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Approaches for Calculation of Holding Costs in the Context of Greenfield Residential Development

Garner GO (Garner, Gary Owen)
School of Urban Development
Faculty of Built Environment & Engineering
Queensland University of Technology
g.garner@qut.edu.au
+61 7 3138 5327 phone
+61 7 3138 1170 fax

Abstract – There are increasing indications that the contribution of holding costs and its impact on housing affordability is very significant. Their importance and perceived high level impact can be gauged from considering the unprecedented level of attention policy makers have given them recently. This may be evidenced by the embedding of specific strategies to address burgeoning holding costs (and particularly those cost savings associated with streamlining regulatory assessment) within statutory instruments such as the Queensland Housing Affordability Strategy, and the South East Queensland Regional Plan. However, several key issues require further investigation. Firstly, the computation and methodology behind the calculation of holding costs varies widely. In fact, it is not only variable, but in some instances completely ignored. Secondly, some ambiguity exists in terms of the inclusion of various elements of holding costs and assessment of their relative contribution. Perhaps this may in part be explained by their nature: such costs are not always immediately apparent. They are not as visible as more tangible cost items associated with greenfield development such as regulatory fees, government taxes, acquisition costs, selling fees, commissions and others. Holding costs are also more difficult to evaluate since for the most part they must be ultimately assessed over time in an ever-changing environment based on their strong relationship with opportunity cost which is in turn dependant, inter alia, upon prevailing inflation and / or interest rates. This paper seeks to provide a more detailed investigation of those elements related to holding costs, and in so doing determine the size of their impact specifically on the end user. It extends research in this area clarifying the extent to which holding costs impact housing affordability. Geographical diversity indicated by the considerable variation between various planning instruments and the length of regulatory assessment periods suggests further research should adopt a case study approach in order to test the relevance of theoretical modelling conducted.

Keywords - Holding cost, housing affordability; regulatory assessment; opportunity cost; Greenfield

Introduction

The economic evaluation of land development projects, like many other kinds of projects, is typically undertaken by using different measures of value based on discounted cash flows. Therefore, the element of time is a critical determinant of viability since the discount applied to any project is always based on discount over time. As pointed out in a recent Urbis report (Walker et al., 2008), like all industries, time is of the essence to the land development business. Since time is critical, it is apparent that if a project takes longer to come to realisation, for any reason, then the costs of that project will increase. In the case of a property development project, costs relating to that portion of time when a project is held up are generally regarded as “holding costs”.

Holding costs can take many forms, but they inevitably involve the computation of “carrying costs” of an initial outlay that has yet to fully realise its ultimate yield. Although sometimes considered a “hidden” cost, it is submitted that holding costs prospectively represent a major determinate of value. Considered in the context of housing affordability, it is therefore potentially pervasive.

This paper focuses on the varying approaches and methodologies adopted when the calculation of holding costs is undertaken, focussing on greenfield development. Whilst acknowledging there may be some consistency in embracing first principles relating to holding cost theory, a review of the literature reveals considerable lack of uniformity in this regard. There is even less clarity in quantitative determination, especially in Australia where there has been only limited empirical analysis undertaken. This is despite a growing quantum of research undertaken in relation to various elements connected with housing affordability. The end result has been a modicum of qualitative commentary relating to holding costs. There have been few attempts at finer-tuned analysis that exposes a quantified level of holding cost calculated with underlying rigour. It may therefore not be too surprising that this matter has become highly prioritised in the Australian Government’s housing research agenda.

Methods

This paper further develops previous modelling attempts seeking to quantify the impact of holding costs on housing affordability - in particular, the consequences of extended regulatory assessment periods as a component of holding costs. However, the focus here is to examine holding cost theory, and how it is applied (or in some cases not applied) in the computation of land development projects.

Since the cost of housing impacts housing affordability, examination of linkages with holding costs therefore has potential to provide greater exposition of housing affordability equations. Understanding the nature and composition of holding costs applying in residential property markets (particularly greenfield development) provides a basis for understanding the impact of indirect regulatory costs – in particular, costs which may be associated with the length of the regulatory assessment period.

The literature review covers the background to holding cost theory and generally accepted “first principles”. It proceeds to provide further insight by providing a comparative methodology of the application of holding cost theory, in the process examining linkages with land supply problems, timeliness of regulatory assessment, and ensuing apparent financial impacts and other perspectives.

