Land Markets and their Regulation: The Welfare Economics of Planning

Paul Cheshire *)
P.Cheshire@lse.ac.uk

and

Wouter Vermeulen **), ***)
W.Vermeulen@cpb.nl

Version March 18 2008

*): London School of Economics
Houghton Street, London WC2A 2AE, UK
**): CPB Netherlands Bureau for Economic Policy Analysis
P.O. Box 80510, 2508 GM, The Hague, NL
***): VU University, Department of Spatial Economics
De Boelelaan 1105, 1081 HV, Amsterdam, NL

Land Markets and their Regulation: The Welfare Economics of Planning

Abstract: *Whether called 'planning' or 'zoning', land markets are regulated in many cities and countries over the world. These interventions ensure the provision of certain amenities but researchers are increasingly becoming aware of the repercussions they have in land and housing markets, as well as in other segments of the economy. This chapter introduces welfare economics – though not an approach widespread in the planning community – as a framework for the evaluation of land use policies. We discuss the conditions under which markets may be expected to deliver a socially desirable outcome if left to themselves, and identify various sources of market failure in land markets that may call for regulation. Stylised models are used to illustrate the form and extent of optimal interventions, classifying their impacts into costs and benefits for society. A substantial body of empirical evidence on the impacts of land use regulation is surveyed. Although estimates of net welfare effects are scarce, the few existing studies suggest that costs may exceed benefits by a significant margin. We conclude with a brief discussion of wider economic impacts.*

Keywords: land use regulation, land markets, housing markets, hedonic pricing, welfare economics

Classification-JEL: R14, R31, R38

1 A normative framework: welfare economics versus planning

The great majority of the world's population, and all those living in developed economies, live in societies in which the goods and services they consume are provided through markets and – subject to their incomes – they are free to choose what, where, and how much to consume. But to varying degrees governments intervene and regulate all markets. So the regulation of land markets is not exceptional in itself: but it is exceptional in its form and severity. What economists call 'land market regulation' however, most people – including those who practice it – call land use 'zoning' or 'planning'. This is definitely a form of regulation, however, since it determines the use of an economic resource according to rules and norms: prices and land markets are still influential, as we will see below, but their influence is constrained and regulated by planning decisions.

Underlying and guiding the form of most systems of market regulation there are general analytical principles derived from welfare economics, which build essentially on two 'fundamental theorems'. The first of these theorems is that under certain conditions, the outcomes generated by markets are 'efficient' or 'socially optimal'. The economic concept of efficiency has a very particular meaning; an outcome is socially optimal if no redistribution of 'goods' or re-allocation of resources is possible which would not make at least one person worse off in welfare terms than they were previously. In other words, taking the real income distribution and legal property rights as given, it is impossible to improve total welfare without damaging the welfare of at least one individual. The validity of this theorem rests on four principle conditions holding, however: the first is that people are the best judges of their own welfare; the second is that the actions of no person or firm influence the welfare of others without that influence being reflected in prices; the third is that no agent in the system has any degree of monopoly; and finally it must be the case that all goods have prices. A violation of any one of these conditions is usually referred to as a 'market failure'.

The point and power of this result may seem paradoxical to a non-economist. It is that the conditions that would have to hold for markets to deliver a socially optimal outcome almost never hold in practice. But they can be identified with complete precision. The beauty of this first fundamental theorem of welfare economics is that it provides clear guidelines for regulating markets. The best sort of regulation intervenes in ways to ensure that so far as possible the conditions leading to market failure are eliminated or, more realistically, their influence is minimised. In nearly all countries there are government bodies charged with ensuring fair competition, regulating monopolistic practices, advising and intervening on

health aspects of industrial processes, or devising policies to restrict pollution or combat global climate change. Some goods – the most obvious being national defence – do not have prices and are provided directly by the government. All these examples of government intervention or regulation reflect clearly identified sources of market failure.

Economists makes a sharp distinction between efficiency – the best society can do on the basis of the current distribution of incomes and wealth – and what is 'equitable', that is, what society might collectively choose as a fairer distribution of income and wealth. The advantage of the notion of efficiency is that outcomes can be analysed without resorting to ethical judgements beyond those identified above. It is the content of the second fundamental theorem of welfare economics that whatever its distributional properties, every outcome that is efficient can be attained in a market economy by transferring money between agents in a lump sum fashion. So if society, for example, really prefers an outcome in which every agent is equally well off, irrespective of their endowments in terms of human capital, it can attain this outcome by transferring money to agents with little human capital and leave the allocation of commodities to markets. Nevertheless, this result takes the distribution of real incomes again as given, treating the 'ideal' distribution as a matter of individual conscience and judgement. Economists are of course interested in distribution but they are less confident in their analysis. For instance, economics has important things to say about the often unexpected distributional outcomes of planning interventions (see section 4 for some examples) but it has little to say about what those distributional outcomes should be. Economics contributes a great deal to the analysis of issues such as the affordability of housing, exclusionary zoning or social housing but it has little to say about the necessity or desirability of the distributional purposes such policies.

To most planners, welfare economics is an alien way of thinking, as they tend to come from a completely different intellectual tradition. Economists are rational, calculating and – aspirationally at least – the closest in approach to natural science of any social science. Planning's roots are in design and engineering and its aspirations are utopian. Hall (1974) in his wonderful overview of the historical origins of planning, devotes a whole chapter to 'The Seers'. The founder of the Council for the Preservation of Rural England (in 1925) was Abercrombie, the author of the seminal 1944 plan for Greater London. Another influential figure in the early days of planning was the eccentric architect of Portmeirion, Clough William-Ellis (1928). Planning has added a good deal of social science over the past generation and is now an established, legalised and legalistic system, but its intellectual roots are in design and what draws eager students into the subject is an aspiration to improve the lot

of human kind by means of a better built environment. Ultimately, for planners, 'urban containment' or 'mixed development' are worthwhile because they are right: or at least that is how it seems to be to an economist looking in to the world of planning.

Another essential distinction is that while planners treat aesthetics and amenities as having intrinsic value, economists attempt to value these attributes in terms of how they influence human welfare, reflected in what people are willing to pay for them. For instance, environmentalists appear to economists to set some absolute value on environmental outcomes, independently of human preferences. Economists try to estimate the willingness to pay for environmental outcomes. Planners favour mixed land uses and mixed communities. Economists ask awkward questions, like what is the value of such attributes? Who gains from them? Who loses? And how much do they cost to secure? All these issues can be treated within the framework of welfare economics, which puts sustainability and environmental outcomes, including those of the built environment and its relationship to rural preservation or conservation, to the same fundamental tests: costs and benefits. They are not outcomes given value in their own right, but their value depends on the preferences and willingness of people to pay for them and what we have collectively to forego in order to obtain them.

This chapter offers a welfare economic perspective on land use regulation that is accessible to planners. Our aim is to persuade planners of the value this perspective has. In the next section, we will discuss the reasons for land use regulation in terms of various types of market failure. Section 3 illustrates how economic theory may be employed to derive optimal land use policies that take account of externalities and the public nature of certain types of land use, while offering some thoughts on the applicability of these theoretical results in the real world. The empirical evidence on costs and benefits of land use regulation is considered in section 4. As land use regulation is relevant for other sectors too, and as there may be indirect effects of these policies, our concluding section puts this discussion into a wider perspective.

2 Why is intervention in urban land markets needed?

How exactly does the rather general framework of welfare economics apply to land markets and cities? Land markets are riddled with problems of market failure, particularly those associated with actions of land owners that are not priced and the provision of specialised public 'goods', such as open space, which it is difficult or impossible to price. An obvious feature of land is that any parcel has a specific and fixed location. The value of any parcel of

land is, moreover, largely determined by the characteristics and uses of other parcels of land bordering it and to which it gives access. A plot of land in central London may be worth £100 million a hectare, not because of its fertility but because it gives easy access to one of the largest, most highly skilled and highest paying labour markets in the world and large numbers of high spending customers. If it is close to a parcel of land being used as a major intersection of the Tube system its value will be substantially greater because access will be even easier. If a firm were to set up on the adjoining plot, smelting lead or incinerating toxic waste, the value of the site would be greatly reduced. Houses under a flight path at Heathrow airport will be worth less than similar houses not affected by aircraft noise. A house in a National Park and with a view out over its unspoilt beauty or with frontage to a good fishing or boating river will equally have a substantially higher price than a similar house looking out to a railway line or a power station. There is an extensive literature documenting the extent, complexity and sophistication of the ways in which land and housing markets capitalise the impact of amenities, neighbourhood characteristics and disamenities to which their location exposes them. As far as it concerns the valuation of open space and other planning-induced amenities, a brief review of this literature is offered in section 4.

But while the value of any given site depends on the uses of sites bordering it and to which it gives access, the actions of the owners of those other related sites which generate (or reduce) that value would, in unregulated markets, be neither rewarded not penalised; or at least only incompletely. The firm that decides to set up a lead smelting plant may lose value in its own site but does not (at least without regulation) have to compensate the owners of the other surrounding sites for the losses they incur. A farmer who pollutes a river would lose the value of his own fishing rights but not the value of all those down river who also suffered loss. These are all examples of *externalities*, and because land values are so strongly influenced by the actions of owners of adjoining and nearby plots, land markets if left unregulated would exhibit serious problems of market failure. The pattern of land uses would consequently be far from the optimum. It should be added, though, that land use externalities do not need to be negative. Households that live in close proximity to each other may find it easier to maintain their social networks and firms may want to locate in close proximity to other firms in order to reap the benefits of agglomeration economies, such as the easy transfer of knowledge.

The provision of *public goods* is another significant source of market failure in land markets. In economics the term ‘public goods’ is used in a very specific way to describe goods (or services) which i) are non-rival in consumption and ii) are non-excludable. What

'non-rival' in consumption means is that if one person benefits from the provision or consumption of a good, this does not affect the welfare of its other consumers or the costs of the producer. I might share a packet of cashew nuts with my friends but the more I eat the less there are for my friends, and replacing the packet would cost resources. But this is not true of all goods – national defence is an example which is often used, but the same is true of National Parks or, indeed, any park, museum, open space, cityscape or architecturally attractive neighbourhood. If I enjoy a walk on London's Hampstead Heath, this in no way restricts the enjoyment of others and any additional costs of park maintenance are so trivial we can forget about them. The exception might come when a park or open space begins to get congested. Then an additional user would impose costs. The enjoyment of existing users (as well as that of the additional user) would be reduced by the congestion effect. 'Non-excludable' means that it is impossible to stop people consuming the good, if it is provided. For practical purposes I can only eat my cashew nuts if I buy them. If I do not pay for them it is easy to exclude me from enjoying them. With some goods this is not possible: for example, if a view is beautiful, it is impossible to exclude people from enjoying it. Cityscapes or areas of architectural interest are equally impossible to exclude people from and it is difficult to exclude them from parks.

This class of public goods is relevant because markets will not provide any incentive, or sufficient incentive, to provide optimal quantities of them. It is also difficult to know what the optimal quantity to provide is, since markets do not provide the necessary signals.[1] Tiebout (1956) demonstrated that this was not necessarily the case for local public goods where the ability to consume was determined by where someone lived. So long as such local public goods were provided and paid for by local governments and their residents and people were free to move, then people could vote with their feet and choose rates of local taxes and supplies of local public goods which best suited their pockets and preferences. But this conclusion rests on particular fiscal and political institutional arrangements and minimal costs of mobility, so it may not be generally applicable as a solution to the real world problem. In

[1] The polar opposite are 'private goods'. For these there is a price reflecting the willingness of consumers to pay for the goods and so signal their preferences, given the distribution of incomes; and a cost reflecting the value of the resource used to produce the goods. The reality is that many goods are neither purely private not 'pure' public goods. There may be a degree of rivalry in consumption - for example a mildly congested park or a piece of infrastructure for which there are some additional costs of maintenance; excludability is frequently a matter of the costs of exclusion and whether it is worth while. One issue important for welfare is that for goods that are non-rival in consumption, regardless of excludability, there is a strong welfare argument for a zero price. So long as the museum is not congested and someone would derive welfare from entering, even if just to shelter from the rain, then charging a zero price makes someone better off without reducing the welfare of anyone else and so it meets the criterion defined above for a welfare improvement.

fact, a significant element of land use regulation is to provide such goods directly by preserving open space within and around cities, supplying parks, recreational facilities as well as conserving architecturally significant areas, environmentally important sites and helping to provide and maintain cityscapes.

