Final Report

Policy options for stimulating private sector involvement in affordable housing across Australia: operationalising and implementing viable new options ("Stage 5")

authored by

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for the

**Australian Housing
and Urban Research Institute**

Sydney Research Centre

AHUR**i**

Australian Housing
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EXECUTIVE SUMMARY

This project is about operationalising the outcomes of a previous commercially focused AHURI project, *"Policy Options for Stimulating Private Sector Investment in Affordable Housing Across Australia"* which is being prepared for the Affordable Housing National Research Consortium. The project is concerned with providing a blueprint and supporting additional financial analysis for the implementation of the outcomes (i.e. policy proposals for new private funding models) of Stages 1 to 4 of the above-mentioned Consortium project.

The three Consortium project reports clearly establish that:

a) housing affordability problems have intensified significantly in Australia over the past 15 years;

b) the bottom end of the rental housing market is failing abjectly in meeting rising demand;

c) existing housing subsidies provided through both the CSHA and the social security system (Rent Assistance), although making a vital continuing contribution to housing affordability, are inadequate (at current and prospective overall volumes of support) by themselves to deal with the worsening situation and that:–

d) the only feasible alternative is to attract and leverage a large volume of private investment (especially from the institutions) into affordable housing provision to supplement provision under existing patterns of investment and subsidy flows. If $3 or $4 of private investment can be leveraged for every $1 of extra subsidy, then the supply of affordable housing will increase substantially by comparison to directly contributing that $1 to Rent assistance (RA) or public housing through the CSHA.

Stage 3 of the Consortium project produced a short list of four models for achieving this degree of private sector leverage. Each model or option met stringent criteria of efficiency, equity, cost effectiveness for government and feasibility.

This report will enable private sector funding options to be operationalised by providing the following:

•   a Manual of "how to" raise private sector finance for SHA's;

•   within the Manual a set of decision diagrams with a specification of the content and documentation required at each decision point such that line agency and Treasury approval processes will be satisfied;

•   within the Manual, the requirements for an implementation report and budget;

•   a detailed financial Model which includes a capital funding option;

•   an extension of the financial and risks analysis report prepared for the Stage 4 Consortium Report including comparisons with capital funding options;

•   results of a training workshop held with interested SHA's and relevant other agencies;

•   a text copy of the electronic help file provided with the Model.

The report is in four volumes each relating to one of the components above. Where relevant summaries are provided at the beginning of each volume.

Volume 1 consists of the Manual, Volume 2 the Financial and Risk Analysis Of Capital Funding Options, Volume 3 the results of a training workshop held with interested parties and Volume 4 the text copy of the electronic help file provided with the Model. Under separate cover AHURI has copies of the electronic Model.

VOLUME 1: MANUAL FOR RAISING NON-GRANT FUNDING FOR SOCIAL RENTAL HOUSING

1 INTRODUCTION

In previous work on this project AHURI has produced a detailed financial analysis of the comparison between capital grant, and debt funding of social rental housing. A sophisticated financial Model accompanies this report. This document is a manual that State Housing Authorities can use if seeking to raise amounts of more than $30m for non-grant funding or equity participation to provide additional social rental housing. It is intended to provide structured generic assistance to housing officers considering the process of raising non-grant funding or equity participation. The Manual has three components, the:

a) generic actions, decisions, and approvals that are required before the type of funding/participation is finalised;

b) subsequent actions decisions and approvals that are required if non government equity participation is to be the principal means by which social housing is to be expanded; and

c) subsequent actions decisions and approvals that are required if government debt funding is to be the principal means by which social housing is to be expanded.

Diagram 1 sets out the generic actions, decisions and approvals required as the first stage in the two part process.

Diagram 1: Funding Options

Establish Program Objectives

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Establish Operational Objectives:
To Include: Numbers To Be Assisted; Types Of Assistance;
Target Group; Eligibility etc

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Define Financial Support, e.g. credit, risk and subsidy

↓

Risk Definition and Risk Profiling Of Options

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Prepare Establishment Budget:
To Include: Legal and Tax Advice Costs; In House Support;
Contract Financial Modeling and Risk Analysis

↓

Preliminary Report And Sign Off To Proceed

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Lead Manager Specification:
To Include: Price and Risk Criteria; Component Cost Details;
Compatibility With Program Objectives; etc

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Tender For Lead Manager/Structure Options

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Evaluate Lead Manager Options

↓

Prepare Short List Of Structure Options

↓

Tax Advice Specification On Short List Of Options

↓

Financial Modeling Specification and Tender:
To Include: Sensitivity and Probability Testing Ranges;
Component Cost Ranges; Cost To Agency
and Returns To Investor

↓

Evaluate Modeling Results

↓

Recommended Option For Minister To Sign-Off

↓

Submission For Premiers Approval

Submission For State Treasurers Approval :
To Include: Principles And Operations Agreements; Housing
Market Research; Model and Option Evaluation

↓

Treasurers Approval and Submission To Commonwealth Housing Minister

↓

Funding Option: Equity   **Funding Option: Debt**

2 FUNDING OPTIONS: STAGE 1

2.1 Program Objectives

Before embarking on a process to obtain external funds/equity participation for social rental housing the recipient organisation should be very dear about the purpose and objectives which apply to the fund raising.

In this regard the:

- reasons for embarking on the fund raising;

- position and projected size of the program viz a viz other programs of housing assistance; and;

- potential costs and benefits;

should be documented and explicit.

2.2 Operational Objectives

The main issues which will need to be addressed in developing operational objectives are:

- initial size of program;

- frequency of fund raising;

- type of assistance;

- number of new households to be assisted;

- type of households to be assisted and source of households;

- income eligibility criteria;

- tenancy vacancy and relocation policy;

- acceptable relocation at termination position;

- term of transaction; and

- source of stock and stock maintenance and disposal issues.

