

Chapter 1

Microeconomic Concepts

Economics is conventionally divided into two types of analysis: microeconomics and macroeconomics: **microeconomics** studies how individuals and firms allocate scarce resources whereas **macroeconomics** analyses economy-wide phenomena resulting from decision-making in *all* markets. One way to understand the distinction between these two approaches is to consider some generalised examples. Microeconomics is concerned with determining how prices and rents emerge and change and how firms respond. It involves an examination of the effects of new taxes and government incentives, the characteristics of demand, determination of a firm's profit and so on. In other words it tries to understand the economic motives of market participants such as landowners, developers, occupiers and investors. This diverse set of participants is rather fragmented and at times adversarial but microeconomic analysis works on the basis that we can generalise about the behaviour of these parties. A particular branch of economics known as *urban land economics* is concerned with the microeconomic implications of scarcity and the allocation of urban property rights. This section brings together and explains the key microeconomic concepts and theories that have a bearing on urban property markets and the important work of authors like Alan Evans, Will Fraser, Jack Harvey and Danny Myers in relating classical economic concepts and theories to urban land and property markets is acknowledged.

1.1 Supply and demand, markets and equilibrium price determination

This book does not seek to present all facets of microeconomics; the focus is on price determination. The world's resources – land, labour and capital – are used to create economic goods to satisfy human desires and needs and **economics** is

concerned with the allocation of these finite resources to humanity's infinite wants. This problem is formally referred to as **scarcity**. In an attempt to reconcile this problem, economists argue that people must make careful choices about what is made, how it is made and for whom; or in terms of property, choices about what land should be developed, how it should be used and whether it should be available for purchase or rent. In short, economics is the 'science of choice'. Because resources are scarce their use involves an **opportunity cost** – resources allocated to one use cannot be used simultaneously elsewhere so the opportunity cost of using resources in a particular way is the value of alternative uses forgone. In other words, in a world of scarcity, for every want that is satisfied, some other want remains unsatisfied. Choosing one thing inevitably requires giving up something else; an opportunity has been forgone. This fundamental economic concept helps explain how economic decisions are made; for example, how property developers might decide which projects to proceed with and how investors might select the range of assets to include in their portfolios. To avoid understanding opportunity cost in a purely mechanistic way – where one good is simply chosen instead of another, we need to clarify how decisions between competing alternatives are made. Goods and services are rarely bought to yield a one-dimensional type of utility to the purchaser; the purchase usually fulfils a range of needs. As Lancaster (1966) explained

The good, *per se*, does not give utility to the consumer; it possesses characteristics, and these characteristics give rise to utility. In general... many characteristics will be shared by more than one good.

For example, a commercial building provides a range of services for the tenant; office space for employees, a certain image, a specific location relative to transport and supplies, an investment and so on.

An assumption must be made at this early stage; that consumers of resources seek to maximise their welfare. Our concern is with commercial property and therefore businesses are the resource consumers and welfare to them means profit. Businesses seek to maximise their profit. A budget constraint limits the choices that businesses can make when choosing between resources in a market – in effect, desire, measured by opportunity cost, is limited by a budget constraint. The existence of a budget constraint is a reflection of the distribution of resource-buying capacity throughout an economy. In some economies this distribution might be state-controlled, in others it is left to competitive forces. In a market economy the allocation of scarce commercial property resources is facilitated by means of a **market**. In economic terms a market has particular characteristics; there are lots of decision-makers (businesses in our case) and they behave competitively; any advantage some might have in terms of access to privileged information for example does not continue beyond the short-run. Each business will have particular preferences or requirements and a budget and these will influence the price that can be offered for property and consequently the quantity obtained.

Let's simplify the commercial property market for a moment to one where land-owners supply properties and businesses demand or 'consume' them. Suppliers interact with consumers in a market-place where property interests are exchanged, usually indirectly by means of money. The short-run¹ demand schedule illustrated in Figure 1.1 represents consumer behaviour and is a downward-sloping curve to

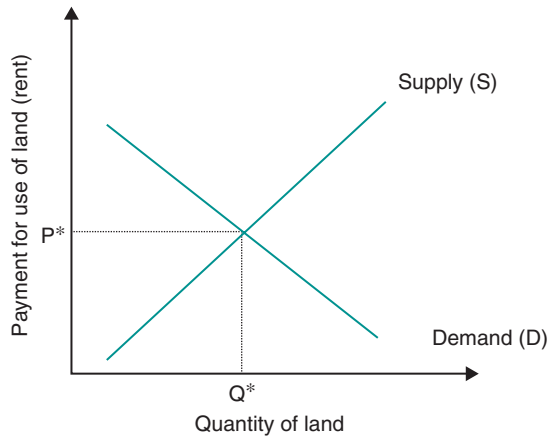


Figure 1.1 Short-run supply of and demand for property.

show that possible buyers and renters of property demand a greater quantity at low prices than at high prices (assuming population, income, future prices, consumer preferences, etc. all remain constant). The short-run supply curve maps out the quantity of property interests available for sale or lease at various prices (assuming factors of production remain constant).² The higher the price that can be obtained the greater the quantity of property that will be supplied. Equilibrium price P^* is where demand for property equals supply at quantity Q^* . Price varies directly with supply and indirectly with demand.

The result of an efficiently functioning commercial property market in the long-run should be economic efficiency, achieved when resources have been allocated optimally. Profit has been maximised and property resources could not be reallocated without making at least one consumer or business worse off, a concept known as Pareto optimality.

But what do businesses demand commercial property for? Property is demanded, and therefore leased or purchased, not for its own sake but as a means to an end; typically, as far as commercial property is concerned, for the production capabilities it offers, the services it supports or the profit it might generate. Demand of this type is known as **derived demand**. This is an important concept as it explains some of the complexity associated with valuation, especially as commercial property offers different utility opportunities for developers, occupiers and investors. This utility value is usually measured in monetary terms and might take the form of a rental value in the case of a tenant or a capital value in the case of an investor, developer or owner-occupier. So commercial property, particularly in its undeveloped state, is a resource that is combined with other resources to produce goods and services that businesses desire. Economists tend to refer to these resources as **factors of production** to emphasise that various factors need to be combined to produce goods or services. The factors of production are usually classified into three groups: land, capital and labour, and sometimes entrepreneurs are specifically identified as a fourth category. To construct a building labour is required to develop a plot of land, and plant and equipment, which may be hired or bought, is required to facilitate the process. These manufactured

resources are called capital or, more precisely, **physical capital**. Each factor of production receives a specific kind of payment. Landlords, who provide the use of land over time, receive rent. Owners of physical capital receive interest, workers receive wages and the entrepreneur gains profit. It is interesting that Marxists challenge the logic of this model as they understand land to be a gift of nature – a non-produced resource – that exists regardless of payment. From a pure Marxist perspective, therefore, land has no value and all property is regarded as theft! Indeed it is too easy to forget that the state or some collective arrangement could own and allocate land.

The Appraisal Institute (2001) summarises the situation: a property or, more correctly, a legal interest in a property, cannot have economic value unless it has *utility* and is *scarce*. Its value will be determined by these factors together with *opportunity cost* and *budget constraint*. The way these four factors interact to create value is reflected in the basic economic principle of supply and demand, and valuation is the process of estimating the equilibrium price at which supply and demand might take place under ‘normal’ market conditions. Property, then, is required to produce goods and services and enters the economy in many ways. Capitalist market economies have developed systems of private property ownership and occupation and the trading of property rights between owners and occupiers as a means of competitive allocation. Economists try to understand the nature of payments that correspond with the trading of these property rights and this is, from an economic perspective at least, the essence of valuation.

1.2 The property market and price determination

This section introduces three inter-related economic concepts concerning the use of land for commercial activity:

- a) The payment in the form of rent that is made for the use of land.
- b) Different rents for different land uses; competitive bidding between different users of land means that each site is allocated to its optimal or profit-maximising use.
- c) Variation in land use intensity.

