (maybe not fully recovered) hidden costs could bring to the environment are interesting question when discussing land pricing. Here, even if further improvement is needed, the tool of fiscal-effect analysis and the transfer of the findings to the European level could improve our understanding.

It could be useful to distinguish between different regions in the European continent. A possible differentiation could be made between coastal zones with a high potential or occurrence of tourism development especially in the Mediterranean area, rural areas in southern Europe, highly industrialised urban areas in northern and middle Europe as well as Eastern Europe with its specific challenges of economic transitions.

More research is also needed for a clearer distinction of the relative importance of drivers in the context of urban development and agricultural areas. Land taxes, for example, will have different consequences in a rural area than in urban agglomerations.

Annex 1 Overview table on main results and open research needs

Guiding research questions	First answers	Future research needs
<p>What are the main drivers of land prices? Are natural values reflected in (higher) land prices? Can environment be a driver of land prices?</p>	<p>Drivers of land prices have to be differentiated between drivers of urban land (and real estate) prices and drivers for agricultural land prices.</p> <p>For agricultural land, key drivers are linked to agricultural production (for example, commodity prices and land productivity) and policy instruments of income support (for example, derived from the 'capitalisation' effect of CAP entitlements in farmland).</p> <p>For urban land and real estate, as well as agricultural land affected by urban pressure, a series of key drivers appear to come into play, in particular those related to urban pressure.</p> <p>Natural values are reflected in (higher) land prices and act as a driver if these values are themselves valued by sellers and buyers, for example recreational amenities, environmental assets improving the quality of life (health) and environmental assets improving production (agriculture). Environmental quality alone is not relevant if it is not important to the current or intended use of land (see Chapter 3).</p>	<p>It is important to identify and analyse the boundaries and links between urban and agricultural land markets. This will help identify the different pressures and the associated land-use changes.</p> <p>Another major area for further exploration is the link between financial markets, land markets and the environment.</p> <p>This analysis requires a distinction between different regions in, for example between:</p> <ul style="list-style-type: none"> • coastal zones and mountain areas with high tourism potential; • rural areas in southern Europe; • highly industrialised urban areas in northern and middle Europe; • Eastern Europe with its specific challenges related to economic transition. <p>A clearer distinction of the relative importance of drivers in the context of urban development and agricultural areas is also needed.</p>
<p>Are land prices in turn a driver for changes in land use? If so, what kinds of change?</p>	<p>There is no clear evidence that land prices initiate land-use changes. But in some cases they clearly contribute to these processes. This is the case at the interface between urban and rural areas and in situations of urban pressure (see Chapter 4).</p> <p>In transition economies, changes in land prices can imply changes in market prices for real estate but also imply changes in land-use patterns, as has occurred in Eastern Europe show (see Box 4.3).</p>	<p>Further research is needed to gain better understanding of the cause-effect chains of land price developments and land-use change.</p> <p>The interactions between economic transition, land prices and land-use change need further investigation.</p>
<p>Can land prices be considered an indicator for land-use changes?</p>	<p>Land prices have the potential for being used as indicators. Particularly in situations where a future land development is expected, it has been noted that prices have changed significantly. Prices could thus assume the function of an early warning indicator.</p>	<p>Further research would be required to investigate whether interactions between land prices, environmental quality, land use and infrastructure are strong enough and to identify differences in the relationships between land prices and land-use changes in order to deduce possible indicators or even tools — or not. Also here, a distinction between urban and rural areas is important.</p> <p>And there is a need to improve understanding of the underlying reasons for price changes (see Chapter 4)</p>