The focus of this paper is therefore to examine holding cost theory based on the hypotheses that it is a primary driver of housing affordability. Connections between regulatory assessment, holding costs and housing affordability are central themes. The dimensions of regulatory assessment as part of the "development pipeline" are given some attention, in order to establish the extent of diversity that exists between different regulatory regimes. The outcomes of this are compared against attempts at quantifying holding cost impact as reviewed in the literature.

This provides additional foundation for related research, in particular the examination of assessment periods against various holding cost elements (and / or the total quantum of holding costs) via spreadsheet scenario analysis. This allows a comparison of outcomes through the modelling of independent variables, such as interest rates (in particular), and the passage of time. In this way, the impacts on housing affordability are ultimately clarified by testing the impact of the major drivers of holding costs.

Geographically, there is considerable variation between various planning instruments and the length of regulatory assessment periods. This implies the need to collect empirical evidence based on various group relationship data - a case study approach. Whilst this paper stops short of field testing predictive models that have potential to reliably quantify the impact of planning delays, and other holding cost variables, it may be anticipated that such models could be readily developed as a result of this preliminary research.

The Complexity of the Holding Cost Calculation

Quantifying holding costs and other related costs such as those associated with delays in obtaining assessment and approvals can be complex depending on the Project and the variables applying in particular circumstances. This complexity increases since holding costs can occur over any or even all stages involved in a property development pipeline - from initial strategic identification of a site, until construction completion and beyond.

Since holding costs are incurred over the total period of financial commitment by stakeholders, they are impacted by various responses to market conditions existing and changing over that time. In the case of a greenfield development, this includes not only prevailing interest rates / investment alternatives that underpin the opportunity cost, but also the period of investment commencing with property acquisition right through to time taken for sales to be effected upon dwelling completion. This fundamentally involves the demand / supply equation, adding even further complication since this equation must also take into account the aspect of human nature itself. We are reminded of this in a recent study which suggests that housing prices are *"better explained in terms of human behaviour and social changes than by mere trend analysis"* (Small, 2009). Household lifecycles and behaviour are now thought to be strongly relevant factors in relation to housing affordability: for example, a recent AHURI report (Wood & Ong, 2009) found that precarious housing affordability circumstances are particularly evident among younger couples with dependent children, a stage in the life cycle that is associated with pressing spending needs.

Holding cost measurement – a derivation of the EOQ model

The basic EOQ (Economic Order Quantity) model identifies the penalty associated with ordering either too much or too little. Holding costs are in reality simply a derivation of the EOQ model, where the shape of the "holding cost curve" demonstrates the sensitivity of the basic EOQ model to lot-size errors when holding costs are assumed to be a strictly increasing (though not necessarily linear) function of average inventory (Brown et al., 1986). The premise is that the penalty associated with ordering either too much or too little is a function not only of the size of the error but of the shape of the holding-cost curve as well.

Derivations of the EOQ model may be found in a variety of applications. For example, most models of inventory control utilise modified versions of the EOQ formula, with the capital cost of holding inventory able to be calculated by adding a fixed interest rate, r, times the purchase price, C, to the out-of pocket holding cost However, this assumes the per unit purchase price is constant, therefore where the purchase price *t* varies over time, methods for computing an adjusted interest rate, *r*, are suggested along with modifications of well-known heuristics and formulas for lot-sizing, with *r* being estimated as the sum of the unadjusted interest rate and the average expected purchase price decrease, measured over a period between 1/3 and 2/3 of the length of the order cycle (Berling, 2007). Other variations of the economic order quantity (EOQ) model such as Ferguson's (Ferguson et al., 2007) enable its use in the case of perishable goods, such as milk, and produce. This is achieved by considering cumulative holding cost as a nonlinear function of time. In this instance the holding cost curve parameters can be estimated via a regression approach from the product's usual holding cost (storage plus capital costs), lifetime, and markdown policy. Thus, a significant improvement in cost vis-à-vis the classic EOQ model is provided.

Some commentators determine that the holding cost rate represent outcomes of a net present value approach, and an average cost approach, which are approximately equivalent. This has been the approach undertaken for more complex inventory holding cost measurement. An example of this may be seen in the measurement of inventory in a two-product system involving joint manufacturing and remanufacturing (Çorbacıoğlua & van der Laan, 2007) whom conclude that the correct holding cost rates deviate from traditional valuation methodology, with impact on operational performance demonstrable. Nonetheless, it is the EOQ model that forms the basis for examining the cost of holding money.