1.2.1 Rent for land

Commercial property has certain economic characteristics that distinguish it from other factors of production. It actually has two components; the land itself and (usually) improvements that have been made to the land in the form of buildings and other man-made additions. This has several implications, not least the existence of a separate market in land for development, which we will discuss in more detail later. Each unit of property is unique; it is a heterogeneous product, if only because each land parcel on which a building is sited occupies a separate geographical position. This means that it will vary in quality – for urban land this is largely due to accessibility differences but will also differ in terms of physical attributes, legal restrictions (different lease terms for example) and external

influences such as government intervention in the form of planning. Property tends to be available for purchase in large, indivisible and expensive units so financing plays a significant role in market activity. Also, because of its durability, there is a big market for existing property and a much smaller market for development land on which to build new property. We also know that, in the UK, about half of the total stock of commercial property is owned by investors who receive rent paid by occupiers in return for the use of property. The other half own the property that they occupy but we can assume that the price or value of each property asset is the capitalised value of rent that would be paid if the property was owned as an investment. This means that we can focus our economic analysis of price determination in the property market on rental values and assume that capital values bear a relation to these, a relationship which will be described in detail in Chapter 4.

Early classical economists regarded rent as a payment to a **landlord** by a **tenant** for the use of land in its ‘unimproved’ state (land with no buildings on it), typically for farming. The classical economist Ricardo (1817) set out a basic theory of agricultural land rent. The theory implied that land rent was entirely demand-determined because the supply of land as a whole was fixed and had a single use (to grow corn). The most fertile or productive land is used first and less productive land is used as the demand for the agricultural product increases. Rent on most of the productive land is based on its advantage over the least productive and competition between farmers ensures the value of the ‘difference in productivity of land’ is paid as rent (Alonso, 1964). Rent is therefore dependent on the demand (and hence the price paid) for the output from the land – a derived demand.

Now consider price determination in the market for new urban development land. Applying marginal productivity theory, land is a factor of production and a profit-maximising business in competitive factor and product markets will buy land up to a point at which additional revenue from using another unit of land is exactly offset by its additional cost. The additional revenue attributable to any factor is called the marginal revenue product (MRP) and it is calculated by multiplying the marginal revenue³ (MR) obtained from selling another unit of output by the marginal product⁴ (MP) of the factor. If other factors of production are fixed, as more and more land is used, its MP decreases due to the onset of **diminishing returns**. So if MR is constant and MP declines, the MRP of land will decline as additional units of land are used *ceteris paribus*. The declining MRP can represent a firm’s demand schedule for the land factor as shown in Figure 1.1.⁵ If the price of land falls relative to other factors of production, demand will increase; that is why the demand curve in Figure 1.1 is downward-sloping. If the productivity of land or the price of the commodity produced increases then demand for all quantities of land and hence the rent offered would rise (the demand curve would shift upwards and to the right from D to D₁, as illustrated in Figure 1.2. On the supply side the situation is a little more unusual. In a market for a conventional factor of production or end-product, the supply curve would be upward-sloping as illustrated in Figure 1.1, but the supply of all land is completely (perfectly) inelastic and cannot be increased in response to higher demand – the only response is higher price. Price therefore is solely demand-determined.

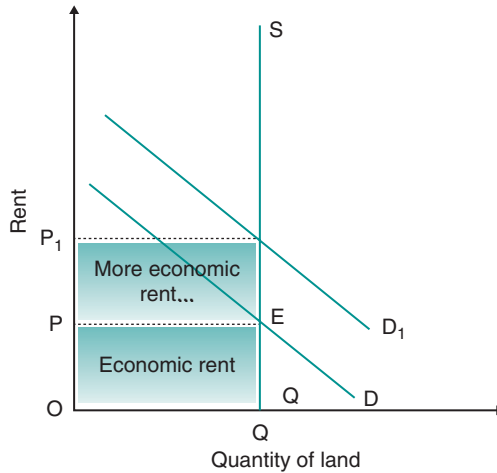


Figure 1.2 Elastic demand and inelastic supply of land for a single use using Ricardian Rent Theory.

Whatever the level of demand, supply remains fixed, the opportunity cost of using land is therefore zero and all earnings from the land (represented in Figure 1.2 by the area OPEQ) is **economic rent** – that part of earnings from a factor of production which results from it having some element of fixed or inelastic supply and there is competition to secure it (Harvey and Jowsey, 2004).

Ricardian rent theory applies to land as a whole since the ultimate supply of all land is fixed, that is why the supply curve is perfectly inelastic (vertical) and all rent is economic rent. But demand for urban development land (as for all commercial property) is a derived demand and, because each unit of land is spatially heterogeneous, different businesses will demand land in different locations for different uses. Consequently they will be able to pay a price for land that depends on the revenue they think they can generate and the costs they will incur in the process. As Harvey (1981) puts it, users compete for land and offer, in the form of rent, the difference between the revenue they think they can generate from using the land and the costs of production (including their **normal profit**). So we can adapt the above theory to take into account different businesses wishing to use land in various locations in different ways.

1.2.2 Land use rents

The supply of land for a particular use will not be fixed (perfectly inelastic) unless, of course, it can only be used in one way. This is because, in response to an increase in demand, additional supply could be bid from and surrendered by other uses if the proposed change of use has a value in excess of its existing use value. The payment to the landowner for the use of land is still made in the form of rent but, since land can be used for alternative uses, supply is no longer perfectly inelastic and has an opportunity cost. Land rent, rather than comprising economic rent only, can now be considered to consist of two elements: **transfer earnings**; a minimum sum or opportunity cost to retain land in its current use, which must be

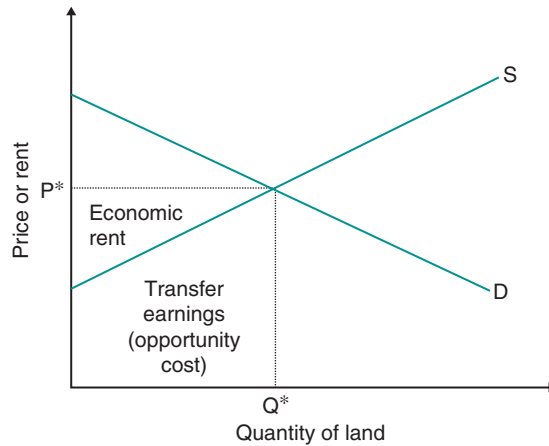


Figure 1.3 Elastic supply and elastic demand.

at least equal to the amount of rent that could be obtained from the most profitable alternative use, and economic rent; a payment in excess of transfer earnings that reflects the scarcity value of the land.

Diagrammatically, the supply curve is no longer vertical; instead it is upward-sloping. Figure 1.3 illustrates the demand for and supply of land for a particular use, warehousing perhaps. Assuming competition between users of land, interaction of supply and demand will lead to a supply of Q^* land for this particular use, all of which will be demanded and for which the market equilibrium rent will be P^* . Because supply is not perfectly elastic, some of this rent is transfer earnings and the rest is economic rent. If the rent falls below the transfer earnings then the landowner will transfer from this land use or at least decide to supply less of it. Q^* is the marginal land and is only just supplied at price P^* and all of the rent is transfer earnings. Assuming a homogeneous supply, the interaction of supply and demand leads to an equilibrium market rent for this type of land use and competition between uses ensures that this rent goes to the optimum use (Harvey, 1981).

The amount of price shift in response to a change in supply will depend on the elasticity of supply, the more inelastic the greater the change in price. Using this neoclassical land use rent theory it is possible to look at the interaction between supply and demand more closely in order to understand the nature of the rent payments for different land uses. Figure 1.4 shows that the rent for retail land use is almost entirely economic rent in the centre of an urban area. Commercial floor-space that is restricted in supply such as shops in Oxford Street in London or offices in the West End of London command a high total rent that is almost entirely made up of economic rent because of the scarcity of this type of space in these locations.

The more elastic supply of land for industrial use on the edge of an urban area means that the lower commercial rent for industrial floor-space is largely transfer earnings, see Figure 1.5. The proportion of transfer earnings and economic rent depends on the elasticity of supply of land: the more inelastic the supply, the higher the economic rent whilst the more elastic the supply, the higher the transfer earnings. Because urban land is fairly fixed in supply (inelastic) and is increasingly

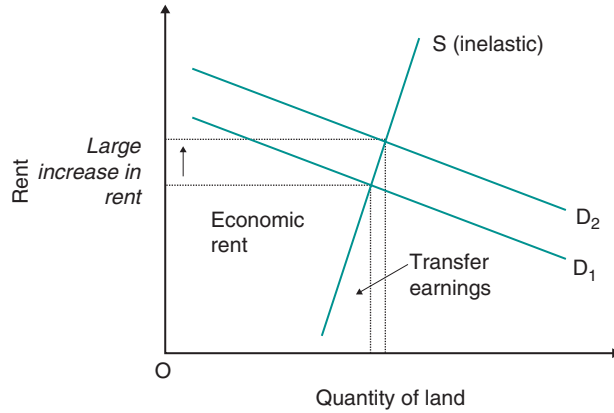


Figure 1.4 Rents for retail land in the central area under conditions of inelastic land supply.