Initial Size Of Program

This will set out the capital fund raising target for the financial year and outline the context viz a viz the size of other organisational capital programs directed at housing assistance.

Frequency Of Fund Raising

The approach to the fund raising method used will be completely dependent upon whether or not the program is to be recurring or 'once-off'. With a recurring program attention needs to be focused upon minimising the establishment costs associated with each fund raising, i.e. a structure such as a bond has very low replicable costs whilst a direct equity investment may cost as much as 4% of the initial fund raising. Consequently early policy decisions need to be made as to whether or not the fund raising is to be recurring. Whilst final decisions will of course await the quantitative (numerical analysis of subsidy costs of options) and tax analysis (quantitative analysis of tax costs and revenues to government, and after tax returns to the investor), policy intentions can be established early in the process.

Number Of New Households To Be Assisted

The first 'cut' target of number of new households to be assisted will be derived from the initial size of the program divided by the average estimated price per acquired dwelling.

Type of Assistance

It will be important to clarify early in the process what the main method of assistance will be: rental subsidy, bond assistance etc.

Type Of Households To Be Assisted And Source Of Households

Clearly if the household and income eligibility criteria are to be, say, indistinguishable from public housing, then households can simply be taken direct from existing waiting lists and Commonwealth grant funds could also be used to support the subsidies arising from the fund raising. Conversely, if the target household group has different household type and income characteristics to that applying to public housing, then it may be that Commonwealth funds will not be available for subsidy support, or that clarification of availability of Commonwealth/State Housing Agreement, (CSHA) funds may be required.

Income Eligibility Criteria.

Because of the particular demand characteristics in the area of a geographic area, it may be that whilst generally targeting to public housing income eligibility ranges closer targeting to say households over $20,000 p.a. income is desired. Any special income eligibility characteristics need to be identified early as this will have a major bearing on the overall real subsidy cost.

Ideal Term Of Transaction

Early decisions and objectives are required as to the ideal term of the transaction. If public housing waiting list applicants are to be targeted the longer the term, the less likely it is that there will be significant numbers of public tenant households remaining in the vehicle's (transaction structure), dwellings at the end of the transaction. This reduces the 'relocation risk' confronting authorities when the transaction is terminated. Ideally a term of over twenty years is desirable.

Tenancy Vacancy And Relocation Policy

This issue can be approached from two perspectives. Because the dwellings will need to be sold off before or at termination, (in order to pay down debt principal or provide equity), consideration needs to be given to the treatment of assisted tenants who remain in dwellings until the transaction terminates.

If the objective is to maximise the number of assisted tenant households then as one assisted tenant household leaves they will be replaced by another from the relevant waiting list. However, at termination, such a policy will leave the organisation with a major tenant relocation problem.

Conversely if, as assisted tenants leave, dwellings are sold or tenanted by private tenants the subsidy cost and relocation problem is minimised, albeit with considerably fewer low income households assisted.

Acceptable Relocation At Termination

For organisations to determine a position on the above, it is necessary to clarify the acceptable proportion of original households which will be relocated at termination. This can be estimated by examining the percentage of tenant households who voluntarily leave public housing each year and projecting how many households are likely to be left at the end of each period i.e. 5, 10 , 15, 20, 25 and 30 years. The analysis will also help agencies to clarify the acceptable relocation risk and hence term of any fund raising.

Source Of Stock and Stock Disposal Issues

Early policy decisions and operational objectives need to be determined for the dwelling stock that are to be passed into the vehicle. In particular, decisions are required about the source of the stock and when dwelling sales will occur. Stock, plus transaction expenses and establishment costs to the value of the fundraising will be required by the execution date of the transaction. Consequently State Housing Authorities, (SHAs), need to determine early on whether existing public housing stock is to be passed in or whether spot purchases will be used to meet transaction requirements. Obviously spot purchase processes need to be anticipated as they will require longer lead times than using existing public housing stock.

Secondly, if it has been determined that new public tenants will replace vacating tenants during the term of the transaction no operational objectives are required about dwelling sales. If, however, it has been determined that dwellings vacated by public tenants are either to be let privately or sold some criteria need to apply as to when a sale is to occur. These criteria need to be determined at the outset, e.g. vacant dwellings will be sold when the value is greater than the original value indexed to inflation plus 1%, and let to private tenants when the value is less, etc.

2.3 Define Financial Support

There are three main types of financial support required:

- credit;

- risk; and

- subsidy.

Credit

If a debt structure is to be used and fixed rate bonds are to be issued by the State Treasury with proceeds on-passed to the Housing Authority it is likely that the Treasury may charge the Housing Authority a premium for the government guarantee over and above the interest coupon applying to the bond. Any non-housing government indemnities-, (promises to pay),- will attract a cost and these costs need to be either factored into the analysis, or (if no guarantees are to be provided), the additional subsidy cost resulting from higher private sector risk premiums will require recognition.

Risk

SHAs face a number of risks in entering an externally funded transaction. These risks are detailed in the discussion about Risk Definition and Risk Profiling, (pp 5-8).

However it is important to recognise, discuss and determine which risks the organisation will accept and provision for, which it will not, and what the consequences will be for the risk premium that will be applied to the rental yield calculation.

For example, with a debt structure such as a fixed rate bond, the SHA is implicitly accepting all housing risks (capital and recurrent), and also some interest rate risk, (i.e. if rates subsequently fall the coupon on the bond may become expensive, and the bond repurchase price will include a premium to par (the extent by which the current bond price exceeds the initial issue price)).

Subsidy

All structures will require a continuous stream of subsidy payments which reflect the difference between the rental yield or bond interest payment required and the net rents received. To the extent that certain risks are not accepted by the SHA the fundraising will either not be achieved, or there will be significant risk premium attached to the rental yield required. It is important to note that if SHAs do not accept certain housing and revenue risks on the one hand, they cannot expect that the pricing will remain as per say a bond, on the other, where these risks are being removed from the investor.