The locational specificity of land, housing and real estate is central to both these reasons for market failure. It also underlies yet another reason for market failure, related to *market power*. Many development projects, most obviously large infrastructure projects such as roads or railways but also large restructuring projects in developed urban areas, require the merging of several or many parcels of land under different ownership to make a viable development. A railway line that is incomplete because a particular landowner refused to sell the essential final parcel of land would be useless.[2] This gives increasing market power to hold-out sellers. For private developers, trying to assemble larger sites from several separately owned plots, this is a nuisance and may lead to non-development, loss of private profits and a suboptimal outcome in terms of social welfare. For major infrastructure projects, the potential for suboptimal social welfare outcomes is very substantial. This led nearly all countries to introduce some form of compulsory powers of purchase either for government on behalf of the developers, or the granting of such powers directly to the companies themselves with (usually) significant regulation attached. This cause of market failure in land markets is, however, not endemic in the way that externalities and problems of public good provision are, and it generates a more specialised and particular type of regulation.

For completeness, we should include the possibility that another assumption underlying the first fundamental theorem of welfare economics, namely that people are the best judges of their own welfare, may also be violated. In this case, the government may want to revert to 'paternalism' and decide for the individual how much to consume of certain goods. The goods that would call for such interventions are usually referred to as *merit goods*, and they may be defined as "goods that society deems to be especially important and that those in power feel individuals should be required or encouraged to consume" (Lipsey and Chrystal, 1995). There are also the inverse of merit goods: goods such as hard drugs or, in some times or cultures, alcohol, that are judged too bad for individuals to be allowed to make

[2] This was a real problem for the early canals and railways constructed after strong property rights had been legally established but before there was significant government intervention or regulation. Acts of Parliament were necessary to acquire the land. Stamford is now a picturesque historic market town but was intended in 1846 to be the site of a major station on the planned railway going from London to Newcastle and Edinburgh. The local landowner, however, Lord Exeter (the head of the Cecil family) with his political influence, successfully fought off the railways thus preventing the town's expansion – indeed causing its serious decline since it was a major coaching stop on the soon deserted great north road – but preserving his control of the electorate and keeping his pocket borough with two members of parliament (Hoskins, 1970, page 287 to 289).

their own choices. This type of argument could possibly be invoked to cover, for example, affordable housing policies, as certain groups in society – such as the very young or very old – may not have the effective power to make their own informed housing consumption choices. However, it is questionable whether the argument could be stretched to justify a large social housing sector, such as for instance in the Netherlands, where it constitutes about a third of the total housing stock.

3 Optimal land use policies in economic theory and in practice

Since outcomes in unregulated land markets can often for a number of reasons be socially suboptimal government interventions in these markets may be welfare enhancing. This section introduces a highly simplified economic framework, which enables us to identify costs and benefits of land use regulation in the context of two particular market failures: a negative externality of residential land use and the public good nature of some open space, such as city parks. We show how this framework may – at least in principle – be used to derive an optimal policy. The next subsection then proceeds to discuss the range of assumptions and simplifications that needed to be made, and what this means for applying the stylised economic framework to land use regulation in the real world. Next to externalities and public goods, redistribution is often another motive for government intervention in land and housing markets, but since economic theory offers no clear reason for large-scale redistribution specifically by interventions in housing and land markets, we ignore this issue here.[3]

[3] The second fundamental theorem of welfare economics holds that under certain conditions, every efficient outcome can be attained in a competitive economy by transferring money between agents in a lump sum fashion. So if society prefers an outcome in which every agent is equally well off, irrespective of their endowments in terms of human capital, it can attain this outcome by transferring money to agents with little human capital and leave the allocation of commodities to free markets. Hence, in the stylised world in which this result is derived, redistribution does not require any market intervention. In practice, it is usually not possible for governments to transfer money in a lump sum fashion, so it has to restore to other means of redistribution. The two main options are progressive income taxation and the taxation or subsidisation of commodities, of which the extensive social or affordable housing programs in some countries are an example. However, it has also been shown that under certain conditions, progressive income taxation is a more efficient means of redistribution than commodity taxation. Intuitively, the reason for this is that redistribution of income allows people to spend the money in ways that they judge most desirable themselves, whereas with redistribution in kind, it is the government that decides this for them. Redistribution in kind may be preferable for individuals whom society judges incapable of deciding what is best for them – as in the merit good argument, but one would expect that the number of such individuals that need to be protected from themselves should be relatively small.

3.1 A simple economic framework for land use policy analysis

In order to illustrate how a welfare economic framework may be used to analyse optimal policy in the presence of land use externalities, we consider a city-region within which all residents live and work. The city-region has an urban core but is surrounded by a rural (or as the French might have it a 'peri-urban') hinterland. This hinterland is interpreted as a multifunctional park that provides citizens with recreational areas, environmental amenities and scenic views – as in the greenbelt that was originally envisioned by Ebenezer Howard.[4] Urban expansion would imply that open space in this greenbelt was reduced, or that it is moved outwards and so becomes less accessible to residents of the inner city. However, in unregulated markets the size of the urban area is the outcome of land use decisions of individual households and in determining the size of their own houses and gardens, these households will generally ignore the loss of access to open space at the urban fringe that their choices impose on the wider community. Hence, they do not take full account of the burden that their behaviour imposes on society, and a government intervention in the land market may be appropriate. Although we may thus conveniently introduce the welfare economics of urban containment policies, it should be noted that the existence and significance of negative externalities related to the total amount of urban land in residential use are not in practice as clear-cut as the conventional wisdom on greenbelt-type policy implies.[5]

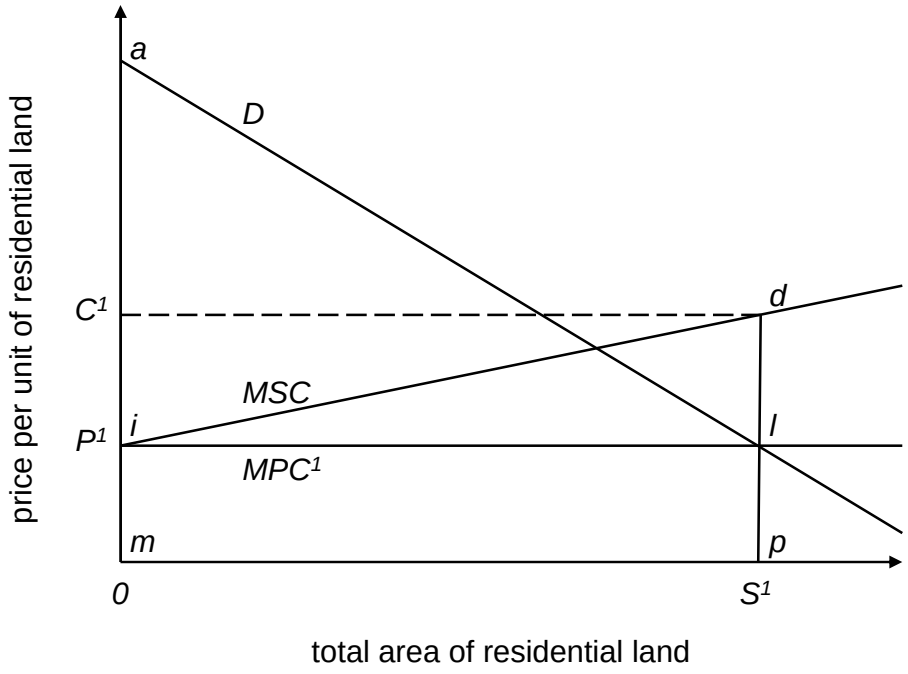
We consider the market for residential land in a partial equilibrium setting. It is assumed that people derive utility from the consumption of residential land, from recreational activities in open space at the urban fringe, and from all other goods and services that are aggregated into a single *numeraire* good. This composite or numeraire good may be normalised in such a way, that one unit of it is equivalent to one currency unit. This allows us to express utility and social welfare in pounds sterling, Euros or any other currency unit. Furthermore, we assume that the demand for residential land is not affected by income, and

[4] Note, however, that these assumptions require that the land in the greenbelts is open to public access. That was certainly the rationale for greenbelts in the original vision of Ebenezer Howard and it arguably applies in some countries. Lee and Fujita (1999) consider the case of the greenbelt around Seoul, South Korea, for which Lee and Linneman (1998) had shown that a premium of about 5% of the land value per kilometre is paid for proximity to the greenbelt. Equally in the Netherlands, areas such as the 'Green heart' and green 'Buffer zones' between cities are accessible through a myriad of walking and bicycle routes. However, in other countries such as the UK and the USA, access is limited or manifestly absent.

[5] In particular, evidence to be discussed in section 4 suggests that residents put much more value on parks within an urban area than on open space at the city fringe (see for instance Table 4.1). To the extent that large chunks of parkland interior to the city – like Hampstead Heath in London – provide a similar experience to recreation in greenbelt land, they may be good substitutes at closer proximity for most urban residents. The economic framework for analysing the public provision of parks will be considered later in this section.

that no relationships exist between the outcome in this market and prices in other markets. These are all simplifying assumptions to help us reveal more clearly important underlying relationships and policy choices.

Figure 3.1: Equilibrium in an unregulated market for residential land



It is helpful to represent this welfare analysis of land use regulation diagrammatically as in Figure 3.1. This figure features aggregate residential land on the horizontal axis, and the price of a unit of residential land at the vertical axis. The downward sloping line *D* indicates the aggregate demand for residential land, which is the sum of all the demands of individual households in society – in this case all those living and working in our 'city-region'. This demand curve is downward sloping, because as the price of residential land falls households may increase the size of their houses and gardens, choose to live in detached houses rather than town housing or apartments and new households will form as housing is cheaper.[6] Formally, it shows the particular level of consumption for every price if all consumers chose their demand for residential land optimally. This price may be interpreted as the social benefit of increasing the aggregate supply by one unit at the specified level of consumption, as it measures the total amount of numeraire goods that residents are willing to forego in order to obtain it. Hence, the area under the demand curve may be interpreted as the total social

[6] In Britain Peterson *et al.* (1997) estimate an elasticity of response of - 0.1 percent: that is a 10 percent reduction in housing prices is associated with a 1 percent increase in the rate of household formation as additional people can afford to set up on their own account.

benefit from residential land consumption, or its contribution to aggregate utility, exclusive of the costs that are associated with it.

