



Paul Cheshire and Stephen Sheppard

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# Land Markets and Land Market Regulation: progress towards understanding

Paul Cheshire, London School of Economics\*  
Stephen Sheppard, Williams College

## Abstract:

We introduce the papers in this volume and put them into the context of the literature on land use regulation. We then synthesise and draw some conclusions from existing research on land use regulation and interpret the evidence currently available. In the light of this review we then identify issues for research. As we stress in this introduction, the analysis of land use regulation is, compared to regulation in other contexts, significantly neglected. We hope that this special issue which draws on the results of a conference held at the Lincoln Institute of Land Policy in the summer of 2002 will go some way towards highlighting and remedying this neglect.

**JEL:** D6; H4; L5; R1

**Key words:** regulation; zoning; land use; capitalisation; sprawl

\*corresponding author:

Paul Cheshire,  
Geography & Environment Department  
London School of Economics  
Houghton St  
London WC2A 2AE  
Tel: (44) (0)20 7955 7586  
email: [p.cheshire@lse.ac.uk](mailto:p.cheshire@lse.ac.uk)

# Land Markets and Land Market Regulation: progress towards understanding

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## 1. Introduction

Housing represents the largest single item in most household budgets. 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<sup>1</sup>. 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 3 times the number of papers devoted to land market regulation<sup>2</sup>.

Moreover, since each parcel of land has a precise location, access to a wide range of amenities and local public and other ‘non market’ goods is determined by land consumption. The evidence increasingly demonstrates that land markets are remarkably efficient at capitalising both property-related taxes as well as the impacts (both positive and negative) of regulation and local public goods and amenities<sup>3</sup>. Thus access to the amenities produced by a system of land use regulation is conditioned on land consumption; if growth boundaries produce the benefit of protected open space, for example, access to those benefits is determined by a household’s willingness (and ability) to pay for locations providing such access. Land markets have implications for welfare and social issues such as segregation going far beyond the shelter houses provide. They are tightly regulated. Yet economists devote comparatively modest amounts of attention to their analysis.

This special issue is an attempt to provide some redress for the relative scarcity of published research on the wider issues related to land market regulation. It results from an international

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<sup>1</sup> Figures from the Consumer Expenditure Survey of 2000. Definitions for “Shelter” and the more inclusive “Housing” available from Bureau of Labor Statistics (2004).

<sup>2</sup> Comparing “regulation and (land or (land use))” with “regulation and (telephone or telecom\*)” search on EconLit

<sup>3</sup> For some recent papers on this see, for example, Thorsnes (2000), Hilber and Mayer (2002), Ihlanfeldt and Shaughnessy (2004), Cheshire and Sheppard (1995; 2002b) or Gibbons (2002)

seminar<sup>4</sup> on the analysis of land markets and land market regulation held at the Lincoln Institute of Land Policy, Cambridge, MA during July 2002. Part of the motivation for the seminar was the recognition that land markets are about more than land and location. They have an important role in delivering life experiences and conditioning the welfare of people in cities. Their regulation has both direct and indirect economic effects that extend into many areas of economic life and public policy. The interaction of land markets and their regulation determines access to a wide range of publicly provided goods such as education or an absence of crime; the consumption of environmental goods – such as open space and clean air, as well as environmental ‘bads’ – such as aircraft noise or pollution. Land markets and their regulation powerfully influence the distribution of real incomes, patterns and the incidence of residential segregation and economic efficiency. Concerns have been raised in some countries (notably Japan and the UK) regarding the interaction between land market regulation and the overall management of the economy through monetary and fiscal policy<sup>5</sup>.

Despite the far reaching and subtle economic effects land market regulation undoubtedly has, the management and design of such regulation is typically in the hands of urban planners whose central concerns and interests often diverge widely from those of economists. Economists tend to adopt a Pigovian or Coasian perspective. The preferences of individuals are sovereign. From the perspective of these preferences, unregulated markets may underprovide certain goods, notably public goods, and leave externalities uninternalised<sup>6</sup>. In the context of land markets there are important amenities – such as open space – which have the characteristics of public goods and significant potential negative externalities which can arise because of the interdependence of uses of neighbouring parcels of land<sup>7</sup>. These problems provide an intellectual basis for land use regulation and legal structures that clarify property rights and improve the ability of land markets to deliver a bundle of goods and services more closely reflecting individual preferences (although see the discussion on this point in section 2, below). Economists, moreover, have a strong preference for measurement and

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<sup>4</sup> The full set of 16 papers given at the seminar together with the discussants’ comments on many of them is available as Lincoln Institute of Land Policy Conference Papers. These were collected on a CD, product code (CD002), available from the Lincoln Institute. A summary of some of the main issues discussed is provided in Cheshire, Greenstein and Sheppard (2003).

<sup>5</sup> The UK Chancellor announced an enquiry into the operation of the British housing market in April 2003. The enquiry’s remit specifically related to the potential impact of land market regulation on housing supply and the instability of the British housing market. An interim report was published in November 2003 (Barker, 2003)

<sup>6</sup> Graves (2003) argues that this underprovision of public goods leads to excessive suburban development.

<sup>7</sup> Empirical support for this interdependence is presented in Irwin and Bockstael (2002). An extension that investigates the importance of the particular form in which nearby land is used is studied by Smith, Paulos and Kim (2002).

quantification. While realising the extent to which a specific measure may coarsen the nuances of a quality (for example ‘sprawl’ or ‘school quality’) nevertheless they prefer to make trade-offs more, rather than less, explicit and are content to accept proxy variables and broad categories<sup>8</sup>.