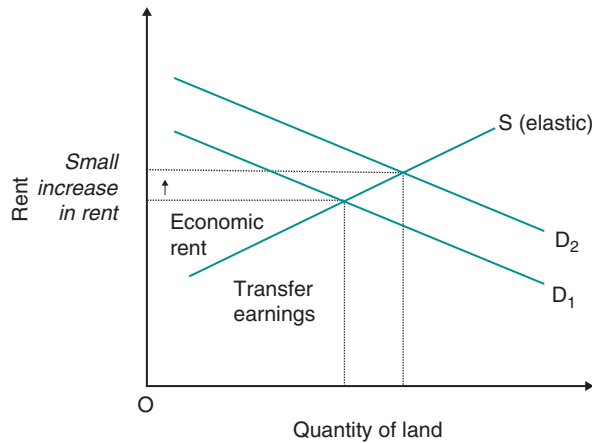


Figure 1.5 Industrial land rents on the edge of an urban area under conditions of elastic land supply.

so near the centre, economic rent forms an increasing proportion of total rent as the centre of an urban area nears. So any increase in demand (or reduction in supply) for central sites is reflected in substantial rises in commercial rent, but on the outskirts an increase in demand (or decrease in supply) for land for a specific purpose only produces a small change in economic rent (and thus total rent as a whole) because land is less scarce.

Before moving on we will consider the effect of time on the elasticity of supply of and demand for commercial land. Taking office land as an example and using conventional equilibrium analysis, in the short-run, supply will be inelastic⁶ (S in Figure 1.6) and demand represented by D will be elastic, producing an equilibrium rent, r^* . If demand for offices increases to D_1 (perhaps an economic upturn has meant that more employees have been recruited and there is a demand for more space), rent will rise to r_1 . In the long-run, supply adjusts in response to this

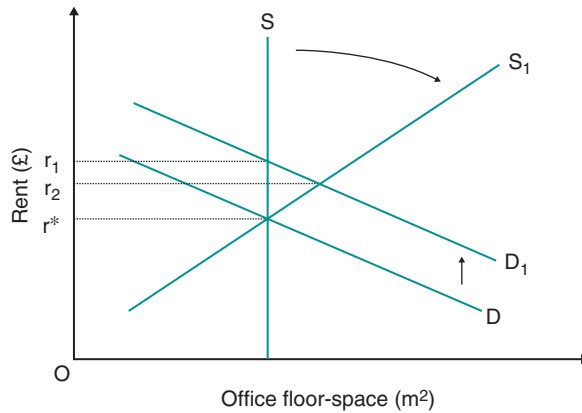


Figure 1.6 Equilibrium analysis of rent for office space (after Fraser, 1993).

increase in demand because the increase in rent improves the profitability of property development activity. The assumption of inelasticity can therefore be relaxed and the supply of office land will increase to say S_1 , settling rents back to r_2 , assuming no further change in demand. It should be noted that this is a very simple model of a complex market that is seldom in a state of equilibrium (Fraser, 1993).

It is now time to turn our attention to the use of land *and* buildings (property) as a collective factor of production. The first thing to point out is the dominance of the existing stock of property over new stock. Because property is so durable it accumulates over time and new developments add only a tiny amount to the existing stock. Consequently new supply has negligible influence on price. Nowadays we think of urban rent as a payment for ‘improved’ land – typically land that has been developed in some way so that it now includes buildings too. Economists refer to this concept of rent as **commercial rent**. If the property is leased to a tenant then the rent would include not only a payment for the use of the land but also some payment for the interest and capital in respect of the improvements that have been made to the land. But it is not easy to distinguish the rent attributable to buildings from that attributable to land. Land is permanent and although buildings ultimately depreciate, they do last a long time. It can be assumed therefore that land and buildings are a fixed factor of production in any time-frame except the very long-run which the user can combine with variable amounts of other factors (labour, capital and enterprise) to undertake business activity. We have also established that, in absolute terms, the physical supply of *all* land is *completely* inelastic and the supply of land for *all commercial uses* is *very* inelastic. The supply of land and buildings (or property) for *specific commercial uses* is *relatively* inelastic in the short-run due to the requirement for planning permission to change use and the time it takes to develop new property, but less so in the long-run as development activity reacts and changes in the intensity with which land is used are possible. Nevertheless, compared to the other factors of production, supply of property is the least flexible. So, because of the negligible influence on price of new supply, demand is the major determinant of rental value.

1.2.3 Land use intensity

It was stated above that the quantity of land that a user demands depends not only on its price and the price of the final product but also on its productivity. The productivity of land can usually be increased in response to increased demand (or a price rise) by using it more intensively through the addition of capital. In economic terms we can add units of other factors of production (labour but, particularly, capital) to the fixed amount of land. As we are dealing with commercial property we are typically referring to the addition of building area or floor-space to a unit of land rather than, say, the addition of fertiliser to farmland. This idea was first expounded by Alfred Marshall (1920) who argued that as demand for a piece of land increases it will be worthwhile providing more accommodation on the site, in other words using it more intensively). By providing more accommodation on a site, land area is being substituted by building area. The relative cost of land and building will determine the extent of this substitution. If land is cheap it will not take much extra building before it will pay to acquire more land to provide more accommodation. Whereas, if land is expensive, a large amount of building may take place before building costs increase to a level at which it pays to acquire more land to provide extra accommodation. It must be borne in mind though that the process of adding more and more capital to a fixed amount of land will be subject to the principle of diminishing returns. Marshall used the phrase '*the margin of building*' to describe that accommodation which it is only just worth obtaining from a given site and which would not be obtained if land were less scarce. This extra accommodation was likened to the top floor of a building which, by erecting this floor instead of spreading the building over more ground, yields a saving in the cost of land that just compensates for the extra expense. The revenue that the accommodation on this top floor provides is just enough to cover its costs without allowing anything for rent. In other words the marginal revenue from this floor equals its marginal cost.

So, for each unit of land, the land use rent theory must simultaneously allocate the optimum (profit maximising) use *and* intensity of that use. We have already examined *allocation of land use* so now let us concentrate on the *intensity of land use*. Assume that the optimum land use of a particular site has already been determined. This means that land is a factor of production which has a fixed cost. What we want to know is the optimum amount of capital (which, it is assumed, means building floor-space) to add to the land. In other words, how intensively should the land be used or how much floor-space should be added to the site to maximise profit? Assuming that perfect competition in the capital market keeps the cost per unit of capital the same regardless of the quantity required, as more capital (floor-space) is added to the fixed amount of land, initially the MRP of the land might increase because of economies of scale but the law of diminishing returns means that eventually it will fall. Profit is maximised where the MRP of a unit of capital equals the marginal cost of a unit of capital, in Figure 1.8 this is when OX units of capital are employed. If the business employs less than this amount the MR earned by an extra unit exceeds its MC and if more are employed the MC of each unit in excess of OX will be higher than its MR. OX is therefore the optimum amount of capital to combine with the land. The total revenue earned is represented by the area QYXO. Total cost (including profit) is area

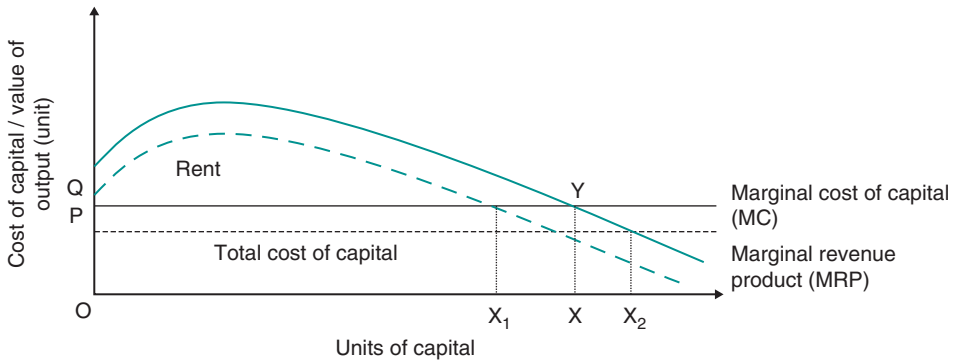


Figure 1.7 Optimum combination of land and capital (adapted from Fraser, 1993).