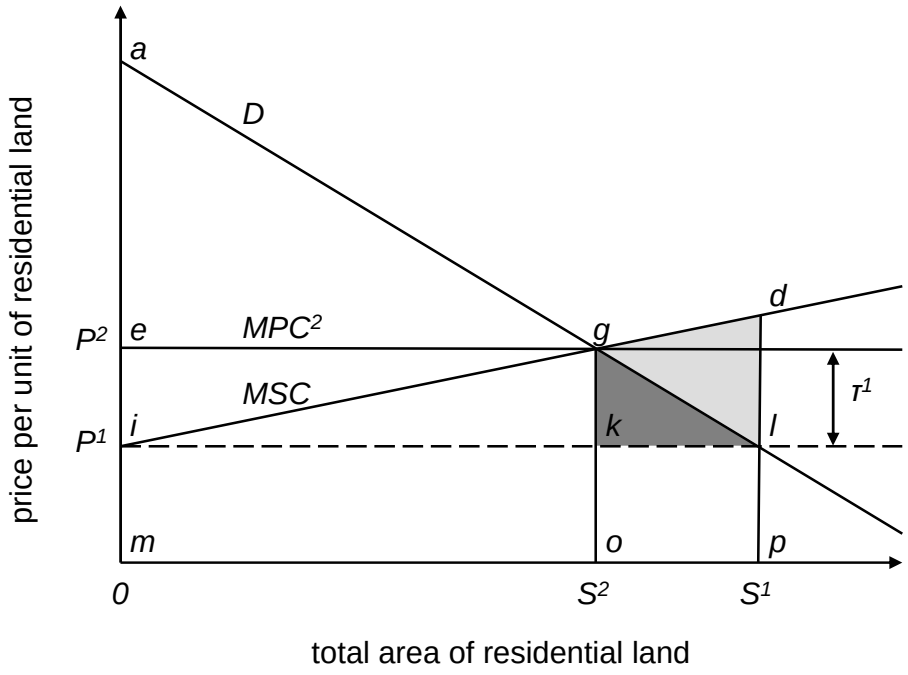
Figure 3.1 also contains two supply curves. The first curve MPC^1, for marginal private costs, indicates the costs of a unit of land that are internalised in markets, consisting mainly of opportunity costs (the price of agricultural land) and conversion costs. We assume that the curve MPC^1 is flat, that is, the costs that are internalised in unregulated markets do not vary with the total supply of residential land. More agricultural land could always be converted to urban use at an approximately constant cost in real terms.[7] The second supply curve *MSC*, for marginal social costs, adds to these private costs the burden imposed on society that is not reflected in market prices. This is the reduced accessibility of greenbelt land at the urban fringe which people value, but by assumption in our model, do not pay for. It can be measured in terms of the loss of the numeraire consumption good that would be associated with an equal reduction in their welfare. As numeraire goods are normalised to currency units, this loss may also be converted into a money value – the payment people would have to make to have exactly the same impact on their wellbeing as the loss of open space. Formally, MPC^1 indicates the private costs of producing an additional unit of residential land for each level of supply, and *MSC* adds the penalty that is equivalent to the loss of access to open space associated with it. The areas under these supply curves therefore indicate the total private and the total social costs from the supply of residential land. We assume that the two curves intersect when the total supply of residential land is zero, and that the marginal social costs increase with the total supply of residential land. In a very small community in which every person can see and walk into the surrounding green open countryside the externality problem would not arise. It only sets in when the city becomes so big that people within it begin to place a value on access to unbuilt land external to the city – access to true green space. This is predicated, though, on there being public access to that green space and one must accept the possibility that large 'country parks' internal to the urban area could be substitutes, even superior substitutes (see also footnotes 4 and 5).

Households will choose to buy residential land up to the point at which the cost to them is equal to the value or welfare they derive from it. In the absence of any government intervention their consumption of residential land will be at the point at which the demand

[7] Formally, in a monocentric city, the supply curve of residential land is upward sloping, because as the urban area grows, the quality of agricultural land at the fringe falls in terms of access to jobs in the centre. Hence, the price of land within the city and the intensity of its usage must rise before it becomes profitable to expand. However, the amount of land that becomes available with each kilometre of city expansion increases quadratically, so for medium to large urban areas, the effect may be negligible for practical purposes; and land at the margin of development should have a constant real supply price.

curve *D* and the supply curve MPC^1 intersect, with a supply of S^1 at a price P^1 for each unit of residential land. How should this equilibrium be evaluated from a welfare economic point of view? The area *alpm* under the demand curve measures the gross social benefit that is derived from the consumption S^1 units of residential land. The total internalised production costs are measured by the area *ilpm* under the supply curve MPC^1. The triangle *ali* that results when all internalised costs are subtracted from the gross social benefit is the *consumers' surplus* in the residential land market. Intuitively, it derives from the fact that all except the marginal consumer would have been willing to pay more than they actually had to for the land they consume. The consumers' surplus may also be interpreted as the value of the numeraire good people would have to be given in order to make them equally well off if the consumption of residential land was zero. However, it does not take account of the loss of access to open space at the urban fringe their consumption choices entail which is not internalised in the cost function. This additional 'social cost' is measured by the triangle *idl*. This can be interpreted as the amount of the numeraire good or money that would have to be taken away from society to have the exact same negative impact on welfare as the loss of access to open space.

Figure 3.2: An optimal tax on residential land development



Because in making their own individual decisions consumers ignore the external costs of land consumption in the free market equilibrium this outcome cannot be optimal. This is readily seen in Figure 3.1. Consider a fall in the consumption of residential land by one unit,

relative to the free market outcome (S^1, P^1). This reduces the gross social benefit by an amount equal to OP^1, while the reduction of social costs (both internal and external) amounts to OC^1. Equivalently, we can say that a marginal reduction of the consumption of residential land does not affect the consumers' surplus in this market, but that it reduces the external costs by an amount C^1 - P^1. Hence, on balance, it makes society better off. Indeed, the condition for optimality in this framework is that a marginal change in residential land use would create changes in social benefits and costs that exactly offset each other.

We can now use this analysis to show how government could intervene in land markets to produce this socially optimal outcome, first by imposing a tax on land consumption and then by direct regulation. Figure 3.2 illustrates a tax on the conversion of open space to residential land, τ^1, which raises the marginal private costs of supplying residential land to the curve MPC^2.[8] Again, households will choose their consumption of residential land such that the social benefit of increasing aggregate consumption by one unit equals the actual costs to suppliers of providing it. Since these costs now include the development tax, this leads to an equilibrium with a lower supply of residential land S^2 at a higher price P^2. The gross social benefit derived from the consumption of residential land is now indicated by the area *agom*, and the total private costs are given by the area *egom*, including tax expenditures *egki*. The consumers' surplus is the triangle *age*. It is much smaller than in the free market equilibrium, both because less residential land is now consumed (incurring a reduction of *glk*), and because people pay a higher price for it (incurring a reduction of *egki*), although since this latter rectangle represents the increase in tax revenues, consumers could be fully compensated if these were entirely redistributed to them.[9] Therefore, the costs of this policy, interpreted as the loss of consumers' surplus in the residential land market that cannot be compensated by tax revenues, amounts only to the dark grey triangle *glk*. This cost reflects the shift in residential land consumption caused by the tax, which might be reflected in slightly smaller houses and gardens or in other adjustments reducing personal consumption of space. However, as the aggregate consumption of residential land was – before the tax was imposed – too large because of the unpriced reduction in access to open space at the urban fringe it caused, the tax also generates benefits. The total external costs are now given by the triangle *igk*, so the tax leads to a reduction of

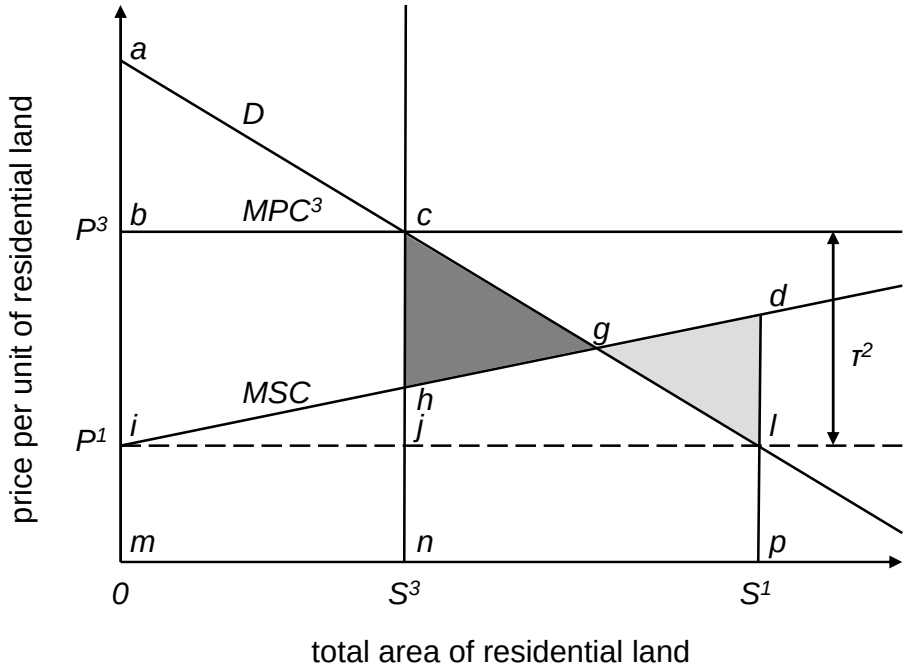
[8] In a stylised model, this development tax is equivalent to a tax on the consumption of residential land, because developers will pass it on to consumers in a competitive setting. Although direct regulation of land use is much more common than this type of fiscal incentive, there is some analogy with the Impact Fees that are gaining popularity in the USA. We will get back to the topic of Impact Fees in section 4.

[9] This assumes that tax revenues are converted entirely into welfare – so there is no deadweight loss associated with collection and spending.

external costs of *gdlk*. This trapezoid may be interpreted as the social value of the open space protected from development by the tax. The net welfare gain of imposing the tax, τ^1, is the difference between the costs, *glk*, and the benefits, *gdlk*; that is the light grey triangle *gdl*.

There can be government failure as well as market failure, however, and in Figure 3.3, we illustrate the case in which the government sets the development tax at a level τ^2 that is too high. The marginal private cost curve is now raised to the level PC^3, resulting in a supply of S^3 at a price of P^3. The trapezoid *acnm* is the value of the gross benefit society derives from the consumption of residential land. After subtracting the total private costs *bcnm*, (of which *bcji* represents the tax) the consumers' surplus of *acb* is left over. The loss of consumers' surplus relative to the free market equilibrium that cannot be compensated through tax revenues amounts to the triangle *clj* – which exceeds the value of the benefits generated by the lower external costs imposed by loss of open space that is represented by the area of the trapezoid *hdlj*. The net welfare effect relative to the free market outcome is the difference between the light grey area *gdl* and the dark grey area *cgh*. Hence, it is seen that this particular level of the development tax not only exceeds the social optimum, but it also leaves society worse off than in the equilibrium without any government intervention at all.

Figure 3.3: A suboptimal quantity restriction on the supply of residential land



As illustrated in Figure 3.3, the government could also secure the equilibrium (S^3, P^3) by imposing a direct restriction on the supply of residential land, for instance through an

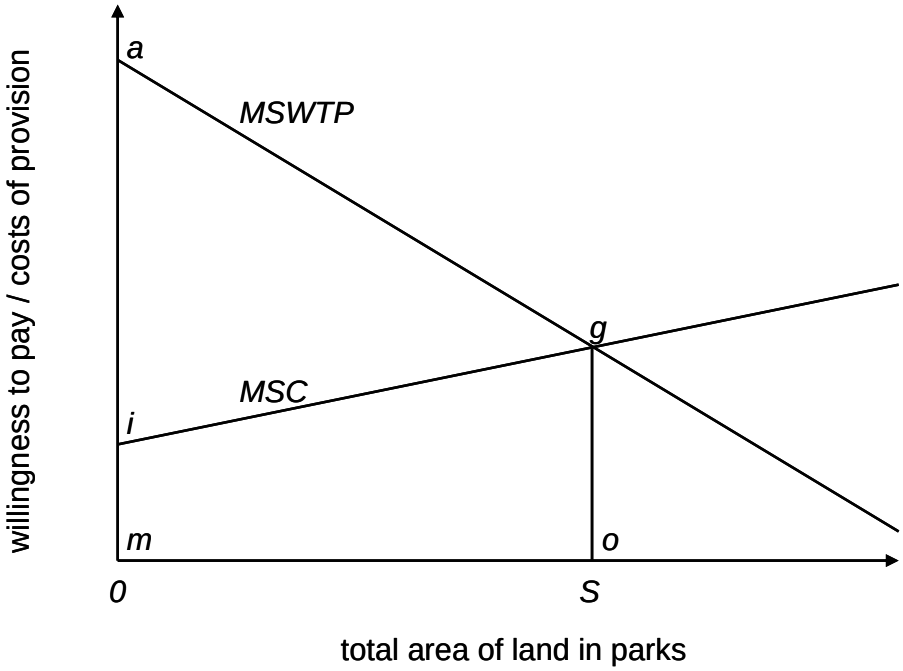
urban growth boundary or the designation of greenbelt land. In practice, this type of direct land use regulation is much more common than the imposition of development taxes. If the government were to impose a growth boundary and prohibit any residential land development in excess of the quantity S^3, then the supply curve would in effect be the vertical line at S^3. In our simplified framework, the welfare implications of directly limiting the supply of residential land to S^3 are the same as when the government levies a development tax τ^2. Moreover, for any level of development tax, the government could impose an equivalent quantity restriction, and vice versa. However, although this does not affect net welfare in principle, it should be noted that in the case of the quantity restriction, the area *bcji* cannot be interpreted as a tax revenue. Instead, while pushing residential land prices above their marginal production costs, direct supply restrictions give rise to *scarcity rents*, which accrue to owners of land with permission for residential development. Hence, there are important distributional consequences, as we will see in the next section.[10] Furthermore, the scarcity rent on a unit of land with permission for development may be interpreted as the shadow price of direct land use restrictions, and being equal to τ^2 – the tax that would lead to the same outcome, it is sometimes referred to as a *regulatory tax* (cf. Glaeser *et al*., 2005, and Cheshire and Hilber, 2008).

