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FIT FOR PLANNING?
AN EVALUATION OF THE APPLICATION OF DEVELOPMENT VIABILITY APPRAISAL MODELS IN THE UK PLANNING SYSTEM

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Introduction

Until relatively recently the discipline of development appraisal has remained the provenance of surveyors and developers, largely ignored by other participants in the development process, particularly planners, architects and construction specialists. This is now changing. Close attention is now paid to the viability (and profitability) of development proposals as the UK government seeks to extract developer and/or landowner contributions to affordable housing, public services and infrastructure. Consequently the theory, application and outputs from development appraisal are under growing scrutiny from a wide range of users in a field widely referred to as development viability appraisal or DVA. For example, at the micro-level Circular 05/05 proposed the submission of 'financial information' as a basis for negotiations between developers and planning authorities in relation to viable levels of affordable housing on a site-by-site basis. Subsequently, tests of the financial viability of development projects have become an integral part of the planning process, both at the forward planning and development control stages. DVA can also be used to assess the financial viability of alternative planning policies and proposals. At the macro-level, Strategic Housing Land Availability Assessments require land allocated to housing development over typical forward planning time horizons of 10 to 20 years to be economically viable.

The aim of this paper is to critically examine the application of development appraisal to viability assessment in the planning system. This evaluation is of development appraisal models in general and also their use in particular applications associated with estimating planning obligation capacity. The paper is organised into four themes:

1. The context and conceptual basis for development viability appraisal
2. A review of development viability appraisal methods
3. A discussion of selected key inputs into a development viability appraisal
4. A discussion of the applications of development viability appraisals in the planning system

It is assumed that readers are familiar with the basic models and information needs of development viability appraisal rather than at the cutting edge of practice and/or academe.

Development appraisal: some background

This research project does not start from an in-depth knowledge of the present application of development appraisal in practice. There have been no surveys of practice (that we are aware of) since Marshall and Kennedy (1992). Therefore our critique of development appraisal is based on models that have found their way into the public domain through publically available appraisals, development appraisal software and development appraisal textbooks. However, it is notable that there has been very little public criticism in academe or professional practice of development appraisal models and methods over the last two decades. This is in sharp contrast to other fields of real estate appraisal, most notably the appraisal of standing investments. This is surprising given that development appraisal and investment appraisal both adopt the same financial model - discounted cash flow or DCF which in turn is grounded in finance theory. Following two previous major UK property market crises in 1973 and 1990, applications of appraisal models to standing investments were subjected to intense scrutiny in terms of their conceptual basis, format, application, methods and reliability. This scrutiny was in part due to the growing interest of property fund managers who were operating in wider investment markets and better trained in corporate finance. This led to significant changes in investment appraisal standards, guidance and the application of methods. It is puzzling that development appraisal has not been subjected to the same critical evaluation but we make the assumption that investor/developers will have been more attuned to these developments than trader/developers. We are therefore also making the assumption that a wide variety of applications exist in practice some of which will have already addressed many or all of the criticisms contained in this paper.

Given this context and the fundamental similarity between investment and development appraisal modelling, it seems useful to use the current framework for appraising standing investments to provide as the context for this review of development appraisal.

Bases and definitions of value

There are two major bases of value defined in valuation standards and both are appropriate to development. The first is the value in exchange, called Market Value and essentially defined as the exchange price in the market place (IVSC, 2007; RICS, 2007). The second is value in use, defined as Investment Value (IVSC, 2007; RICS, 2007) and described as the value to an individual investor or group of investors. Distinguishing two concepts of value in this way raises two issues; that an asset may have a different value to an individual than others in the market and this value can differ from Market Value. But it also raises the possibility that an asset can be mispriced by the market. In the UK, these two bases have been applied in practice using different methods. Market Value is usually judged by reference to comparable transactions and Investment Value by an explicit, cash-flow based, consideration of the future benefits of the ownership of the asset using a rational assessment of the target rate of return. In an individual Investment Value, specific tax and financing arrangements can be taken in to account; in a group Investment Value, a more market orientated approach can be used for a number of the inputs.

It is evident from this definition and from the appropriate guidance notes that, when conducting as estimate of Investment Value, the appraiser is being channelled towards identifying particular circumstances of individual clients and incorporating these circumstances to calculate individual worth. This is conventionally carried out by an explicit DCF analysis based on inputs derived from the client and/or appropriate research. However, it is important to distinguish between DCF being used to assess exchange price and being used to assess worth to a specific buyer or type of buyer. Although DCF techniques can be used to estimate both price and worth, a crucial point is that the inputs will usually be derived from different sources and produce different outputs. The US Appraisal Institute was keen to avoid any confusion in the application of DCF techniques to estimate different bases of value. For Market Value, they stipulated

> "To avoid misuse or misunderstanding when DCF analysis is used in an appraisal assignment to develop an opinion of market value, it is the responsibility of the appraiser to ensure that the controlling input is consistent with market evidence and prevailing market attitudes. Market-value DCF analyses should be supported by market-derived data, and the assumptions should be both market- and property-specific. Market-value DCF analyses are intended to reflect the expectations and perceptions of market participants along with available factual data." (The Appraisal Foundation, 2000, Uniform Statements of Appraisal Practice, Statement 2, Discounted Cash Flow Analysis)

This implicitly assumes sufficient market activity to generate sufficient market signals.

It is important to note that both bases have a single point timeframe. It is a present value at the valuation date, based on information available at that date. Since both facts (e.g. unexpired lease terms) and expectations (e.g. capital growth) change over time as new information 'arrives', estimates of exchange price or Investment Value have no shelf life regardless of method. The use of forecasts in cash flows does not change this fact. An appraisal is a single time point snapshot of a dynamic market; value and viability will change through time and, therefore, the individual appraisal has no shelf life. The central risks in real estate development are that the predicted viability model inputs (e.g. construction costs, development revenues) are likely to change (relative to the original estimates) over the development period.

This debate is relevant to development appraisal in that any assessment of inputs into a development appraisal needs to be undertaken in either a Market Value or Investment Value framework. In a Market Value framework, the actual scheme needs to be assessed in relation to the optimum development. If the proposed development is less than optimal, Market Value should be assessed assuming the optimal development, not the actual one. If development viability is being considered in relation to an actual scheme, it has become an Investment Value, the value can be different to Market Value and individual inputs can be different. However, it would be assumed that few developers would not adopt profit maximising strategies and that most developments are therefore optimal. DVA should in principle be based on Market Values and therefore should assume that optimal development is taking place.

Reliability 1: Are Development Appraisal Models Theoretically Robust?

The residual model

Because the range of development constraints and possibilities vary between individual sites, appraisal techniques relying upon 'the law of one price' can be problematic. Sole reliance on prices achieved on what might be regarded as similar, neighbouring sites can often be, at best, a useful backup. Instead, variations of a project-based modelling approach, known as the residual model, are often used. The residual model is based on the assumption that an element of latent or residual value is released after development has taken place. The value of the site in its proposed state is estimated, as are all of the costs involved in the development, including a suitable level of return to the developer. If the value of the completed development is greater than its cost to build, the difference, or residual value, is the value of site. Alternatively, where land costs are fixed, the residual value is the amount available for profit to the developer undertaking the development and being exposed to the development risks. The logic of this model is not disputed in this paper. In principle, the residual model can be used to find the residual value of any of the inputs once the other inputs are fixed but residuals of either land or profit are the normal outputs.

How would we recognise the ideal development viability appraisal model if we found it? We suggest two pre-requisites. First, since the aim of the model is often to estimate the monetary surplus generated by a development project available for the purchase of land, the model should identify the level and timing of all relevant costs and revenues from the development project. Second, the monetary surplus should be priced in a theoretically robust manner. It is stressed that this is an ideal since we are dealing with the future and it will rarely be feasible to predict with precision and accuracy the quantum and timing of all revenues and costs generated by a development project. However, it is an ideal to aspire to.

In practice, the residual model has been applied in two ways; a simple residual method and a cash flow or DCF method. Differences between the methods largely relate to the complexity of the application of the model.

The simple residual method

In essence, the simple residual method with no forecasting produces a simplified representation of the financial flows in development based on the following assumptions:

- The gross development value (GDV), expressed in current values, is received at the end of the development period. It does not discount this amount back to the present day over the development period. It places the GDV at the end of the development assuming a single capital receipt for the development.