PYXO and surplus revenue is therefore QYP. If the current land use is the most profitable then land rent is QYP, i.e. the surplus remaining after deducting costs of optimally employed factors of production from expected revenue (Fraser, 1993). The amount of land that a business user will demand depends on its price relative to other factors of production, the price of the goods or services produced on or provided from the land and the productivity of the land. If the price obtained for goods and services produced from the land falls the MRP curve will drop from the solid line to the dashed line. Alternatively the production cost (the cost of each unit of capital) might fall, perhaps due to an improvement in construction technology or a fall in the cost of borrowing capital. This would shift the marginal cost of capital line downwards. Either case will, *ceteris paribus*, affect the margin at which it is profitable to use the land, the commercial rent that can be charged and the intensity of use of the land. Similarly a more profitable use would have a higher MRP curve and could therefore afford to bid a higher rent. Competition between different land uses ensures that the land is allocated to its most profitable use and the land rent surplus QYP is maximised.

In terms of land use intensity, Figure 1.7 and the underlying land use rent theory shows that, in order to maximise revenue from a site, capital must be added to the point where marginal revenue product equals marginal cost. This also has the effect of maximising the surplus revenue that is available to pay as rent: the highest bidder or rent payer is also the most intensive user of the land. This assumes that competition for land for various uses will ensure that the use of each site will be intensified up to a point at which it is no longer profitable to add any more capital to the same site. In a market where supply is inelastic, as demand for business space in a locality increases, its prices rise. At the same time the higher price of land means that it makes sense to intensify its use up to the point where the production costs (excluding rent) are so high that it is more cost-effective to purchase additional land than use the existing site more intensively. So a factory owner in a central location may find that, on account of the high rent for the site, the revenue generated will not cover production costs and may decide to relocate and sell the site to an office user. Harvey and Jowsey (2004) illustrate this point by comparing two sites of the same size; (a) one in the city centre and (b) one in a suburb (b). Figure 1.8 shows that it is the strength of demand (represented by the MRP curve) which determines land rent and intensity of land use. For reasons

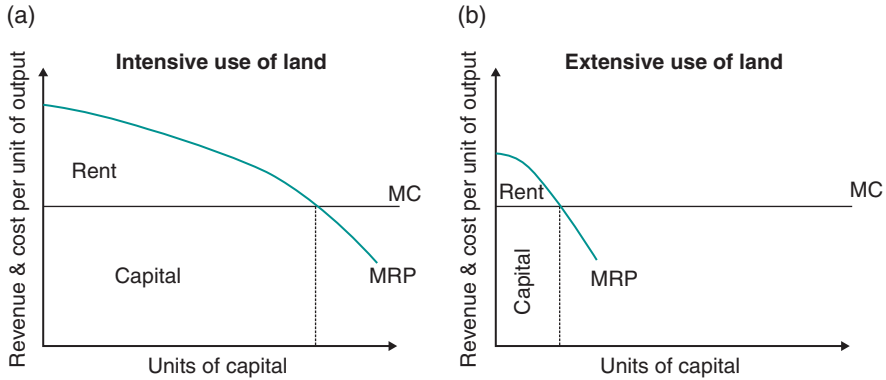


Figure 1.8 Demand and its effect on rent and intensity of land use.

that will become clear in the next section it is the city centre site from which a business user is able to extract more revenue per unit of output. From the landlord's perspective, where demand (reflected in the commercial rent obtainable) is high (high MRP curve) a more intensive use of land is possible and rents are high.

This is a very simple model which will be developed a little later in section 1.4 in the context of property development. Specifically it will be assumed that MC is not constant – as increasing amounts of capital are added to a fixed piece of land it becomes progressively more expensive to do so, as is the case when building a high-rise office building. The MC curve therefore rises.

To summarise, the rent for land is regarded as a surplus and is determined largely by demand. Different users compete for each piece of land and competitive behaviour ensures that each piece is allocated to its most profitable use and its most profitable intensity of use. We have made a number of simplifying assumptions along the way and we shall come back to these at the end of the next section.

1.3 Location and land use

Our discussion so far has suggested that different users of land might be prepared to offer different rents for a piece of land because it offers the potential to make different amounts of revenue depending on the use to which it is put. But what is this potential and why are different uses able to offer or bid different rents to use it? Land offers certain attributes that some commercial users find more beneficial than others and we have to bring these in to our discussion now. In developing our understanding of commercial rent we are not only concerned about supply of and demand for land as a whole, land for particular uses and the intensity with which those uses are employed on land, but also where the land is. We need to understand this final part of the jigsaw because land, unlike other factors of production (labour and capital), is fixed in space so the location of each site influences the way in which it is used and its profit-making potential. In short, we need to know a little about the economics of space.

As well as formulating a theory of agricultural land rent based on fertility Ricardo also recognised that land near a market bears lower transport costs and so generates more revenue with the surplus (over and above costs and normal profit) being paid as rent. Ricardo (1817) argued that

[I]f all land has the same properties, if it were unlimited in quantity, and uniform in quality, no charge could be made for its use, unless where it possessed peculiar advantages of situation.

So land that is close to the market or a supply of labour (a ‘prime’ site) will yield the same output as land that is further away (a ‘secondary’ site) but would incur lower labour and capital costs due to its accessibility advantages. Assuming the exchange value or price of the output remains the same regardless of whether it was produced on prime or secondary land, the utility value of the prime site is greater and this value is transferred via competitive bidding from user to landlord in the form of rent.

In 1826 the German landowner von Thünen applied Ricardian rent theory in a spatial context and demonstrated the relationship between the ability to pay agricultural rent for a piece of land and its distance from the market in which the farm produce is traded. The theory assumes that farmland exists in a boundless, featureless plain over which natural resources and climate are uniformly distributed and that produce is traded at a central market which is connected to its catchment area by a uniformly distributed transport network. It was also assumed that although different agricultural produce can be produced which differs in production costs and bulk so that cost of transportation varies, revenue from each product per unit area of land is the same; in other words von Thünen’s theory was a cost-based model which ignored intensity of land use and revenue differentials. Fixing all other costs Figure 1.9 shows that, for a single land use, transport costs will increase as distance from the central market increases. Assuming competition

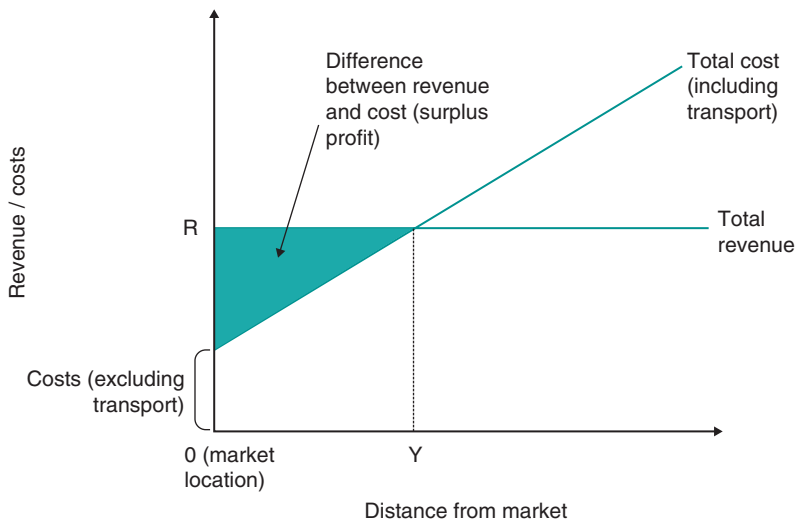


Figure 1.9 Von Thünen’s single use revenue and cost model (adapted from Harvey and Jowsey, 2004).