Whereas we have focused so far on a negative externality of residential land use, the public good nature of certain land uses such as open space may be a much more important rationale for government intervention, particularly within urban areas. As explained in section 2, public goods are characterised by non-rivalry and non-excludability in consumption, and these conditions substantially hold for certain types of land use such as public parks, beautiful landscapes or coastlines and rare habitats; and features of cities, such cityscapes and historic districts or architecturally interesting neighbourhoods. The free market would not provide enough of these goods, because their social benefit could not be fully converted into a private flow of revenues to compensate the provider. In other words, the private provision of public goods like city parks would generate a particular type of positive externality; the urban community would benefit from them without fully paying either for the social value they generated or the costs of provision. Hence, the reason for government intervention here is conceptually related to the negative externality of residential land use that was discussed earlier in this section, and subsidies (rather than taxes) or direct provision of these public

[10] Besides transfers from consumers to landowners, these scarcity rents may also dissipate in rent seeking behaviour. Furthermore, in a spatial setting, they may be partly offset by foregone gains to landowners of land the development where is restricted. This is discussed in section 4. Both considerations are ignored in this stylised framework.

goods could equally generate optimal outcomes. Again, in the practice of land use planning, public goods are usually provided directly, rather then through pecuniary incentives to private developers.

Figure 3.4: The optimal provision of a public good



We illustrate the optimal provision of land in parks in Figure 3.4, which has a similar general setup as Figures 3.1 to 3.3. On the horizontal axis, we now measure the total area in parks rather than the amount of land in residential use. A market for land in parks does not exist, so that demand and supply curves do not reflect market prices. Nevertheless, it may still be assumed that land in parks generates benefits to the urban community, and that if land in parks was not available in order to have an equivalent level of welfare, residents would have to be compensated with more numeraire goods – measured in currency units. This implies people, collectively, would be willing to pay a certain sum of money in return for the provision of these parks. The 'demand curve' *MSWTP* should be interpreted in this way – as the marginal social willingness to pay for land in parks. This curve is downward sloping because the people derive less utility from an additional piece of park land if the total supply of parks in the area is already substantial – as is aptly illustrated in the Cheshire and Sheppard (1995) paper that we will discuss in the next section. On the other hand, if society provides these parks, it pays a price in terms of forgone alternative land use and maintenance costs. Here, we assume this marginal social cost curve *MSC* is upward sloping, though the argument

would run in the same way for a horizontal supply curve.[11] As for optimal development taxes and land use restrictions dealing with a negative externality of residential land use, the optimal supply of land in parks has the property that the marginal social benefit it generates equals the marginal costs of production, so at the optimum, the net welfare effect of providing an additional unit of park land is zero. This point is simply the intersection of the *MSWTP* and *MSC* curves, where an amount *S* of park land is provided. The gross total benefit derived from this policy is measured by the trapezoid *agom* and by subtracting the total social costs *igom* we obtain the net social benefit of *agi*.

3.2 From welfare economic theory to practice

What value do the optimal policy rules that we derived in the previous subsection have for land use planning in the real world? Clearly, numerous simplifications have been made, that could drive a wedge between optimal policy in theory and practice. This subsection discusses a number of these simplifications, and how relaxing them might alter policy prescriptions.

One major simplification of the approach in the previous subsection is that for both residential land and open space, it aggregates demand and supply to the level of 'society' – composed of all the residents of a city-region. However, in section 2 we have stressed that many land market failures arise from the fact that each parcel of land has a specific and fixed location. The bundling of land use with accessibility implies that social welfare depends not just on the quantity of open space but on its distribution relative to that of residential land. For instance, if all open space is supplied in the north of the city, and residents live in the south, then the social value of this open space will be less than if it was supplied in a more accessible way. On the other hand, a certain quantity of open space may be appreciated more when it is provided in one large area, than when it is divided into many small pieces. Moreover, patterns of residential land use determine landscapes and cityscapes, and some patterns may be more pleasing than others. If we allow for hills and valleys, then houses on the high ground will command views which are valued. But having houses on hills may deprive other residents of views of open hill tops. The implication is that for a more complete policy prescription, we should disaggregate our framework to many different local residential land markets, and derive an optimal regulation of land use for each of them. Nevertheless, the bundling of land use and accessibility implies that the local supply of open space is

[11] Note that if the park is publicly provided, the distinction between private and social costs becomes meaningless.

capitalised into land prices. Land and so the houses on it located near a nice park is more expensive, all other things equal. So in contrast to the assumptions made in the previous section, the social value of open space may be largely reflected in market prices. This may have important consequences for the provision of certain types of open space by local governments or private developers not considered here.[12]

A second complication that arises when implementing the policy prescriptions of the previous subsection is that their optimality is conditional on the absence of market failures in other markets. However, as we have extensively discussed in section 2, urban land use is associated with a myriad of externalities, which are not always easy to disentangle. In principle, externalities should be addressed in the most direct way possible, because such policies are likely to be the most effective, while generating the least undesirable side effects. For instance, if the use of carbon-based fuel is excessive from a social point of view contributing to global warming, the answer is to address this market failure directly. The closest we are likely to get to an optimal solution is by imposing a fuel tax. This gives households a direct incentive to reduce fuel usage. It would push up the demand for higher density living only to the extent that there is a link between housing density and the demand for transport. Similarly, a link between urban form and traffic congestion may exist but congestion externalities will likely be addressed more efficiently by taxing them directly, rather than regulating land use in such a way that the urban form becomes less congestion prone.

Yet in practice, land use regulation is often treated as a solution to a wide range of externalities. To illustrate the disadvantages that this may have, let us consider again the example of a negative externality of fuel use. If the government seeks to reduce these external costs by restricting the supply of residential land through urban containment policies the only effect on fuel use will come from a more compact urban form reducing car mileage. There are two issues to consider here. The first is that a restraint on urban land take will only affect new

[12] Consider for example a developer who owns all the land in a neighbourhood. The developer may give up some land and create parks instead. These parks push up the price of surrounding houses, compensating for the opportunity costs of assigning land to parks. Under certain conditions it may be shown that, if all benefits of the parks capitalise fully within the neighbourhood, the developer will provide an optimal amount of them while maximizing profits. So in this case, no government intervention is required to arrive at the social optimum. This line of argument has, for example, been applied to the characteristic development of West London: residential squares surrounded by houses. It has been suggested that the more unified land ownership patterns to the West of London made this a more common pattern of development than the high density development on the land in fragmented ownership to the East of London. The land owners and developers in the west could internalise the benefits of the open space they provided. However, other factors such as the spatial distribution of natural amenities (clean air for example because of the prevailing westerly winds) played an important role. West London was developed for richer households; the demand for open space is income elastic so was more valuable in the developments designed for richer people.

development – perhaps as little as 1% of all development. The result would be that even if there is any causal relationship between density and less fuel use, the impact via land use controls will be painfully slow. The second point is that reactions may be altogether more complex. A more compact urban form might intensify social contacts so that, while trips are shorter on average, the total number of trips increases. Because houses and shops would be smaller, shopping and restocking trips may be more frequent and more subject to congestion. So overall the land use policy is likely to be at best marginally effective, and it may even increase the external costs of fuel use.[13]

A third major assumption underlying the derivation of optimal taxes or direct regulation in the case of externalities and public goods is that the government has sufficient information. For instance, in order to find the optimal development tax of Figure 3.2, the government needs information about the private and social costs of residential land use. Moreover, if it chooses to restrict land use directly, it also has to know the shape of the demand curve, and because of the spatial fixity of land, in principle it has to know the shape of these curves at each location. Implementation of the optimal supply of parks in Figure 3.4 presumes knowledge about the value that an urban community attaches to the marginal unit of land in parks, which is even more complicated since there is no market for parks and residents have an incentive to overstate their valuation in surveys ('free-riding'). Although the informational requirement for optimal land use regulation may seem prohibitive the bundling of land and accessibility also offers the opportunity for measuring the social costs and benefits of particular types of land use providing amenities, such as open space, or disamenities, such as noise or pollution. In so far as these are capitalised in land prices we can estimate their social value through the impact they have on house prices. As we will see later, this is one of the main techniques for empirical welfare analysis of land use regulation.

In summary, we might say that policy implications of the simple framework set out in subsection 3.1 should be hedged about with many provisos – some relating to the nature of the particular externalities and sources of market failure and others relating to more technical issues including failures in other markets which may have a bearing on the particular market – here the land market – we are interested in, and a substantial informational burden exists on top of this. Policies in the real world may end up attempting to achieve something close to a

[13] Conversely, it has been argued that fuel taxes should be increased because this would lead to more compact urban form. However, fuel taxes have been shown to be less efficient instruments for this purpose than development taxes or growth boundaries (cf. Bento *et al*., 2006, Cheshire and Sheppard, 2002). One of the undesirable side effects of raising fuel taxes, relative to these direct instruments, is that it increases the density gradient in cities.

second best and the best policy mix will need to be based on both the unachievable ideal and on judgement about how significant particular market failures are and how failures in one set of markets may interact with failures in others. Nevertheless, the intuition obtained here provides a useful and in fact practical benchmark. In particular, government interventions in land and housing markets always generate costs and benefits for society, and policy makers should aim to strike a balance between them.

4 Evidence on the effects of land use regulation

This section reviews some of the evidence that has been built up over the past 20 years or so about the welfare effects of land use planning. In principle the net effects could be positive or negative. On the one hand by correcting market failure and ensuring a supply of amenities that would otherwise be undersupplied, land use regulation in the form of planning or zoning, creates benefits. At the same time, however, it may restrict the supply of valued goods – notably the supply of specific kinds of space – in housing, offices, shops, factories or, of course, in the form of private open space: in gardens. Any planning policy that curbs urban expansion, increases densities or restricts building heights necessarily restricts the supply of a particular type of space. If supply is restricted it is not just that the price is driven up, so the good in question becomes more expensive, there may be knock on effects on productivity and mobility and there will certainly be distributional effects. Those landowners who own land on which it is allowed to build (or build higher) get an increase in their asset values; those who are unable to develop their assets in the most profitable way get a corresponding reduction in asset values. Those who own houses gain in asset values, especially if their houses are endowed with more of the attribute the planning system is restricting the supply of (they have bigger gardens or their houses are constructed in the greenbelt); those who rent or are would-be house buyers suffer a reduction in asset values or incomes. We review the evidence of each of these effects in turn, including the rather sparse evidence on the net welfare effects: that is the net impact on welfare allowing for both the value of benefits generated and higher costs imposed on the use of space.

4.1 The valuation of planning induced amenities

The two main methods for empirical valuation of open space are via the estimation of 'hedonic' models and stated preference analysis. The use of hedonic[14] models is theoretically preferable since it is based on clear theoretical foundations and observes the actual behaviour of people. As pointed out in section 2, each house consists of a complex bundle of attributes and because each parcel of land has a unique location its occupation determines access to a wide range of local public goods. This implies that their value is reflected (or capitalised) in house prices. The price of any house is in a sense the aggregate price of all its attributes, including the access it gives to local amenities and public goods. In fact these non-structural attributes typically account for the great majority of the total value of a house. Although as an empirical technique the estimation of hedonic models goes way back to the 1920s (see Sheppard, 1999), it was Rosen (1974) who provided the theoretical framework and showed how the valuation of such goods may be estimated in hedonic models. A sizeable and ever growing literature has followed his idea.

