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Holding Cost Model for Greenfield Housing Developments

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The conceptualisation, sensitivity and measurement of holding costs and other selected elements impacting housing affordability
Objectives of the program of research and investigation

1. To establish the **nature and composition of holding costs over time**, as related to residential property in Australia, and internationally.

2. To examine the **linkages** that may exist between various planning instruments, the length of regulatory assessment periods, and housing affordability.

3. To **develop a model that quantifies the impact of holding costs** on housing affordability in Australia, with a particular focus on the consequences of extended assessment periods as a component of holding costs. Thus, provide clarification as to the impact of holding costs on overall housing affordability.
Research Question #1

What is the **nature and composition of holding costs** applying in Australian and international residential property markets? Is the matrix relatively static, or changing over time?
In relation to property, and property (residential real estate) development, what are the prevailing planning and statutory regulations utilised in Australia and internationally? Which (if any) of these instruments are used to support affordable housing concepts, and which (if any) of these instruments represent part of the holding cost matrix? In the context of housing affordability, has any public or private planning tool been identified in the literature as being more effective, or more destructive, than any other?
What is the **extent and variability** of **regulatory assessment periods** in Australia and internationally? Does the length of the regulatory assessment period **impact holding costs**?
Can it be established that the assessment period is a contributor impacting housing affordability? To what extent, and what are the linkages? What are the policy implications, e.g. Does the evidence exist to demonstrate that changes to the framework used in Australian or overseas jurisdictions might result in promoting or retaining affordable housing?
Can a **model** be developed in the light of the foregoing to **quantify the impacts of holding costs**, focussing on the timing of assessment periods, in relation to housing affordability - or otherwise maximise the opportunities for affordable housing?
Methodology

LITERATURE REVIEW, THEORETICAL ASPECTS, ECONOMIC MODELLING, CASE STUDIES
Methodology detail

- Literature review
  - investigation into the key issues
  - Special emphasis towards any research conducted that gives rise to linkages.

- Examination of holding cost theory
  - Development of new concepts

- Development of economic (theoretical) spreadsheet model for holding costs
  - May include other identified selected elements.

- Analysis and interpretation of case study bases.
  - Testing of theoretical model (refinement)
  - Further refinement: statistical analysis - multi-variable regression analysis (develop predictive models based on demographic and other group relationship data)
Research compatibility

- Research dovetails into existing research being carried out by AHURI (Gurran et al., 2008)

Table 15: Generic fee schedule

<table>
<thead>
<tr>
<th>COSTS</th>
<th>Time</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time (time for approval, number of meetings; consultation, referrals, appeals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documentation/preparing planning proposal itself – costs of consultants and studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Referrals (Referral to State planning authority or other state agencies, e.g. transport, heritage, conservation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Building / development control requirements

| Standard Requirements (e.g. Floor space ratio, height, tree preservation, setbacks, landscaping, private open space, car parking, driveway width/design, Building Code of Australia compliance) |      |
| Environmental standards – e.g. additional costs associated with meeting special sustainability requirements |      |
| Heritage requirements – e.g. additional costs associated with |      |
Preliminary Findings Related to the Conceptualisation, Sensitivity & Measurement of Holding Costs & Impact on Housing Affordability
The Housing Affordability Puzzle:
Understanding impact of Holding Costs
The Issue of Holding Costs

- Housing affordability - increasing prominence despite strong economic growth and prosperity.
- A major consideration for any new development.
- Multi-dimensional, complex and interwoven.
- **One** impact factor is holding costs.
- The nature and extent of its impact requires clarification.
  - Its contribution may be of greater significance than commonly held - especially where the time taken for regulatory assessment is excessive.
Holding costs defined

- 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 always relates one way or another with regards a computation of the “carrying costs” of an initial outlay that has yet to fully realise its ultimate yield.

- Although sometimes considered “hidden”, it is nonetheless often pervasive.
  - It affects housing affordability, the actions of repossesses, and the profitability of developers.
Regulatory assessment – just one component of “holding costs”

- Larger, more complex property development applications take a longer period of time for regulatory authorities to assess how or if statutory guidelines are met.
- However, this is time during which a developer must “carry” any costs outlaid on a project.
- In the case of large residential estate developments, it is more likely to be lengthy than not.
- This period can therefore represent a significant component, but not the only component, of “holding costs”
Regulatory assessment ... not always a holding cost!