Planners come from a combination of engineering and aesthetic intellectual traditions in which values are in some sense absolute or physical and not derived from individual preferences. A plan is ‘right’ as an architect might judge a building to be ‘right’. Planners tend to measure the variables with which they deal in terms of physical units – for example the number of households, dwelling densities, or acres of land allocated for a particular use. The debate that was triggered in the UK in the late 1990s about a potential crisis of land availability was entirely presented in terms of expected growth in household numbers, partly reflecting the expected increase in single person households (HMSO, 1996). In this debate, planners did not regard rising real incomes as a relevant factor. Incomes are related to the ‘demand for housing space’; household numbers to housing ‘need’.

In the world view of economists, planners deal in merit goods, value judgements and attempt to impose what they think is best on urban form. They are not scientific. In the world view of planners, economists adopt excessively abstract models as a way of justifying the satisfaction of the unsustainable desires of consumers and developers. Planners are innately suspicious of the measurement and quantification of what constitutes an ‘amenity’ or ‘sprawl’ since measurement blunts the nuances of quality. This identifies a second motivation for the seminar: to initiate a dialogue between planners and economists in the hope of stimulating new analytical work on both the role of land markets within cities and the impact that systems of land market regulation have. It brought together economists and a smaller number of urban planners with a view to encouraging new, more analytical, but policy relevant work on land markets and their regulation.

Sixteen papers were presented at the conference, six of which are published in this special issue. Four central issues emerged from the conference and are represented in this volume. The opening session engaged with the wider economic effects of land use planning. Two

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<sup>8</sup> In their analysis of land use in Massachusetts, for example, Evenson and Wheaton (2003) are happy to reduce the 36 categories of land use defined in the physical measures to four. As Quigley notes in commenting on their paper ‘the categories are fine.... (and include).... two different cranberry bogs...those located in woods and those located in cleared areas’.

important overviews were provided by Mills [2002] and by Evans [2002] with a senior policy maker's perspective provided by Riley<sup>9</sup>. Mills focused on the US, arguing that density controls, which operate with increasing intensity in the US, set effective minimum lot sizes constraining consumer choice and leading to an over consumption of land. This caused a suboptimal combination of capital and land to be employed in housing and construction, leading to a loss of consumer welfare and economic efficiency as well as to excessive land consumption.

Evans offered a British perspective where, since the Town & Country Planning Act of 1947, the issue has been one of ever increasing constraints on urban development. In many parts of south east England this has now produced a situation in which the market price of land could rise from £2000 to £2 million per acre simply by moving a few feet as the designated boundary of agricultural to urban land use was crossed. A distortion so extreme could not be expected to have neutral effects. In trying to explain the causes for the relatively low growth rate of the British economy, Evans argued that economists had paid too little attention to the role of urban growth controls. These explicitly and intentionally restricted development and raised housing (and other urban real estate) prices in high demand regions, impeding labour mobility. Since land is an essential input into the housing production process its price was substantially increased. Riley's argument was that there were social benefits as well as costs associated with land market regulation and that these were likely to vary systematically from one location to another. Without evaluating the benefits as well as the costs one could not draw conclusions as to whether regulation in a particular community was producing suboptimal outcomes. We address some of the wider issues resulting from land market regulation in Section 2 below.

The issue of 'sprawl' and its regulation is directly analyzed in two papers in this issue. Irwin and Bockstael and Cavailhes *et al.* must contend from the outset with the problem of defining sprawl. 'Sprawl', although an important issue in the public mind, has been defined in various vague or contradictory ways that make the comparison of the results of different studies difficult. Not unexpectedly, the definition of 'sprawl' proved to be an area of difference between planners and economists at the conference.

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<sup>9</sup> In 2002 Chief Economist in the UK Department of Environment, Transport and the Regions.

Irwin and Bockstael's finding that there are interdependencies between the pattern of current land use and the probability that a neighbouring lot will be developed is not surprising and illustrates once again how the indirect or unanticipated effects of land use regulation may run counter to the intention of the policy. Policies to combat sprawl frequently seek to cluster development and preserve open rural space. Since the probability of a given lot being developed increases the more undeveloped land there is surrounding it, the policy sucks development away from more densely developed urban areas. Clustering policies increase the likelihood of a rural lot being developed (thus accelerating development in more rural areas) because of the external benefit created by surrounding undeveloped lots. This effect is only neutralised if a large proportion of rural lots are zoned for open space.

Caveillehes *et al* explore 'sprawl' in a very different, European, rural context: in France in 1999 about one third of the land surface was occupied by 'periurban' communes. Such 'periurban' communes form the commuter hinterlands of major cities and are defined as those having at least 40 percent of their active population commuting to a central city. Although rural in appearance, therefore, they are functionally urban. Their model allows for a different form of interdependence or externality between land uses: that created by past and existing agricultural use and current residential use. Even with homogeneous household preferences their model demonstrates the likelihood of an outcome in which the residential zone surrounding the central city was characterised by smaller average residential land plots than suburbanisation of the city would generate in the absence of this interaction between households and farmers. Such an interaction thus reduced the net amount of land taken into urban use for a given population and income level although the physical extent (or 'sprawl'?) of the city together with its periurban belt was greater. Agricultural land was to an extent a substitute for land in gardens.