In their survey of hedonic studies on the benefits of open space, McConnell and Walls (2005) report a wide variation between estimates, and they highlight the importance of distinguishing between different types of open space. The value of preserving a piece of land in a certain use is bound to depend strongly on whether it is a park in an urbanised area, a piece of exurban agricultural land or a wetland. The careful study of house prices in the Minneapolis – St. Paul metropolitan area in the USA by Anderson and West (2006) shows more than this. Not only does the capitalised value of proximity to open space depend on the type of open space and how far away it is from the house but it also varies according to the characteristics of the neighbourhood. For an average home, they find that benefits from proximity to open space range from a low of 0.0035% of sales price for every one percent decrease in the distance to the nearest neighbourhood park, to a high of 0.034% for every one percent decrease in the distance to the nearest lake. Importantly, they find that the value of proximity to open space rises with average income and density in the neighbourhood, while it falls with distance to the central business district. Given that access to open space is a 'normal' good – people consume more of it as they get richer – it is not surprising to find that it has a higher value in richer neighbourhoods. Equally the finding that its value is higher in higher density neighbourhoods suggests that at least to an extent public open space is a

[14] 'Hedonic' from the ancient Greek for 'pleasure'.

substitute for private open space. The reason why the value of open space falls with distance from the city centre could be that the total supply of (private and public) open space in suburban areas is higher, so that its marginal benefit is lower, or that residents in suburbs have easier access to open space outside of city boundaries as a substitute for parks.

A potential drawback of estimating the value of proximity to open space by means of its hedonic price is that while this yields the slope of the valuation of open space with respect to distance, its level – its total value – is not inferred. The valuation of a large special park might decline less with distance, simply because it is appreciated over a wider area, so that its value to the whole metropolitan community might be considerably larger than the total value of a local park of which the valuation declines more steeply with distance. This problem is circumvented by estimating the value of the amount of open space surrounding a house, at the expense of imposing more restrictive assumptions on the relationship between valuation and distance. This latter approach has been applied for instance by Cheshire and Sheppard (1995, 1998), who estimated a hedonic model for house prices in two British towns, subject to land use restrictions that varied significantly in severity. In order to measure the benefits of planning induced amenities, these authors considered the share of land in a square kilometre around each house that was used for either 'accessible' or 'inaccessible' open space, as well as the share of land that was not in industrial use.[15] Accessible open space meant accessible to the public – parks, recreation grounds, churchyards or common land; this was mainly internal to the urban area. Inaccessible open space was land not built on and not accessible to the public. This was mainly greenbelt land used for farming at the urban fringe but included private woodland. Increasing the shares of both types of open space was found to yield significant gross benefits, with the benefits associated with accessible open space considerably exceeding those from inaccessible open space, but accessible open space was valued less at the margin in the town where land use planning was more restrictive. In a similar hedonic analysis of house prices in three Dutch cities, Rouwendal and Van der Straaten (2008) find a significant effect of the share of land in parks and public gardens within 500 metres, while proximity to industrial land decreases house values.

While the main focus of these studies was on the value of open space within urban areas, the preservation of open space outside cities may generate significant benefits as well. As we saw, Cheshire and Sheppard (1995) found some value for agricultural land in the greenbelt for houses within the kilometre square. Irwin (2002) however concentrates on this

[15] The authors did note, however, that there were no significant impacts on house prices of open space (or less industrial land) in locations further than the surrounding spare kilometre.

issue, analysing residential transactions in an exurban region in central Maryland, USA. She found that within 400 metres of a house, the conversion of one acre of developable pastureland to conservation land raised the average house price by 1.9%; converting it to public land yielded a premium of 0.6%. That is the more certainly the agricultural land was protected from development the greater the 'value'. Interestingly, conversion to low-density residential land had a negative impact on surrounding house prices, underlining the fact that one of the important attractions of open space is simply that it is not developed. This negative impact is also likely to be one reason for NIMBYism. As Fischel (2001) has argued, since houses form a substantial element in peoples' asset portfolios and they are immobile, there is a significant incentive to protect their value by using local zoning or planning policies to prevent land in one's neighbourhood from being developed.

Although the hedonic approach has the advantage that it rests on revealed preferences – actual behaviour – it also has potential limitations. It is only truly applicable if the value of the amenity in question is localised within the housing market area covered by the study. This may be reasonable in the case of a neighbourhood park or a local school but would be questionable in the case of an amenity for which demand extended over a wide area. This is very likely to be the case with, for example, National Parks, and might possibly be the case with a Greenbelt provided that it acts as an accessible recreational area, such as the 'Green heart' in the west of the Netherlands. It is also almost certainly the case with world famous attractions, such as Hyde Park, in London, or a famous cityscape, such as Venice. There is an alternative approach to valuing such amenities and that is stated preferences, sometimes known as 'contingent valuation'. In this approach people are asked to put a value – how much they would be willing to pay and in what circumstances – to have access to or just to know that particular amenities exist so they could access them if they felt inclined. This approach has significant disadvantages since people may make different choices or suggest different values when they are actually confronted with decisions for which they have to pay. There is also a potential for the 'free rider' problem. That is people overstate their valuations in order to increase the supply of an amenity that will largely be paid for by others. Although research using the contingent valuation method has become substantially more sophisticated over time still these methodological concerns remain (cf. Arrow *et al*., 1993, McConnell and Walls, 2005). Nevertheless, it may yield valuable insights that complement findings relying on revealed preferences, and sometimes there is simply no alternative method available.

As in their survey of hedonic studies, the McConnell and Walls (2005) survey of stated preference research finds substantial heterogeneity in the estimated stated value of open

space, and again its type and location appear to matter a lot. Nevertheless, for agricultural land, the stated value is in the same order of magnitude as in the Irwin (2002) study of exurban house prices discussed previously, suggesting that fears about missing wider benefits of agricultural land using hedonic methods may be misplaced. Also consistent with Irwin's results, stated preference studies suggest that negative externalities of residential development are an important motivation for the preservation of open space. Based on a survey of stated preference research in the UK, Barker (2003) also reports a strong dependency of the value of open space on its location and use (see Table 4.1, copied from Barker (2003), page 36). For instance, publicly accessibly open space in the urban core is valued much more than greenbelt land, and the landscape value of intensively farmed land is particularly low. These values are broadly consistent with those in Cheshire and Sheppard (1995). Open space at the urban fringe not accessible to the public has a relatively low value although its value is significant. Interestingly, the values reported in Barker are significantly higher than in most US studies that are surveyed by McConnell and Walls. Perhaps, this is a parallel finding to that of Anderson and West (2006): open space is more valuable in more densely developed contexts and densities are greater in the UK than in the USA. In addition of course, in the UK there are some access rights even to agricultural land by means of 'public footpaths' or ancient rights of way. So the amenity value of agricultural land in the UK – even in Europe generally – may be higher than in the USA or other countries which have no rights of public access to private land at all.

Table 4.1: Benefits from different land use in the UK

Land type	Present benefit (per hectare per year, in 2001 £)
Urban core public space (city park)	54,000
Urban fringe greenbelt	889
Urban fringe forested land	2,700
Rural forested land	6,626
Agricultural extensive	3,150
Agricultural intensive	103
Natural and semi-natural wetlands	6,616

Source: Barker (2003)

While our discussion of the benefits of land use regulation has so far focussed on the provision of open space, it is important to keep in mind that urban planning is about much more. Other aspects, which have received considerable attention in so-called 'New Urbanism' and 'smart growth' initiatives in the US, are dense development, the mixture of land uses,

access by public transit and the provision of infrastructure for pedestrians and bicycles. The valuation of such planning-induced features of neighbourhoods may be estimated using similar hedonic or stated preference methods. An interesting example is Song and Knaap (2003; 2004), who find significant effects for several new urbanism design features in a hedonic model of the Portland, USA housing market. For instance, they find that the connectivity of local street networks, pedestrian accessibility to commercial uses and proximity to light rail stations raise house values. On the other hand they find that higher densities of neighbourhoods and mixed land uses within a neighbourhood have a negative impact on house prices. This may be comparable to the finding that there is a positive income elasticity of demand for (private) space and that more industrial land in a neighbourhood generates a negative price effect. Nevertheless, Song and Knaap show that these effects are more than compensated by the many positive contributions of new urbanism design features to house prices, so that neighbourhoods that by and large adhere to these principles command a significant premium.

4.2 The costs of land use restrictions: housing supply and prices

In generating these benefits, land use regulation imposes limits on supply, although the question has to be asked, what exactly does the regulation restrict the supply of? Different systems and instruments of land use planning may restrict the supply of different attributes of the built environment. For example planning system in the UK and in some South-East Asian countries explicitly restrict the supply of land for urban development by imposing containment boundaries and greenbelts. But they do not impose much restriction on the subdivision of existing developed sites. In the USA, in contrast, there are strong restrictions on converting existing houses to multiple occupation or to subdividing built lots. Many communities also impose minimum lot sizes which, to European eyes, can be oppressively large.[16] Spatial planning in the Netherlands combines restrictions on urban expansion through greenbelts with regulation on the type and size of houses to be built, but it tends to foster higher density development rather than minimum lot sizes. Furthermore, restrictions on building height are a form of land use regulation that is observed all over the world.

[16] Some communities in the mid West have 10 acre minimum lot sizes. Glaeser and Gyourko (2003) conclude that in many communities in New England the willingness to pay for an increase in lot size beyond the mean is negative! That is people are being constrained to buy and consume more land than they would ideally like to. But they still found that house prices were increased as a result of this restriction on supply. What was being restricted was the supply of house+land bundles.

Notwithstanding the heterogeneous form in which supply restrictions come, their effect is to push up house prices. Indeed, various countries and cities have experienced soaring house prices in recent years, and in some cases, the role of planning as a mechanism restricting supply has been well established. Glaeser *et al*. (2005) in their study of the Manhattan housing market, where prices increased by more than a half between 1980 and 2000, concluded that supply restrictions imposed by the New York zoning laws particularly on height, were the likely cause.

Since the Manhattan market consists mainly of condominiums, the marginal construction costs of new housing amount to the costs of increasing building height, which can be estimated fairly accurately. The authors calculated that average condominium prices exceeded $600 per square foot in the early 2000s, while construction costs for space on an additional floor – even for the typical high-quality, luxury-type condominium unit – were no higher than $300 per square foot. Given these costs and prices in an unrestricted competitive market, the construction of condominiums would have been a lucrative business so high construction rates should have been observed. However, only 21,000 new units were permitted throughout the entire decade of the 1990s, whereas there were 13,000 new units permitted in 1960 alone. They argue that since the construction industry in New York is highly competitive, the difference between prices and construction costs must be interpreted as a shadow price of planning restrictions, or as a regulatory tax (see our discussion in section 3.1). In other words, restrictions on building heights have pushed up house prices in this city. Left without the height restrictions developers would have built higher – because it was profitable to do so. Similarly, Quigley and Raphael (2005) show that in Californian cities where land use regulation is more restrictive, new construction is less sensitive to prices and housing is more expensive.

In some European countries, a rise in aggregate house prices has also been related to land use regulation. This has been a particular issue in the UK for instance, where there has not only been a long-run upward trend in real house prices (increasing in real terms by a factor of 3.5 between 1955 and 2002 – see Cheshire and Sheppard 2004), but an increasing volatility in the housing market. The argument here is that if the supply becomes less responsive to price changes because of regulatory restrictions, any short run changes in demand translate more directly into price changes. In a series of reports to the Treasury and the Office of the Deputy Prime Minister, Barker (2003, 2004) identified both a falling affordability of housing and a reduced responsiveness of supply to demand. She argued that the British planning system was the main cause of these problems. Furthermore, the Barker

reports contain a thorough discussion of the consequences of such housing and land market institutions for the wider economy and for aggregate welfare. Real house prices have also risen substantially over the past decades in the Netherlands (increasing by a factor of 3 in real terms since the early 1970s), which may be attributed at least in part to a lack or supply responsiveness. Vermeulen and Rouwendal (2007) find that the Dutch housing supply had become almost totally price-inelastic as a consequence of government interventions in land and housing markets.