- The costs of the development are a single lump sum financed entirely by debt. In the absence of a mechanism for assessing a spread of the costs and, therefore, the interest payments on the debt, the model assumes a crude approximation by halving the time period over which interest accrues. This has the effect of assuming that all costs are spread equally throughout the development period and the use of the finance rate effectively delays payment for the costs of development to the end of the development; placing them at the same date as the GDV.

- Profit is deducted as a cash lump sum taken as a proportion of total development costs or development value. As profit is also a cost to the development at the end of the development, all the income and outgoings are now placed at the end.

- Finally, the gross residual amount is the amount that can be paid for the site at the end of the development. But site value is a current value and therefore the residual surplus at completion of the development is discounted back from the end of the development to the beginning at the finance rate. As a consequence, it is assumed that the land value is paid to the landowner at the commencement of the development and is also funded entirely by debt. When land costs have been incurred, the equation can be rearranged to estimate expected profit. Theoretically, the same is true for any other input.

Whilst the simple residual method is still commonly used in practice, it has long been recognised as being over-simplified. Often, the assumptions outlined above are not realistic. In reality, the residual land value or realised profit will be driven by *actual* future costs and revenues and the *actual* timing of these cash flows. Building costs are not usually incurred evenly throughout the construction period and there can be significant pre-planning costs and long lead-in periods. The method cannot easily handle phased expenditure and revenue. This is a key limitation, particularly in the case of residential development.

The (discounted) cash-flow method

The simple residual method can be extended to a cash flow format. This allows the timing of expenditure and revenue events to be modelled more accurately. However, the method retains the same basic rationale – that development viability is a function of the value of the completed development less the costs of providing it. Indeed, the cash flow output will be close to the output of a simple residual if:

1. All receipts and profits are received at the end of the development period

2. Costs are spread equally over the development period
3. Costs and revenues are expressed in current terms

The only difference would occur on account of the crude attempt to spread costs evenly in the simple residual compared to the accurate spreading of costs evenly in the cash flow. We believe that cash flow approaches are widely used in development appraisal but can be based on the same assumptions as the simple residual method and essentially only add a cash-flow framework. Many of the basic valuation texts and computer models adopt this approach. Consequently, the only improvement in terms of model composition of using cash flow approaches has been that the assumptions concerning the timing of development expenditure and revenue are appraised more accurately.

However, a number of practices and assumptions are considered to lack the rigour of mainstream capital budgeting theory. Real estate academics from a corporate finance background who have addressed development appraisal have made a number of criticisms regarding the robustness of the development appraisal methods as they are currently specified and applied (see for example Brown and Matysiak, 2000; Geltner and Miller, 2000). Some common limitations are: failure to inflate future costs and forecast revenues, simplistic incorporation of return requirements and inclusion of financing as a cost.

In conventional approaches to modelling development viability, it appears to be a common practice to input current values and current costs. This avoids incorporating assumptions about inflation in costs and values. In practice, anecdotal evidence suggests that some developers do adjust cost and values to reflect expected growth or decline. This is also illustrated in some development appraisal textbooks, and specialist development appraisal software allows for these assumptions to be incorporated. Further, the use of forecasts is standard practice in the appraisal of standing property investments.

It is usual practice to assume required profit in terms of a cash sum and to include it in the cash flow. In contrast, in mainstream capital budgeting theory, required profit is expressed as a required return. The expected cash flow is discounted at the required return in order to assess viability or to assess the surplus available to purchase the land. A notable distinction between the two approaches to return is that simple static ratios to cost or value are not sensitive to time. For instance, all else equal, the profit level (if expressed as a ratio of development costs or values) would be the same for a one or ten year scheme. However, internal rates of return are time sensitive and reflect return per period.

A number of commentators have pointed to a common error in project evaluation - the potential confusion between the use of cost of debt and the opportunity cost of capital in the cash flow appraisal. This confusion appears entrenched in standard development appraisal. It is also common practice to assume all-debt financing. Again, this is in contrast to mainstream project appraisal where the value of the project's equity and the value added by financing are treated separately. When bidding for investments, it is common practice for institutional investors to use a cash flow analysis to estimate the Gross Present Value (GPV) of the project cash flows. In the appraisal of standing investments, the GPV is essentially a residual surplus calculated in the same way as a residual land value using a discounted cash flow technique. However, in this broader property investment context, cost of finance is not used as a discount rate and profit is not assumed as a margin on expected sale value or cost. Instead, in line with mainstream capital budgeting theory and consistent with wealth-maximisation, profit requirement and opportunity cost are embedded in a required rate of return.

The key point is that there is little direct connection between the rate at which a company can borrow and the appropriate discount rate to be applied to a particular project. This is particularly so when the expected cash flows are subject to a high degree of risk as in many property developments. The mainstream approach to dealing with financing in project evaluation is to discount the projects at the weighted average cost of capital (WACC) or discount the equity at the cost of equity.

The combination of blending financing and investment decisions with an unrealistic premise of 100% borrowing in conventional development appraisal has meant that a number of mutations have emerged in practice that attempt to rectify these problems. Some developers perform appraisals assuming loan-to-cost ratios and produce geared cash-flows assuming only a proportion of development costs are borrowed. Since it requires an assumption of land costs in order to estimate the geared cash flow, this approach is not normally used to assess land value: instead it used to assess the NPV of a geared cash flow including land costs. Furthermore, in an attempt to make an unrealistic model slightly more realistic, in some appraisals different finance rates for credits and debits are applied in the cash flow.

Although there are examples of development appraisals that apply mainstream capital budgeting approaches (using a WACC as a required rate of return and ignoring the conventional finance and profit deductions, for example), there is no consistent professional practice regarding gearing and finance costs. The central problem is that, whilst project or investment evaluation and appraisal are at the core of capital budgeting theory, fundamental tenets of this body of knowledge are not embedded in development appraisal. In mainstream project evaluation theory, a project's value is a function of the forecasted after-tax cash flows assuming all-equity financing discounted at the opportunity cost of capital (see Brealey, Myers and Allen, 2008).

This implications of this discussion regarding the inclusion of finance costs in a development viability appraisal are potentially far-reaching. Whilst an initial response may be "Since developers do incur financing costs, they need to be accounted for in a development viability appraisal", there are some fairly clear arguments that can be made against this line of reasoning. Development appraisal is an exception in terms of project appraisal. As stated above, in mainstream theory of project evaluation, the investment decision is usually separate from the financing decision. Debt is an integral element of many non-property projects but it is generally not included in the appraisal of whether a project is viable. The conventional approach is to assess whether a project is viable and, if it is, to then focus on financing the project. Less fundamentally, it is rarely the case that all development costs are borrowed. In practice, a whole range of gearing levels will be applied. For instance, pension funds are precluded from borrowing.[1] The alternative model of viability is simpler and is already used by some developers. Finance costs and assumptions are excluded and profit is not included as a cash sum. Instead, the all-equity cash flow is discounted at a hurdle rate of return. A key issue is identifying this input.

Reliability 2: To What Extent Are the Outputs of DVAs Certain?

Another potential response to the analysis above is that including finance costs is a common-sense, simplifying assumption that is intuitive and really does not matter very much – except to academics! In the real world, informational deficiencies may be so pervasive that relatively minor tweaks to models are going to have no significant impact on the actual

[1] Although they may in practice invest of private vehicles that are able to borrow to execute a development project.

decision. After all, these apparently flawed models have apparently served the industry well for decades. Given the difficulties of estimating appropriate hurdle rates of return (see below) and the extent of uncertainty in other inputs, there seems to be some merit in this line of reasoning.

Do the limitations of the simple residual and incorrect application of development cash-flow methods matter? The persistence of approaches being applied in practice using assumptions that lack rigour may seem odd. But, as noted above, existing assumptions have rarely been questioned or evaluated. A rationale may lie in the level of information or input uncertainty in the models. Essentially, this may be so high that there are no perceived benefits in terms of increased certainty of output from improving the theoretical robustness of the cash flow method. Given substantial uncertainty about projected costs and values, there may be little motive or incentive for developers to improve the quality of the underlying methods.

What is the appropriate hurdle rate of return for development projects?