Three of the papers in this special issue are by economist-planners: those by Meen and Andrew, Song, Knaap and Frece and by Shoup. All of this group analyse the specific impact of particular planning policies. Meen and Andrew examine a policy commanding widespread support in the UK and elsewhere: the promotion of mixed neighbourhoods. Their paper also illuminates the issue of sprawl in the sense that it examines the determinants of household movement between broadly defined zones of the London metropolitan region and the rest of southeast England. Since households were disaggregated by type this also allowed the effects of such movement on the socio-economic and ethnic composition of the zones to be

simulated. Although the total population of central London has been rising since 1990 (for the first time since WWII) this is primarily associated with the younger age structure of its population and international migration. Households resident in Inner London who moved only had a 40% probability of staying within the Inner zone whereas a moving household previously resident in the rest of southeast England had an 86% probability of staying in that 'periurban' zone but only a 3% probability of moving to the inner zone. On the other hand if zone social deprivation was controlled for then there was a 75% probability of an Inner London household staying in the same zone when it moved: almost the same as for the periurban, rest of southeast England zone. Thus household movement seemed to be reinforcing zone homogeneity. Free choice was resulting in less mixed neighbourhoods. On the other hand it was shown that property tax variations could be used with some effectiveness to influence patterns of movement between zones if policy sought deliberately to create mixed neighbourhoods.

Song, Knaap and Frece set out to test the impacts of 'new urbanism' policies on house prices; do the neighbourhood characteristics such policies seek to create generate price premia in the housing market? After examining the aims of the Portland 2040 Plan and identifying the policy instruments it advocated for implementing new urbanism ideas for the area, the authors developed quantitative indicators of a set of physical characteristics of development representative of the ideas of the new urbanism. These included measures of neighbourhood mix, the extent to which there was mixed commercial and residential use, density (higher densities being an aim of the plan) and ease of non-auto access. The authors construct a sample of some 29000 houses in their study area and then include their physical indicators in a hedonic model to estimate the impact they had on house prices. The results are mixed, with some features such as higher density and proximity to multi-family housing being associated with significant discounts while better pedestrian access to local amenities and commercial areas commanded significant premiums.

Shoup's paper addresses an issue of land use regulation which at first sight might seem excessively narrow: the failure to charge a price close to its opportunity cost for curb side parking and the complementary (and costly) planning requirements for off-street parking. His evidence, however, seems convincing: this situation represents a substantial cost on urban development in the US and generates a substantial efficiency loss. The requirements imposed on both commercial and residential development for off street parking can be construed as



specific impact fees. Viewed thus the additional construction costs necessary to meet them can, for example in Los Angeles, represent as much as a 67% increase in the construction costs. Where impact fees could be paid as an alternative to providing parking spaces the range across the communities surveyed varied from about 5 to 88% of construction costs. In the context of residential construction in Oakland off-street parking requirements increased construction costs by 18% and reduced densities by 31%. Comparable effects on densities and costs were observed in Southern California. Against this just a single curb space, reasonably priced and with payment effectively collected, could raise an amount only a little less than the nation-wide median property tax. Shoup's analysis shows that this double distortion has serious effects on patterns of land use, densities and urban land consumption while generating significant social costs mainly in the form of additional congestion.

The final paper by Ihlanfeldt and Shaughnessy is representative of the focus of several papers that were presented: how effectively and under what conditions do land markets capitalise the effects of regulation, the value of amenities and locally provided public goods or property taxes? Several papers argued that capitalisation was conditional and rather more complicated than had been suggested in most of the literature to date. One important issue was the need to consider the supply side of amenities and local public goods as well as the demand for them. Ihlanfeldt and Shaughnessy provided a synthesis of the analysis of the incidence of impact fees. They sought to test what they identified as the 'new view' of Yinger: that impact fees both provide for valued services and, other things equal, lowered property taxes. Thus they are expected to be capitalised into the prices of housing, both new and old, and to be neutral with respect to vacant land. These propositions are carefully tested on a unique data set for Dade County, Florida and strong evidence consistent with the new view of capitalisation emerged. An additional \$1 of impact fees was reflected in a \$1 increase in the price of both new and old housing but had no effect on the price of vacant land.

## **2. Wider implications for land use regulation**

Although neglected relative to its economic importance, there does exist a significant literature dealing with land use planning or regulation. There is a parallel literature addressing land taxation and the interaction of land taxes with land use regulation. Two recent contributions to this literature providing wide-ranging overviews are Ladd (1998) and Netzer (2003). In this introduction, however, our focus is on the impact of regulation. In our

judgement regulation has been of increasing importance over the past decade or more while land taxation has been tending to become relatively less important.

The literature analysing land use regulation is both theoretical and empirical although the empirical literature is distinctly thinner on the ground. One can distinguish two main theoretical families of work. There is a more informal political economy type of work, drawing on classical welfare economics without much formal modelling. Evans (1999) provides an overview of this branch of work although it does not include an important recent contribution of the leading US representative, Fischel (2001) nor Brueckner's (2000) synthesis of the arguments. This body of work, going back at least to Bailey (1959), deals with a complex world in which there is a range of types of externality associated with land use and its occupation as well as a range of quasi-public goods associated with land consumption. Much of the work, particularly that done in the UK, tends to assume a 'national system' in which different planning authorities work within a given framework and there is substitution between externalities generated by land use, land consumption and other goods (including quasi-public goods such as open space that may be generated by land use regulation). In addition Fischel's recent contribution analyses the political economy of home ownership viewing houses as important but illiquid elements in peoples' portfolios of investment assets. This sets a framework within which it may be rational for homeowners not only to seek to influence local zoning regulations but also – even though they have no children – use the political process to campaign for better local schools (Hilber and Mayer, 2002).

A second branch of work, dominated by US economists, has attempted formally to model the outcome of zoning. The focus of such models has tended to be the welfare impact of growth constraints. In order to produce tractable models this work has concentrated on very simplified worlds. Brueckner (1990; 1995 or 1996) or Engle *et al.* (1992) for example examine a two city world in which one city can set a growth boundary while the other is passive. Land consumption is generally taken as fixed so that population is equivalent to land consumption, there is only an externality of congestion, there are no agglomeration economies and utility levels equalise between the regulated and unregulated cities through the mechanism of mobility. It is not startling to discover that such models almost universally lead to the conclusion that regulation is welfare reducing. Because global land consumption is fixed, the gains of the regulating city's citizens are always more than offset by the losses incurred in the non-regulating city.