- Some researchers (Gurran, Milligan, Baker, & Bugg, 2007) have compared outcomes achieved in levels of affordable housing in the UK and Netherlands as against Australia and North America.
- They conclude a *strong* government role (as against the *quantum* of government involvement) in urban policy and land regulation can explain the achievement of higher levels of affordable housing.
- This seems to augur with research in Hong Kong market (Tse, 1998) - demonstrated that the imposition of more “land-sales restrictions” by government will actually lower the level of land prices.
- Conclusion - whilst a link exists between the delays experienced in obtaining planning approvals, and housing affordability, that link – although likely - does not necessarily establish itself as a holding cost.
Examples of Holding costs in Property Development

- acquisition costs: e.g. undeveloped Land Cost or financial commitment to site acquisition
- costs of meeting planning regulations
- costs associated with the statutory approval process
- development application or administration fees
- Rates, special council charges and land tax (paid during acquisition, development and construction)
- any contributions made for physical and social infrastructure
- expenses in participating in the planning process, through staff time and site holding costs while approval is sought
- Interest paid (or interest lost) on any of the above expenses until recoupment through selling final product
- Opportunity costs calculated over the time a developer must “carry” any costs outlaid on a particular project / loss of Interest over a development period
- delays in the production process leading to reduced or cancelled financial returns
Cost of housing – a significant affordability component

- The costs of housing relates 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.

- Under consideration

- This 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.
The Critical Element of Time, & Impact on Housing Affordability

- Housing affordability - impacted by the passage of time
- Includes time taken by regulators to input + make decisions on projects once a financial commitment made
  - included in calculation of holding costs by developers
  - cost inevitably passed on to end-purchasers.
- Extent to which time impacts a project varies considerably
- Speed at which infrastructure and services implemented often driven as much by planning processes as economics
- Strongly linked with the costs of development and ultimately, housing affordability.
Increasing indications that the contribution of holding costs and its impact on housing affordability is very significant.

Unprecedented level of attention by policy makers have given them recently.

Evidence: embedding of specific strategies within statutory instruments (e.g. Queensland Housing Affordability Strategy and the South East Queensland Regional Plan; establishment of the ULDA.)
The Impact

- Analysis suggests even small shifts in the regulatory assessment period can significantly affect housing affordability.
- Other costs associated with “holding” also impact housing affordability, however these costs cannot always be easily identified.
- The real impact is felt by those whom can least afford it - new home buyers can easily pushed into un-affordability.
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
The Complexity of the Holding Cost Calculation

- depends on the Project variables and circumstances
- complexity increases since
  - holding costs occur over any or all stages in the property development pipeline
  - prevailing interest rates / investment alternatives underpin opportunity cost
  - period of investment - property acquisition to sales progression
  - fundamentally involves the demand / supply equation - & further complication: human nature
The Generic Greenfield Property Development Pipeline

Minimum typical development timeframe (6 years)

1. STAGE 1: Strategic identification and designation of new land release area
2. STAGE 2: Gazette of re-zoning / material change of use
3. STAGE 3: Negotiation of infrastructure levies and detailed structure planning
4. STAGE 4: Statutory subdivision and development approval
5. STAGE 5: Major civil works, servicing of allotments and issue of new titles
6. OR 7: Land Sale OR Development approvals & dwelling construction

Dwelling completion

Maximum typical development timeframe (16 years)

1. STAGE 1: Strategic identification and designation of new land release area
2. STAGE 2: Gazette of re-zoning / material change of use
3. STAGE 3: Negotiation of infrastructure levies and detailed structure planning
4. STAGE 4: Statutory subdivision and development approval
5. STAGE 5: Major civil works, servicing of allotments and issue of new titles
6. STAGE 6: Land Sale OR Development approvals & dwelling construction

DEVELOPER IDENTIFIES VIABLE SITE
Regulatory constraints operate

DEVELOPER RAISES MONEY
Market constraints impact highly variable time-frames

DEVELOPMENT IS CONSTRUCTED
Finance Restructuring

Holding cost period incurred by developer from initial investment / commitment

Holding Costs

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)
KEY ISSUES IN DATA MODELLING

Economic Model
Key issues
Holding Costs for Greenfield development

- computation / methodology varies widely.
- Sometimes completely ignored.
- ambiguity exists - inclusion of various elements and assessment of their relative contribution.
  - Costs not as visible
  - More difficult to evaluate since for the most part they must be ultimately assessed over time in a changing environment
Tse (1998) 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 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.

\[
\max \quad k = \frac{\theta(A) - rL}{A - L}, \quad \text{s.t.} \quad A > L
\]

- \( k \): 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
The Relevance of Opportunity Cost

- The concept of opportunity cost 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.
- The discount is 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 Use of Capitalisation and Discounting

Where
- \( PV \) is the Present Value
- \( FV \) is the Future value
- \( i \) is the interest rate per period
- \( n \) is the total interest periods

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

Example: the discount factor for an investment that can earn 8.5% per annum over 12 years is \((1+0.085)^{-12}\).