Guiding research questions	First answers	Future research needs
Are high land prices a potential obstacle for environmental measures, such as protecting areas with high natural values?	<p>There is some evidence that high land prices can be an obstacle for environmental measures. Box 5.4 shows that specific instruments that shape land markets — in this case, pre-emptive rights for acquisition — assist a policy of land acquisition for nature conservation purposes. This is especially the case if environmental goals compete with other financially strong uses such as tourism development.</p>	<p>In order to prevent environmental degradation, the value of ecosystems and their services should be better reflected in land market prices. The concept of ecosystem services could be beneficial in this context. Further development and specification of the approach is needed in order to understand how this concept could be applied for land markets (see Chapter 5).</p>
Can land prices and taxes be a potential instrument for land use and environmental policies?	<p>Several approaches and case studies on economic instruments that support environmental policy have been presented and discussed in Chapter 5:</p> <ul style="list-style-type: none"> • environmentally related taxes, fees and charges; • tradable permit systems ('cap and trade'); • environmentally motivated subsidies; • payments for ecosystem services (PES); • fiscal instruments: case studies on taxation in the Netherlands and Germany; • case study on a fiscal effect analysis in Germany (Chapter 4). <p>In practice, hardly any have been used as yet.</p> <p>Some of these approaches (for example, PES and subsidies) have not yet been assessed closely in terms of their interaction with land-use planning. But they could contribute to a further development of new approaches in this regard.</p> <p>Taxation could be used as an instrument to shape land-use patterns. This has been debated in at least two countries, though not yet put into practice. The discussions in Germany and the Netherlands provide some insights into how taxation could be used in land-use policy. Its practical application on a broader scale, however, appears to be problematic still.</p>	<p>Taxes could be an add-on to traditional land-use planning. But a major challenge in the research on land taxation is to fully understand how the value of open space could be incorporated into a taxation system, since the societal value of open space is not fully reflected in its market value. Similarities could be explored with the 'eco-taxes' applied to tourism activities.</p> <p>This research will be necessary for any tax intervention that could contribute to bridging this gap.</p> <p>Other promising economic instruments such as payments for ecosystem services, environmentally motivated subsidies and tradable permit systems still need to be adapted in order to be applicable on land markets. A major concern in this regard is that land is a non-homogenous good that is not easy to compare from one location to another. Economic instruments, however, often require certain comparability. As a result, as a first step it would be necessary to create a system that allows for comparison of land, including its physical and environmental qualities that are the focus of conservation efforts.</p>
Which data is important in the context of land pricing?	<p>The work on land prices will require good and comparable data across European countries — and data availability will be crucial if land prices and related data are to be used as indicators related to land use.</p> <p>Development of a database on land prices could start with data from the pilot countries. There is a need to consider separately the prices of built-up land (and if possible the cost of real estate separate from the land), agricultural land and forest land.</p>	<p>There is a need to assess alternative data sources. One problem is that there are many types of land price indices in different countries, making it difficult to decide which index should be analysed. Further problems are the many different sources for land prices based on varying methodologies. In addition, in some countries, 'real' (i.e. market) land prices differ from those declared to the government and thus registered in the official statistics.</p>

Guiding research questions	First answers	Future research needs
What attributes are needed in order to develop appropriate indicators?		For the development of land prices as an indicator, it would be valuable to have a correlated time line of data on land prices together with correlated data on major drivers of land prices, plus data on land-use changes. Such time lines could shed some light on whether changes in land prices are responsible for land-use change or whether land prices would be a feasible indicator that could help to identify challenges for sustainable land-use planning. The application of GIS tools in combination with (historic) remote sensing could be an option in this context.
Options for (available) land pricing data bases.	Section 6.2 provides for data of three pilot countries, Italy, Spain and Luxembourg: In Italy real estate prices are estimated on the basis of real transactions, while in Spain and in Luxembourg they are estimated on the basis of newspaper advertisement.	Streamline existing databases and develop a coherent system for the European Community.

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Abbreviations

BBR	Bundesamt für Bauwesen und Raumordnung (Federal Office for Building and Regional Planning)
CAP	Common Agricultural Policy
CEMAT	Conférence européenne des Ministres Responsables de l'Aménagement du Territoire (European Conference of Ministers Responsible for Regional/Spatial Planning)
EEA	European Environment Agency
ES	Ecosystem services
ESDP	European Spatial Development Policy
ESPON	European Spatial Planning Observation Network
ETC-LUSI	European Topic Centre on Land Use and Spatial Information
EU	European Union
FAO	Food and Agriculture Organization
NABU	Naturschutzbund Deutschland e.V. (The German Nature and Biodiversity Conservation Union)
NGO	Non-governmental organisation
NUTS	Nomenclature des Unités Territoriales Statistiques
PES	Payments for ecosystem services
REFINA	Forschung für die Reduzierung der Flächeninanspruchnahme und ein nachhaltiges Flächenmanagement (Research for the Reduction of Land Consumption and for Sustainable Land Management)
SAPS	Single Area Payment Scheme
SPS	Single Payment Scheme
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
US	United States of America

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