If land consumption is allowed to vary – that is there can be substitution of land for other goods in consumption – then regulation may be welfare enhancing or it may be welfare reducing (Sheppard, 2003). The answer depends on the value and nature of the congestion externality. This result is obtained in the context of a simplified structure of demand, and analysis of more complex models would likely reveal that the demand structure is as important as the value of the congestion externality in determining the efficiency of land use regulation. Moreover the congestion externality is only apparent at the fringe of the urban area (the models are focusing on the welfare impacts of a growth constraint – not on the production of open space internal to the cities) and the assumption that only one city is able to engage in an active system of land use regulation is maintained. In some ways this assumption is more appropriate for the US context since each community – usually subject to a State-wide enabling framework – is able to set its own regulatory system. However the reality is much more complex than one city active and others passive. Communities set their regulations in the knowledge of the regulations in competing communities and no doubt engage in complex games in determining their own regulatory stance. That stance itself is likely to be influenced by the community's income level and home ownership rates (see Evenson and Wheaton 2003 for an exploration of these issues). In Europe regulatory systems tend to be nationally determined even if there is some local choice, and cities may not be allowed to adopt a permissive policy towards development. In this context the active : passive city model has less appeal, since there may be no passive location where development takes place once displaced from the constrained location.

### **3. Estimating the impact of land use planning and zoning**

To some extent the empirical work has corresponded to the more and less formal schools of theoretical analysis discussed above. Data difficulties and the lack of a uniform national system in the US within which zoning takes place are factors that have limited studies of the impact of land use regulation.

The paper by Song, and Knaap and Frece characterises the main concerns of the 'new urbanism' as the development of mixed use and 'anti-sprawl policies', especially in the form of densification. They are able to show that some aspects of mixed uses contribute positively to house prices but that others have a negative effect. Not unexpectedly higher densities are,

other things equal, associated with a price discount. Similarly Irwin and Bockstael provide a detailed analysis of one particular policy claimed to be 'anti-sprawl' – clustering. They have shown elsewhere that land values reflect neighbouring patterns of land use with proximity to agricultural land and more open land in a neighbourhood commanding a price premium.

In the US these are relatively recent concerns and policies but to the UK student they have a very familiar ring. Although zoning is long established in the US 'smart growth' is relatively new but British land use regulation – at least in its modern manifestation – was determined by the 1947 Town and Country Planning Act and has always had as its central aim 'urban containment'. Indeed the various modifications introduced since 1947 have mainly been intended to reinforce the effect of regulation to reduce total urban land take via 'urban containment' (or growth boundaries in the terminology of the new urbanism) and densification. To this have been added supplementary aims of reducing energy use and creating 'sustainable cities'. The idea of the 'sustainable city' has become dominant amongst planners and is almost without question interpreted as synonymous with more compact urban forms. It is argued, moreover, that densification and regulations designed to generate mixed communities (see Meen and Andrew this issue) are complementary means of achieving the aim of sustainable cities. Such policies received official international and national approval in reports from the Commission of the European Communities (1995) and from Britain's Department of the Environment (1995) and have been adopted in other European countries, such as the Netherlands. An additional aim of land market regulation in the UK - as elsewhere - is the provision of public goods - mainly open space and the minimisation of negative externalities generated by 'non-compatible' land uses, and the co-ordination of urban development with infrastructure provision.

Because policies to achieve 'densification' have been in place in the UK for considerably longer than anywhere else in the world and have been pursued with significant administrative efficiency and openness it is worth looking in some detail at how these policies have been implemented, how this compares with comparable policies in the US and elsewhere, and what some of the long run impacts of the policy of urban containment – more or less a synonym for 'smart growth' – have been. There are important lessons to be learned, and even a superficial analysis shows that the economic effects of this form of land use regulation – pursued now over almost two generations – have been far reaching.

Perhaps partly reflecting the uncertainties as to what exactly ‘sprawl’ is, regulation to contain it works in very different ways in different countries and communities. The planning system in Britain rests on the British legal concept of tenure which separates the right to develop land from the right to occupy it. Freehold tenure in Britain is the closest a property occupier can get legally to ‘owning’ their property but any type of development or improvement (within the strict set of senses defined in planning legislation) to freehold land requires ‘development permission’ from the planning authority. The planning authority in the British system corresponds approximately to the US zoning authority. These local planning authorities in Britain work within the framework of a tightly and legally defined planning system. Although the planning authority is in the first instance a quite local community-based, elected authority, the ‘planning system’ and its goals are determined by national legislation modified and interpreted by official notes of guidance from national government. Development as a legally defined concept within this system includes both construction and any change of use defined in the statutes. Thus to change a shop selling clothes to one selling houses (a realtors) legally constitutes development and would require planning permission.

Since its inception the focus of the British planning system has been on containing urban development (see Hall et al 1973 for an early analysis of these policies). Planning authorities have delimited ‘urban envelopes’ (or growth boundaries) and preserved land in agricultural use through the definition of Green Belts or other designation that prevents development of any type. While in the early days, following the 1947 Act, there was concern not to allow building at densities which were too high, more recently – certainly since the national adoption in 1998 of a policy of urban densification and a target for 60 percent of all new development to be on so-called ‘brownfield’ sites – the target has been higher density construction to promote ‘sustainability’.