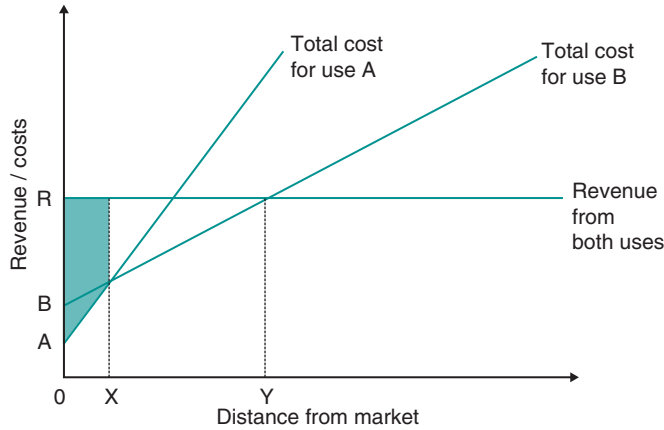


Figure 1.10 Von Thünen's two-use revenue and cost model (adapted from Harvey and Jowsey, 2004).

between uses, any surplus profit over and above costs (which include normal profit to the farmer) is paid as rent to the landowner. As the theory assumes total revenue remains constant the rent (surplus profit⁷ in Figure 1.9) decreases as the distance to the market increases. Beyond distance Y this use is no longer profitable as costs exceed revenue.

Figure 1.10 introduces a second land use (A) for which fixed production costs are lower, OA, but the final product is more bulky than the original land use (B) and therefore incurs more steeply rising transport costs as distance to the market increases. Assuming revenue is the same from both products, close to the market land use A has the greatest surplus (revenue less costs) available to bid as rent (AR as opposed to BR). So land use A is able to outbid land use B but only up to distance X from the market, after which, because B's total production costs do not rise so steeply, it is able to outbid A.

As more land uses are added with different levels of fixed costs and different rates of rising transport costs an agricultural land use rent theory is obtained by rotating Figure 1.10 180 degrees and considering the rent-earning capacity (i.e. revenue less cost) of each land use on the y axis. In Figure 1.11, which is adapted from Harvey and Jowsey (2004), the shaded areas represent rent-earning capacity and the sizes of these are maintained for each land use. The revenue line is dropped as it is constant for all land uses. A rent curve MN is derived showing the rent for land at different distances from the market. Given a central market and a homogeneous agricultural plain, a series of concentric zones of land use is the result and the relationship between location, land use and rent should now be evident. Of course reality confounds all of the simplifying assumptions made by von Thünen's and we do not see concentric rings in the real world. Instead natural features, the vagaries of the transport network and other irregularities such as government trade policy break up this simple pattern, but the theory retains a robust logic that is hard to deny.

Building on Ricardo's observations and von Thünen's theory Mill (1909) argued that in a country where land remains to be cultivated the worst land in actual cultivation pays no rent and it is this marginal land that sets the standard for

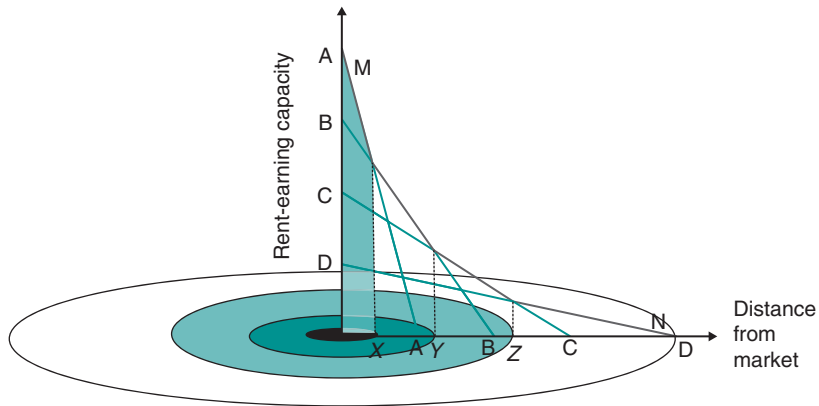


Figure 1.11 Land use bid-rent theory.

estimating the amount of rent yielded by all other land (beyond D in Figure 1.11). It does this by establishing a benchmark so that whatever revenue agricultural capital produces, beyond what is produced by the same amount of capital on the worst soil, or under the most expensive mode of cultivation, that revenue will be paid as rent to the owner of the land on which it is employed. In other words

Rent, in short, merely equalises the profits of different farming capitals, by enabling the landlord to appropriate all extra gains occasioned by superiority of natural advantages (Mill, 1909).

Like agricultural land uses, what urban land uses desire is accessibility, not just access to the market (where the customers are) but also access to factors of production (particularly labour but capital too) and to other complementary land uses.⁸ The aim is to seek a location that minimises transport costs involved with marshalling factors of production but maximises access to the market and to complementary land uses. With a radial transport network around a central market and the other simplifying assumptions, von Thünen's model can be applied to urban land uses. In explaining the cause of different land values within an urban area Hurd (1903) suggested that

since value depends on economic rent, and rent on location and location on convenience, and convenience on nearness, we may eliminate the intermediate steps and say that value depends on nearness.

Theoretically, as Kivell (1993) points out, in a mono-centric urban area the centre is where transport facilities maximise labour availability, customer flow and proximate linkages and therefore attracts the highest capital and rental values. Haig (1926) suggested that

rent appears as the charge which the owner of a relatively accessible site can impose because of the saving in transport costs which the use of the site makes possible.

His theory emphasised the correlation between rent and transport costs, the latter being the payment to overcome the 'friction of space'; the better the transport

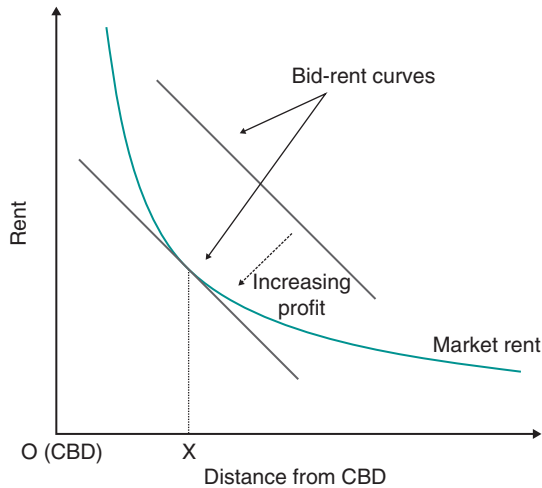


Figure 1.12 Bid-rent curves (adapted from Harvey and Jowsey, 2004).

network, the less the friction. The theoretically perfect site for an activity is that which offers the desired degree of accessibility at the lowest costs of friction. Haig's hypothesis was therefore

...the layout of a metropolis ... tends to be determined by a principle which may be termed the minimising of the costs of friction (Haig, 1926).

Haig's hypothesis concentrated on the cost-side of profit maximisation but some land uses such as retail are able to derive a revenue-generating advantage from certain sites, particularly those most accessible to customers. Therefore, the revenue-generating potential of a site must be weighed against the costs of friction for these land uses. Marshall (1920) noted that demand for the highest value land comes from retail and wholesale traders rather than manufacturers because they can fit into smaller sites (i.e. develop land more intensively) in places where there are plenty of customers. Therefore

In a free economy, the correct location of the individual enterprise lies where the net profit is greatest (Losch, 1954).

In attempting to quantify spatial variation in rent and land use Alonso (1964) adapted von Thünen's agricultural land use model to urban land use. Alonso suggested that activities can trade off falling revenue and higher costs (including transport) against lower site rents as distance from the centre increases. This can be illustrated by defining 'bid-rent' curves (similar in nature to indifference curves) which indicate the maximum rent that can be paid at different locations and still enable the business to earn normal profit, as shown in Figure 1.12. In other words the lines join equilibrium locations where access and rent are traded off against each other. In a monocentric city market the rent curve derived in Figure 1.11 can be superimposed. Businesses will endeavour to locate on the bid-rent curve nearest the origin and the equilibrium location is at X as this is the most profitable location at current rents.

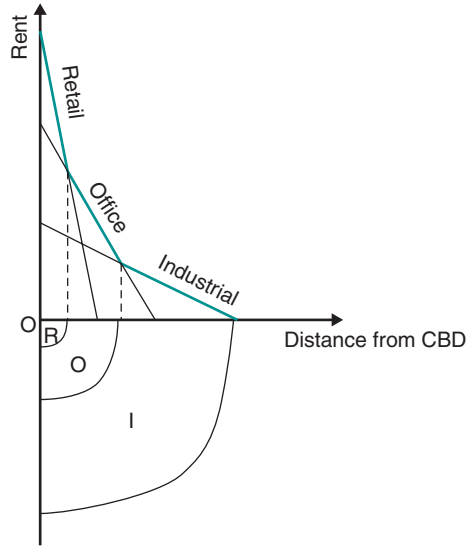


Figure 1.13 Alonso's bid-rent concept.