Thus, an asset worth $100,000 in 12 years time can be calculated to have a present value of $37,570.

- The difference between the asset’s future worth of $100,000 and the present value, i.e. in this case $62,429, represents the “opportunity cost” of investing $37,570 over 12 years.
- Equates to the amount of interest that could have been earned at the relevant compound interest rate, had it been invested.

Thus, our opportunity cost equation is

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

Interest foregone

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

- 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.
Opportunity cost measurement

- Obviously, the longer the time taken, the greater the cost of holding the asset.
- Often the greatest difficulty to determine is the selection of the interest rate.
- the rate of interest provides the correct measure only if the relevant alternative to holding cash balances is holding interest bearing assets (Darnell & Evans, 1988).
- 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.
Opportunity cost = rate of interest 

but what rate?

- Therefore, 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, it is usually inferred that the 'opportunity cost' of holding cash is determined by the rate of interest.

- The debate is 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.
Derivation of financial gains foregone (the “best alternatives” for holding cash)

<table>
<thead>
<tr>
<th>Action</th>
<th>Relevant alternative action</th>
<th>Percentage gain foregone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding non-interest bearing money</td>
<td>Holding interest bearing money</td>
<td>$\left( \frac{v_2 - v_1}{v_1} \right) = r$</td>
</tr>
<tr>
<td>Holding non-interest bearing money</td>
<td>Holding a physical good</td>
<td>$\left( \frac{v_3 - v_1}{v_1} \right) = \eta$</td>
</tr>
</tbody>
</table>

- The value 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, the value of holding a physical good is equivalent to a change in value due to $\eta$ inflation, expressed as $v_3 = (1+\eta)$. Thus, the results for each possibility can be expressed in the table.

Table - adapted from The Holding Cost of Money (Darnell & Evans, 1988)
Derivation of financial gains foregone (the “best alternatives” for holding cash)

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<td>( \frac{v_2 - v_1}{v_1} = r )</td>
</tr>
<tr>
<td>Holding non-interest bearing money</td>
<td><strong>Holding a physical good</strong></td>
<td>( \frac{v_3 - v_1}{v_1} = \eta )</td>
</tr>
</tbody>
</table>

- 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.

Table - adapted from The Holding Cost of Money (Darnell & Evans, 1988)
Holding Costs – general principles in calculation

- 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 or assumption** is that the development moneys will be outstanding for an average of half the period during which the estate is being developed and sold.
- The interest allowance is calculated on the development costs including the contingency allowance (Whipple, 1995).
- This emphasises the importance of timing on the profitability of development projects.
Variability Caused by Period of Holding & Other Timing Factors

- The longer the holding period, the greater the risk, and therefore the greater the discount rate used.
- 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.
- But changes in expectations, interest rates and holding costs, market imperfections, and short term construction requirements will lead to divergence of prices from the path.
Treatment of Holding Costs by Commercially Available Models

Typically provided in two ways:

1. Firstly, the “holding period” is obviated by assumptions contained within discounting calculations in the DCF analyses / feasibility.

2. Secondly, there is a separate, readily identifiable input category denoted “Land Holding Costs”
Estate master example:
separate, readily identifiable input category denoted “Land Holding Costs”
Treatment of Holding Costs by Commercially Available Models

- 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.
The Queensland Government’s recent ‘Affordable Housing Strategy’ (QHAS) – “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).