The Relevance of Opportunity Cost & the Use of Capitalisation and Discounting

The Present Value & Discount Factor

The holding cost of an investment is generally regarded as being equivalent to opportunity cost. Opportunity cost has been, in its simplest form, described as a term used by economists to depict the scenario when someone forgoes one opportunity to take another (Powell & Stringham, 2004). Another definition (Miles et al., 2004) describes opportunity cost as being interest that could have been earned that is forgone: this forgone interest represents the opportunity cost associated with receiving a dollar in the future rather than today. Consequently, today's value, or the present value, of the dollar to be received in a given time period should be reduced by the cost of the "lost opportunity" over that same time period.

The concept of opportunity cost therefore involves the calculation of a present value, on the basis that we are solving for the difference between the current day value of a compounded future amount. The amount of interest that could have been earned during the term of an investment – the compound interest – represents the difference between the present value and the future value amount, and is known as the discount. Guthrie describes the discount as being the "shrinkage" that occurs when an amount of money is moved back in time at the compound interest rate (Guthrie & Lemon, 2004). This is also more generally known as the opportunity cost, or perhaps more colloquially, opportunity "lost".

The general present value formula is expressed as:

$$PV = \frac{FV}{(1+i)^n}$$

Where
PV is the Present Value
FV is the Future value
i s the interest rate per period
n s the total interest periods

The transposed formula $PV = FV(1+i)^{-n}$ is typically expressed since it is easier that way for the algebraic calculator. The factor $(1+i)^{-n}$ is the *discount factor* (also known as the present worth of 1 factor), that is simply the reciprocal of the *accumulation factor*, i.e. $(1+i)^n$ which is the basic tool for solving accrued compound interest.

Thus, we can determine that the discount factor for an investment that can earn 9.5% per annum over 15 years is $(1+0.095)^{-15}$. Thus, an asset worth $100,000 in 15 years time can be calculated to have a present value of $25,632. The difference between the asset's future worth of $100,000 and the present value, i.e. in this case $74,368, represents the "opportunity cost" of investing $25,632 over 15 years, or the amount of interest that could have been earned at the relevant compound interest rate, had it been invested. Therefore we have a formulae for Opportunity Cost *oC* as:

$$oC = FV - \left[FV(1+i)^{-n}\right]$$

It is this imputed value over time that is fundamental to the concept of "holding cost". If an investment is made in a certain asset that requires it to be held during a period in which incurs no growth, then the amount of interest foregone because of the need to "hold" the investment is equivalent to the "opportunity cost" of holding the asset. In other words, one depiction is that it represents the interest foregone due to the expense made on the outlay.

Selection of Interest Rate Applicable for the Calculation of Opportunity Cost

Obviously, the longer the time taken, the greater the cost of holding the asset. However, what is often the greatest difficulty to determine is the selection of the interest rate. As pointed out (Darnell & Evans, 1988), the rate of interest provides the correct measure only if the relevant alternative to holding cash balances is holding interest bearing assets. That suggests that the opportunity cost measurement should reflect the utility that is anticipated to having to forgo as a result of making the choice to hold money. The definition given for “Opportunity cost” therefore relies upon a comparison between holding non-interest bearing money, and the best alternative providing the greatest financial yield.

The usual approach to measuring the cost of holding money is to note that by holding cash balances an individual foregoes income that could be earned on an interest-bearing asset (Darnell & Evans, 1988). From this, Darnell states, it is usually inferred that the 'opportunity cost' of holding cash is determined by the rate of interest. Further, any debate has been over the selection of a data proxy for the rate of interest (e.g. should it be a short/long rate? the dividend price ratio? the whole structure of interest rates? etc.). The value v of holding non-interest bearing money is zero, since the future value of $1 remains $1, no matter the passage of time: the face value remains the same. In that instance, $v_1 = 1$. In the case of holding interest bearing money the formula is equivalent to the impact of r the nominal interest rate is $v_2 = (1 + r)$. However, as Darnell argues, the value of holding a physical good is equivalent to a change in value due to η inflation, expressed as $v_3 = (1 + \eta)$. Thus, the results for each possibility can be expressed in the following table 1:

Table 1- Derivation of financial gains foregone (the "best alternatives" for holding cash)

Action	Relevant alternative action	Percentage gain foregone
Holding non-interest bearing money	Holding interest bearing money	$(v_2 - v_1)/v_1 = r$
Holding non-interest bearing money	Holding a physical good	$(v_3 - v_1)/v_1 = \eta$

Taken from The Holding Cost of Money (Darnell & Evans, 1988)