Some urban land uses place greater emphasis on accessibility than others and these will have steeper bid-rent curves since a considerable drop in rent will be necessary to compensate for the falling revenue as distance from CBD increases. Rent gradients emerge, illustrated in Figure 1.13, for each land use where the steepest gradient prevails. Retailers outbid office occupiers because they are particularly dependent on a central location where the market is located, accessibility is maximised and transport costs are minimised. The availability of such sites is very limited and therefore supply almost perfectly inelastic (consider the shops surrounding Oxford Circus in London as an example). Office occupiers, in turn, outbid industrial occupiers. Consequently rents generally decline as distance from the central area increases. Basically greater accessibility leads to higher demand which, in turn, causes rents to rise and land use intensity to increase. This competitive bidding between perfectly informed landlords and occupiers within a simplified market allocates sites to their optimum use.

Alonso's theory rests on simplifying assumptions: a central market in an urban area and a perfect market for urban land. Agglomerating forces, spatial interdependence, special site characteristics and topographical irregularities are all ignored. If the main determinant of differences in urban rent in a city was accessibility and if transportation were possible in all directions and the transport cost-distance functions linear, there would be a smooth land value gradient declining from the centre. In reality the gradient falls steeply near the centre and levels off further out (Richardson, 1971). Other distortions result from trip destinations to places other than the centre such as out-of-town office, retail and leisure, and a non-uniform network of transport infrastructure. Despite the simplifying assumptions this *bid-rent* theory is still regarded as an acceptable explanation of spatial variation in the demand for property. As Ball et al. (1998) argue; the rent or price paid for an owner-occupied property reflects its utility to the user.

This utility is a function of land and building characteristics and location. Rents and capital values thus vary spatially and occupiers will choose a location based on an analysis of profit they can make at different locations. Competitive pricing should ensure that, in equilibrium, land is allocated to its most profitable use, but inertia and planning controls influence this. In reality, competitive bidding between users of land often results in mixed use on sites; retail on the ground floor and offices above (Harvey and Jowsey, 2004).

As Richardson (1971) notes, the central feature of the market is that land rent is an inverse function (typically a negative exponential function) of distance from the centre. This function is primarily a reflection of external and other agglomeration economies and transport costs.

The significance of transport costs is obvious. People and activities are drawn into cities because of the need for mutual accessibility, especially between homes and workplaces. Even within cities, the distances between interrelated activities have to be minimised, and the existence of transport costs tends *ceteris paribus* to draw activities together (Richardson, 1971).

The role of external economies and agglomeration economies is generally less obvious but probably more significant. Agglomeration economies include scale economies at the firm or industry level. External economies include access to a common labour market, benefits from personal contacts and environmental factors.

So, according to Geltner et al. (2007), equilibrium in a well-functioning land market is attained when aggregate transport costs are minimised and aggregate land value is maximised. Bid-rents represent the maximum land rent that a user would be willing to pay for a location and a bid-rent curve shows how the bid-rent from a user falls as distance from some central point increases. This central point is the point at which costs are minimised / value maximised for a given use, each of which has its own bid-rent curve (and central point). The classical economic theories of urban rent and land use have been criticised primarily due to their simplifying assumptions and the increasing influence of modern working practices and living habits on the way urban land use is organised. These criticisms are summarised as follows:

- The process of allocating a land use to a site is constrained by inertia (preventing a high proportion of urban land that is in sub-optimal use from coming on to the market) and high mobility costs (preventing users from relocating) (Richardson, 1971).
- A change in the distribution or level of income or a change in the spatial pattern of consumer demand will cause a change in urban land values and the pattern of uses.
- A change in transport costs will have a greater effect on those uses that depend more heavily on transport.
- The theories have no regard for land use interdependence, sometimes referred to as complementarity between neighbouring land uses.
- Land use changes infrequently because of the long life of buildings, lease contracts, neighbourhood effects, expectations and uncertainty. Consequently, adjustments in supply and demand towards an equilibrium are slow.

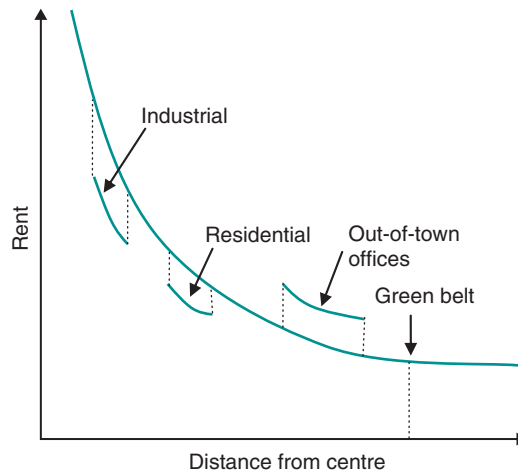


Figure 1.14 The effect of land use planning controls on bid-rent theory (Evans, 1983 and 2004).

- There is no uniform plane; geographical and economic factors, the rank and size of urban areas, proximity to other centres, history, favoured areas, cultural dispositions, existence of publicly owned land and ethnic mix all distort the perfect market assumption.
- The theories unrealistically assume a free market with no intervention and perfectly informed market players. In reality the major restriction on the competitive allocation of land uses to sites is land use planning control. This may restrict supply for some uses (leading to artificially higher rents) and over-supply other uses (leading to artificially lower rents). Diagrammatically the result is suggested in Figure 1.14.
- Owners of property have monopoly power due to heterogeneity of property.
- The theories ignore spill-over effects such as the filtering of land uses and property types and diseconomies such as traffic congestion.

The emergence of greater spatial flexibility as a result of increased car use, lower transport costs and better information and communications technology meant that, in the 1960s, the classical economic approach to explaining land use allocation, growth and pricing was challenged; see Meier (1962) for example. Indeed, ubiquitous car ownership has led to the phenomenal growth of out-of-town leisure, retailing and office activity, causing rents to rise in outer areas, and developments in information and communication technology which facilitate home-working and internet shopping may have similarly dramatic impacts on land use patterns in the future. Yet, despite these shortcomings, the classical theories retain a logical appeal that is difficult to counter. As Lean and Goodall (1966) wrote

An urban area consists of a great variety of interdependent activities and the choice of location of any activity is normally a rational decision made after an assessment of the relative advantages of various locations for the performance

of the activity in question, given the general framework and knowledge prevailing.

In the long-term each land use will tend to the location which offers the greatest relative advantage. This will be the profit maximisation location for businesses. The spatial differentiation of land use becomes more marked and complex as the degree of specialisation increases in significance and complementarity linkages become more commonplace.

The relationship between the location of urban land uses and the rents that they attract is a complex one. Land supply in the centre is limited and competition increases rents. At a certain size and level of transport provision, diseconomies of scale set in and lead to congestion. Other influences include planning, declining importance of manufacturing, rising administrative employment and more multi-regional and multi-national organisations. These influences, together with disadvantages of city centre locations such as congestion, parking, high rents and taxes, have led to decentralisation. But despite predictions that decentralisation would continue at an increasing rate, there has not been a wholesale abandonment of the city centre. The need for face-to-face contact with clients or complementary activities remains crucial to many businesses and economies of concentration, agglomeration and complementarity can outweigh the problems associated with the city centre.

In summary, as Henneberry (1998) points out, the relationship between accessibility, property values and land use patterns preoccupied early theorists. Travel costs, it was suggested, were traded off against rents from the central area to suburbs of a mono-centric city. The centre has declined as the predominant location of employment and services in the modern city because accessibility is now heavily car-dependent and peripheral centres of activity have grown. In short, accessibility has become a more complicated phenomenon requiring more sophisticated treatment and it is important to study accessibility more rigorously in order to understand the locational advantages of individual properties rather than rely on traditional bid-rent theory that places the peak rent contour in the central area of a city.

1.4 The economics of property development

The development or supply of new commercial property resulting from activity in the development sector adds only a tiny fraction to the existing stock of commercial property each year. This helps explain why property exchange prices and their associated valuations are largely explained by demand-side factors. Supply-side factors (the supply of new developments) have little impact on overall stock availability: property is a durable good. It is price signals from the buying and selling of investments and occupational interests in the *existing* stock that influence the supply of and demand for *new* stock.