The British system thus transparently and intentionally constrains the supply of ‘space’ for urban development. In this it appears similar to the system of ‘growth boundaries’ adopted in Portland, Oregon in 1973. The evolution and impact of these on house prices was the focus of the study by Phillips and Goodstein (2000). As the paper by Irwin and Bockstael demonstrates, however, anti-sprawl policies can work in other ways as well. In their case - in Maryland – such policies aim to cluster development. It is reasonable to argue that development is increasingly tightly regulated in New England. There, however, it might be more accurately characterised as attempting to regulate the number of house+land bundles

(integer regulation of developed lots). If this is correct it is not constraining the availability of space per se; indeed a system which constrains the number of house+land bundles in a community or region is quite consistent with one that is oversupplying urban land. It might reduce the price of garden space and lots, while still increasing the price of houses.

We should expect different forms of regulation, therefore, to have different impacts on house and land prices. All those identified above will tend to increase the price of developed lots but some may reduce the price of land, at least per unit area. Indeed as is argued by Mills (2002), in those parts of the US where zoning regulations require large minimum lot sizes, the price of urban land per acre may be significantly depressed compared to what would be observed in an unregulated market with resulting implications for urban form, house characteristics (cheaper space is substituted for other housing attributes) and capital : land ratios in urban areas. The point here is, however, that even if growth constraints are implemented supposedly in pursuit of urban sustainability, a system such as that which appears to operate in New England may raise house prices while reducing the price of land per acre. Indeed the methodology used in Glaeser and Gyourko (2003) could generate a negative price of land even though regulation was imposing a strong effective constraint on the supply of house+land bundles. They use an hedonic approach to deduce the price of land by comparing the prices of houses of otherwise comparable characteristics but with different lot sizes. Unless lots are (infinitely) divisible the hedonic price of marginal land measured in this way could well be negative and is certainly likely to be small if there is any effective minimum lot size regulation in force<sup>10</sup>.

Let us explore some of the economic implications of growth controls of what one might call the British type: those that constrain the amount of land available for urban development with an explicit space constraint but permitted lot subdivision and infilling (densification). Elsewhere we have provided estimates of the distributional and welfare effects of such regulation (Cheshire and Sheppard, 2002a). The conclusion was that even allowing for the value of the amenities generated by the planning system in the form of more open space within the city and at its periphery, and the separation of industrial from residential use, there was a substantial net cost measured as the implied equivalent variation in incomes associated with a local policy of growth constraint. There were also significant distributional impacts. In

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<sup>10</sup> The alternative methodology used by Glaeser and Gyourko (2003) which is effectively a residual valuation approach will in fact provide a measure of a quite different concept of land: land with the value of all local amenities, public goods and neighbourhood characteristics capitalised into it. This is quite distinct from the classic urban economic concept of land as ‘pure space with accessibility’ (see Cheshire and Sheppard, 1995).

particular the effect of a growth boundary was significantly regressive. The benefits generated by it were distributed even more unequally than were the incomes of owner occupiers in the community studied. This is not entirely surprising since the benefits are consumed disproportionately by households living at the periphery with access to the protected open land and these households tend to be richer.

There are, however, other impacts of a long-term policy of constraining space consumption. Table 1 shows the hedonic prices estimated for a mean characteristics house in the community that was the focus of the study. This community was the Reading area in southeast England (defined so as to approximate to a Reading Metropolitan Statistical Area). This is a prosperous community some 65 kilometres west of London, which has experienced rapid economic growth since about 1970.

Hedonic models have been estimated for three dates. Table 1 shows prices for selected characteristics for two of them,<sup>11</sup> 1984 and 1993. The price of a composite good such as housing is the aggregate of the prices of the set of individual characteristics of which it is composed (see Rosen, 1974, for the classic exposition of hedonic price theory). One needs therefore to think about the nature of both the demand for the individual characteristics and of their supply. If the supply of all characteristics was perfectly elastic then, as demand rose, price would not. In an unregulated housing market many characteristics would be in more or less perfectly elastic supply: the exceptions might be land giving access to the employment centres of very large cities such as London or New York or characteristics which were limited by nature: such as access to the coast or – in the case of Reading – direct frontage on the river Thames. The supply of characteristics relating to structures would presumably reflect construction costs. If there was technical progress their supply price in real terms might fall over time.

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<sup>11</sup> The third sample relating to 1999/2000 did not include household incomes and so it is not possible to estimate the structure of demand for housing attributes: see Table 3 and the discussion of it for the significance of this.

<sup>12</sup> The third sample relating to 1999/2000 did not include household incomes and so it is not possible to estimate the structure of demand for housing attributes: see Table 3 and the discussion of it for the significance of this.

Table 1: Changes in prices of selected attributes: Reading housing market, 1984-93

	1984	1993	% Change
<i>Income (pre-tax)</i>			
from sample	£13,694	£28,969	111.5
South East ( <i>Regional Trends</i> )	£12,896	£22,027	70.8
<i>Price Level (1987=100)</i>	91.0	141.9	55.9
Sample mean house price	£51,066	£94,990	86.0
<b>Reproducible attributes</b>			
Central heating	£4,954	£5,997	21.1
Bedrooms	£2,599	£2,801	7.8
Bathrooms + WC	£4,687	£6,229	32.9
<b>Planning amenities</b>			
Less industrial land	£74	£224	202.7
More open accessible land	£51	£227	345.1
More closed unbuilt land*	£102	£60	- 41.2
<b>Space (price per m<sup>2</sup>)</b>			
Garden Space:			
at centre	£49.5	£152.3	207.9
at periphery	£ 4.5	£22.9	404.9
Median distance	£12.8	£32.1	151.5
Internal floorspace	£171	£425	148.5
<b>Local Public Goods</b>			
Best secondary school	£7,090	£13,414	89.2

\* Mainly agricultural land to which there are no significant rights of public access.