All of the early determinations on risk acceptance will, of course, need to remain preliminary until the lead manager has been appointed and the proposed transaction has been canvassed in the investment community. This canvassing process may well reveal either no appetite for the proposed transaction or a very high and inefficient risk premium. For example in the case of one of the infrastructure bond investments, where investors were required to accept some income risk associated with revenue projections from the tolls, the price of the bond was in excess of 2% per annum above the prevailing real rate Commonwealth Treasury Bond. SHAs may find similar or more expensive risk premiums applying to housing fundraising and decide that they can accept certain risks at a real cost less than that implied by private sector pricing mechanisms.

2.4 Risk Definition and Risk Profiling

Risk Terms

The NSW Government's Total Asset Management Manual (1993) discusses risk in the following terms:

> 'Risk is the possibility that an expected outcome is not achieved
> or is replaced by another, or that an unforeseen event occurs.
> This is a broad view of risk that includes both uncertainty due to
> future events and the consequences of limited knowledge,
> information or experience'

Risk Analysis is the process of identifying risks, estimating their likelihood's, and evaluating potential consequences.

Risk Management is the set of activities concerned with identifying potential risks, analysing their consequences and devising responses so as to ensure that project or program objectives and delivery goals are achieved. This includes management of ongoing risks associated with the ownership of assets.

Risk Analysis

Diagram 2 sets out a checklist for risk analysis.

Diagram 2: Preliminary Risk Assessment

Identify risks
Checklists, similar projects, brainstorming

2.5   Assess likelihood & consequences
Evaluation
Determine risk factors

2.6   Rank Risks
Identify major and moderate risks
Major risks: Develop Risk Action Schedule
Moderate risks: Specify Management Measures
Screen minor risks Minor risks: Accept risk
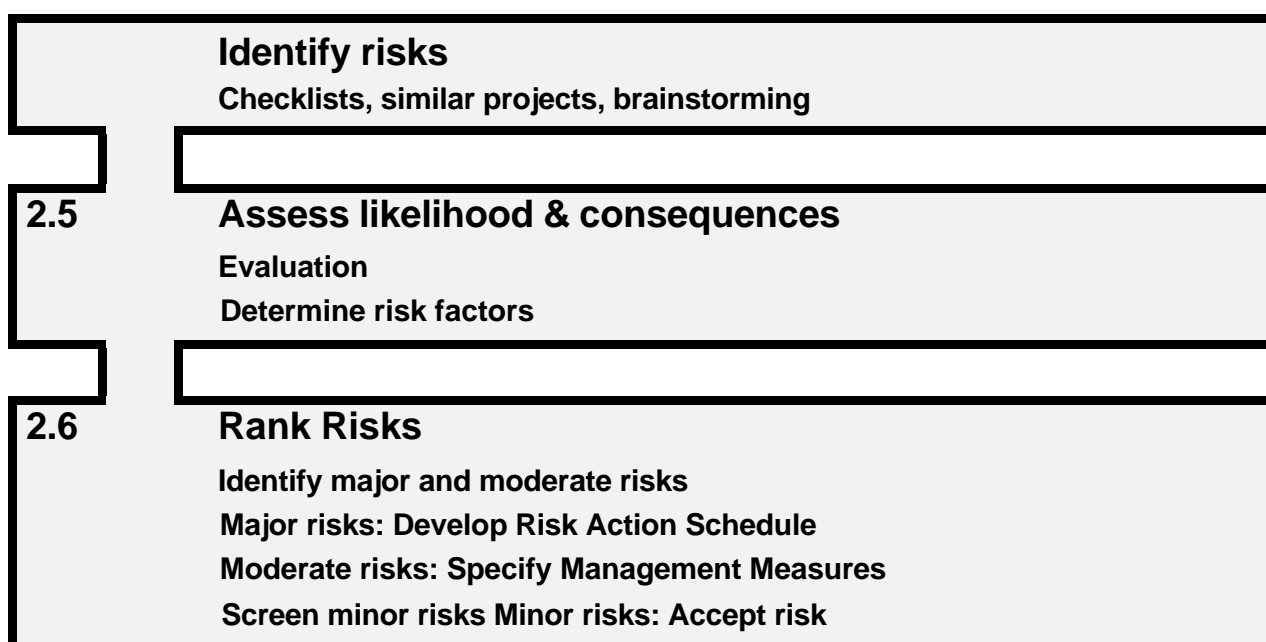
Source**:** NSW Government's Total Asset Management Manual, 1993

The steps in developing a risk strategy are to:

a) identify risks;

b) assess likelihood;

c) determine potential impacts and identify most significant risks;

d) determine quantitative techniques to be applied;

e) document the most significant risks that can be quantified;

At this stage in the analysis we want to identify or define the range of risks that confront the options available for raising funds and to conduct a preliminary risk analysis of potential impacts and most significant risks.

Identification Of Risks

The analysis begins with listing the risks that might affect each project. The aim is to generate a comprehensive list of the relevant risks and document what each one involves.

The identification should include:

- a description of the risk and how it might arise;
- possible initiating factors;
- main assumptions; and
- a list of principal sources of information.

Categories Of Risk

There are two categories of risk *systemic* and *unsystemic*.

In the case of housing assistance options *systemic risks* relate to those changes in the general economic environment and the wider housing market that affect either the rate of return or the cost of subsidy. *Unsystemic risks* concern that part of the variability in return or subsidy cost which cannot be explained by reference to systemic risks.

Unsystemic risk includes such factors as the unique financing structure or financing method plus agency specific risks such as management and human errors etc.