This argues that in determining the cost of holding these money balances is the greater of the nominal interest rate, and the inflation rate. This is because whilst the monetary gain foregone in the case of purchase of an interest bearing asset is the nominal interest rate, the monetary gain foregone in the case of a good is the rate of inflation. This identifies the potential gain foregone willingly, in order to enjoy the benefits of holding the asset. Accordingly, the general formula for the expected cost of holding money may be expressed as[1]:

$$oC = \max(r, \eta)$$

Variability Caused by Period of Holding & Other Timing Factors

Reed suggests that, in relation to a property asset, the calculation for measuring the cost of the holding period (or property “reversion”) is either the application of capitalisation rate to an income stream (if the property is income producing), or conducting a discounted cash flow

[1] A number of interesting points are noted (Darnell & Evans, 1988) whom state that (1) the real rate of interest is never the holding cost of non-interest-bearing money. The real rate of interest may be seen as the opportunity cost of buying a good when holding an interest bearing asset is perceived as the best alternative. (2) In studies of hyperinflation, the opportunity cost off holding real balances has been identified as the expected rate of inflation. Since in such episodes the inflation rate persistently exceeds the nominal rate of interest, the analysis presented provides the explicit theoretical justification for this practice.

analysis (DCF) if there is an irregular steam of inflow and / or outflow payments (Reed, 2007). The latter computes the present value of an expected reversion, and in the case of a property model the income stream and reversion are valued in one operation.

Regardless, the longer the holding period, the greater the risk, and therefore the greater the discount rate used in such analysis. Reed states that this applies equally for leveraged or non-leveraged investments since there is an amortised cost in the former, or otherwise an opportunity cost acquired in the latter case. This is in general agreement with the Adams explanation of present value and time (Adams et al., 1968) whom states that in an effective market, the price of land will reflect capitalisation of the anticipated future flow of net rent. Until the time of development, the capitalisation process suggests a time path for land prices. A distinguishing feature of vacant land, however, is that up to the time it is developed the return to the owner is zero, or if we consider taxes and related expenses, negative.

Theoretically, then, if the development of the land has been anticipated, the price of vacant land should tend to follow a time path determined by the discounting of its value at development at the prevailing interest rate. Changes in expectations, interest rates and holding costs, market imperfections, and short term construction requirements will lead to divergence of prices from the path. Relationships between land prices and relevant variables from the economy are to be anticipated. If we assume *V* at the time of development *t*, *V* is itself the present value of an expected series of net returns, and an appropriate rate of discount, *i*, the present value *P*, assuming continuous discounting, is as follows (Adams et al., 1968):

$$P = V / e^{it}$$

Thus the relative rate of change of the present value, with respect to *t* is as follows:

$$\frac{dP/dt}{P} = -i \quad or -(i + r)$$

Where

r	is the rate of real estate taxation
V	is the value (at the time of development)
t	is the time of development
P	is the present value
i	is the appropriate rate of discount

In other words, the price of an undeveloped piece of land can be expected to grow at the rate $(i + r)$ where *i* corresponds to the net rate of return which can be earned on other comparable investments. Adams points out that in a perfectly operating market, the present values of properties will be aligned to their anticipated values to the expected dates at which the properties will be developed. If the factors which determine development value and date of development are taken into account, undeveloped land prices may be expected to increase over time at the rate *(i + r).* This is entirely the result of capitalisation and discounting.

Overall, the costs of housing may relate to construction costs, land costs, costs of land purchase and eventual sale (i.e. taxation and professional fees), developers profit for risk-taking, and also financial costs including interest costs and opportunity costs. However, it is the latter that is considered here, and includes (Eccles et al., 1999):

- the prevailing level of interest rates;
- the length of time that the development takes to complete;
- the length of time that the development takes to produce income or sell.

As a minimum, holding costs will relate to at least the rate applicable to the funding of a development project, according to the nature of the Project. The generally accepted principle is that the development moneys will be outstanding for an average of half the period during which the estate is being developed and sold. Assuming a two year life the interest allowance is calculated on the development costs including the contingency allowance (Whipple, 1995). Whipple, in evaluating cash flow analysis, rightly emphasises the importance of timing on the profitability of development projects. Static models ignore such a sensibly conceived scenario analysis.