Included in the set of characteristics in elastic supply would be land and space. The costs of converting land into urban use are more or less constant in real terms over time and are a function of the costs of providing infrastructure including transport. Basic geometric laws require that the potential supply of land at the fringe of current urban development that would be made available by extending transport systems in, say, a mile wide annular ring, will be large, in any small to medium sized city, relative to the existing urban area.

It is informative to look at the hedonic prices reported in Table 1 in the light of these considerations. Sample incomes rose about twice as much as prices in general but the increase in house prices was some 1.5 times that of the Retail Price Index (RPI). This increase in the price of the composite good, houses, however, concealed great variation in the change in



prices of individual characteristics. A number of these, confined exclusively to structural characteristics capable of being reproduced via the construction industry, showed only modest price increases – far less than the 56% increase in the RPI. Central heating, which was almost certainly subject to strong technical progress over the period, rose in price by only 21 percent and bedrooms, where partitioning costs are presumably minimal, by only 8 percent. The price of the ‘best’ secondary school increased by 89 percent: very much in line with teachers’ salaries which over the period failed to keep pace with incomes in general.

In contrast all prices reflecting space increased by considerably more than either the RPI or house prices in general. Their relative increase in price, moreover, mirrored the extent of the supply constraint via regulation. The policy of urban containment restricted the supply of space most strongly at the urban periphery and there garden space increased by more than 4.7 times house prices. As would be expected the price of internal floor space significantly exceeds the price of garden space and garden space can always be substituted in favour of internal floor space.

Table 2: Number of Households, Household Size & Housing Units per Household: Great Britain

	1966	1971	1976	1981	1986	1991	1996	2000
Households '000	17400	18571	19333	20177	21254	22392	23492	24375
Average size	3.00	2.93	2.83	2.72	2.60	2.51	2.43	2.38
No of Houses per HH	1.01	1.02	1.04	1.04	1.04	1.03	1.02	1.01

**Sources:** *Monthly Digest of Statistics, Annual Abstract of Statistics and Housing & Construction Statistics,* various

As noted above, British planners work in physical units. Concerns about the availability of urban land are formulated in terms of forecast changes in household numbers based on demographic trends. Since policy requires houses to be built at specific densities this, in turn, implies making a specific amount of land available for building. Yet as a comparison of Table 2 and Figure 1 shows household growth has little obvious relationship with house price increases. Between 1966 and 2000 houses per household remained essentially constant. The numbers of houses and households increased in step with each other. Over the same period the real price of houses in England and Wales doubled. Something other than rising household numbers, therefore, would appear to have been involved in the increase in house prices.

Table 3 indicates the likely reason. This shows estimates of the price and income elasticities of demand for specific housing attributes. Price elasticities show more variation over time and between attributes but the estimated income elasticities of demand are very consistent and show that demand for space, both internal and in gardens, is income elastic. As incomes rise over time households attempt to increase their consumption of space but since its supply is constrained by land market regulation the effect is to drive up its price. There is of course substitution between housing characteristics. If garden space becomes relatively more expensive this can be substituted by public open space or other housing attributes such as the number of floors. Instead of building single story houses developers can build multi-story structures or they can build semi-detached or town houses instead of detached houses, leaving more garden space for a given lot area. Similarly internal space can be substituted by smaller rooms and perhaps by design features. Thus we should not expect the price of the composite good ‘houses’ to rise as fast as that of those characteristics – in this case space – constrained in supply. Nor should we expect the elasticities of demand for the composite good to be the same as those for individual characteristics.

Table 3: Price & Income Elasticities of Demand of Selected Attributes of Housing, 1984 and 1993

Attribute	Estimated Elasticities <sup>1,2</sup>			
	1984		1993	
	Price	Income	Price	Income
<b>Reproducible structure attributes</b>				
Bedrooms	-1.129	1.593	-2.95	1.91
Bathrooms + WC	-1.308	1.585	-6.75	1.87
<b>Space</b>				
Internal space	-1.216	1.592	-10.34	1.72
Land area (size of garden)	-1.533	1.678	-1.20	1.76

<sup>1</sup> From Cheshire and Sheppard 1998

<sup>2</sup> From Cheshire, Marlee and Sheppard, 1999.

Real household disposable incomes in the UK increased by 37 percent between 1984 and 1993 and by 73 percent between 1984 and 2002. Given that this increase was concentrated in areas of the southeast outside Greater London and that increases in household numbers were

concentrated in the same areas, it is easy to understand the dynamics of increased demand for urban land in southern England.

Given the form of the ‘anti-sprawl’ land market regulation practiced in Britain since 1947, therefore, and these possibilities of substitution, we should expect the price of space and housing land to have risen over time to a very much greater extent than the price of the composite good, ‘houses’. We have already seen that this is apparently the case in one constrained housing market in southeast England but Figure 1 shows that it is also true at a much more aggregative level. This plots both the real price of housing land and ‘houses’ over the longest time such a series can be constructed. The housing land series comes from a mix of sources: research on auction prices (Vallis, 1972) covering the period 1892 to 1969 but only for England; and official data on housing land prices, published since 1963 but relating to England and Wales. These have been spliced together to make a continuous series. Similarly house prices come from several sources. Before 1974 they relate simply to the average house price for the United Kingdom. Since then there is some simple hedonic adjustment for a limited number of attributes but they still relate to the UK. Thus both series have defects (as indeed does a price deflator constructed over such a long period) but the conclusion is so striking that no deficiencies in the data could obscure or explain it.

Before regulation began to constrain the supply of land following the Town and Country Planning Act of 1947, land for housing showed no trend in real price. Indeed between 1892 and the date of the last pre-WWII population census, 1931, despite a 61 percent increase in household numbers and a 25 percent increase in real incomes, real land prices appeared to fall. Since newly constructed houses are only a small fraction of the supply of housing at any time, constraints on land availability had no great effect on land prices for some 10 years or so. However from 1955 to 2002 the real price of housing land increased by a factor of 11.1 (with a trend increase of perhaps 7.5 times). In contrast the real price of houses increased over the same period by only 3.4 times (with a trend increase of 2.7 times). Thus real land prices increased about three times as much as the price of houses. Furthermore, the volatility of the price cycle was greater and increasing for land relative to houses. Again given that the quantity constraint applies to land rather than houses this is what should be expected.