The four main risk types therefore are:

a) **systemic risks** including:

- *general economic risks,* which includes such variables as inflation, capital growth or contraction rates, rental yields or real rents change, unemployment and income growth or contraction, nominal and real interest rates, and construction cost escalation rates,
- *natural disasters,* such as landslip, earthquake, fire, flood, lightning, wind and weather;

b) **unsystemic risks**

- *structural and financial risks,* including funding sources, financing costs, ownership, and residual risks to Authority where there is private sector involvement; contractual risks, and procurement planning.
- *agency of issue specific risk,* including political, project management, project delivery (contract selection, tendering, negligence etc.), human error, organisational (including industrial relations, resources shortage, management, work practices etc.), and systems (including communications failure, hardware and software failure error etc.).

Housing Risks Defined

Systemic Risks

When any State Housing Authority (SHA), makes a direct investment in housing for rent to low to moderate income earners it assumes a number of systemic risks. These are:

Dwelling Price or Asset Risk.

Any dwelling purchased by SHAs may gain or lose value according to market price movements. Consequently it is possible that at different times the asset base of SHAs may actually fall.

Rental Yield Risk.

Many SHAs "mark to market" that is, unrebated rents are set at the prevailing private rental market yields. For SHAs with any significant proportion of unrebated tenants, there is a risk that the unrebated rental income may either fall, or not increase, affecting the rent income received.

Rental Payment:

There are three payment risks associated with public rental housing and these are:

Unemployment and/or Income Loss Risk

Research on low to moderate income earners has indicated that the income of this group is highly volatile and that in times of recession a significant proportion of this group may suffer substantial income loss. Given that for a very high proportion of public housing tenants' pensions and benefits are the primary source of income this risk may not be very great. However for employed tenants there is a risk of income loss and the consequent reduction in rent received as a result of downward adjustments in rent paid.

Unemployment And/Or Default Risk.

The second payment risk is that tenants' may completely default, and rental income is lost.

Vacancy Risk.

Higher than anticipated vacancies may result in loss of rent income received, although this risk is not very high in public housing due to the large waiting lists.

Interest Rate Risk

If debt financing is used, whether directly by SHAs or on-passed as grants from central borrowing authorities, interest rate risk is present. If rates rise the cost of subsidies or the rate of return will be reduced.

Cost Escalation Risk

Finally SHAs face the risk that maintenance and other costs may escalate at a faster rate than anticipated with consequent higher expenditures.

Determine Significant Risks

The objective is to identify significant risks which must be managed, and to screen minor risks.

Risk Likelihood

The third step of the analysis is to determine or estimate both the likelihood of a risk arising and its potential consequences.

The assessment involves:

- an estimate of the likelihood of each risk arising. This might be done initially on a simple scale from 'highly unlikely' to 'almost certain';

- an estimate of the consequences of each risk in terms of the project/proposal criteria. This might be done on a simple scale from inconsequential to severe.

Diagram 3 sets out how a quick and dirty risk assessment can be conducted, prior to more detailed quantification.

Diagram 3: Risk Assessment

Moderate Risk	Major Risk
Minor Risk	Moderate Risk

(Vertical axis: **IMPACT**; Horizontal axis: **LIKELIHOOD**)
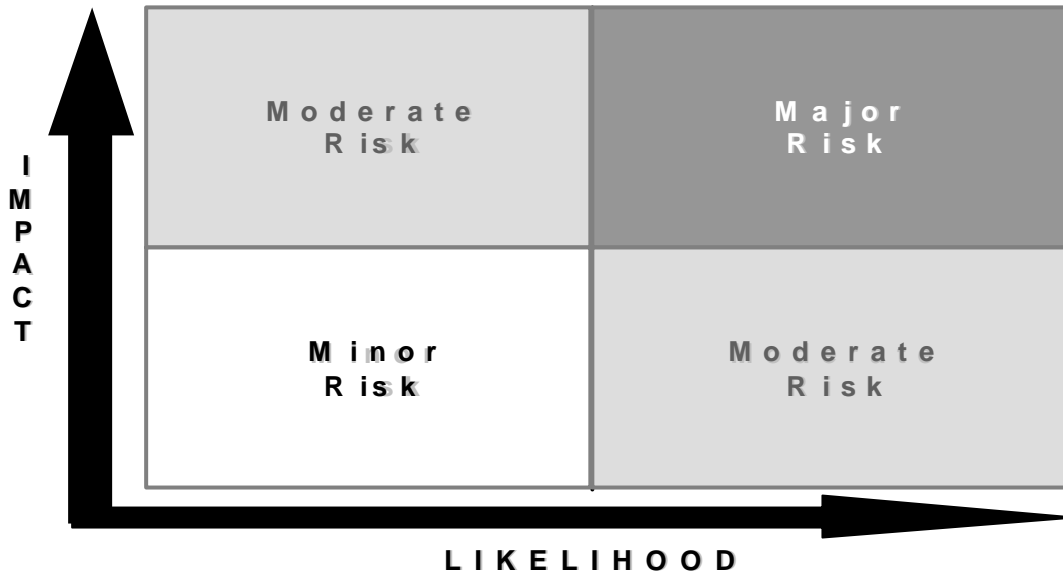
Source: NSW Government's Total Asset Management Manual, 1993

By identifying the principal risks and locating each one in the deemed position on the diagram, it quickly becomes possible to isolate those risks which require further more serious investigation.

2.7 Prepare Establishment Budget

Once some preliminary work has been done on the above, it is important to prepare a budget which encompasses the cost of all of the work required up until the execution of the fund-raising. Besides the allocation of internal resources expenses will be incurred on external support in the following arenas:

- lead manager fees;

- legal advice;

- tax advice (necessary in the case of an equity fund-raising); and

- financial modeling and quantitative risk analysis.