Due to constraints of space, an in-depth discussion of the determinants of the target rate of return for development projects is outside the scope of this paper, Geltner and Miller (2001, 789) acknowledge that "one of the most difficult steps in applying the NPV approach evaluation is estimating the appropriate opportunity cost of capital." Brown and Matysiak (2000) discuss risk grouping, risk ratios, CAPM, arbitrage pricing theory and WACC. Nevertheless Geltner and Miller (2000) stress that, although difficult, estimating a required rate of return is an unavoidable element of all project evaluations and inherent to the process. They suggest a number of possible approaches, contingent upon the stage in the development process, that draw upon real option pricing, the use of a 'reinterpreted' WACC or historic return data from 'pure play' real estate development companies.

However, it is clear that estimating a required rate of return for real estate development opportunities typically requires data that do not exist or assumptions that are difficult to verify. Whilst identifying the appropriate required rate of return for real estate development opportunities may be problematic, it is important to acknowledge that required rates of return are implicit in all conventional development appraisal techniques when applying crude profit on GDV and profit-on-cost ratios.

Current research by IPD into actual IRRs generated by development schemes has the potential to provide useful data but a question raised by the discussion in this paper would be the model framework used to assess the returns.

This discussion assumes that DVAs are undertaken within the context of a finance model utilising the target rate of return for the development and the sole indicator of profit is that target rate. In practice, other measures of profit are used within the more simple models including simple returns on costs or values. The only way to take different development time scales or different levels of risk into account is to intuitively vary the rate. Again, empirical work comparing schemes could give some indication of the rates but they would have to be analysed within the framework of the timeframe of particular developments. Assessing start and finish dates for these empirical analyses could be a problem as they may not be obvious for more complex schemes.

What is the right level of detail in a development viability appraisal?

In the same way that an overly detailed map can be unusable, models that attempt to include all the detail about a system become intractable (Haggith and Prabhu, 2003). The number of inputs into a development appraisal can be very large. For an idea of the sheer number of variables that can be included, see Appendix 1 and also VIP12 and GVA Grimley (2009). There are a growing number of 'exceptional' costs such as decontamination and waste recycling and a detailed breakdown planning obligations (S106 payments) that may be included as development costs. The number of inputs has expanded substantially over time. What began as a method with a few key inputs for value and cost (usually rents and yields for commercial land use and unit sale prices for residential) has expanded to become a very detailed breakdown of the mix of land use, property type and tenure, development density, management and operating costs for social housing, etc. The inputs into a residential development appraisal in particular can be unbalanced in that very high levels of detail are applied to social housing variables whilst little detail is requested on potentially important variables such as commercial land uses, abnormal development costs, construction costs, etc.

Largely due to high levels of input uncertainty, it is common to find in other disciplines that simple, aggregated models can produce similar outputs to complex, disaggregated models. This paper offers questions rather than answers in this respect. Is there an optimal level of detail? Do detailed models produce more robust outputs? Are detailed models necessary for large-scale, long-term development schemes? Given that viability is usually driven by a relatively small number of variables and that these variables are prone to high levels of uncertainty, it is unlikely that debating detailed assumptions about future rental arrears in affordable housing elements can improve the accuracy of the appraisal substantially.

Cost and revenue uncertainty

Development appraisers are uncertain about current levels of costs and revenues. The output from a development viability model can be very sensitive to changes in certain key, inputs; rental and capital value, building costs and development period in particular, but many of the other inputs are ratios of these key inputs. For instance, asset disposal fees are expressed as a percentage of revenue; many professional fees are often expressed as a percentage of construction costs; profit is typically assumed to be a percentage of cost or revenue. In essence, estimates of future fees are affected by uncertainty in: current levels of the input variable (e.g. construction costs), estimated change in the level of the input variable (e.g. building cost inflation), the ratio (e.g. fee rates) and future changes in the ratio.

Uncertainty surrounding estimates of current levels of costs and revenues and future cost and price inflation introduces scope for justifiable variations in estimation of the key inputs into a development appraisal. This will, in turn, produce intrinsic uncertainty in the output. Rarely will development appraisals by different appraisers produce identical findings and rarely can an appraisal state as a fact that a proposed development is viable: it can only state that, based on a set of specific estimates and expectations, a site is viable.

Forecast uncertainty

An important question is whether a development appraisal should include forecasts of values and costs. It is important to acknowledge that there is a body of opinion that is sceptical about the validity of forecasting property markets in general. A key point is that, if markets are inherently predictable, it should possible for most investors to make abnormal returns on a consistent basis. This does not seem to be the case. Whatever its merits, market forecasting is deeply embedded within most markets.

For institutional property investors, expectations of future investment performance at the levels of individual property asset, sector, region, country and across other asset classes (e.g. bonds and shares) are crucial to property selection and tactical and strategic asset allocation decisions. A high degree of technical sophistication in forecasting has been developed over recent years, with a range of advanced quantitative and qualitative procedures now used by institutional investors, including judgemental procedures, causal/econometric procedures and time series/trend analysis procedures (Higgins, 2000). Numerous property forecasting studies have been conducted in recent years; these have been concerned with forecasting property rents, stock levels, returns, yields and cash flows; econometric and structural modelling, and comparisons of property forecasting procedures (see Newell, McAllister and Brown, 2003).

However, uncertainty and disagreement are inherent in the forecasting process. Most economic forecasting is based upon econometric modelling. Error (in the statistical sense) is intrinsic to econometric forecasting techniques since estimates are essentially a point drawn from a probability distribution. The limitations of econometric methods due, in particular, to the effects of structural shifts and unanticipated events are exacerbated by problems of data availability and reliability in property markets. Additionally, property forecasts are normally dependent upon 'driver' forecasts of the independent (typically macro-economic) variables which themselves will be subject to forecast uncertainty and, where two or more are procured, will display disagreement.

The extent to which a viability model with forecasts will produce a different output from a model without forecasts depends upon the difference between cost and revenue inflation, the relative proportion of costs to revenues and the development period. In many circumstances, estimated land value can be extremely sensitive to relatively small changes in forecasts of changes in costs and revenues. However, this is a function of the residual nature of the calculation and cannot be eliminated by using one technique or another. As a result, forecasts of changes in costs and revenue levels over time can have a substantial impact on land value or profitability estimates and, indirectly, on estimates of the capacity to generate planning obligations. However, the forecast time periods for development schemes are often shorter than for investment horizons and it would seem odd for a market which has developed a major forecasting ability to apply it to investment but not development.

Another limitation of the traditional simple residual model is that sites are appraised in isolation. Since it is the current level of most variables that is incorporated into the simple traditional residual appraisal model, the potential effects of differences in future supply conditions are not addressed. For instance, two sites may have similar *current* cost and revenue conditions with one in a market with extremely constrained supply and the other in an area where competing sites are numerous. The application of a traditional simple residual model or a cash flow model incorporating only current values will result in similar estimates of viability for both sites. Cash flow models could take account of this problem by reflecting the different supply conditions in different forecasts of price inflation or time on market. However, it is important that such forecasts incorporate local supply variables into forecasting models and that there is improved understanding of the price elasticity of supply at the local level.

Incorporating risk and uncertainty

Uncertainty largely explains George Box's renowned observation that "[a]ll models are wrong, but some are useful" (Box and Draper, 1987, 424). As discussed above, development appraisals are prone to uncertainty because there is uncertainty in assumptions about current levels of the inputs and in about how these variables will change over the uncertain development period. Risk in development can be defined in terms of the extent to which actual outcome diverge from expected outcomes. It can only be eliminated by fixing all of the input variables at the date of the valuation. As already noted, there are two key types of uncertainty:

1. Defensible disagreement between modellers about model composition and inputs
2. Unanticipated changes affecting revenues and costs

There are a number of standard approaches to the assessment of the impact of possible variation in inputs. A typical approach is to construct scenarios, typically two or three-way cross-tabulations. These tend to identify key inputs that drive risk rather than measure risk. Two studies have argued for deterministic models to be replaced or at least supplemented with probabilistic modelling (French and Gabrielli, 2004, Atherton et al, 2008). The thrust of the argument is that probabilistic modelling can reflect both the uncertainty of and correlation between input estimates. The standard approach here is to use simulation techniques.

Simulation software can be ‘added’ to Excel to produce multiple estimates of an output rather than a single estimate. The distribution of possible outcomes is generated by the software which recalculates the result over and over again, each time using different randomly selected sets of values determined by specified probability distributions. In effect, simulation is trying all valid combinations of the values of input variables to simulate all possible outcomes. It then presents the outcomes and their probabilities. Simulation programmes require us to estimate:

- what our best estimate is of an input (the mean),
- how certain we are about that input (the standard deviation),
- the statistical distribution of this uncertainty,
- boundaries around this distribution if necessary and
- how the inputs are correlated.