Taxation & Liquidity Effects

Other factors might also be included under the general ambit of "holding costs". For example, land taxes may not be neutral in their economic impacts due to liquidity effects. Liquidity effects of land taxes may be in the form of holding cost effects or capitalization effects (Bourassa, 1992). Bourassa also recognises that "holding cost" effects may occur when land is being withheld from development for non-financial reasons, such as the direct benefits of land ownership. Such non-financial reasons might also include processing delays by approving bodies and other planning matters that impact on time. Capitalization effects may occur when there are imperfections in capital markets which prevent the acquisition of land for otherwise viable projects.

This augurs well with earlier work completed (Bourassa, 1988) which examines the liquidity effect results from increases in the rate applied to land. The incentive effect is due simply to the increase in supply that occurs as the excise effect of the tax is reduced. The liquidity effect has two components. One is the effect on current landowners, who must bear increased holding costs and who are thereby encouraged to improve their properties or sell to someone who will. The other component is the obverse of increased holding costs and is due to capitalization of the tax in land value. Reduced land values make it easier for potential developers to acquire land. Bourassa concludes that the effect on current landowners, who must bear holding costs in the form of land taxes, is encouragement to improve their properties to maximize return on investment - or sell to someone who will do so. The other component of the liquidity effect is simply the obverse of increased holding costs; nonetheless economists generally agreeing that increases in taxes on land result in decreases in land value.

Impact of Land Supply

Another perspective is the extent of house price volatility due to restriction, or otherwise, of land supply by governments. Commonly referred to as "land banking behaviour", this strategy impacts not only the behaviour of property developers, but also housing prices – and therefore, affordability. Constraints of planning decisions also impact the supply equation. Such constraints have been described to typically include transport, infrastructure, environmental impact, competing land uses, and construction capacity (Tse, 1998). However, these constraints are not applied uniformly and an argument exists that the amount of available land, and the supply of housing, may at time relate to political considerations outside of what might be otherwise justified by analysing population and household growth. This leads Tse to conclude that not only land supply, but also planning controls, development processes and marketing practices are important determinants of housing supply. It may therefore be demonstrated that land banking behaviour is inevitably governed by general economic conditions. Furthermore, in uncertain economic conditions, there may be greater uncertainty about future housing price appreciation which could actually have a negative effect upon the land-holding costs: i.e. uncertainty increases the expected future value of the vacant land.

In examining these issues, Tse calculates an equation that long-term land holding costs should cover interest costs on the basis that the amount of land sales by the government and land in developers' land banks tend to decrease when market interest rates increase. The conclusion reached here is that the rate of interest can be viewed as a kind of land-holding cost, since a developer's optimal amount of land bank occurs when the expected marginal rate of return of land holdings equals the rate of interest. This has been expressed (Tse, 1998) as follows:

$$\max_{L,A} k = \frac{\theta(A) - rL}{A - L}, \quad s.t. \quad A > L$$

Where:
k rate of return
L loan amount
A amount of land in land bank
$\theta(A)$ expected return from holding (A) amount of land in land bank
r interest rate to finance land holdings

Thus, the maximisation of the rate of return on equity is a result of choosing both the amount of land in a land bank, and the amount of loan.

Holding costs may also at times work somewhat in reverse to what would normally be expected. For example, market fluctuations may also impact on the viability of lot releases resulting in an amended staged release or holding back of lots until a positive return can be realistically anticipated (Walker et al., 2008). An evolutionary economics approach to the analysis of land and property markets suggests that, at least in the short term, policies that impose extra costs on developers, especially at a time of relatively static prices, may lead to reduced development output (David, 2008). In this instance, the opportunity "cost" of holding may become an opportunistic gain; however this ignores risk since holding lots longer prior to release may not always produce a positive result.

The Treatment of Holding Costs by Commercially Available Models

Holding cost computations by commercial available software are typically provided in two ways. Using Estate master as an example (Development Feasibility, and Development Management Modules) the following may be observed:

Firstly, the "holding period" is obviated by assumptions contained within discounting calculations in the DCF analyses / feasibility. This is the period in which an investment is intended to be held based on investor expectations - from the point of initial financial commitment (acquisition), to the sales revenue period. By default, it takes into account factors such as anticipated market growth and revenue span. Interest on borrowings (and interest received on re-investment of surplus funds) is incorporated in the discount rate. Financing charges including interest on outlays is included by default and represent part of the total development cost. Interest earned on deposit in a trust account (often utilised in an acquisition transaction) is computed over the time that deposit sits in the trust account – however the interest is divided evenly between the seller (Land Owner) and the buyer (Developer)[2]: in some circumstances this may prove too prescriptive. Furthermore, these holding costs, although computed, are not separately identifiable in the project summaries. There may also be an argument that rare hyperinflationary conditions cannot be taken into account, at least from a holding cost point of view, i.e. where inflation exceeds the interest rate. The problem compounds where such conditions are not reflected in revenues received from property.