Commentators in the UK have noted (see, for example, HM Treasury, 2003 or Barker, 2003) that the supply of houses seems to be inelastic. Although construction responded to the price

increases of the early to mid 1970s, and responded modestly to the house price boom of the late 1980s, the boom of the late 1990s and early 2000s has not produced any increase in house construction. House construction in 2001 was the lowest in any year since 1951 in the UK. This falling response of house construction to house prices is explicable in terms of the constraint on space for houses rather than on a falling elasticity of supply of house construction itself. As land prices get bid up and development is forced away from easy and cheap to build on green field sites to re-cycled land and infilling, so both the costs of obtaining land and the costs of construction on it must be expected to increase. Thus the increased inelasticity of land as a result of land market regulation induces an increasing inelasticity of supply of house construction. At the same time the rising real price of housing means that it is increasingly treated as a financial asset by house owners and the rising real price of urban land or land with the potential to be converted to urban use increasingly dominates the calculations of developers.

#### **4. What do we need to know and how might we most fruitfully investigate it?**

Several central questions are suggested by both recent research and the papers presented at the conference. These are first, the extent to which zoning and land use controls are strictly binding on economic decisions as opposed to being adjusted to accommodate market outcomes? Second, to the extent that land use controls do affect market outcomes what are the impacts on the distribution of welfare (or the income equivalent) across the affected population? Third, what and how important are the indirect effects of land use regulation in the form additional delays and uncertainty in development? Fourth, what data resources can be used for analysis of these questions, and how can data collection efforts be coordinated to facilitate comparison between cities and different national planning systems? Finally, in so far as growth constraints increase the real price of housing and particularly housing land, what are the wider impacts on the saving and consumption behaviour of individuals and on the behaviour of developers – especially their rent-seeking activities?

The first question has to this point had little empirical attention. Perhaps the study by Evenson and Wheaton (2003) comes closest in that they do investigate the relationship between the characteristics of communities and their application of zoning policies. Fischel (2001) likewise touches on these questions through analysis of how zoning and homeownership interact to generate incentives for homeowners to ‘demand’ particular zoning policies.

Clearly an important issue is whose preferences shall be accommodated? A constraining policy with respect to urban growth may be favoured by existing home owner-voters within a community but be contrary to the preferences of non-home owners and non-residents. In contexts where zoning is the responsibility of the local community – as in much of the US or in the UK – a serious problem may arise from the fact that the costs of development (both disruption and loss of amenity and property values) are localised while the benefits of development (both lower housing prices and access to amenities) are spread more widely. Thus in investigating the extent to which zoning follows or leads preferences we need to consider whose preferences, and the extent to which community preferences may be endogenous with zoning practice.

One problem is that empirically it is most unlikely that there is single answer to the question of how far land use regulation is binding on economic decisions. It is almost certainly a matter of degree and will depend on both the form of the land market regulation (zoning, development control, growth boundaries or Master Planning, for example) and the legal and institutional context within which the regulation is implemented. Regulations may evolve (or partly evolve – we do not know) to reflect changing economic circumstances or price differentials but equally the strictness with which a given regulation may be implemented will vary with context. There are some countries even in Western Europe where regulations may be very flexible. It therefore seems more sensible to look for research reflecting a representative variety of conditions and modes of regulation.

The few empirical studies that have been done to date have, as might be expected, focused on the most constrained communities but have found substantial impacts on house prices, economic welfare and the distribution of real incomes. This suggests that land use regulation at least can be to a degree binding but it is likely that such impacts will vary greatly from context to context. For example it appears that growth boundaries are particularly regressive in welfare terms (Cheshire and Sheppard, 2002a) but the impact of other types of planning policy, such as the promotion of ‘mixed communities’ or mixed land use, might have very different distributional effects. It is certainly worth investigating. Given the sheer size of the estimated net welfare impact of land use regulation in the very few studies that have tried to quantify it, there is certainly a need for additional studies in different contexts, using different methodologies and techniques.

Policy makers and developers alike invoke planning delays as a significant potential cost of land use regulation yet there is surprisingly little serious research attempting to quantify such costs. An initial consideration of the impact of delays in development resulting from land use regulation is presented in Keogh and Evans (1992). Such delays are central to the theoretical model presented in Mayo and Sheppard (2001). According to Barker (2003) the percentage of major housing development applications approved in England (bearing in mind that typically there would be extensive negotiations with the planning authority prior to formal application) fell from 84 to 75 percent between 1996 and 2002 while the percentage approved within three months fell from 53 to 36 percent. Delays have a direct financing cost but more interesting and perhaps significant may be the impact delays have on uncertainty. Where major developments are involved, especially major infrastructure projects such as airports, other investment is conditional on the outcome of the decision and the uncertainty generated for related investment may be the most important cost of delay. This is an area where further research, particularly empirical studies, could help to enhance our understanding of the impacts of land use regulation.

One of the most promising developments is the rapid increase in the availability of, and ability to process, remote sensing data on land use; and the parallel ability to integrate such physical data with socio-economic or other data. Burchfield et al (2002) provide an example of how researchers are beginning to be able to investigate large scale patterns of land use change. Evenson and Wheaton (2003) show how very detailed data on the physical use of land can be integrated with jurisdictional and socio-economic data. But these developments are still at a very early stage. We are not aware of any work attempting to relate such large scale data sets to data relating to individual households rather than aggregative measures for whole communities.