- The QHAS does not elucidate their computation methodology
- Urban Land Development Authority - mandate reflects QHAS philosophy, in particular the speeding up of property development “red tape” processes.
  - ULDA agrees 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.
PRELIMINARY ECONOMIC MODEL EXAMINING THE EFFECTS OF TIME FOR A PROPERTY DEVELOPMENT PROJECT
Model development

- Attempts to quantify impact of holding costs on housing affordability
- Provides a focus on the consequences of extended assessment periods as a component of holding costs
- Thus, clarification as to the impact of holding costs on overall housing affordability and sustainability is provided
Assumptions (Base model)

- Interest rate (cost) - 9.00%
- Development Timing: (all post Identification of suitable site and site purchase)
- Assessment period: Planning & Building Consents including DA – typically 18 months
- Funds raising (debt and / or equity) 3 months
- Construction and development 9 months
- Total development time from acquisition - 30 months
- Undeveloped Land Cost - $37,500 per lot equivalent based on gross yield area
- Acquisition costs - 3% of acquisition and land costs per lot p.a
- Development Costs, $75,000 per lot
- Interest Costs on development - based on 30% of total development period = 9 months @ 9%
- Selling Costs @ 4.7% gross realisation
- Developers Margin - 20% of Total costs
- Gross realisation = $165,000 per lot.
Key assumptions:
(derivation of the EOQ model)

- **Interest rate** – 9% effective p.a.
- Opportunity cost on Undeveloped land costs + acquisition costs + development costs (over **time**)
- “Typical” 200 lot **greenfield** development
- **Inflation**
  - the cost of holding is the greater of the nominal interest rate, and the inflation rate.
<table>
<thead>
<tr>
<th>BASE CASE SCENARIO</th>
<th>Assumptions used</th>
<th>Gross</th>
<th>Per Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate (cost)</td>
<td>9.00% per annum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development Timing:</td>
<td>Base Case</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identification of suitable site and site purchase</td>
<td>0.00 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning &amp; Building Consents including DA</td>
<td>18.00 months</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Funds raising (debt and / or equity)</td>
<td>3.00 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction and development</td>
<td>9.00 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.00 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL development time from acquisition</strong></td>
<td><strong>30.00 months</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undeveloped Land Cost</td>
<td>$7,500,000</td>
<td>$37,500</td>
<td></td>
</tr>
<tr>
<td>Acquisition costs</td>
<td>3.00%</td>
<td>$225,000</td>
<td>$1,125</td>
</tr>
<tr>
<td><strong>$7,725,000</strong></td>
<td><strong>$38,625</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of Interest over a development period of</td>
<td>30 months</td>
<td>$1,857,189</td>
<td>$9,286</td>
</tr>
<tr>
<td>Number of lots</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rates, special council charges and land tax say (% of acquisition and land costs per lot p.a.)</td>
<td>3.53%</td>
<td>$681,828</td>
<td>$3,409</td>
</tr>
<tr>
<td>Development Costs, say</td>
<td>$75,000 per lot</td>
<td>$15,000,000</td>
<td>$75,000</td>
</tr>
<tr>
<td>Interest Costs on development - based on (30% of total development period)</td>
<td>9 months @ 9%</td>
<td>$1,001,516</td>
<td>$5,008</td>
</tr>
<tr>
<td><strong>Total Development costs including interest</strong></td>
<td><strong>$18,540,533</strong></td>
<td><strong>$92,703</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Costs of Development incl. acquisition</strong></td>
<td><strong>$26,265,533</strong></td>
<td><strong>$131,328</strong></td>
<td></td>
</tr>
<tr>
<td>Developers Margin</td>
<td>20% of Total costs</td>
<td>$5,253,107</td>
<td>$26,266</td>
</tr>
<tr>
<td>Sale price before selling costs</td>
<td>$31,518,639</td>
<td>$157,593</td>
<td></td>
</tr>
<tr>
<td>Selling Costs @ 4.7%</td>
<td>$1,481,376</td>
<td>$7,407</td>
<td></td>
</tr>
<tr>
<td>Gross realisation</td>
<td>$33,000,016</td>
<td>$165,000</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL HOLDING COSTS FOR PROJECT</strong></td>
<td><strong>$2,858,705</strong></td>
<td><strong>$14,294</strong></td>
<td></td>
</tr>
</tbody>
</table>
# Economic Analysis to Examine the Sensitivity of Time on a Development Project