Secondly, there is a separate, readily identifiable input category denoted "Land Holding Costs" which is in fact a repository for capital expenditure line item or items representing financial commitments during construction. Whilst these items can be escalated (or left as a fixed cost), this component is provided for the inclusion of items such as insurance, council rates and land taxes and the like, incurred during the time of property development – and entered as whole dollar amount. These are not operational costs, but "once-off" or relatively infrequent capital items incurred by a developer during the development phase – so they do represent bona fide holding costs. In theory, land acquisition cost could also be included here; however this is more appropriately sited under its own section where the payment regimes and settlement details can be detailed, along with other acquisition cost items such as valuation charges and legal expenses. The opportunity cost of these items, i.e. interest equivalent incurred over time based on their capital outlay, is picked up - but imputed into the cash flow itself and not separated out for later identification.

It may be concluded that the identification of holding costs, although generally incorporated in commercially available development models, are not readily identifiable. This is despite the separation of identifiable "land holding cost" capital line items.

Methodological Deficiency Despite Acknowledgement of the Significance of Holding Costs by State Government

The Queensland Government's recent 'Affordable Housing Strategy' (QHAS) acknowledges holding costs due to costs associated with delays in obtaining assessment and approvals can add up to $20,000 per dwelling to the end price (*Queensland Housing Affordability Strategy*, 2007). These are denoted as being "development holding costs during the assessment period" Even though the QHAS does not elucidate their computation methodology, some believe this to be a conservative figure, and highlight the extent to which these costs can escalate. As an example, an RDC Media Release (Elliott, 2007) calculated that in a recent Queensland development project the tax and regulatory charges accounted for 26% of the purchase price of $579,000. It was pointed out that excessive delays and massive court costs (on appeals) all result in

[2] Both the deposit percentage and interest on deposit are optional inputs

excessive holding costs. In this example, the interest bill alone on the holding cost associated with delays in council assessment was calculated to be $8,928. However, the analyst provides limited information as to either how this cost was derived, or any detail on the methodology used. It also ignores other holding costs associated over the total development timeframe; for example, opportunity costs commencing with commitment upon land acquisition, re-financing requirement, if any, and financial commitments during construction.

Operating in tandem with the QHAS in Queensland has been the newly established Urban Land Development Authority. Its mandate reflects QHAS philosophy, in particular that related to housing affordability - and specifically, the speeding up of property development "red tape" processes. The ULDA intends to make housing more affordable by addressing factors that they perceive impacts on the price of new housing. This is stated ("Urban Land Development Authority website," 2009) to include *"getting land to market faster, streamlining development approvals, and simplifying planning requirements."* The primary way this is intended to be achieved is by speeding up the development assessment process. However, whilst the ULDA appears to agree with QHAS conclusions by stating that *"delays in the development assessment process can increase development holding costs between $15,000 to $20,000 per dwelling, which is typically passed on to the end purchaser"*, again there is no indication of methodology used to derive this amount.

Lack of Clarity in Identifying Regulatory Assessment as a Component of Holding Costs in the Greenfield Residential Development Pipeline

The quantum of time taken by regulatory authorities to assess and consider applications for a particular development represents part of the holding cost calculation, and may even be demonstrated to represent a major component. However, these costs are not always well informed or clarified even though they are repeatedly acknowledged as significantly impacting housing affordability. It has been recently observed (*National Housing Supply Council - State of Supply Report*, 2009) that the relationship between housing costs and planning regulations, charges and procedural requirements has been raised regularly in the course of inquiries into housing affordability. However, many of these inquiries[3] struggle to quantify, or even identify, various holding cost components.

Although research is emerging in these areas – notably through AHURI (Gurran et al., 2008) - there have been only limited attempts to quantify the relative weight or proportionate cost of planning related costs to a development project which might ultimately determine impact on housing affordability. The best estimate provided in the AHURI positioning paper supports assertions by the sector that taxes, levies and compliance costs (including costs of meeting planning regulations and holding costs) now amount to about a third of the cost of new house and land packages. However, Gurran notes the methodology for deriving this figure at "just under $30,000 to the price of a block of land" is unclear[4].