The simulation programme will draw numbers randomly from the distribution. Numbers that occur frequently in the distribution are more likely to be selected. In return, based on the inputs provided, the simulation programme provides us with its best guess of the actual outcome, the probability of achieving any specific outcome, the probability of being in a range of possible outcomes and the level of uncertainty around the estimated outcome.

However, there are many practical obstacles with measuring risk in a development scheme. In any risk analysis, a main consideration will be the form of the probability distributions that express the uncertainties in the system. This is a major difficulty in developing models of this kind. It is necessary to specify a considerable number of distributions in these models and, practically, the justification of the form of any or all of them is a problem that is common to all risk analyses. The literature tends to use easily managed distributions, e.g. Normal, Triangular, rather than attempting any systematic understanding as to which distributions might be most appropriate.

The Application of Development Viability Appraisal in the UK Planning System

As indicated previously, the two basic standard outputs of a development appraisal are a land valuation and an estimate of profitability. The outputs that planning authorities require are the assessment of scope for planning obligations and affordable housing targets and, more specifically, these planning outputs from development appraisals can be categorised as follows:

1. *Assessment of planning obligations*

   The regulatory planning framework in the UK typically requires landowners to contribute a proportion of financial surpluses generated by planning permissions to local government. However, this proportion is not calculated as a percentage of uplift in land value resulting from the granting of planning permission, as it has been in the past. Instead, the amount of the contribution, known as a 'planning obligation' is negotiated on a site-by-site basis between landowner and local planning authority. Negotiations over the level and timing of payments can be difficult when the development timescale is long. For example, it has become accepted wisdom that large residential schemes should be subject to S106 agreements which include a 'flexible viability appraisal' although it is not clear what the threshold for a 'large' scheme is.

2. *Area-wide Viability Appraisal*

   When allocating land for housing, PPS3 requires local planning authorities to evaluate whether the sites identified are economically viable and the likely level of planning obligation that could be secured. Sites may be identified but may not come on-stream for some years so generating detailed cost and revenue projections can be impractical. The assessments tend not to appraise the viability of specific sites but the broad viability of sample sites at a strategic level having regard to the typology of the sample sites. The DVAs usually include sensitivity analysis to examine effect on residual land value (per hectare) of varying the values of key inputs[2]. Such appraisals are intended to provide the

[2] For example, sales revenue, amount of planning obligations, development density, construction costs, timescales, tenure split.

basis for local planning authority policies regarding planning obligations in an area and/or site allocation.

However, it could be argued that, in terms of residential viability assessment, any area is essentially a collection of residential development sites. The robustness of an 'area wide' viability assessment will depend on the degree of homogeneity of capacities, values and costs within that area. If there is a sufficient level of uniformity of capacities, costs and values among sites within an area, then the 'area wide' viability assessment should be robust. However, if sites are heterogeneous, it is possible that, by ignoring the specific conditions for each site, 'area-wide' viability appraisals may provide an unreliable basis for policy formation. If sites are heterogeneous, a 'one size fits all' planning policy may be inappropriate.

What should be the land cost assumption in a development viability model?

The Homes & Communities Agency (HCA) has been grappling with the issue of, what they term, Threshold Land Value. This is, essentially, a land value at or above which it is assumed the landowner would be prepared to sell. A number of variants have been suggested and there seems to be little consensus about how it is implemented. In this section, we discuss the alternatives outlined by the HCA.

However, there should be a framework to this discussion and we believe that the residual nature of the development appraisal model provides that framework. Essentially, the residual approach to land value determines the residual amount after the costs of the development have been accounted for and the developer given their return on the development. The residual amount is the amount available to pay for the land element *and* any additional costs of obtaining the planning permission including the obligations. Regardless of whether the developer is the landowner or not, this should not change this basic framework. A developer who owns the land has the option to sell the land. Without the development planning permission, the landowner already has a market value of the land in the current use. Depending on the site, the difference between the market value of the land for development ignoring the obligations and the market value for the current use can be significant or quite minor. Local authorities cannot ignore that the obligations will have to be paid out of this difference and therefore the question should revolve around a fair split of this increase between landowner and LA. This increase will vary enormously dependent upon the nature of the individual site. It is this individuality that spawned the development of the residual model of valuation rather than a direct comparison of similar sites in the first place.

The HCA alternatives were:

1 Market Value of land based on price signals from land transactions

Approaches that advocate a Market Value threshold (where transaction prices have been formed in regulatory conditions with a low level of planning obligations) are implicitly supportive of the transfer of increases in land value associated with planning permission to the landowner. For instance, assume that house-builders' bids for residential development sites were formed in a planning regime without any requirement to provide a social housing component, producing typical land values of £2,000,000 per acre for serviced residential development land. Where a policy is introduced requiring planning authorities to secure an increased proportion of affordable housing but that such a policy must be financially viable; all else being equal, if a Market Value of land is assumed at £2,000,000 per acre in a viability appraisal, a scheme with a proportion of affordable housing above zero will not be viable. Whilst Planning Inspectorate decisions may currently favour the use of Market Value, such decisions may be the product of limited understanding of development processes relative to planning processes. The key point is that market land prices are contingent upon market and regulatory conditions. Proposals to increase AH provision may appear unviable if viability appraisals are based upon the market prices of land formed in an environment when land prices were higher due to different regulatory requirements and/or market conditions. To adapt Ricardian rent theory, the market price of land does not determine the extent of planning obligations, it is the extent of planning obligations that determines the market price of land.

2 Market Value expressed as a proportion of Gross Development Value

Many of the same points can be made about the second option. Land price/GDV ratios are also an artefact of specific market conditions and regulatory requirements. There is no reason to expect land costs to be any specific proportion of development value. Such 'rules of thumb' have no economic meaning. They are simply heuristic devices that may have worked in a specific market environment. There is no reason to presume that they have any application in another market environment.

3 Existing use value plus an incentive

In terms of practicality, the key (and most difficult) question regarding this option is the size of the inducement necessary to encourage landowners to release land for development. Incentivising landowners remains a complex issue. Landowners' expectations have been formed in a set of market and regulatory conditions that, in many cases in the past, have created substantial value uplifts when planning permissions are granted. In the some cases, it is unlikely that land in agricultural use would be released on the basis of EUV plus 15-30% of current EUV. In many cases, this will be a very small share of the uplift generated by planning permission. Landowners are likely to exercise their real option of waiting - until there is a change of regulatory regime. Indeed, this is likely to be their optimal strategy in an environment of reduced housing land supply. A maximum relative or absolute fixed increase on existing use value provides a potential practical approach to assumed land cost. However, it is important that it is set at a level that induces the supply of sites by real estate entrepreneurs and landowners. The calibration of this incentive needs to be addressed. However, this question raises ideological issues which are outside the scope of this paper.

<u>Land owned by developer and sunk costs</u>

A DVA is a snapshot of viability in time. Complications can arise in situations where a developer has acquired land or a landowner has incurred costs in preparing a site for development prior to the appraisal date. If the DVA has been undertaken at the very start of the development process, then these costs would be taken into account. However, often DVAs are undertaken at a later date, usually during planning negotiations and, possibly, after significant site-related costs have been incurred. Given that such costs are intrinsic to the development process, their omission from the DVA will tend to result in an overestimation of a site's capacity to generate surpluses and, therefore, planning obligations. However, the treatment of high historic land costs in planning appeals suggests that previous sunk costs for this variable are not considered when determining a site's current capacity for planning obligations. If the aim of the DVA is to produce an estimate of planning obligation capacity at a specific date which is after development evaluation, the omission of unavoidable these historic sunk costs effectively reduces the return to the landowner.

This is subject to the precise way in which the planning obligations are assessed but there seems to be a case for stating that DVAs be subject to a special appraisal assumption. This is to ensure that any landowner who has improved the development value of the site by undertaking improvements has the costs of these works, if these have not been reflected in an increase in the current use value of the site, incorporated into the appraisal.

Estimating development viability through time

Regardless of sunk costs, the inherent volatility of the expected costs and revenues creates changes over time in the level of financial surpluses generated by development sites. As planning obligations are funded from these financial surpluses, the ability to deliver planning obligations is affected by this volatility.