## Per Lot Basis

<table>
<thead>
<tr>
<th>BASE CASE SCENARIO</th>
<th>BASE CASE SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment time (months) for Planning &amp; Building Consents including DA</td>
<td>0</td>
</tr>
<tr>
<td>Undeveloped Land Cost</td>
<td>$37,500</td>
</tr>
<tr>
<td>Acquisition costs</td>
<td>$1,125</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$38,625</td>
</tr>
<tr>
<td>Loss of Interest over development period</td>
<td>$3,476</td>
</tr>
<tr>
<td>Rates, special council charges and land tax</td>
<td>$1,364</td>
</tr>
<tr>
<td>Development Costs, say</td>
<td>$75,000</td>
</tr>
<tr>
<td>Interest Costs on development</td>
<td>-$1,964</td>
</tr>
<tr>
<td><strong>Total Development costs including interest</strong></td>
<td>$81,804</td>
</tr>
</tbody>
</table>

## Total Development Costs

<table>
<thead>
<tr>
<th>BASE CASE SCENARIO</th>
<th>BASE CASE SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developers Margin</td>
<td>$24,086</td>
</tr>
<tr>
<td>Sale price before selling costs</td>
<td>$144,515</td>
</tr>
<tr>
<td>Selling Costs</td>
<td>$6,792</td>
</tr>
<tr>
<td>Gross realisation</td>
<td>$151,307</td>
</tr>
<tr>
<td><strong>TOTAL HOLDING COSTS FOR PROJECT</strong></td>
<td>$5,441</td>
</tr>
</tbody>
</table>
Sensitivity of Time on a Land Development Project

Tabel: Total Holding Costs for Project per Lot in Thousands

Length of assessment period (months): 0, 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66

Total Holding Costs: $0, $10, $20, $30, $40, $50

Graph shows a linear increase in total holding costs with the length of the assessment period.
Increase in Cost of mortgage repayments due to total holding costs

Cost of monthly mortgage repayments due to total holding costs

Length of assessment period (months)

Increased monthly mortgage repayments

$0 $100 $200 $300 $400 $500
Assumptions having greatest impact include interest rates & development timing (incorporating holding period).

Typical ("base case") scenario: total holding costs equate to approximately $15,000 per lot (18 months regulatory assess).

For every month the assessment time is delayed, the end-user will pay approximately an extra $500 more.

- If time reduced by 6 months, holding costs reduce to just over $11,000 per lot.
- If time is increased by 6 months, holding costs increase to $17,000 per lot.
- If timeframes are further extended (exceeds 5 years), holding costs could climb to $40,000 per lot and beyond.

Effectively raises average cost of each allotment from $165,00 (Base model assumption) to over $200,000.
Since new home buyers typically obtain finance to complete their purchase, if the cost of acquisition rises, then so does their mortgage.

Therefore, impact can be based on calculating the additional monthly mortgage repayment required to cover the costs of extended assessment.

The impact of these costs can then be examined in terms of average household income.

In this way, the impact of assessment time can be directly related to housing affordability - in the context of the “30/40 affordability rule”
Housing Stress Defined

- The 30/40 rule: Such low income households are considered to place themselves in a position of “housing stress”.
- More generally described by financial institutions as a situation in which homebuyers are paying 35% or more of their income on housing costs. More traditionally described as "Mortgage Stress" – the situation in which homebuyers are paying 35% or more of their income on home loan repayments (Kryger, 2003).
- An alternative definition, adopted by the National Housing Strategy, is based on the proportion of income paid by income units in the lowest 40% of the income distribution for housing payments. According to financial institutions, this is a convenient measure since “it provides continuity with traditionally used measures and … is simple to apply and easy to understand” (Gabriel et al., 2005).
Cost of increased mortgage repayment - % of Household income

Length of assessment period (months)

- $0
- $100
- $200
- $300
- $400
- $500

- 0%
- 1%
- 2%
- 3%
- 4%
- 5%
- 6%
- 7%
- 8%

- Red: Cost of monthly mortgage repayments due to total holding costs
- Green: Cost of mortgage repayment due to assessment period as a % of average household income
- Blue: Cost of monthly mortgage repayments due to assessment period

Increase in mortgage repayment as a % of average household income
Increased Costs and Housing Affordability – Measurement of the Impact Upon Mortgages

- Percentages would be even higher for those in the bottom 40% of household income distribution - in concert with the “30/40 affordability rule”.
- Such consumers (especially first home buyers) are therefore potentially pushed into the realms of unaffordability and mortgage stress.
- Even a 6 month reduction in assessment period equates to a approximately 2% reduction in the percentage of household income devoted to mortgage repayments.
- **This highlights that even small shifts in assessment period can significantly affect housing affordability, and emphasises the need for timely processing by regulatory authorities.**
### Economic Analysis to Examine the Sensitivity of Time on a Development Project