Long-term trends in real house prices in the UK and the Netherlands contrast starkly with, for instance, the German experience, where the real price of houses fell in both the decades of the 1980s and 1990s and was completely stable over the whole period 1971 to 2002. Over the same 30-year period German real household disposable incomes increased at 2.6 percent a year compared to 2.3 percent in the Netherlands and 2.9 percent in the UK (OECD, 2004), so variation in this typical determinant of housing demand across these countries has been modest compared to the observed variation in real house price growth. However, similar shifts in demand may lead to strongly divergent price developments under different supply conditions, and in line with this argument, the estimated price elasticity of housing supply in Germany of 6 is of a completely different order of magnitude than in the other two countries (Swank *et al*., 2002).

It should be recognised, however, that many studies relating aggregate housing supply and prices to land use regulation fail specifically to identify the causal effect of particular regulatory measures. For instance, in their study of the Manhattan condominium market, Glaeser *et al*. (2005) admit that:

> while it is difficult to think of a plausible alternative explanation of why buildings are not taller, we recognise that our analysis essentially is naming a residual (p. 351).

In a critical assessment of the empirical literature on the effect of land use regulation on house prices, Quigley and Rosenthal (2005) find that the evidence is mixed and inconclusive. Some of the challenges to proper estimation of this effect are fairly standard in the econometrics of policy evaluation. In particular, there may be simultaneity in housing market developments and the imposition of land use policies, and it is difficult to control for factors that affect both. For instance, wealthier communities where housing is more luxurious might have a taste for certain zoning regulations (and the incomes, of course, to indulge such tastes). In addition to these issues, the measurement of land use regulation is problematic, because the heterogeneity in shapes it may take is vast, ranging from caps on population or construction to urban growth

boundaries and from minimum lot size zoning to Impact Fees[17] (Quigley and Rosenthal provide a taxonomy in their survey). There is no reason to expect that these different policy options have similar effects on housing market outcomes, so the estimated effect of an aggregate index of land use regulation is difficult to interpret.

Nevertheless, recent studies that deal with one or more of these issues do suggest that land use regulation restricts housing supply while pushing up prices. For instance, in an analysis of new residential construction in US cities, Mayer and Somerville (2000) distinguish separately the average delay in obtaining permission for subdivisions, the number of growth management techniques and the imposition of impact fees. They report that metropolitan areas with more extensive regulation can have up to 45 percent fewer starts and price elasticities that are more than 20 percent lower than those in less-regulated markets, even if the effect of Impact Fees is not statistically significant. Ihlanfeldt (2007) analyses the impact of an aggregate measure of land use regulations on jurisdictional house prices in Florida, US. Dealing carefully with the issue of endogeneity, he also finds a significant positive impact. However, in another study with Burge (Burge and Ihlanfeldt, 2006) he had already shown that communities which used Impact Fees and therefore had a greater fiscal incentive to permit development were indeed less restrictive.

Besides methodological issues, Quigley and Rosenthal (2005) suggest that part of the difficulty in establishing an upward effect of land use regulation on prices is that in practice, they may not be binding:

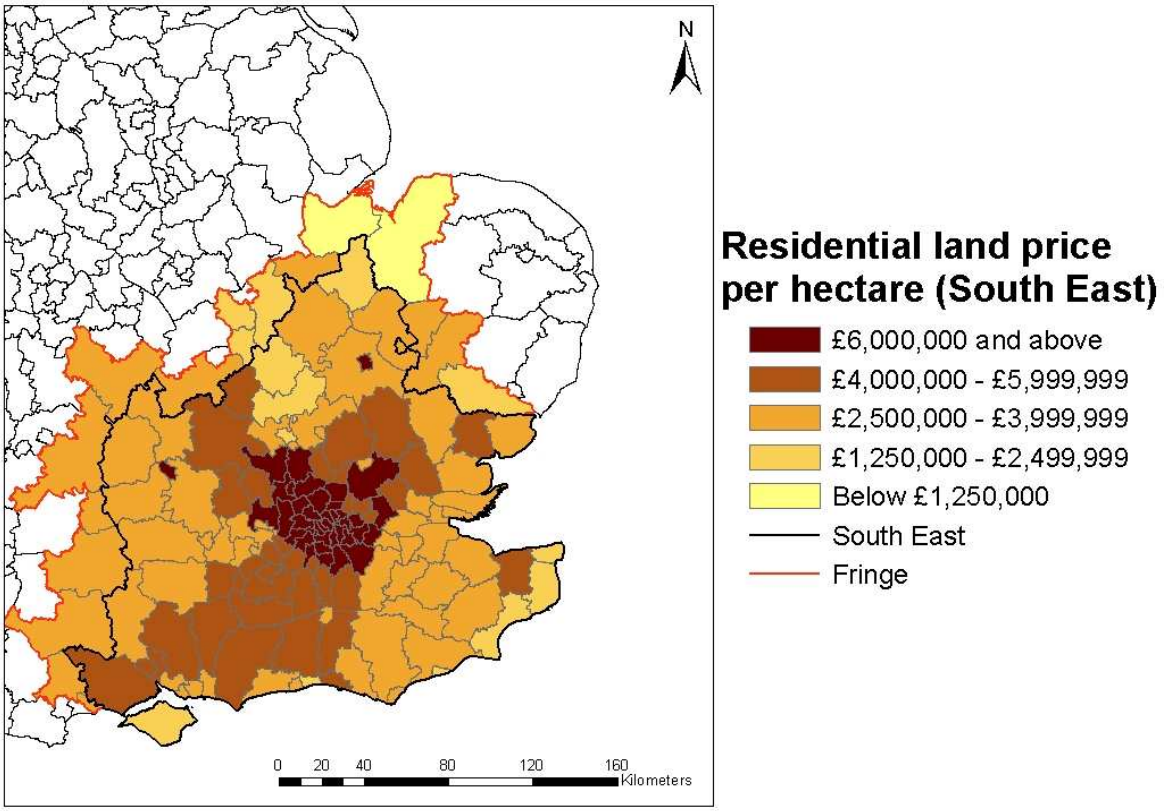
> The net effect of adopting development restrictions may ultimately be symbolic only, meant to appease "not-in-my-backyard (NIMBY)" and other constituencies, but generally lacking the will or ability to implement true growth management in the face of population pressures (p. 84).

This statement is telling for the differences that exist between planning in the US and in many European countries, where governments tend to have a much stronger grip on land use and be far more restrictive in terms of land supply. In South-East England or the west of the Netherlands, for instance, 'grotesque' (Muellbauer, 2005) discontinuities exist between the price of land in agricultural use and adjacent land that is zoned for residential development. Cheshire and Sheppard (2005) report an increase of price from £7.500 to £3,000,000 per hectare at the urban boundary in Reading and data for 2007 – see Figure 4.1 – shows several

[17] Though Impact Fees, in principle, cannot legally be used in the USA as a mechanism of land use regulations since they have to satisfy a 'rational nexus' test: that is for them to be legally valid government has to be able to show a clear connection between the development and the need for additional infrastructure etc. and the level of fees has to be a function of these costs (see Ihlanfeldt and Shaughnessy, 2004).

locations where the value of agricultural land that is rezoned to permit residential development is well over £6,000,000 per hectare: so getting permission to change use from agricultural to residential increase the price of land some 700-fold. Against the background of such direct evidence on the planning-induced segmentation of land markets, the question of whether land use regulation raises prices seems somewhat pedantic.

Figure 4.1: Prices of developable cleared land in the UK South East



Source: Property Market Report (July 2007)

Nevertheless, in spite of a sizeable literature on the impact of land use regulation on supply and prices, evidence on its costs in terms of welfare and their distribution over different groups in society is scarce. Quigley and Swoboda (2007) consider restrictions on the amount of developable land through critical habitat designation under the US Endangered Species Act. Their analysis is only of costs - they ignore any benefits - and their prime focus is the distinction between partial equilibrium effects in the preserved area and general equilibrium effects in the wider urban area, assuming that the total regional population is given. The authors show theoretically that reductions in the amount of developable land increase the population density in existing urban areas and induce urban expansion into other

areas. The owners of both types of land benefit, while consumers of housing and owners of the protected land lose. The model is calibrated on data for a typical US city to show that general equilibrium effects of critical habitat designation are substantially larger than partial equilibrium effects, and that this policy induces major transfers, predominantly from consumers to owners of developed land. These findings extend to the case of an urban growth boundary.

Bertaud and Brueckner (2005) consider the social costs of restrictions on building height also in the framework of a monocentric city. They apply this analysis to the city of Bangalore, India, where a cap exists on the ratio of a building's total floor area to the area of the land parcel on which it sits. Again the authors look only at costs and ignore any potential benefits. They show that in general, height restrictions increase a city's 'footprint' - the total area of land it occupies - and that for each household in the city, the welfare loss is equal to the extra commuting costs that a household at the urban fringe incurs. Their model indicates that lifting the height restrictions in Bangalore would reduce city size by about 17%, and that the cost saving would range from 1.5% to 4.5% of household income, depending on the specific assumptions about urban form. The same framework could be applied to the minimum lot size zoning policies that enjoy significant popularity in the US.

4.3 The evidence on net welfare effects

To the best of our knowledge, Cheshire and Sheppard (2002) were the first to provide a comprehensive account of the welfare effects of land use regulation that is empirically founded on revealed preferences in land prices. They use estimates from earlier work on the Reading housing market, discussed in subsection 3.1, coupled with data on the incomes and demographic composition of the households to estimate the structure of demand for both private residential land and planning produced amenities such as open space, as a function of prices and household income. More specifically, the planning induced amenities that contribute to household utility in their model are the share of land in a square kilometre around the house that is used for either accessible or inaccessible open space and the share of land that is not in industrial use. This demand system is integrated in a monocentric urban economic model, which is calibrated to various data sources for the Reading housing market.

Since both costs and benefits of changing the planning system operate through the residential land market, the authors can then use this model to estimate the trade-offs involved in producing a little more or less of the 'planning amenities' and a little more or less of private

space for residential occupation. From this it is possible to estimate the net welfare effects of relaxing the planning system's constraints on land supply in various ways. They find that increasing the amount of residential land within the city boundary and shifting this boundary outwards both have positive net social gains, although gains of the latter policy option are substantially larger. If Reading would be allowed to expand by 70% of its total surface, the estimated net welfare gain would amount to almost 4% of household income even allowing for the loss of inaccessible greenbelt land and accessible open space such a relaxation would entail. Nevertheless, these findings do not support the abolition of land use regulation altogether since the system did produce benefits. The problem is that it produced those benefits in its then current degree of restrictiveness on supply at considerably greater cost to the community than the value of the benefits generated.

In the same study, Cheshire and Sheppard consider the distributional effects of land use regulation. This was possible because their sample included the precise location of the houses (and so the 'value' of their consumption of planning produced amenities) and the income of the households. With respect to the gross benefits, they report that the provision of inaccessible open space – greenbelt land - tended to increase inequality; benefits were even more inequitably distributed than were the incomes of owner occupiers. The separation of industrial from residential land was broadly neutral in distributional terms compared to the incomes of owner occupiers, while the provision of accessible open space tended to reduce inequality. However, overall, adding all three amenities together the net welfare effect was almost distributionally neutral – again relative to the distribution of the incomes of owner occupiers. This suggests that richer households do not only benefit more from planning-induced amenities, but that they also, through the housing market, pay a higher price. The distributional effects through land ownership, which were the focus of Quigley and Swoboda (2007), were not considered explicitly here.

The study by Rouwendal and Van der Straaten (2008), also mentioned in Section 3.1, closely follows the work by Cheshire and Sheppard in various respects, although their prime focus was on open space within cities. In a stylised theoretical model, the authors show that the amount of open space in a neighbourhood is optimal when the total benefits of increasing it by one unit are equal to the local price of residential land. Applying this cost-benefit rule to three Dutch cities, they find that the share of land in open space is too high in Amsterdam, too low in The Hague and approximately optimal in Rotterdam. The similarity in the specification of land use externalities suggests that the same first-best policy rule would apply equally in the Cheshire and Sheppard model. Since the local provision of open space renders urban

growth boundaries superfluous in such an ideal setting, it is not surprising that relaxing growth restrictions in Reading was found to be so beneficial.