Discussions will need to be held with the range of possible contractors to enable some preliminary estimates of these costs. If an equity transaction is to be pursued there are additional costs relating to the cost of legal and tax advice for the equity partner, and often a establishment fee to the partner.

2.8 Preliminary Report and Sign Off To Proceed

Once these steps have been completed and a budget and timetable established all of the information required for a Chief Executive or Ministerial Sign-Off To Proceed to develop the proposal is available. A report should then be prepared accordingly.

2.9 Lead Manager Specification

At this point it is appropriate that a lead manager tender specification be prepared. This specification should include

- program objectives;

- operational objectives and determinations;

- the range of options which must be examined, plus any other options which the lead manager can devise;

- the short and long term funding objectives of the program, i.e. intial and annual fundraising volume desired;

- the risks which must be canvassed by the response;

- the range of financial support that will be provided;

- the manner in which the costs are to be itemised i.e. subsidy, risk, credit,

- the fees which are to be itemised; lead manager, trustee, manager and agent i.e. (housing department), lawyers and tax advisors;

- the proposed budget for establishment;

- the quantitative support which will be required, i.e. a model, spreadsheet output etc;

- the criteria which must apply to the lead managers assessment of the options; A possible set might be:

  - fit with program and operational objectives; particularly tenancy management and dwelling disposal objectives;
  - volume of funds that could be raised;
  - feasibility and replicability; i.e. fungability and liquidity;
  - risks to the organisation;
  - establishment and fee costs;
  - subsidy costs;
  - total transaction costs; and
  - special concessions required from government.

2.10 Tender For Lead Manager

Once the tender specification has been prepared a short list of merchant bank and structuring arms of the major banks should be drawn up and the tender dispatched. This information can be obtained from the Australian Bankers Association to be found at www.bankers.asn.au

2.11 Lead Manager Evaluation.

After receiving the tenders the tenders can be evaluated against the stated criteria and a short list of the four best structuring options drawn up.

2.12 Short List Of Structure Options

The precise nature of each of the short listed options should be drawn up complete with a diagram for each.

2.13 Tax Advice Specification On Short List Of Options

Advice should be sought from a relevant tax lawyer on the precise income and capital tax treatment of each of the options for each of the main types of taxpayers; individual, company, superannuation funds, life assurance companies, and partnerships and trusts.

2.14 Financial Modeling Specification and Tender

After receiving the tax advice from the legal advisors a specification for the financial modeling tender should be prepared and distributed to a short list of qualified entities. This tender will concentrate on two major questions; the quantitative cost and risk, and the nature of the analysis tools to be provided to the organisation upon completion of the analysis. The tender will also include a copy of the tax advice as an attachment. For each of the short listed options the tender will include specification of:

- the base case to be analysed;

- the base cost and price data including discount rate or rates; term; vacancy and dwelling disposal assumptions;

- the sensitivity test ranges and number of different sensitivity test outcomes required;

- whether or not probability testing will be required;

- the financial criteria to be provided, ie;

    o present value base case cost by component (establishment cost, fees, credit, risk and yield, subsidy expressed as a percentage of the initial fundraising amount);

    o the range of total gross (before tax) and net (after tax) cost outcomes for both the Commonwealth and the State and the relative variances of each of the options from the base case;

    o maximum exposure and year of maximum exposure;

    o pre and after tax return to investor; and

    o where positive cases exist, year of payback.

The tender will also require a comparison with the 'do-nothing' option i.e. grant funding.

The tender will also specify in what program the Model will be prepared and how user friendly the final Model is to be, including the use of drop down dialog entry boxes etc.

2.15 Evaluation of Modeling and Other Results.

Once the modeling has been completed all submissions and quantitative analysis will be reviewed according to the detailed evaluation criteria set out in the lead manager tender specification.

2.16 Recommended Option For Sign Off

A detailed report to the CEO and Minister can now be prepared according to the results of the evaluation. This will include recommendations as to the lead manager and option to be preferred and outline the next steps in the fund-raising procedure.

2.17 Premiers and Treasurers Submissions

Once the Minister and CEO have signed off detailed submissions to the Premier and Treasurer can be prepared for the Ministers signature. If the preferred option requires Treasury bond issues or guarantees these submissions will include:

- a short two page outline of the proposal, the key results of the analysis, and the next steps.

- attachments which will contain:

    o draft Principles and Operations Agreements which document the relationship and processes applying to the prosecution of these transactions re the Housing Agency and the State Treasury;

    o results of the lead manager evaluation;

    o the short list analysis and option evaluation including a comparison with the do nothing approach;

    o the risk analysis and financial evaluation of the preferred option;

    o a copy of the Model.

2.18 Treasurers Approval and submission to Commonwealth Minister

If CSHA funds are to be used to support the vehicle's costs it will be prudent to obtain agreement from the relevant Commonwealth Minister. The submission to the Commonwealth Minister will include all of the material outlined in 2.15 plus an analysis of the proposal's compliance with the CSHA. If an equity option is preferred the next steps are somewhat different to that applying to a debt option.

3 FUNDING OPTIONS: EQUITY

Diagram 4 sets out the steps required for an equity fund-raising.

3.1 Submission To State Treasurer Re: Stamp Duty

Under an equity transaction existing public stock may be passed into the vehicle; or, the Housing Authority may procure dwellings for the entity by spot purchasing private stock. In either case the entity will be liable for stamp duty payments of 2% or more of the dwelling value acquired. This cost will add considerably to the Housing Authority's costs so it may be appropriate to seek an exemption from the State Treasurer in this case.