Below, the changing financial surpluses generated from development over time is modelled through the period 2004 to 2008. We have modelled expected financial surpluses from sites for standard office and standard retail property using national market indicators of rental growth, capitalisation rates and construction costs. In this simplified model, some inputs, most ntably, the discount rate or rate of return required by the developer have remained fixed over time. We have used a standard residual discounted cash flow model without growth projections so that, in effect, the expected financial surplus generated by the hypothetical development is the residual surplus available for land purchase assuming no planning obligations.

The results are illustrated in Figures 1 to 4. Figures 1 and 2 show the absolute change in gross development value, construction costs and expected financial surpluses available for land purchase and/or planning obligations. Figures 3 and 4 illustrate these changes as growth/decline per annum. Construction costs grew through the period and show little volatility. GDVs show significant growth through the period to 2006 (in fact they kept growing until the summer of 2007). In offices, the growth in capital values from 2004 to 2006 was from £2,769 per square metre to just over £4,000. In retail, it was from £3,269 per square metre to £4,181. These represent growth rates of 15% in 2005 rising to 25% in 2006 for offices and 14% in 2005 and 15% in 2006 for retail.

Growth in expected financial surpluses available for land purchase and/or planning obligations in the period 2005 and 2006 was greater than GDV.

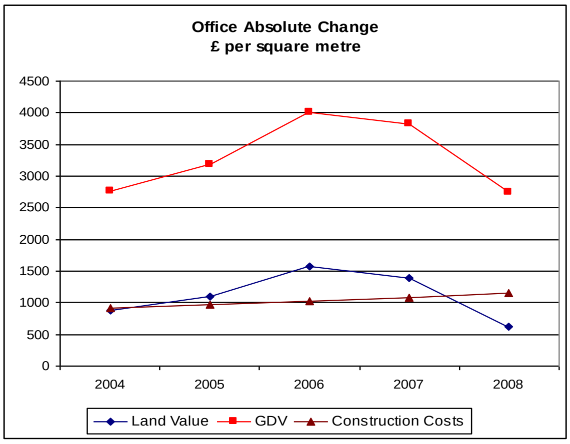

Figure 1 Office Property Value Change 2004 to 2008 - £ per sq.m

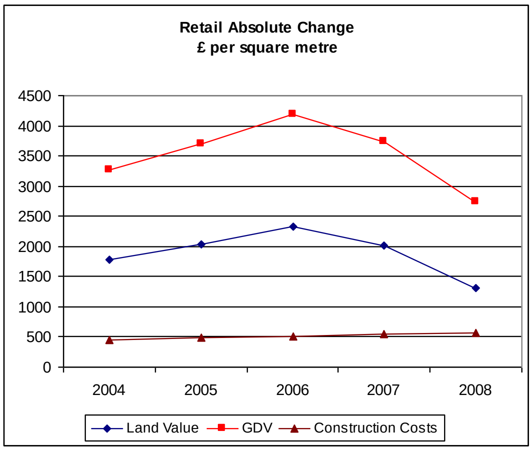

Figure 2 Retail Property Value Change 2004 to 2008 - £ per sq.m

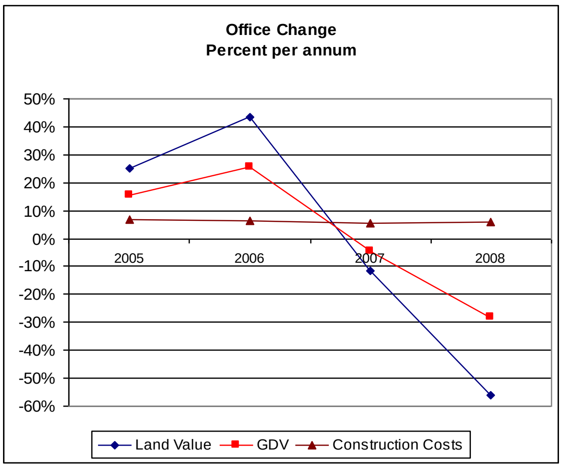

Figure 3 Office Property Value Change 2005 to 2008 - % pa

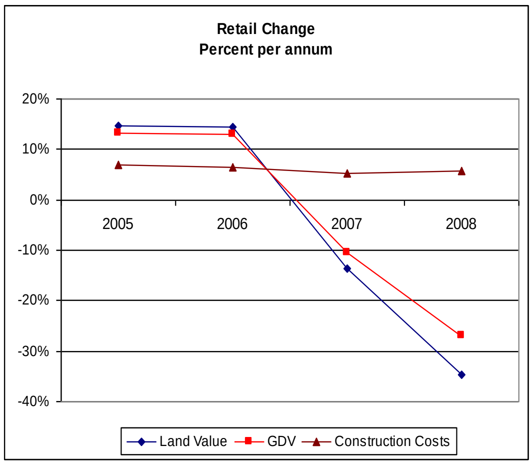

Figure 4 Retail Property Value Change 2005 to 2008 - % pa

While office GDVs rose by 15% and then 25% in 2005 and 2006, the expected financial surplus available for land purchase and/or planning obligations rose by 25% and over 45% in the same period.

The difference is a function of the relationship between site value and GDV. Retail costs less to build while having, on average, greater asset values per square metre. Land values are therefore higher as a proportion of asset value causing the land value to react less to changes in the GDV than where land values are a lower percentage of GDV. Essentially the financial surpluses generated by development are less sensitive to changes in asset values than in office markets. In the downturn, financial surpluses available for land purchase and/or planning obligations on retail sites fell by 14% in 2007 and 35% in 2008 due to falls in GDV of 11% and 27%. It is only in 2008 that the expected financial surpluses from sites fall below 50% of GDV. In all other years, they are above 50%.

In contrast, the fall in the GDV of offices has a much greater impact on the expected financial surplus available for land purchase and/or planning obligations. While office capital values fell by 5% in 2007, expected financial surpluses fell by 12% and in 2008 while capital values fell by 28%, expected financial surpluses fell by 56%. The expected financial surplus never exceeds 40% of GDV throughout the period and by 2008 it has dropped to 22.5%.

It must be stressed that this model has been constructed using simple inputs to illustrate the behaviour of expected financial surpluses to final developed values and construction costs. Target rates of return have been held constant. In reality, it may be that that market volatility causes some changes to the model inputs. In rising markets, the increased demand for development land may reduce target rates and increase expected financial surpluses still further; when markets fall development activity including land sales decreases and in some circumstances virtually ceases. Land values may appear to be more flexible in rising markets than in falling or fallen markets (Fraser, 1984, 253).

Residential land prices display a similar increased volatility through time. Rather than create a hypothetical index driven set of expected financial surpluses from sites, indexes of residential house prices and land prices exist and these can be compared to identify the relationship. The analysis below is based on the Halifax house price index for house prices and the Valuation Office Agency index of residential land values. Figure 5 sets out the land price index for England and Wales and compares it to the Halifax index of house prices for whole of the UK. It indicates the annual percentage change.

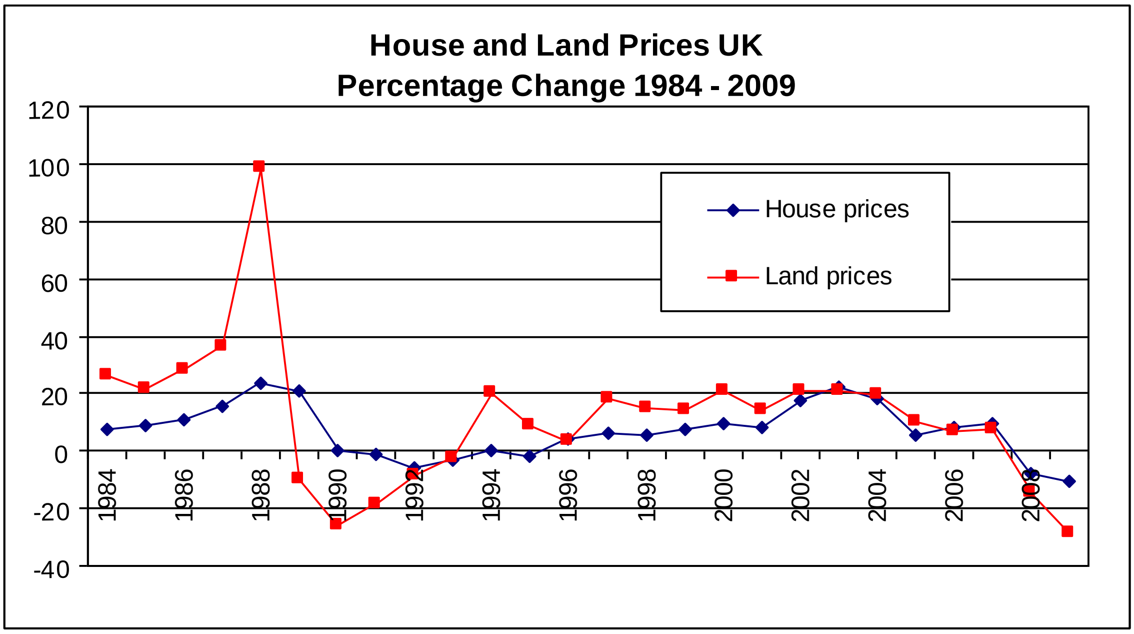

Figure 5 : House and Land Price Change 1984 to 2009 – UK
Sources: Halifax and Valuation Office Agency