<table>
<thead>
<tr>
<th>TIME (months) Planning &amp; Building Consents including DA</th>
<th>BASE</th>
<th>CASE SCENARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL HOLDING COSTS FOR PROJECT</td>
<td>$14,294</td>
<td>$5,441</td>
</tr>
<tr>
<td></td>
<td>$11,245</td>
<td>$17,444</td>
</tr>
<tr>
<td></td>
<td>$24,069</td>
<td>$31,154</td>
</tr>
<tr>
<td></td>
<td>$38,738</td>
<td></td>
</tr>
<tr>
<td>Total costs of mortgage repayments due to holding costs, per month</td>
<td>$130</td>
<td>$50</td>
</tr>
<tr>
<td></td>
<td>$103</td>
<td>$159</td>
</tr>
<tr>
<td></td>
<td>$220</td>
<td>$284</td>
</tr>
<tr>
<td></td>
<td>$354</td>
<td></td>
</tr>
<tr>
<td>Loss of interest due to assessment period</td>
<td>$5,330</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>$3,476</td>
<td>$7,265</td>
</tr>
<tr>
<td></td>
<td>$11,395</td>
<td>$15,897</td>
</tr>
<tr>
<td></td>
<td>$20,804</td>
<td></td>
</tr>
<tr>
<td>Total costs of mortgage repayments due to assessment period, per month</td>
<td>$49</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>$32</td>
<td>$66</td>
</tr>
<tr>
<td></td>
<td>$104</td>
<td>$145</td>
</tr>
<tr>
<td></td>
<td>$190</td>
<td></td>
</tr>
<tr>
<td>Cost of mortgage repayment as a result of assessment period as a % of average household income</td>
<td>1.67%</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>1.09%</td>
<td>2.27%</td>
</tr>
<tr>
<td></td>
<td>3.57%</td>
<td>4.98%</td>
</tr>
<tr>
<td></td>
<td>6.51%</td>
<td></td>
</tr>
</tbody>
</table>
Interest Rate Impact
Not so subtle…
Increase in Cost of mortgage repayments due to assessment period

1% Interest rate

Increased monthly mortgage repayments

Length of assessment period (months)

Cost of mortgage repayment due to assessment period as a % of average household income
Cost of monthly mortgage repayments due to assessment period
Increase in Cost of mortgage repayments due to assessment period

5% Interest rate

Increased monthly mortgage repayments

Length of assessment period (months)

Cost of mortgage repayment due to assessment period as a % of average household income
Cost of monthly mortgage repayments due to assessment period
Increase in Cost of mortgage repayments due to assessment period

- **10% Interest rate**

- **Cost of mortgage repayment due to assessment period as a % of average household income**
- **Cost of monthly mortgage repayments due to assessment period**

- **Length of assessment period (months)**
- **Increased monthly mortgage repayments**

- **Increase in mortgage repayment as a % of average household income**
Increase in Cost of mortgage repayments due to assessment period

15% Interest rate

Length of assessment period (months)

Increased monthly mortgage repayments

Cost of mortgage repayment due to assessment period as a % of average household income

Cost of monthly mortgage repayments due to assessment period

Increase in mortgage repayment as a % of average household income
Increase in Cost of mortgage repayments due to assessment period

20% Interest rate

Length of assessment period (months)

Increased monthly mortgage repayments

Cost of mortgage repayment due to assessment period as a % of average household income
Cost of monthly mortgage repayments due to assessment period
Conclusions

- Various models utilised for defining & measuring h.c.
- Whilst most ultimately rely upon derivations of the Present Value / discounting approach, the application of these “first principles” varies widely.
- On many occasions, the methodology utilised is not readily apparent.
- This lack of information makes it difficult to determine the degree of rigour that has been applied.
- Does not provide confidence in the derived outcomes.
Conclusions

- Even commercially available applications 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.
- 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.
Conclusions

- **CASE STUDY ANALYSIS – THE NEXT STEP**
  - Broadly based analysis regions and towns in Australia, i.e. empirical case study analysis, cross-referencing
  - Preferable - 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.
  - Confirmation of the theoretical model
Holding Cost Model for Greenfield Housing Developments

The conceptualisation, sensitivity and measurement of holding costs and other selected elements impacting housing affordability.

Questions?