[3] The NHSC report indicates examples such as the Department of Community Services and Health, National Housing Strategy, AGPS, Canberra, 1991 and, more recently, the Productivity Commission (Productivity Commission, First home ownership) and the Senate Select Committee on Housing Affordability in Australia (Senate Select Committee on Housing Affordability in Australia, *A good house is hard to find*), June 2008.

[4] It is noted that the final report from Gurran has yet to issue, with the next stage - empirical research - needed to verify the range of costs (including holding costs), under differing geographical scenarios. It is also noted that the case study design for the empirical research phase, includes provision for the calculation of both "time" and "holding cost" against a generic fee schedule containing each process cost, building or development control requirement, and other planning related costs or charges.

The Residential Development Council (RDC) acknowledges the time cost of excessive delays in gaining development approval is a significant cost with significant blow-outs in the timeframe to process applications (*Reasons to be fearful? Government taxes, charges and compliance costs and their impact on housing affordability. Summary Report - Residential Development Costs Benchmarking Study, March 2006.*, 2006). However, whilst observing that holding costs (interest costs, rates, land tax etc) increase in line with the amount of time it takes to prepare and assess development approvals, the calculation methodology is not transparent. Somewhat paradoxically, the report states that "these costs have previously been hidden from discussions on housing affordability".

In Queensland, the Development Application process form part of the "Residential Development Pipeline". It is a large component of the regulatory assessment process. Consideration of the elements of this may therefore assist in understanding the generic stages and the expected timeframes likely to be encountered regardless of geographical location. The elements within this "pipeline" are summarised in Figure 1 below and further detailed at Table 2 appended to this report.

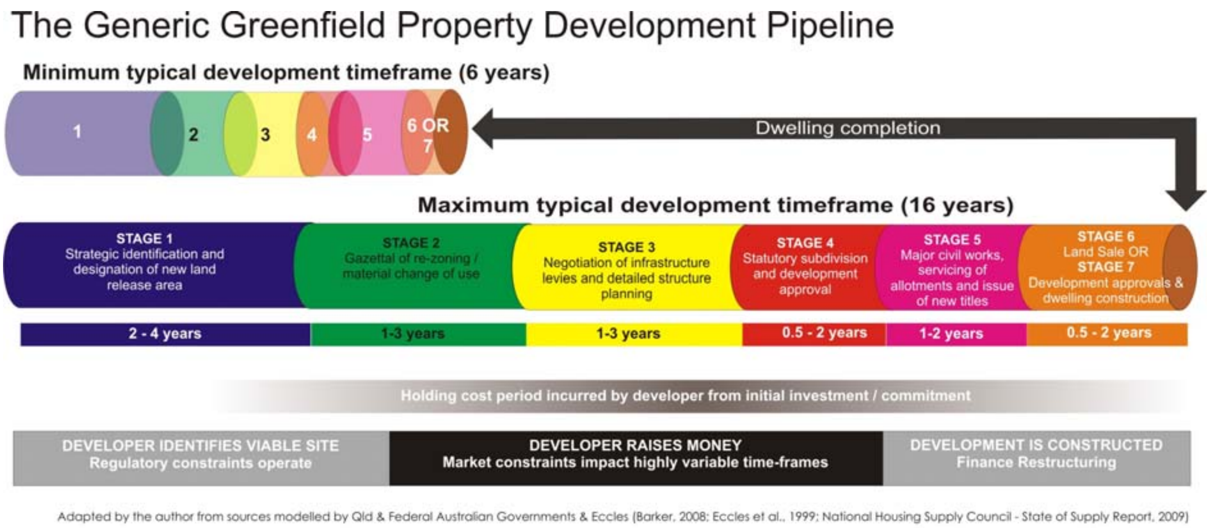

***Figure 1- Simplified Generic Property Development Pipeline.** Adapted by the author from sources modelled by Qld & Federal Australian Governments & Eccles (Barker, 2008; Eccles et al., 1999; National Housing Supply Council - State of Supply Report, 2009)*

A typical total development timeframe lasting somewhere from six to sixteen years as indicated by the above graphic, translates to a typical holding cost period from between four to twelve years. These periods will inevitably be site specific, with the holding cost period relating to a point of commencement aligned with initial investment commitment (occurring somewhere between stages 1 and 2), and concluding upon sale realisation for the whole investment (occurring somewhere between stages 6 and 8). Note in the above graphic (Figure 1) the Holding cost period is to an extent indeterminate at the extremities (thus the timeline bar fades at either end); this can only be fully determined on a site by site basis.