The geometric mean increase in house prices from 1983 onwards until 2009 was 6.6% per annum. For land prices, the geometric mean was 9.33% per annum over the same period. Taking the average increase or decrease each year, house prices averaged an increase of 6.95% pa while the land price increase was 11.7% pa. The standard deviations are very different with the house price standard deviation being 9.09% while the residential land value standard deviation is over 2.5 times greater at 24.5%.

Given the slight mismatch in regions included in the two datasets, a similar analysis was carried out for the greater London area. Figure 6 illustrates the same differences between the land and house prices, with the average increase in land prices higher at 10.1% pa against 7.8% pa for house prices and a much higher standard deviation at 23.4% compared to 10.9% for the house prices.

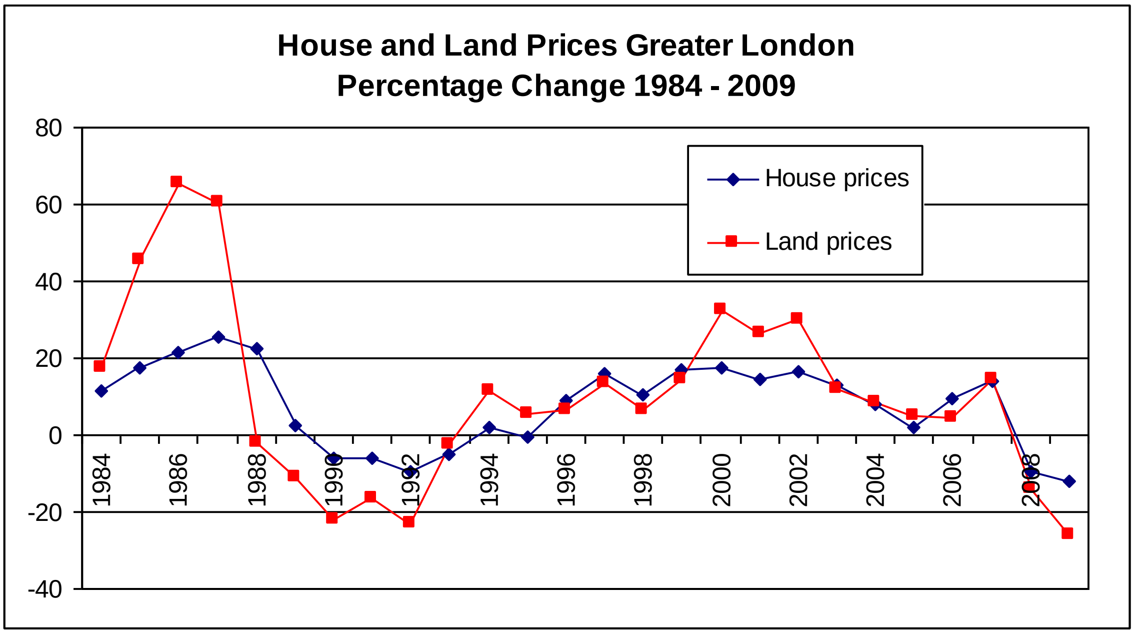

Figure 6 : House and land Price Change 1984 to 2009 – Greater London
Sources: Halifax and Valuation Office Agency

This illustrates that expected financial surpluses generated by development are extremely volatile through time and the volatility is a function of the relationship between the changes in GDV and the costs of development (excluding land and planning obligations) – the smaller the expected financial surplus as a proportion of expected revenues and costs, the greater its sensitivity to changes in expected revenues and costs.

Site values have fluctuated more than asset values. Risk in development is partly exposure to these fluctuations and fixing either site value and/or planning obligations at one point exposes the developer to the whole risks attached to these fluctuations. By implication, planning obligations that are static and inflexible may be inappropriate given dynamic markets. As long as revenue inflation exceeds development cost inflation, this will not cause any problems for the delivery of planning obligations. However, when there is a negative market shock, planning obligations estimated and fixed in the context of a different set of market expectations may prevent development from occurring because it is not financially viable. In the last two/three years, agreements forged in the pre- crisis period have been unaffordable by developers and may created development losses and/or abandonment.

An interesting issue is whether local planning authorities should participate in development risks with planning obligations linked to actual rather than expected financial surpluses or whether they should inherently be a fixed cost to the development at the outset. Overall, risk/return theory suggests participation in risk should lead to more income, facilities, infrastructure, etc and there would be less likelihood of developments being shelved as obligations would reduce in weak markets and increase in strong markets (assuming developers without perfect foresight and underestimating both upturns and downturns).

This shift for local planning authorities from being a quasi-bondholder to a quasi-shareholder would have to be operationalised and this aspect has not been developed here. There are precedents for LPAs taking a risk share in development; for example, comprehensive redevelopment schemes where they were landowners or had compulsory purchased the land for the development. In those cases, ground rents were fixed on a risk-sharing basis tied to total income/value of the completed development or LAs participated in the development profits over and above a fixed return on the land element.

Estimating development viability across space

The residual appraisal model not only produces an estimate of financial surplus available for land purchase at a specific point in time but also in space. The financial surplus generated from a particular site may bear little relation to even its closest neighbours. If this were not the case, then recourse to recent transactions in the locality would yield evidence for a comparison method valuation. Put simply, there would be no need to apply a residual model. So the spatial specificity of development land is the primary reason for the residual model and it is also why its adaptation to area-wide appraisals of 'typologies' of development sites in 'localities' and 'sub-markets' is open to question. The aim of this section is to provide a preliminary empirical investigation of spatial variation in the price of residential building land and in the price of new dwellings at various geographical scales. Large spatial variations in expected revenues from similar sized sites would suggest that there were substantial spatial variations in their capacity to generate financial surpluses.

The first part of the investigation used estimates of land prices published by the Valuation Office Agency (VOA)[3]. It should be noted that these are based on valuations rather than transaction prices and therefore may smooth actual price differentials and, indeed, the VOA states that the land values should be regarded as illustrative rather than definitive. The table in Appendix 2 reveals substantial variation across the regions. It is also interesting to note how this variation expands and contracts over time. Removing London reduces spatial variation but the coefficient of variation of land prices across the regions averages around 30% over the time period. At the city/town level, Table 2 shows the dramatic increase in variation of land prices when location is examined at a larger scale. Coefficients of variation are in excess of 70%. Removing Camden brings the variation down but it remains very high. In 2010 only prices for suburban sites of 0.5 hectares are reported and only for 26 cities and towns (21 in England). Even with a sample size of less than one quarter of that available in 2009 the coefficient of variation is 51%. There are no regional figures and nothing for central London.

Table 1: Residential building land prices (£/hectare) by city/town and site type, 2009

		Small Sites (sites for less than five houses)	**Bulk Land (sites in excess of two hectares)**	**Sites for flats or maisonettes**
With Camden	N	97	97	93
	Mean	2,458,557	2,281,753	2,599,032
	SD	1,824,001	1,640,670	1,948,433
	CoV	74%	72%	75%
	Median	1,900,000	1,700,000	2,000,000
Without Camden	N	96	96	92
	Mean	2,338,333	2,190,938	2,477,826
	SD	1,394,718	1,382,649	1,567,431
	CoV	60%	63%	63%
	Median	1,900,000	1,700,000	2,000,000
				Source: Valuation Office Agency

The second part of the investigation looks at variations in residential house prices at a local scale. Price information on new-build transactions is difficult to obtain and no national or regional statistics are published. At the local level, various data sets are collated from Land Registry data and other sources. Table 1 summarises sales in 2009 in Winchester. The variation at the local level is clear to see - even when dwellings are categorised by type. It

3 http://www.voa.gov.uk/publications/property_market_report/

should be noted that this sample does not include dwellings constructed on urban extensions or in rural areas and is therefore likely to underestimate variation within the local authority district.