3.2 Appointment Of Lead Manager and Submission To State Treasurer Re: Loan Council Exemption

From the previous evaluation in Stage 1 a Lead Manager can now be appointed. The Lead Manager's function is to make sure the transaction gets done and all of the various required components are in place before execution. The Lead Manager normally makes sure any required underwriting is in place at the agreed price, and identifies and solicits counter-parties to the transaction. The Lead Manager also assists with fee negotiation and with the preparation of submissions re: Loan Council exemption and tax rulings. Under Loan Council rules equity transactions are exempt from inclusion in a State's debt raising quota.

However, Loan Council has been very clear that full exemptions only apply when all of the risk of the transaction is borne by the private sector. In hybrid transactions where some of the risk is being borne by the State and some by the private sector, Loan Council has been inclined to only exempt a portion of the fundraising, (relative to the risk portion taken by the private sector), or include the full value of the transaction in the State's Loan Council quota. The majority of State's are now borrowing far less than their quota entitlement and this may not constitute the impediment to fund-raising it once was.

3.3 Offer Document and Finalisation Of Counter-Party(ies).

The first task of the Lead Manager is to finalise an appropriate private sector counter-party. Normally the Lead Manager will have extensively canvassed possible counter-parties prior to submitting their tender response and will, therefore, be in a strong position to execute the transaction. Indeed one of the criteria for the choice of Lead Manager may well be the strength of counter-party interest obtained.

The Lead Manager will now prepare a draft 'Offer Document' to present to the Counter Party for their agreement to proceed. This offer document will contain:

- the transaction structure;
- the specific terms of the offer including any offer to pay the counter-party's legal fees, (i.e. yield, capital gain provisions, term, 'pass through' provisions (i.e. provisions governing how equity will be repaid as dwellings are sold, and any restrictions on pass through i.e. no repayment of equity for say ten years);
- the credit support, (i.e. government guarantee), risk and subsidy capital which will support the transaction;
- fees to be paid for all functions including; lead manager, trustee, government guarantee and manager and agent fees;
- the dwelling and tenancy management arrangements, particularly their separation from the investment function, and the role of the housing agency as manager and agent;
- details of stock to be provided and the acquisition and valuation processes that will apply; and
- anticipated execution date.

If the counter-party accepts the offer document the procedure is to provide a letter to both the Lead Manager and the Housing Authority confirming acceptance and commitment to proceed to legal documentation and execution.

Diagram 4: Funding Options: Equity

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│     Submission To State Treasurer Re: Stamp Duty      │
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│   Appointment Of Lead Manager and Submission To       │
│   State Treasurer Re Loan Council Exemption           │
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┌─────────────────────────────────────────────────────┐
│        Offer Document and Finalization                │
│        Of Counter-Party(ies)                          │
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│               Tax Ruling (optional)                   │
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│        Fee Negotiation and Establishment:             │
│   To Include:Lead Manager; Trustee Manager; and Legal │
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│               Appointment Managers                    │
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│            Target Date For Execution                  │
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│     Determination Of Final Terms Of Transaction:      │
│   To Include: Name Of Security; Issuer; Issuing       │
│   Manager; Lead Manager; Rating; Security; Form;      │
│   Issue Date; Issue Price; Minimum Holding;           │
│   Investment Return; Indexation and Payment Dates;    │
│   Capital Return; Capital Return Restrictions; and    │
│   Termination Date                                    │
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│             Pricing Review 1 and 2                    │
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│        Lawyers Appointed And Legal                    │
│        Documentation Commenced:                       │
│   To Include: Transaction Manager; and Management     │
│   And Agency Agreements                               │
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│        Finalisation Of Stock Arrangements:            │
│   To Include: Source Of Stock; Stock Details;         │
│   Valuations; and Tenancy Arrangements                │
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│        Launch And Stock Transfer If Required          │
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3.4 Tax Ruling (optional)

It may be that before final execution of the transaction the equity partner requires a tax ruling as comfort. In this regard the Housing Authority would need to instruct the relevant legal advisors to draw up the appropriate application for ruling, and after review by the equity partner and the Housing Authority submit it to the Australian Taxation Office.

3.5 Fee Negotiation and Establishment

After acceptance of the Offer Document the fees to be paid to the various parties (minus the Lead Manager) can be negotiated. At this point it is quite appropriate to put the legal fees out to tender on a fixed fee basis. The main fee parties are, Lead Manager, Trustee and Legal. The transaction may or may not have a Transaction Manager whose primary duty is to calculate the precise regular payments to be made to the equity partner and maintain financial records including sales and value of equity outstanding etc. These functions can be performed by each of the parties but the cost of a Transaction Manager is very small and avoids payment disputes.

3.6 Appoint All Managers

At this point all Managers are appointed subject to execution of the transaction.

3.7 Target Date For Execution

A target date for execution can now be set.

3.8 Final Terms Of Transaction

The final financial and structural transaction terms are now set and the final modeling review completed. A 'terms sheet' is produced for all parties to refer to.

This sheet contains the:

- name of the transaction;
- issuer i.e. housing authority;
- issuing manager;
- lead manager;
- rating (if appropriate, most equity transactions are not rated);
- security type;
- execution date;
- value of total equity;
- investment return (i.e. yield);
- indexation and or payment dates;
- capital return;
- capital return restrictions; and
- termination date.

3.9 Pricing Review 1 and 2.

Once this terms sheet has been finally agreed the final price and transaction details are set before legal documentation commences.

3.10 Lawyers Appointed and Legal Documentation Commences

At this point the lawyers are appointed and the legal documentation commences. There may be up to 10 legal documents including:

- Partnership document, (main document for agreement between the parties);

- Management and Agency Agreement, (M&A),(covers the asset and tenancy management responsibilities of the Housing Authority and confers certain rights and sets out fee payments);

- State Deed, (covers the agreement between the State Treasury and the external party including guarantees and covenants);

- Trust Deed, (covers the nature of the credit, risk and subsidy support to be provided by the Housing Authority and the purposes for which funds can be used);

- Trustee Deed, (covers the responsibilities of the Trustee);

- Transaction Or Equity Managers Agreement, (covers the responsibilities of the equity manager and the fees to be paid); and

- Calculation Document, (specifies and quantifies the precise way in which the returns the equity partner are to be calculated and sourced).