These time variations alone, superimposed by interest rate variations over the time period and the time required for full realisation, all contribute to the difficulty in arriving at a rigorously computed holding cost calculation(s). Tranched financial arrangements for land acquisition, re-financing during the course of a land development project (typically undertaken especially in the case of larger projects), and various market constraints additional to those mentioned, all add further complexity.

Conclusions

This paper has examined various models utilised for both defining and measuring holding costs. Whilst most ultimately rely upon derivations of the Present Value / discounting approach, the application of these "first principles" varies widely. As a result, the methodology used in calculating holding costs also has wide variation. On many occasions, the methodology utilised is not readily apparent, including disclosure of major assumptive variables such as interest rate(s) and timing. This lack of information makes it difficult to determine the degree of rigour that has been applied, thus does does not provide confidence in the derived outcomes. Even commercially available applications, whilst incorporating holding cost calculations within their models, do not fully disclose these costs as a separately identifiable item.

In some instances, holding costs are even completely ignored in determining the total costs involved in the development pipeline. Difficulties in their calculation are typically due to uncertain or imprecise timelines, as well as the additional complexity of holding cost methodology, liquidity effects and other aspects. Whilst a generic development pipeline model can be considered, it is apparent that wide variations exist in the nature of holding costs which have great dependency on site specific variables. This complexity in deriving holding cost calculation may therefore explain why commentators usually provide vague or even no detail when applying holding cost theory to support public policy, or specific land development projects.

Despite this lack of detail, significant resources have been poured into policies designed to specifically inhibit the holding cost effect in Australia as part of addressing the broader issue of housing affordability. In the case of Queensland, this includes the implementation of the Queensland Housing Affordability Strategy, and the creation of the Urban Land Development Authority.

Whilst recognising that holding costs are only one contributor to the housing affordability equation, there needs to be significantly more research into its underlying nature and effects, and in particular an analysis over time. The need for a broadly based analysis by regions and towns in Australia, i.e. empirical case study analysis, cross-referencing with a rigorous international comparison study, is indicated. Additional consideration of further market and non-market variables and their likely impact on housing affordability would also be required in order to assist in determining the total impact of holding costs.

Table 2- The Generic Greenfield Property Development Pipeline & The Impact of Time

Stage (commencing from perceived Demand Increase)	**1. Strategic identification and designation of new land release area**	**2. Gazettal of rezoning/ material change of use**	**3. Negotiation of infrastructure levies and detailed structure planning**	**4. Statutory subdivision and development approval**	**5. Major civil works, servicing of allotments and issue of new titles**	**6. Land Sale AND / OR 7. Development approvals and dwelling construction**	**8. Dwelling Completion**
Milestone	**DEVELOPER IDENTIFIES VIABLE SITE** Regulatory Constraints operate, e.g. planning, building consents, site acquisition / purchase; other constraints		**DEVELOPER RAISES MONEY** Market constraints impact timeframes which vary considerably (e.g. interest rates, bankers / investor attitudes, land bought forward)		**DEVELOPMENT IS CONSTRUCTED** Additional finance restructuring typically undertaken		
Time (6 years minimum, to 16 years maximum)	2–4 years	1–3 years	1–3 years	6 months – 2 years	1–2 years	6 months -2 Years OR 9–12 months	milestone
Detail	Identification of master planned area (in Qld, within defined Urban Footprint)	Rezoning under local government planning instruments is generally initiated by the proponent – time dependant on scale and complexity	Landowner/ developer undertakes the development/ structure planning process with a view to obtaining the necessary approvals – time usually depends on the quantum of government departments responsible	Issue of statutory development/subdivision approvals is the responsibility of the relevant local authority which responds to developer-initiated applications (road layouts, lot sizes and dimensions) generally on a stage-by-stage basis	Completion and certification of the construction works (undertaken by the landowner/developer) by approval agencies - subdivisions usually constructed in stages of around 50 lots - development of a large subdivision may therefore occur over a number of years.	housing design, approval and construction - may be undertaken by a lot purchaser or by a developer/builder who intends to offer a house and land package	
PIFU Residential Development Pipeline nomenclature	• Broadhect are Land			• Lot Approval	• Operational Works • Lot production • Lot registration	• Dwelling approval	
Typical Holding Cost period incurred by developer from initial investment or commitment (4 years min. to 12 years max.)							

Adapted by the author from sources modelled by Qld & Federal Australian Governments & Eccles (Barker, 2008; Eccles et al., 1999; *National Housing Supply Council - State of Supply Report*, 2009; "Urban Land Development Authority website," 2009)

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