Finally, we note two additional questions whose answers would be important for improved policy and a deeper understanding of urban land markets, but that remain elusive. We have discussed above the choice of community, location and housing consumption and how these are affected by land use regulation. With housing consumption accounting for such a large proportion of household budgets, it is natural to suspect that land use regulation, through its impact on housing consumption – including via its effects on expectations of future relative asset prices - might generate significant changes in consumption of other goods, and in

aggregate savings and labour supply. At present these linkages are not well understood and certainly not precisely measured – indeed hardly investigated at all.

A second question concerns the nuances of how land use regulation affects supply behaviour. Analysis by Riddiough (1997) and Mayo and Sheppard (2001) has explored potential mechanisms through which land use regulation might alter the risk faced by developers, and thereby alter the supply of housing. Again it is likely that the impact of growth constraints on the price and expected future price of land will have a significant impact on developer behaviour. Understanding the variety of ways in which housing supply responds to land use regulation, and empirical measurement of the magnitude of these responses is an important area for future research.

We think the articles printed here make a useful contribution to knowledge on a range of issues relating to land markets and land market regulation but they really only should whet researchers' appetites. Like most worthwhile studies they answer restricted questions in credible ways but collectively they demonstrate that land market regulation is an important aspect of policy which has far-reaching and substantial effects. But even the specialist research community has still only scratched the surface with respect to the extent and complexity of these effects.

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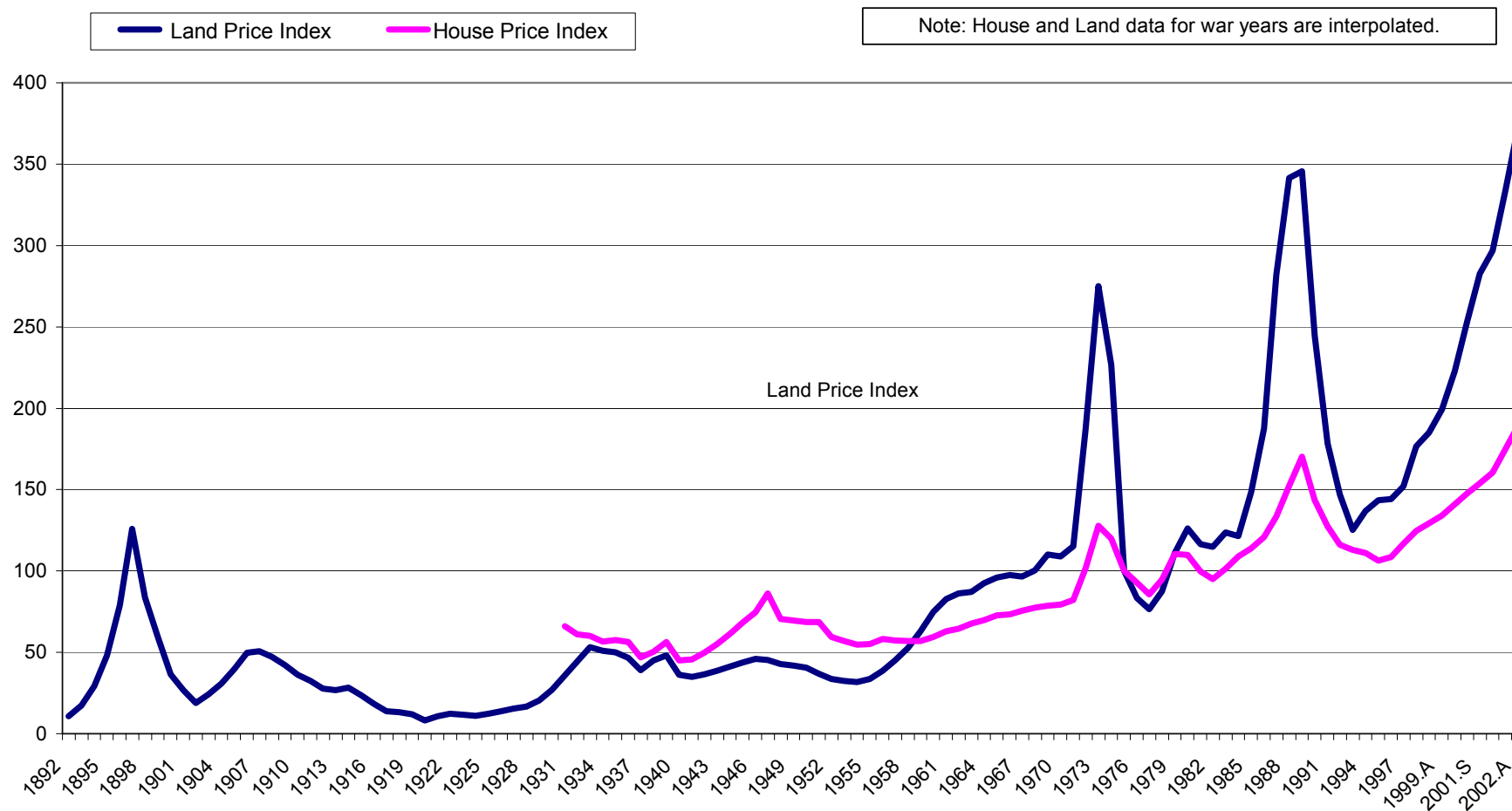
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Figure 1: Long Run Real Land & House Price Indices (1975 = 100): England/England & Wales



Housing land prices are from 3 sources: Vallis (1972) *Estates Gazette* – 1892 to 1969 England: *Housing & Construction Statistics* – 1963 to 1987 England & Wales; and *Property Market Report*, Valuation Office – 1983 to 2002  
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