3.11 Finalisation Of Stock Arrangements

The Housing Authority prepares all the necessary documentation preparatory to transferring the titles of the relevant housing stock to the equity partner. This documentation includes schedules of each property's characteristics,(address, property type) etc, title particulars, valuations, and relevant certificates including stamp duty exemption.

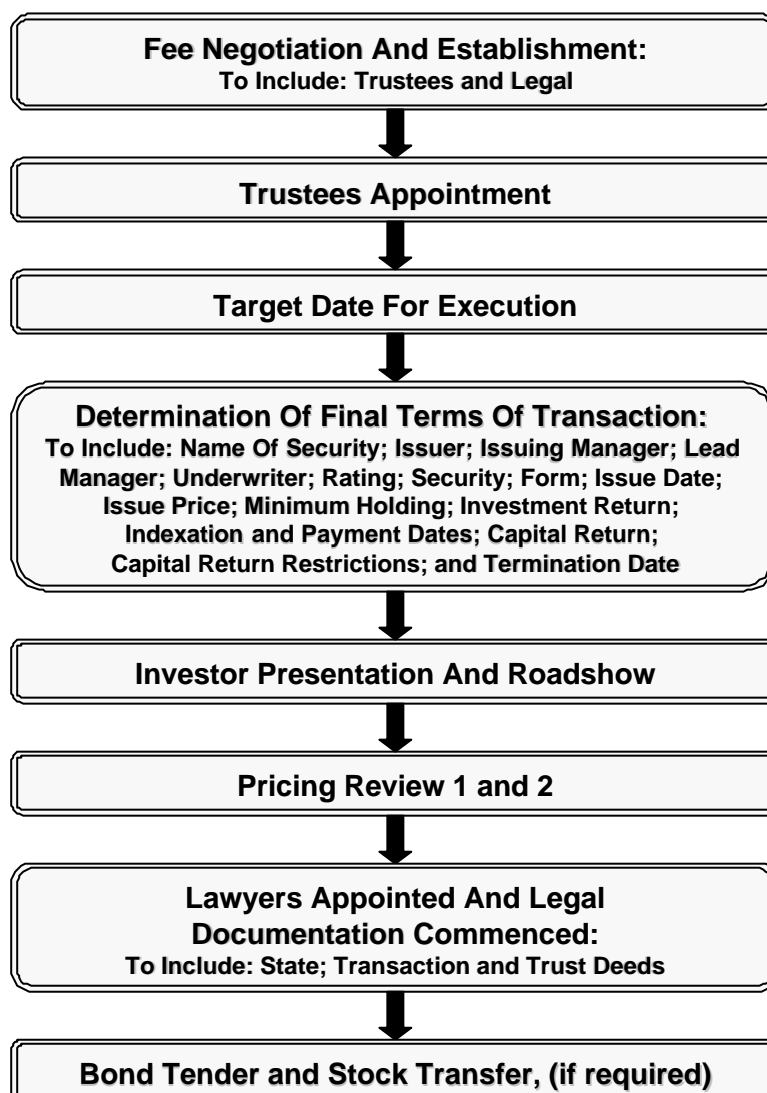## 3.12 Transaction Execution and Stock Transfer

On the appointed execution date all documents are signed by the relevant signatories and executed, a bank cheque for the equity value is provided and the stock is transferred to the equity partner.

4 FUNDING OPTIONS: DEBT

The procedures for the establishment of a debt funded structure are considerably simpler than those applying to equity. Diagram 5 sets out the main steps.

Diagram 5: Funding Options: Debt

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┌─────────────────────────────────────────────┐
│        Fee Negotiation And Establishment:     │
│          To Include: Trustees and Legal       │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│            Trustees Appointment               │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│           Target Date For Execution           │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│   Determination Of Final Terms Of Transaction:│
│ To Include: Name Of Security; Issuer; Issuing │
│ Manager; Lead Manager; Underwriter; Rating;   │
│ Security; Form; Issue Date; Issue Price;      │
│ Minimum Holding; Investment Return; Indexation│
│ and Payment Dates; Capital Return; Capital    │
│ Return Restrictions; and Termination Date     │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│        Investor Presentation And Roadshow     │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│             Pricing Review 1 and 2            │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│         Lawyers Appointed And Legal           │
│         Documentation Commenced:              │
│  To Include: State; Transaction and Trust Deeds│
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│     Bond Tender and Stock Transfer, (if required)│
└─────────────────────────────────────────────┘
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In a debt structure the following elements of the equity structure are not required:

- stamp duty exemption;
- Loan Council exemption;
- equity partner, lead manager, transaction manager, and manager and agent;
- offer document;
- tax ruling;
- four of the main documents including, Partnership Agreement, M&A, Equity Managers Agreement and Calculation Document; and
- stock documentation and stock transfer

A Trust Deed for the capital support for the bond payments and a State Deed providing the government guarantee on the bonds plus a terms sheet for the bonds and a bond script is all that is required. An optional component is the appointment of a Trustee to oversee the

disposition of the assets of the Trust although these may be handled by the Housing Authority.

4.1 Fee Negotiation and Establishment

At this point it is quite appropriate to put the legal fees out to tender on a fixed fee basis. The main fee parties are, Trustee and Legal.

An additional fee may be paid to Treasury or Treasury Corporation for the administration of the bond payments and repurchase of bonds and for the government guarantee.

4.2 Trustee's Appointment

If appropriate a Trustee would be appointed.

4.3 Target Date For Execution

A target date for execution can now be set.