Table1: New-build house prices in Winchester at street level by dwelling type, 2009

Type	Street	Ave Price	No. Sales	Mean	SD	CoV
Detached	Chilbolton Ave	£635,000	1			
	Fairway Drive	£590,000	1			
	Mornington Drive	£782,500	2			
	Old Kennels Lane	£662,500	1			
	Pump House Mews	£453,000	2	£624,600	£119,500	19%
Semi-detached	Chilbolton Ave	£432,500	2			
	Drayton St	£175,000	2			
	Fairway Drive	£290,000	3			
	Mornington Drive	£297,750	2			
	Pump House Mews	£217,500	2	£282,550	£98,196	35%
Terraced	Andover Rd	£294,995	2			
	Chilbolton Ave	£295,833	3			
	Fraser Gdns	£518,800	5			
	Mornington Drive	£300,000	1			
	Pump House Mews	£425,000	1			
	Queens Gate	£460,000	1			
	Winton Close	£299,997	2			
	Winton Mews	£384,000	1	£372,328	£88,112	24%
Flats	Chilbolton Ave	£330,000	1			
	Cranworth Rd	£217,660	8			
	Fraser Gdns	£250,771	19			
	Pump House Mews	£285,000	3			
	Queens Gate	£190,000	1			
	Winton Close	£101,053	12	£229,081	£79,788	35%

Source: www.nethouseprices.com

Such price variations within a local authority area would lead to comparable variations in the expected financial surpluses available for land purchase and/or planning obligations. Moreover, in the same way that there are variations in expected revenues from sites, there are also likely to be variations in expected costs (ignoring variation in planning obligations). It is worth pointing out again that heterogeneity in expected revenues and costs among sites is the fundamental reason why appraisers adopt a method that models the cost and revenues of each site.

The HCA's Area Wide Viability Model allows construction of up to nine site 'typologies' to represent different types of development in an area (typically, within the boundary of a local authority), and inputs into these drive the output(s). The typologies might be formed on the basis of location (urban/suburban/rural, greenfield/brownfield), size, density and infrastructure requirements. The HCA model provides four example typologies (large urban extensions, suburban infill, higher density urban infill and distributed rural) together with some hypothetical input values. The model uses a conventional cash flow method (with developer's profit and finance included) to test the viability of each typology separately as well as aggregated. It is possible to 'goal seek' the model to determine total potential planning obligation by setting all public contributions (affordable housing, infrastructure levies, etc.) to zero. The difference between the resulting land value assuming permission to develop with planning obligations and value assuming current planning use then represents the uplift. The results of the HCA model are shown in Table 3. What this reveals is the substantial variation in the relative uplifts created by planning permissions due in large part to the variation in GDV and value in current planning use between sites.

Table 3: Site-level variation in land values

Site type	Land value assuming planning permission	Value in current planning use	Uplift due to planning permission	50% allocated to landowner	As a proportion of value in current planning use
Large urban extensions	£13,469,035	£2,560,000	£10,909,035	£5,454,518	213%
Suburban Infill	£6,062,435	£3,549,000	£2,513,435	£1,256,718	35%
Higher density urban infill	£7,518,804	£4,350,000	£3,168,804	£1,584,402	36%
Distributed rural	£4,158,998	£581,000	£3,577,998	£1,788,999	308%

Key Findings

- Relative to the applications of appraisal models to standing investments, development appraisals have not been subject to comparable scrutiny in terms of their conceptual basis, format, application, methods and reliability.

- Largely due to the spatial heterogeneity of site characteristics and property prices, it is often difficult to rely on market signals generated by land sales to estimate the exchange price of other sites. As a result, when valuing development sites, development viability appraisers typically resort to a residual approach. This is largely unavoidable. As a result, this paper has focused on *how* the residual approach is applied rather than *whether* it should be applied.

- A development viability appraisal can be used to estimate at least two different conceptual bases of value – Market Value and Investment Value. Market Value appears to be the most objective framework for DVA.

- A crucial point is that, regardless of approach to estimating viability, the time-frame of the development viability appraisal is fixed at one point in time. The assessment of viability will change as market and project conditions and expectations change. This is common to all standard bases of estimating property values. Viability appraisals, whether used to estimate land value, profitability and/or planning obligation capacity have no shelf life. Put simply, a development project's profitability, value and/or planning obligation capacity changes over time.

- In order to evaluate the composition of the various development viability appraisal models, it is useful to have some idea of what the ideal DVA model for estimating the financial value of a development project would look like. We suggest two key requirements:-

    - Assuming that the optimal development mix is specified, development viability appraisal models should identify the revenues and costs from a proposed real estate development project and predict accurately the level and timing of all financial inflows and outflows.

    - The cash flows generated by development projects should then be priced using capital budgeting techniques that are theoretically rigorous in terms of wealth maximisation.

- The composition of some mainstream development appraisal models has been criticised on the grounds that they do not appear to attempt to and/or fail to meet these requirements.

- As commonly applied, both simple and some cash flow residual models of development viability fail to estimate the value of development projects in a theoretically robust manner. This is because of the incorporation of financing in the development appraisal and the use of a crude profit mark-up as a proxy for required return. Development appraisal is an outlier in the sense that, although many non-property development projects involve gearing, it is regarded as a common mistake to incorporate financing in mainstream theory of project evaluation.

- In addition, the simple residual approach often oversimplifies the timing of cash flow from the development with the potential to produce over- and underestimates of interest costs. Simple residual models do not enable expected changes in the costs and revenue variables to be incorporated as and when they are expected to occur. Cash flow approaches provide a more accurate measure of finance costs and allow for changes in costs and revenues to be reflected when they are expected. However, whilst cash flow models, as commonly applied, improve on the simple residual model, they do not address the underlying theoretical weaknesses in its approach to pricing the expected cash flow.

- The main barrier to the application of more robust capital budgeting techniques relates to the difficulties of estimating a hurdle rate of return for a development project. However, this is not unique to real estate development projects and is a common problem in any project appraisal. In addition, hurdle rates of return are implied in conventional development viability appraisals and can be identified.

- In the context of a high level of appraisal output uncertainty due to appraisal input uncertainty, appraisal output uncertainty generated by poor model composition may be trivial. Said differently, choice of appraisal model may be unimportant given the extent of uncertainty about target rate of return and expected costs and revenues. This may explain the apparent neglect of development appraisal models amongst professional institutions and the academic community.

- Whilst there is some scepticism about the reliability of forecasts and it is clear that uncertainty in the form of disagreement and error is inherent in real estate forecasts, expected changes in values and costs should be incorporated in a development viability appraisal models. Using current values is an implicit forecast of no-change. There is a well-established property market forecasting sector that can provide these information inputs.

- Forecasts provide the obvious means of incorporating variations in supply conditions into development appraisals. Traditional simple residual and cash flow appraisal models without forecasts do not allow for the fact that there may be substantial variations in alternative development land availability (i.e. competition) among sites.

- Development viability appraisal modelling is saturated with uncertainty. Intrinsic uncertainty due to differences in expectations and scope for subjectivity about the estimates of current levels of costs and revenues and about future cost and price inflation introduces scope for justifiable variations in estimation of the key inputs into a development viability appraisal and, therefore, unavoidable disagreement about the outputs.

- Whilst it has been acknowledged above that uncertainty is inherent to development viability appraisal modelling, there are clear difficulties in measuring and communicating this uncertainty. Although simulation methods provide a useful approach to estimating the range of outputs and the probability of different outputs, there is a major difficulty in developing simulation models of this kind. It is necessary to specify a considerable number of distributions in these models and, practically, the justification of the form of any or all of them is not easy. Put differently, there is uncertainty associated with the level and nature of uncertainty in the model inputs and, therefore, uncertainty associated with the level and nature of uncertainty in the model outputs.

A number of issues also emerge regarding the specific application of development viability appraisal modelling in the context of planning policy formation and negotiations about planning obligations.