1.4.1 Type and density of property development

As demand for urban property increases it becomes worthwhile to pay more for land (land rent increases) to avoid the rising expense of building on the existing

site more intensively. This increased demand (and increased land rent) will stimulate supply in the form of new construction in the development sector. Sub-marginal land might become marginal (break-even) or even super-marginal (profit-making) if demand increases sufficiently. This process is subject to the principle of diminishing returns which can be delayed by more efficient use of the land, perhaps by using technology to use the land more intensively by building upwards. If the fixed unit of land is expensive or less marginally productive in comparison with the variable units of capital then a developer will employ more capital on the fixed unit of land, use it more intensively in other words, perhaps by building at a higher plot density – a high-rise building for example. This is why land in the city centre is more intensively developed than land in more peripheral urban locations (Fraser, 1993).

Marshall (1920) was the first economist to consider how the principle of diminishing returns may be applied to the intensity of development on an urban site. If a site has no scarcity value the amount of capital employed per unit area which would yield the maximum return varies with the use to which the site is put. So the use that yields the maximum return for a given amount of capital per unit area will tend to be the use to which the site is put, all other things being equal. But when the site has scarcity value it may be worthwhile to go on applying capital beyond this maximum rather than pay the extra cost of land required for extending the site. In places of high levels of scarcity (and therefore high land value) this intensified use of land will be much greater than on sites used for similar purposes but where land is less scarce (and therefore of lower value). Marshall used the phrase ‘margin of building’ for that floor-space which it is only just worth adding to a site and which would not be added if the land were less scarce. The example he used was the top floor of a building; by erecting this floor instead of building on extra land a saving equivalent to the cost of that land is effected which just compensates for the expense of constructing the extra floor. In a nutshell, if land is cheap a developer will take much of it and if it is expensive he will take less and build higher. So a combination of things is going on: competition between different land uses ensures that land is used in its most efficient way (maximising return for a given amount of capital per unit area) up to the margin of building at which point it is no longer profitable to apply more capital to the same site. Referring back to Chapter 1, we are considering land use intensity from the point of view of new development activity rather than intensifying an existing use.

Fraser (1993) illustrated Marshall’s ideas in a diagram similar to that shown in Figure 1.15. A characteristic that makes property development so exciting – if not risky – is that every scheme is different but, to illustrate the underlying economic principles, consider an ‘average’ development project as follows. The marginal cost (MC) curve shows the additional cost for each extra unit of floor-space added to a site of fixed size. At low density levels, there are economies of scale to be reaped by adding more floor-space so that the cost per unit of floor-space initially falls; consider the cost saving per unit of floor-space that might be gained by building two storeys instead of one. After a certain point, however, it becomes progressively more expensive to add more floor-space to the fixed amount of land. For example, a high-rise building will need bigger foundations, faster lifts and so on. The time taken to build it will be longer so finance costs will be higher. Moreover, the uncertainty over what the market will be like at the time of

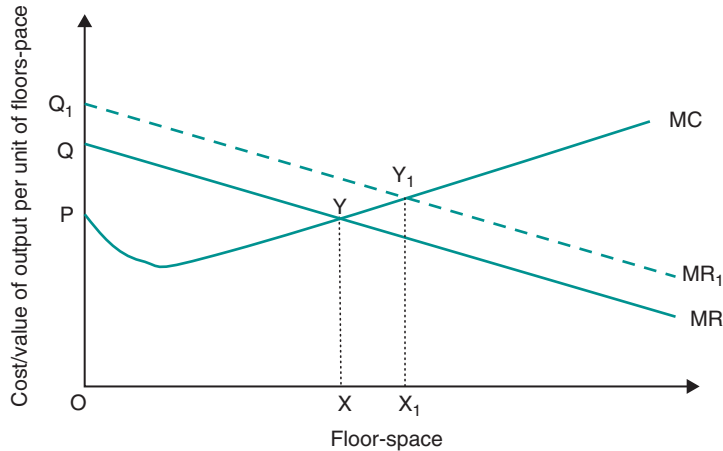


Figure 1.15 Optimum development density (Source: Fraser, 1993).

completion will be greater and this will mean that the risk and hence profit required by the developer will be higher. All of this means that the cost of adding each extra unit of floor-space increases. The marginal revenue (MR) curve is the addition to revenue or development value that is obtained from the completed development for each additional unit of floor-space. It slopes downwards because the principle of diminishing returns means that users of the property will obtain less and less utility for each additional unit of floor-space. The highest value space is usually found on the ground floor – that is why retail users outbid all other commercial users – and the rent per square metre on upper floors may well be less than on the lower floors. Fraser (1993) shows that the optimum amount of floor-space is OX units of accommodation and the area bounded by PQY represents the price the developer would pay for the site, i.e. the capital value of the site for this particular development.

Harvey and Jowsey (2004) also reiterate Marshall's ideas and note that by building higher the developer is effectively saving on land cost. Consequently a developer will only build more intensively so long as it is cheaper than acquiring extra land. So there is a margin of building in terms of the intensity of use of each piece of land (or density of development) and the extent to which additional land is used. Under free market conditions competition for land between different developers ensures that, in the long run, development everywhere will be pushed to the point where MR is equal to MC of capital.

Fraser (1993) extends his analysis of development density by demonstrating that site values and development density are affected by changes in costs and revenue. For example, an increase in property values will cause the MR to increase to MR₁, raising the optimum density to OX₁ and increasing site value to Q₁Y₁P. Fraser also argues that the diagram can be used to explain differences in site value and building density that are observed in different locations. Quite simply, if more revenue can be obtained from a particular site, perhaps because of its accessibility advantages in a city centre for example, then its marginal revenue will be higher at say MR₁. The value and development density of such a site will be high. A less

accessible site on the edge of town would yield less marginal revenue at say MR and its value and density of development will be lower.

The type of development that is allowed to take place on a site and the intensity to which that site is developed is not determined solely by free market economics; they are regulated by planning policy and development control. Evans (1985) demonstrated how Government controls intervene to determine land use independently of the market. Landowners may also dictate the type, density and timing of development.

1.4.2 *The timing of redevelopment*

According to Fraser (1993) there are two conditions necessary for property development to be economically viable, assuming developers and landowners seek to maximise profit. First, expected development value must exceed development costs, including the price of the land and the developer's profit, and second, development site value must be at least the same as existing use value. Achievement of the first condition is measured using the residual method of valuation (see Chapter 3) which is advanced in subsequent sections of this chapter. If the second condition is not met then the developer would be unable to purchase the site at a price that would allow sufficient profit to be made. Equally the owner would be unlikely to sell to a developer at a price below existing use value.

We have seen from Chapter 1 that land use is determined by the highest bidder. The amount paid is the present capital value of the future income stream for that use. It follows that the use of an existing property will change if another user can bid a higher price than the existing occupant, subject to planning constraints, inertia of ownership and occupation and so on. But we know that buildings last for a very long time and a change of use might require redevelopment of the site. In this case, rather than comparing the present value of the existing use with the present value of the best alternative use, we need to compare the present value of the existing use with the present value of the site cleared and ready for development to its optimum use. Calculation of the latter is the role of the residual method of valuation introduced in Chapter 3. Assuming competition among developers to acquire a site, the residual site value for development purposes will be the highest price which the most efficient developer would be willing to pay (Fraser, 1993). This value can then be compared with the value of the site in its existing use and, if higher, means that development is viable.

By now you may have realised that the relationship between existing use value and development value of a specific site will vary over time. The value of a site that has just been developed for a particular use will be the highest value that could be obtained for that site; otherwise it would have been developed for another (more profitable) use. To investigate the relationship between existing use value and development value⁹ of a site in more detail we need to consider the economic life of a building. Lean and Goodall (1966) stated that the economic life of a building will be the period for which the present (capital) value of the existing use is greater than the present value of the site cleared and ready for development. It is possible to illustrate the relationship over time between the capital value of a

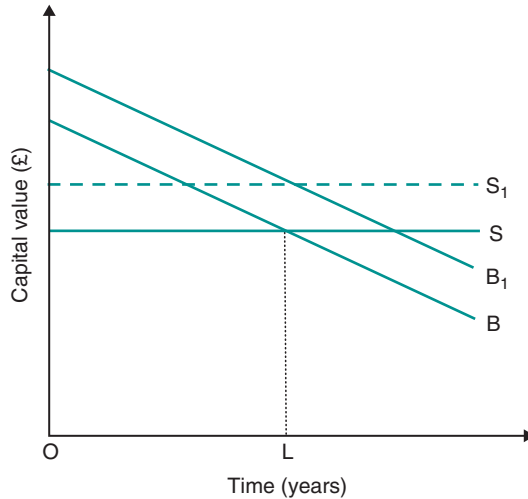


Figure 1.16 The economic life of a building (after Lean and Goodall, 1966).

cleared site and the capital value of the buildings on it (improvements made to it). Figure 1.16 shows the capital value of a site and buildings which are currently used as offices.