Walsh (2007) assumes that not only the share of open space in a neighbourhood enters household utility, but also the distance to the nearest parcel of publicly held open space, as in Anderson and West (2006). This specification of demand is incorporated into a general equilibrium model of land use, which is calibrated to data from Wake County in North Carolina, USA. As in Quigley and Swoboda (2007), an important message of this paper is the likely existence of a gap between partial and general equilibrium evaluations of land use regulation, because the preservation of land use in one location may induce urban expansion and loss of open space at other places. The author even finds that through endogenous adjustments in privately held open space, for example land in agricultural use, increases in the quantity of land in public preserves may lead to a decrease in the total amount of open space in the metropolitan area. Amongst the policy scenarios that are considered, the public acquisition of land or development rights in the more densely populated parts of the county appears to be the most beneficial, while the imposition of an urban growth boundary is found to be particularly costly.

A small number of studies analyse the costs and benefits of greenbelts or urban growth boundaries within urban equilibrium models that rely more heavily on theory, with a sensible choice of key parameters constituting their main empirical foundation. Lee and Fujita (1999) provide a useful theoretical framework for the welfare analysis of greenbelts, considered as a multifunctional park that provides citizens with recreational areas, environmental amenities and scenic views.[18] The authors show that if the enjoyment of at least some of these public goods declines with distance, the imposition of a greenbelt that imposes binding restrictions on residential development is socially desirable, although leapfrogging development at its outer fringe should be allowed under certain conditions. Similarly, Brueckner (1990) and Engle *et al*. (1992) propose a theoretical framework in which urban growth boundaries may be socially desirable, as negative externalities increase with of the number of people in a city because of congestion, pollution or crime. It should be realised that the externalities or public goods in these latter models affect all residents in the same way, so their impact would not identifiable via variations in local house prices.

Both Bento *et al*. (2006) and Cheshire and Sheppard (2003) have analysed the efficiency and distributional impacts of alternative anti-sprawl policies, coming to rather

[18] On the realism of these assumptions, see our discussion at the outset of section 3.1.

different conclusions. Bento *et al*. assumed that households value the amount of open space that is preserved through such policies and set parameters so that their numerical model resembled a typical US city, although the parameter for the valuation of open space was chosen arbitrarily. In terms of efficiency, both an urban growth boundary and a tax on land conversion turned out to be optimal policy responses to the externality, and should reduce the equilibrium city size by about 12%. Taxes on fuel or property appeared to be rather poor second-best policy alternatives, reducing city size by about 8% and 4% respectively in the constrained optima. Cheshire and Sheppard (2003) used the valuation of open and private space as estimated in their 2002 model (rather than assuming values) and then modelled the welfare effects of a) growth boundaries; b) fuel taxes; and c) a tax on the consumption of land with each tax rate selected to achieve the same total urban take of land as the observed urban growth boundaries in a). The result was that by a significant margin the most welfare effective mechanism was a tax on land consumption with a fuel tax being no more efficient in welfare terms than an urban growth boundary. This assumed, however, that tax revenues were converted entirely into welfare – there was no deadweight loss associated with collection and spending. It also did not evaluate the welfare impact of the growth boundary itself. It simply asked the question if this is the total urban area that society wants what is the least costly way in welfare terms of achieving it. They also took no account of other possible benefits associated with fuel taxes.

Bento *et al.* (2006) also considered the distributional effects for land owners. As in Quigley and Swoboda (2007), these depended strongly on the location of the land. For instance, the fuel tax harmed owners of land close to the city fringe and the property tax harmed owners of land near the CBD. To owners of land that was not developed, the development tax was preferable to an urban growth boundary, because they benefit from the redistribution of tax revenues.

In a welfare analysis of clustered deconcentration policies, which combine urban growth boundaries with accommodative policies in satellite communities, Vermeulen and Rouwendal (2008) consider a negative externality of city size. Their model was calibrated to the Dutch capital of Amsterdam and a nearby town founded in the 1960s, and the parameters that relate to the externality were chosen such that the present level of restrictiveness in the main city was optimal by assumption. This required that on average, households spent about 10% of their disposable household income on development taxes. Despite this, government plans to accommodate demographic growth mainly in the satellite city while maintaining tight restrictions around Amsterdam itself could not be justified with this externality. Furthermore,

the authors showed that implementation of the present land use controls might impose a net welfare loss of several percent of disposable household income, if the government had overestimated the importance of the city size externality. As in Bento *et al*. (2006), open space within cities is ignored in this paper.

4.4 Regulation of non-residential land use

All the above evidence has related to the impacts of land use planning on prices and welfare through the residential sector. By far the largest proportion of a cities occupied land is in residential use but planning restrictions can in principle have impacts on prices and welfare in other land uses. There is very little evidence here, however. Again in principle there are likely to be benefits and costs and to observe price increases is not necessarily to infer a welfare loss. If the supply of say commercial space is restricted, then there will be both distributional effects – owners of property allowed to (fully) develop will gain while owners of property unable to develop will lose. The costs of space will be increased and since space is an input into production output prices will increase and total output will fall somewhat. But there may also be benefits in the form of historic cityscapes preserved and the amenity values of cities.

Glaeser *et al*. (2005) in their study of the New York housing market note in passing that the impacts of height (development) restrictions on office costs are slight. Indeed at the low point in the real estate price cycle, in 1996, they estimated the effect of development restrictions on the cost of office space to be zero although by the high point of the cycle, in 2002, there appeared to be some small effect – equivalent to a tax of perhaps 50%. This, however, may have simply reflected a short run adjustment problem since expansion of the stock of office space in the face of a rapid increase in demand is difficult.

However, as has already been noted, European governments are less wary of regulating markets than is the case in the USA and the local fiscal system in the USA provides a very strong incentive to local communities to encourage commercial development. Business property taxes are an important source of net revenues to local governments – business property creates more tax revenues than it costs local communities to service. Again these conditions are not uniformly found in Europe where in some countries such as the UK business property taxes are entirely a national tax providing no direct revenues to local communities at all despite the legal obligation local communities have to provide services for businesses. Thus in effect the fiscal incentive is entirely reversed. Local communities are fined for allowing any development at all.

Table 4.2: Estimated regulatory tax for UK office markets and selected European cities. The regulatory tax is expressed as a percentage of marginal construction costs

City	Estimated Regulatory Tax Rate (RT)		
UK Markets[†]	1999	2005	Average 1999-2005
London West End	9.18	8.89	8.09
City of London	6.41	3.34	4.88
Canary Wharf	3.43	2.77	3.27
London Hammersmith	2.77	1.82	2.19
Manchester	2.71	2.50	2.30
Newcastle upon Tyne	1.06	1.19	0.97
Croydon	1.18	0.99	0.94
Edinburgh	3.11	2.62	2.91
Glasgow	2.33	2.05	2.04
Maidenhead	3.72	2.27	2.70
Reading	2.71	1.61	2.03
Bristol	1.53	1.96	1.57
Birmingham	2.59	2.68	2.50
Leeds	2.15	2.17	1.93
Selected European Cities	1999	2005	Average 1999-2005
London West End	7.62	8.37	8.00
City of London	4.68	4.31	4.49
Frankfurt	5.44	3.31	4.37
Stockholm	4.28	3.30	3.79
Milan	2.07	4.11	3.09
Paris: City	2.35	3.75	3.05
Barcelona	2.23	3.16	2.69
Amsterdam	2.12	1.92	2.02
Paris: La Défense	1.41	1.93	1.67
Brussels	0.52	0.84	0.68
United States (based on Glaeser *et al.*, 2005)	1996 (cycle bottom)	2000 (cycle peak)	
Manhattan (New York City)	0	0.50	

Source: for details of how these values were calculated see Cheshire & Hilber (2008).

It is against that background that the figures in Table 4.2 should be interpreted. These derive from Cheshire and Hilber (2008) – the first study to have planning impacts on commercial property as its main focus. They used the same measure of the gross costs as Glaeser *et al*. (2005) – the so-called 'regulatory tax': that is the difference between the costs of building an additional unit of space and the price of that space (see also our discussion in section 3.1). In the Cheshire and Hilber study however, this is expressed as a 'tax rate' on

costs. Thus the value reported for London West End offices as the average 1999-2005 means that the excess of the price of space over its costs of construction was estimated as being equivalent to a 809% tax on constructions costs.

It is obvious that the gross costs of regulation in European centres is far higher than in the US and far higher in Britain than in nearly all Continental European cities. It is not surprising to find a higher cost in London's West End or the City of Paris than in the City of London, London's Docklands or La Défense. Amenity values are higher in such locations. Nevertheless it is not clear why Amsterdam or Brussels (Belgium is well know for having by European standards very flexible planning controls) deserve much lower levels of restriction than London Docklands or even Birmingham. The gross costs for many of these cities suggest that there is a least a case to answer. Are the costs being imposed on office users generating even remotely matching benefits for society?

5 Conclusions

The wide range in terms of institutional arrangements, form and restrictiveness in which land use regulations are applied all over the world make it impossible to summarise their effects on housing markets and welfare in a few key facts and figures. In some cases, regulations on land use appear to exist merely *pro forma* and no impact whatsoever can be empirically identified, while planning-induced discontinuities in land prices have been described as 'grotesque' in cases at the other extreme. Clearly, land use regulation that does not impose binding restrictions neither generates benefits to society nor imposes costs, but in places where planning holds a strong grip on housing supply and urban form, adverse welfare effects have been found to be substantial, sometimes even amounting to several percentage points of household income. Less is known about the impacts of planning on costs of space for economic activities although again, what evidence there is, suggests these can be substantial.

As we have emphasised throughout this chapter, there is still a lot of research to be done, and the evidence on net welfare effects of land use regulation is particularly scarce. Illustrating the discrepancy between the importance of the topic and the extent to which it was ignored by most economists, Cheshire and Sheppard (2004) observed that:

> In the US 32.4% of consumer expenditures are on housing generally, with 18.7% (virtually the same as the 18.5% in the UK) of expenditures specifically for shelter. This is about three times the expenditure on all fuels, utilities and public services combined. Telecommunication services comprise only 2.3% of household

> expenditures, yet regulation of such services receives much more attention from economists; in economics journals telephone regulation alone is the subject of about three times as many papers as land market regulation (p. 619-620).

It is therefore not surprising that the literature has hardly come to grips yet with the fact that over and above the welfare effects that operate via urban land and housing markets, binding land use regulation is likely have additional indirect effects. While we have provided a rather extensive survey of the existing evidence on the former type of welfare effects in this chapter, we conclude by sketching a number of these wider consequences, as some of them are likely to be important for aggregate welfare and policy.

To begin with, the paper work that comes with residential development in a regulated urban land market imposes a 'fixed cost'. Whoever bears that cost, and it is likely to be mainly negatively capitalised into land prices, it does cost real resources. It is reported in Shanghai that getting from a cleared site to a saleable building requires a total of more than 130 permits, licences and permissions.[19] It is easier to carry such costs in large development projects and large developers that have more experience with the bureaucratic processes. Hence, a barrier to the entry of new and small firms in the industry may be imposed, so that competition is restricted. Furthermore, as illustrated in Figures 3.3 and 4.1, development in urban land markets that are directly regulated may generate substantial 'scarcity rents' which become available once development is permitted. Would-be developers and others attempting to capture a share of these scarcity rents spend resources. At one extreme this may just lead to wasteful expenditures on advocates, glossy brochures, and luxurious trips with people who make planning decisions; at the other it can lead to large scale corruption damaging the capacity of public administration. The Italian research institute CENSIS (CENSIS, 1985) estimated that more than 2.7 million illegal homes were built in Italy between 1971 and 1984. That was more than 50 percent of all homes built over that period and constituted in 1985 12.3 percent of the total stock of homes in Italy.