- In terms of model inputs, a key issue determining the surplus available for planning obligations is the share in land value uplifts generated by planning permission that goes to the landowner. Said differently, how are development gains to be shared between the local planning authority and the landowner? Specifying this proportion raises ideological issues outside the scope of this paper. However, at an operational level, Threshold Land Value needs to be specified. It needs to be set at least at a level that will incentivise landowners to release land.

- The fact that development viability appraisals will become obsolete as market conditions change raises a fundamental issue of whether viability appraisals are suitable for the purposes for which they are often being used in the planning system. Since models assess viability in a unique set of market conditions at a given single point in time, it may not be appropriate to use the results of viability appraisals to fix planning policies that are to be applied in a different set of conditions. The experience of the market downturn provides a clear example of how the capacity to extract planning obligations from sites can change rapidly and substantially over time.

- A further potential problem relates to the application of 'area-wide' development viability appraisals. The fact that appraisers typically must resort to the residual approach in order to value development is largely due to a combination of thin trading and heterogeneity in property development sites. This inherent uniqueness of each development site may mean that 'area-wide' policies on planning obligations supported by 'area-wide' viability appraisals are inappropriate. In the same way that the trading price of one site may provide an unreliable signal of the value of a nearby site, the planning obligation capacity of a typical site may provide little indication of the planning obligation capacity of a specific site. The robustness of an 'area wide' viability assessment will depend on the degree of homogeneity of site capacities, values and costs within that area. If there is a sufficient level of uniformity of capacities, costs and values among sites within an area, then the 'area wide' viability assessment should be robust. However, if sites are heterogeneous, it is possible that, by ignoring the specific conditions for each site, ‘area-wide’ viability appraisals may provide an unreliable basis for policy formation. If sites are heterogeneous in terms of potential development revenues and costs per unit of construction, a ‘one size fits all’ planning policy may be inappropriate.

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Appendix 1: Detailed revenues and costs

Land value = present gross land value – site acquisition costs

Site acquisition costs = site investigation fee + (land acquisition price x % agent and legal fees) + stamp duty

Development value = GDV – purchaser's costs (disposal costs)

GDV = capitalised rent + gross sales receipts - total non-recov cost - ground rent + grant(s)

Capitalised rent [for each tenanted land use] = net annual rent / yield
Net annual rent = gross annual rent x (1 - % non-recov cost)
Gross annual rent = gross annual rent per unit area x area x efficiency ratio

Gross sales receipts [for each owner-occupied land use] =
Market capital values + (market capital values x % discount to Market Value for various categories of AH) – total non-Recov cost
Market capital value = No. units x unit sale price [for each property type]
Total non-recov cost = fixed non-recov cost (management costs, voids, bad debts, non-recoverable repairs on rented AH (% gross unit rent), including rented share of shared ownership AH

Ground rent = (leasehold gearing % x annual gross rent) + fixed ground rent deduction

Grant(s) = % Social Housing Grant for Social Rented Housing plus AH grant per unit plus any other sources of AH funding, etc.

Purchaser's costs (disposal costs) = capitalised rent – (residential sale price x % sale fee) + (rent x % letting fee) + (commercial sale price x % sale fee)

Development costs = building costs + external works + fees + other costs + contingency

Building costs = No. units x unit area x building cost per unit area [for each property type]

External works = site clearance and contamination remediation + engineering works + (cost of parking space x no. spaces) + (demolition cost per unit area x area) + (highway works per unit are x area) + (% building costs for utilities) + (cost of private garden landscaping x no. private gardens) + cost of public open space per unit area x area) + (cost of children's play area x area)

Fees = Professional fees + agents fees + development control fees

Professional fees = ((architect + QS + engineers + landscape architect) x summed total % building costs) + (legal + planning consultants + highway consultants + ecology consultants + archaeology consultants + finance consultants)

Development control fees = planning application + bldg regs + EIA

Other costs = S106 costs + Misc surveys + NHBC costs

S106 costs = Provision of open space + Payments for landscaping + General environmental improvements + Ecology, countryside management etc + Allotments + Sport facilities + Permanent highway works + Temporary highway works + Traffic management/calming + Parking provision + Green transport/travel plans + Provision and improvement of footpaths + Provision and improvement of cycle paths + Construction, funding of community centres + Community art + Town centre management + Childcare/creche facilities + Public toilets + Healthcare facilities + Waste and recycling features + Training and regeneration initiatives + Contribution to education + Amount per dwelling + Number of dwellings

NHBC = (residential Market Value x % Market Value)

Contingency = building costs x % contingency fee

Forecasts

- Cost inflation forecasts, broken down by land use
- Value inflation forecasts, broken down by land use

Appendix 2: Residential building land prices

Residential building land prices (£/hectare) by region

Year	London	SE	NE	NW	Y&H	EM	WM	E	SW	Mean (inc London)	SD (inc London)	CoV	Mean (exc London)	SD (exc London)	CoV
1990	2,329,000	902,000	535,000	582,000	587,000	438,000	722,000	849,000	729,000	852,556	573,484	67%	668,000	159,777	24%
1991	1,939,000	704,000	486,000	492,000	537,000	396,000	630,000	594,000	581,000	706,556	470,783	67%	552,500	95,848	17%
1992	1,490,500	615,000	509,000	471,000	465,000	361,000	546,000	562,000	540,000	617,722	335,152	54%	508,625	77,144	15%
1993	1,455,000	603,000	488,000	451,000	433,000	373,000	545,000	543,000	517,000	600,889	327,558	55%	494,125	73,347	15%
1994	1,625,000	761,000	514,000	481,000	538,000	458,000	624,000	733,000	587,000	702,333	361,645	51%	587,000	112,484	19%
1995	1,712,000	798,000	524,000	501,000	541,000	459,000	619,000	783,000	601,000	726,444	388,047	53%	603,250	126,440	21%
1996	1,827,000	817,000	524,000	502,000	538,000	471,000	632,000	833,000	638,000	753,556	423,235	56%	619,375	139,749	23%
1997	2,071,500	1,140,000	520,000	548,000	572,000	514,000	691,000	1,010,000	728,000	866,056	503,723	58%	715,375	237,594	33%
1998	2,205,000	1,340,000	520,000	579,000	610,000	590,000	890,000	1,070,000	900,000	967,111	537,672	56%	812,375	290,029	36%
1999	2,528,500	1,660,000	530,000	665,000	650,000	680,000	940,000	1,240,000	1,060,000	1,105,944	641,650	58%	928,125	381,182	41%
2000	3,345,000	1,980,000	550,000	783,000	690,000	830,000	1,070,000	1,700,000	1,330,000	1,364,222	883,452	65%	1,116,625	511,298	46%
2001	4,223,500	2,280,000	610,000	897,000	770,000	1,000,000	1,240,000	1,980,000	1,470,000	1,607,833	1,126,871	70%	1,280,875	593,029	46%
2002	5,493,000	2,490,000	1,010,000	1,150,000	870,000	1,260,000	1,440,000	2,660,000	1,720,000	2,010,333	1,448,917	72%	1,575,000	670,799	43%
2003	6,143,000	2,760,000	1,230,000	1,315,000	1,270,000	1,770,000	1,870,000	3,180,000	2,030,000	2,396,444	1,556,666	65%	1,928,125	716,579	37%
2004	6,680,000	2,880,000	2,210,000	2,042,000	2,000,000	2,010,000	2,070,000	3,390,000	2,160,000	2,826,889	1,521,991	54%	2,345,250	511,215	22%
2005	7,020,000	3,020,000	2,210,000	2,540,000	2,320,000	2,090,000	2,190,000	3,500,000	2,230,000	3,013,333	1,572,593	52%	2,512,500	496,322	20%
2006	7,350,000	3,320,000	2,490,000	2,700,000	2,420,000	2,080,000	2,200,000	3,850,000	2,500,000	3,212,222	1,649,430	51%	2,695,000	598,044	22%
2007	8,407,500	3,830,000	2,590,000	2,766,000	2,550,000	2,190,000	2,350,000	4,200,000	2,690,000	3,508,167	1,957,227	56%	2,895,750	721,309	25%
2008	7,240,000	3,300,000	2,060,000	2,421,000	2,050,000	1,860,000	2,120,000	3,425,000	2,400,000	2,986,222	1,688,263	57%	2,454,500	591,053	24%
2009	5,355,000	2,370,000	1,320,000	1,730,000	1,420,000	1,150,000	1,650,000	2,675,000	1,620,000	2,143,333	1,300,228	61%	1,741,875	523,804	30%

Source: Valuation Office Agency