Lean and Goodall argue that, if we assume that office space was the most profitable use at time $t=0$, the line B shows how the capital value of the office building falls over time as depreciation takes hold, maintenance costs increase relative to rental value and a better standard of accommodation is expected. S shows the capital value of the cleared site assuming no change in supply and demand over time and that land and construction costs remain constant over time. The diagram shows that it is not economically viable (profitable) to redevelop the site until $t=L$. In reality, redevelopment is likely to occur sometime after L, perhaps when the lease ends, and the decision is subject to planning constraints and sunk investment in the existing use. The economic life of the building depends primarily on its earning power and only secondarily on its structural durability. S may increase to S_1 due to infrastructure improvements and this will reduce the economic life of the building. Similarly B may increase to B_1 due to refurbishment or conversion to a more valuable use and this will increase the economic life of the building. The model can also be used to explain urban structure. In the central area buildings fall into disrepair as owners anticipate redevelopment (B_1 to B) while, at the same time site values may increase (S to S_1). Further out from the centre the built environment is characterised by lots of conversions and refurbishments, increasing building values (B to B_1) but the infrastructure usually worsens (S_1 to S). In the suburbs buildings tend to be well maintained (B to B_1) but development forces are strong (S to S_1).

In the long-term and within the regulatory framework, land in private ownership tends to move to its most profitable use but many factors can slow the development process down (Lean and Goodall, 1966). In reality, according to Fraser, development site value will have to exceed existing or alternative use

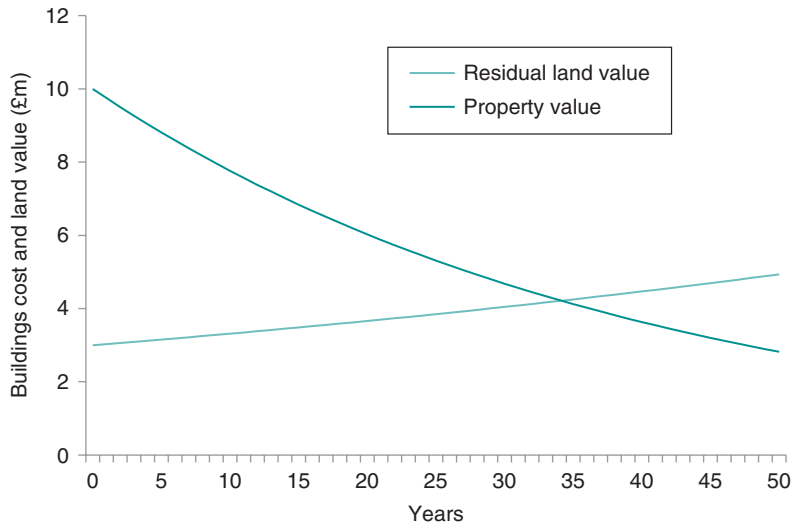


Figure 1.17 The relationship between land and property value.

value sufficiently to overcome landowner's inertia. Evans (1985) expands on this theme: expectations of landowners as to what might be the 'right' price for land may lead to a refusal of a bid that is different from expectations either now or in the future. This is known as speculation if the price expectation is higher and inertia if it is lower. Also, an owner-occupier may be unwilling to relocate without compensation sufficient to overcome the costs and possible loss of revenue, even though it may be more profitable to operate from a different location (Lean and Goodall, 1966). This means that the price paid for development land must be significantly in excess of the pure existing use value. Finally, Evans (1985) notes two landownership issues that may affect development activity. The first issue is tenure. Landlords may be more willing to sell and displace their tenants whereas owner-occupiers would have to displace themselves. Allied to this are possible statutory rights that a business tenant might have that legally secures occupation beyond the end of the current lease – the security of tenure provisions that were discussed in Chapter 4. The second issue is fragmentation of ownership. The larger the development proposal the greater this issue becomes. Trying to assemble a large development site from several smaller sites that are separately owned can be time-consuming, arduous and expensive. Sometimes developers will work with local authorities – which have powers of compulsory purchase – to ensure that these types of development can proceed.

Often, especially in the case of previously developed land (brownfield sites), it is the decline in existing use value through depreciation that brings about the redevelopment of a site well before the buildings are incapable of economic use, so the impact of depreciation (see Figure 1.17) on property is considered in Chapter 8.

Key points

- Rent is regarded as a surplus amount paid to the landowner by the user from the MRP generated after having deducted the unit costs of optimally employed factors of production involved in using land in its most profitable manner.
- The pattern of urban land use is determined by supply and demand. Classical urban location theory states that on the supply side landowners will seek to maximise value by allocating land to its optimum use, subject to planning regulation. On the demand side demand for urban land is a demand for space and occupiers or tenants of land pay occupation costs or bid rents that reflect a location's accessibility. This classical view of the relationship between land use and rent explains whether or not a site is brought into economic use, the intensity of that use and the rent that might be charged. The classical theories also posit that spatial variation in cost and revenue determines the optimum profit maximising use for a particular location.
- An extreme view of the heterogeneity of land is that the supply of each unique parcel of land is perfectly inelastic but of course there will be many plots of land that are substitutable to a greater or lesser extent. When considering urban land, sites in the centre are less substitutable than those on the outskirts simply because there are less of them. Consequently the supply of these sites is more inelastic. But these sites are the ones in greatest demand because they are the most accessible to raw materials (labour and capital) and the market (consumers) so their rents are higher and they tend to be the most intensely developed. This inelastic supply means that economic rent is high in the central area and may even represent 100% of the total rent due to the inability of supply to increase.
- The supply of new property each year represents only a tiny fraction of existing stock. This is why the property supply is regarded as inelastic in every time frame except the very long-run.
- The use to which a piece of land is put depends on competitive bidding between developers who are, in turn, interpreting the requirements of occupiers and investors. The amount of land used for a particular development and the intensity of use that is made depends on the cost of capital and revenue that can be obtained. Because these factors vary over space they also help explain why different land uses are located where they are and why they are developed to the varying densities.
- Development of a site is economically viable when the present value of the site cleared and ready for development is greater than the value of the existing use.

Notes

1. In economics the short-run is the decision-making time frame of a firm in which at least one factor of production remains fixed whilst in the long-run all factors of production may be varied and firms can respond to price changes.
2. Supply and demand schedules are referred to as curves but, for illustration purposes, these curves are normally depicted as straight lines because they are simple representations of the general form of the schedule rather than an empirically based one.

3. In a competitive product market, price is constant so MR is also constant and equal to price.
4. MP of a factor is the addition to total product (output) obtained from using another unit of that factor.
5. Technically, the MRP schedule is equal to the demand schedule only if the firm uses a single factor but it can be proven that when more than one factor is used the demand schedule for each slopes downwards.
6. Even if supply was not fixed/perfectly inelastic in the short-run, the longevity of property means that new stock is a very small proportion of total stock and therefore stock availability/supply depends much more on the availability of existing stock, either via vacant premises or the ability of uses to change easily (Ball et al., 1998).
7. The rent paid in respect of any particular use of the land is therefore a geared residual payment (unless there is monopoly ownership of land) but its volatility is reduced as the land can be transferred to the next most profitable and thus restrict drops in rent. Also, land rent is based on expectations of profitability rather than actual year-to-year profit revenue and this tends to reduce the volatility of land rent in the short-term (Fraser, 1993).
8. Complementary land uses include things like comparison shopping and symbiotic business activities.
9. The value of a site depends on the use to which it is put and a change to alternative use realises that value. Rather confusingly development control in the UK regards many changes of use as 'development'. For the purposes of this chapter though, development involves a more tangible replacement of buildings. Development value is thus regarded as a specific form of alternative use value calculated using the residual method of valuation.

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