Anticompetitive effects may extend indirectly to other sectors by restricting entry. In this respect the retail sector has been much discussed because restrictions on the supply of land for shops may lead to market power for the existing retailers in a local area (Competition Commission, 2008). Just the same happens to the price of beer if the planners restrict the number of pubs in a neighbourhood. In Oxford, England, the local planning system determined that the community 'did not need any more Estate Agents'. The established local Estate Agents were the sole beneficiaries of this restriction.

[19] Private communication from a Chinese developer.

Furthermore, planning may inhibit the development of 'big box' retail shops at the urban fringe, in which the exploitation of economies of scale may lead to significantly higher productivity levels. Gordon (2004) argues that this type of regulation explains a significant part of the observed difference in aggregate productivity growth between the USA and Europe over the past decade. This measure obviously does not reflect any benefits that people may derive from having more small local shops in their residential area and less development on land at the edge of cities. But this benefit comes at the unrecognised and unquantified expense of higher prices in the shops and more frequent, smaller, shopping trips.

Other important indirect effects of land use regulation may derive from its potential repercussions on regional labour markets. As shown for the USA by Glaeser *et al*. (2006), regulation that restricts housing supply in an urban area may also restrict the number of workers and hence job growth, while it pushes up house prices and wages.[20] In turn, the full benefit of economies of agglomeration may not be reaped, so that labour productivity growth is hampered throughout the economy. This also appears to be relevant in the Randstad area in the west of the Netherlands – one of the most densely populated metropolitan areas of the OECD – where job growth in the past decades has been lower than in surrounding regions as a consequence of land use planning (Vermeulen and Van Ommeren, 2008). In line with the argument of foregone economies of agglomeration, the OECD (2007) pointed to lagging labour productivity growth in this area relative to other metropolitan areas, partly as a consequence of rigidities in housing markets. Nevertheless, with the notable exception of Rossi-Hansberg (2004), hardly any theoretical or empirical work on the relationship between land use regulation and economies of agglomeration exists.

As housing dominates the budget of most households, land use regulation that raises prices is likely to affect more macroeconomic outcomes than just the productivity of labour. For instance, high house prices make each dollar earned less valuable, so that restrictive planning reduces the incentives to supply labour. Furthermore, housing being the dominant asset in most households' portfolios, there are also repercussions on saving, investment and consumption choices. Most households are not able to adequately diversify the uncertainty about asset returns of housing, and land use regulation may not only push up the share of housing in their portfolios, but also the degree of uncertainty about its returns. Since these returns may be spent in turn on consumption, this enhances macroeconomic volatility and

[20] The same mechanism holds equally for cities that compete on international labour markets, who may find it more difficult to attract highly skilled workers as housing gets more expensive.

risk, as has been extensively discussed in Barker (2003, 2004) at the time that the UK considered entry into the Euro area (see also OECD, 2004).

Finally, the fact that housing features so prominently in the portfolio of owner-occupiers, and that the risk associated with this is hard to diversify, opens up a range of issues within the field of political economy. For instance, it implies that older generations who already own a house have an incentive to limit new construction, as this will raise their asset gains. For essentially the same reason, it implies that homeowners have an incentive to limit new construction in their local neighbourhoods, the NIMBY behaviour that we have briefly discussed in the previous section. This may be particularly problematic if voting for land use regulation occurs at the local level, where its costs are most strongly experienced and bear particularly heavily on small numbers of voters, while the benefits of new development accrue to people in a wider area (who have no votes in the decision making process).[21] Such considerations may lead to policies that deviate from optimal planning, and as we have amply discussed throughout this chapter, the costs this imposes on society may be large. Hence, next to its welfare economic aspects, the political economy of land use regulation is another field in which progress should be made, in order to understand not only the consequences but also the causes of the restrictive planning of land use that is presently gaining popularity in various parts of the world.

References

Anderson, S. T. and West S. E. (2006). Open space, residential property values, and spatial context. *Regional Science and Urban Economics*, **36**, 773–89.

Arrow, K., Solow, R., Portney, P. R., Leamer, E. E., Radner, R. and Schuman, H. (1993). *Report of the NOAA panel on contingent valuation.* Washington, D.C.: Resources for the Future.

Barker, K. (2003). *Review of Housing Supply: Securing our Future Housing Needs: Interim Report – Analysis*. London: HMSO.

Barker, K. (2004). *Review of Housing Supply: Final Report – Recommendations*. London: HMSO.

[21] Moreover, even if voting occurs at a higher regional level, this type behaviour may still be influential through local lobby groups. If the costs of residential development fall on a small group of people, it is worthwhile for them to lobby and the transactions costs of forming lobbying groups are lower than for the large group of people each receiving only a small benefits. This is likely to be true even when the combined value of the many small benefits substantially exceeds that of the relatively few large costs.

Bento, A. M., Franco, S. F. and Kaffine, D. (2006). The efficiency and distributional impacts of alternative anti–sprawl policies. *Journal of Urban Economics*, **59**, 121–41.

Bertaud, A. and Brueckner J. K. (2005). Analyzing building height restrictions: predicted impacts and welfare costs. *Regional Science and Urban Economics*, **35**, 109–25.

Brueckner, J. K. (1990). Growth controls and land values in an open city. *Land Economics*, **66**, 237–248.

Burge, G. and Ihlanfeldt, K. R. (2006). Impact Fees and Single Family Home Construction. *Journal of Urban Economics*, **60**, 284–306.

CENSIS (1985). *Italy Today*. Roma: CENSIS.

Cheshire, P. C. and Sheppard, S. (1995). On the Price of Land and the Value of Amenities. *Economica*, **62**, 247–267.

Cheshire, P. C. and Sheppard, S. (1998). Estimating the demand for housing, land and neighbourhood characteristics. *Oxford Bulletin of Economics and Statistics*, **60**, 357–82.

Cheshire, P. C. and Sheppard, S. (2002). Welfare Economics of Land Use Regulation. *Journal of Urban Economics*, **52**, 242–69.

Cheshire, P. C. and Sheppard, S. (2003). Taxes versus Regulation: the welfare impacts of policies for containing urban sprawl. In Netzer, D. (ed), *The Property Tax, Land Use and Land Use Regulation*. Cheltenham: Edward Elgar, 147–72.

Cheshire, P. C. and Sheppard, S. (2004). Land Markets and Land Market Regulation: progress towards understanding. *Regional Science and Urban Economics*, **34**, 619–37.

Cheshire, P. C. and S. Sheppard (2005). The Introduction of Price Signals into Land Use Planning Decision-making: a proposal. *Urban Studies*, **42**, 647–63.

Cheshire, P. C. and Hilber, C. A. L. (2008). Office Space Supply Restrictions in Britain: The Political Economy of Market Revenge. *Economic Journal*, forthcoming.

Competition Commission (2008). *Groceries Market Investigation – Provisional Decision on Remedies*. Press Release 15 Feb 2008, London: Competition Commission.

Engle, R., Navarro, P. and Carson, R. (1992). On the theory of growth controls. *Journal of Urban Economics*, **32**, 269–83.

Fischel, W. (2001). *The Homevoter Hypothesis*. Cambridge, Massachusetts: Harvard University Press.

Glaeser, E. L. and Gyourko, J. (2003). The Impact of Building Restrictions on Housing Affordability. *Federal Reserve Bank of New York Economic Policy Review*, June.

Glaeser, E. L., Gyourko J. and Saks, R. E. (2005). Why is Manhattan so Expensive? Regulation and the Rise in Housing Prices. *Journal of Law and Economics*, **48**, 331–69.

Glaeser, E. L., Gyourko, J. and Saks, R. E. (2006). Urban growth and housing supply. *Journal of Economic Geography*, **6**, 71–89.

Gordon, R. J. (2004). Why was Europe left at the station when America's productivity locomotive departed? NBER Working Paper no. 10661.

Hall, P. G. (1974). *Urban and Regional Planning*. Harmondsworth: Penguin.

Hoskins, W. G. (1970). *The Making of the English Landscape*. Harmondsworth: Penguin Books.

Ihlanfeldt, K. R. (2007). The effect of land use regulation on housing and land prices. *Journal of Urban Economics*, **61**, 420–35.

Ihlanfeldt, K. R. and Shaughnessy, T. (2004). An Empirical Investigation of the Effect of Impact Fees on Housing and Land Markets. *Regional Science and Urban Economics*, **34**, 639–61.

Irwin, E. (2002). The Effects of Open Space on Residential Property Values. *Land Economics*, **78**, 465–81.

Lee, C.–M. and Fujita, M. (1999). Efficient configuration of a greenbelt: theoretical modelling of greenbelt amenity. *Environment and Planning A*, **29**, 1999–2017.

Lee, C.–M. and Linneman, P. (1998). Dynamics of the greenbelt amenity effect on the land market – the case of Seoul's greenbelt. *Real Estate Economics*, **26**, 107–29.

Lipsey, R. G. and Chrystal, A. (1995). *Economics*. Oxford: Oxford University Press.

Mayer, C. J. and Somerville, C. T. (2000). Land Use Regulations and New Construction. *Regional Science and Urban Economics*, **30**, 639–62.

McConnell, V. and Walls, M. (2005). *The value of open space: Evidence from studies of nonmarket behavior*. Washington, D.C.: Resources for the Future.

Muellbauer, J. (2005). Property Taxation and the Economy after the Barker Review. *Economic Journal*, **115**, C99–C117.

OECD (2004). The contribution of housing markets to cyclical resilience. *OECD Economic Studies*, **38**, 125–56.

OECD (2007). *Territorial Review: Randstad Holland, Netherlands*. Paris: OECD.

Peterson, A. W. A., Pratten, C. F. and Tatch, J. (1997). *An Economic Model of the Demand and Need for Social Housing: Technical Report of a Feasibility Study*. London: Department of the Environment, Transport and the Regions.

Quigley, J. M. and Raphael, S. (2005). Regulation and the high cost of housing in California. *American Economic Review*, **95**, 323–28.

Quigley, J.M. and Rosenthal, L.A. (2005). The effects of land use regulation on the price of housing: What do we know? What can we learn? *Cityscape*, **8**, 69–137.

Quigley, J.M. and Swoboda, A.M. (2007). The urban impacts of the Endangered Species Act: A general equilibrium analysis. *Journal of Urban Economics*, **61**, 299–318.

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, **82**, 34–55.

Rossi–Hansberg, E. (2004). Optimal Urban Land Use and Zoning. *Review of Economic Dynamics*, **7**, 69–106.

Rouwendal, J. and Van der Straaten, J. W. (2008). The costs and benefits of providing open space in cities. Tinbergen Discussion Paper, 2008 – 001/3.

Sheppard, S. (1999). Hedonic Analysis of Housing Markets. In P. C. Cheshire and E. S. Mills (eds.), *Handbook of Regional and Urban Economics Vol. III: Applied Urban Economics*. Amsterdam: Elsevier Science Publishers.

Song, Y. and Knaap, G. (2003). New urbanism and housing values: a disaggregate assessment. *Journal of Urban Economics*, **54**, 218–38.

Song, Y. and Knaap, G. (2004). Measuring the effects of mixed land uses on housing values. *Regional Science and Urban Economics*, **34**, 663–80.

Swank, J., Kakes, J. and Tieman, A. F. (2002). *The housing ladder, taxation and borrowing constraints.* Amsterdam: DNB Report no. 9.

Tiebout, C. (1956). A pure theory of local expenditures. *Journal of Political Economy*, **64**, 416–24.

Vermeulen, W. and Rouwendal, J. (2007). Housing supply and land use regulation in the Netherlands. Tinbergen Discussion Paper, 2007 – 058/3.

Vermeulen, W. and Rouwendal, J. (2008). Urban expansion or clustered deconcentration? An applied welfare economic analysis of growth controls and the foundation of satellites. Tinbergen Discussion Paper, forthcoming.

Vermeulen, W. and Van Ommeren, J.N. (2008). Does land use planning shape regional economies? A simultaneous analysis of housing supply, internal migration and local employment growth in the Netherlands. Tinbergen Discussion Paper TI 2008 – 004/3.

Walsh, R. (2007). Endogenous open space amenities in a locational equilibrium. *Journal of Urban Economics*, **61**, 319–44.

Williams–Ellis, C. (1928). *The Octopus in England*. London: Geoffrey Bles.