4.4 Final Terms Of Transaction

The final financial and structural transaction terms are now set and the final modelling review completed. A 'terms sheet' is produced for all parties to refer to.

This sheet contains the:

- name of the transaction;
- issuer i.e. housing authority;
- issuing manager;
- lead manager;
- rating (should secure AAA);
- security type;
- execution date;
- value of total equity;
- investment return (i.e. yield);
- indexation and or payment dates;
- termination date.

4.5 Investor Presentation and 'Roadshow'

In conjunction with the Treasury or Treasury Corporation all major institutional investors would be canvassed for interest in the bond. The results of the 'roadshow' would inform the pricing review.

4.6 Pricing Review 1 and 2.

As with the equity vehicle once this terms sheet has been finally agreed the final price and transaction details are set before legal documentation commences.

4.7 Lawyers Appointed and Legal Documentation Commences

At this point the lawyers are appointed and the legal documentation commences. There may be up to 10 legal documents including:

a) State Deed, (covers the agreement between the State Treasury and the external party including guarantees and covenants);

b) Trust Deed, (covers the nature of the credit, risk and subsidy support to be provided by the Housing Authority and the purposes for which funds can be used);

c) Trustee Deed, (covers the responsibilities of the Trustee if any);

d) Transaction Execution, (Bond Tender), and Stock Transfer (if required).

On the appointed execution date the Treasury or Treasury Corporation would conduct a bond tender whereby the terms sheet (without the yield would be) tendered to institutional investors and the yield price struck after receipt of all tenders.

4.8 References

NSW DEPARTMENT OF PUBLIC WORKS, 1993, *Total Asset Management Manual*, *Risk Management* (pg 6)

VOLUME 2: QUANTITATIVE ANALYSIS OF CAPITAL, (GRANT) AND DEBT FUNDED SOCIAL HOUSING ASSISTANCE OPTIONS

1   EXECUTIVE SUMMARY

In previous work for the Affordable Housing National Research Consortium a detailed 'user friendly' financial model, operating help manual, and associated report was developed which calculated the likely present value of the subsidy cost associated with using government bond funds to acquire $100m of housing for social housing tenants. This report and the associated Model builds on that work. The detailed financial model provided to the Affordable Housing Research Consortium contained both debt and rent assistance modules for which can calculate the subsidy in current dollars in a variety of cases, (i.e. sets of assumptions or scenarios). This Model has had added a module for providing the same reporting subsidy outcomes for on budget capital (grant), funding of public housing (the use of Commonwealth and State capital grants to acquire or build public housing stock). Page 1 of the report sets out in detail how each of the options has been constructed. This report sets out:

- the subsidy outcomes for public housing as per the "base case" in the previous Consortium analysis;

- sensitivity testing of that base case outcome for public housing; and

- a sensitivity testing comparison of the capital (grant), funding and debt options.

The base case findings are set out in the table below, (reproduced from page 11).

Base Case: National Result: Subsidy Cost Outcomes: Capital (Grant), Funding Compared To Debt Option

Option	Gross Present Value $M's	Gross Per Tenant Year $	Direct Tax Receipts $M's	Tax Per Tenant Year $	Net Present Value $M's	Net Per Tenant Year $
Capital (Grant), Funding	33.94	1,869	0.0	0.0	33.94	1,869
Debt	34.60	1,904	19.80	1,070	14.80	834
Difference Capital (Grant), Funding Versus Debt	-0.66	-36	+19.80	+1,070	+19.14	+1,035

The findings of the sensitivity testing are outlined below.

1. In the large majority of the cases tested the gross subsidy costs per tenant year are just slightly lower in the capital (grant), funded public housing option;

2. However, should a program of debt funding be supported by the Commonwealth, the net national cost per tenant year is significantly cheaper than grant funding of public housing. This occurs as a result of the revenue received by the Commonwealth from the taxes paid on bond interest and any capital gains on bond sales. In the debt option base case the net subsidy cost is 55% cheaper to the Commonwealth than capital (grant), funding; and

3. Furthermore, at some point in 2002 interest rates are almost certain to move off their thirty year lows. If there is a near term bond issuance for funding public housing, it is very probable that the gross (before tax), subsidy cost per tenant year would be up to 25% cheaper than capital (grant), funding over the term of the transaction.

2 INTRODUCTION

2.1 Background

In previous work for the Affordable Housing National Research Consortium a detailed 'user friendly' financial model, operating help manual, and associated report was developed (Model and help manual available from AHURI) which calculated the likely present value of the subsidy cost associated with using government bond funds to acquire $100m of housing for social housing tenants. This report and the associated Model builds on that work. The detailed financial model provided to the Affordable Housing Research Consortium contained both debt and rent assistance modules for which can calculate the subsidy in current dollars in a variety of cases, (i.e. sets of assumptions or scenarios). This Model has had added a module for providing the same reporting subsidy outcomes for on budget capital (grant), funding of public housing (the use of Commonwealth and State capital grants to acquire or build public housing stock). This report sets out:

- the subsidy outcomes for public housing as per the "base case" in the previous Consortium analysis;

- sensitivity testing of that base case outcome for public housing; and

- a sensitivity testing comparison of the capital (grant), funding and debt options.

2.2 Description Of The Two Options

Debt Option

The Housing Subsidy model essentially calculates the commencing amount of funds that should be put on deposit to pay required rental subsidy for social housing tenants and capital shortfalls on debt repayments, (if any), for the term of the transaction. The Model assumes dwellings required to house social housing tenants are initially purchased from the proceeds of a bond issuance, and that as time goes on the proceeds of sales of the dwellings is used to repatriate the principal owed on the bonds and to provide for any operational shortfalls. In the event that the net sale value of the dwellings exceeds the bond principal outstanding the Model reduces the initial capital injection required, and makes up for any operating shortfall by short term borrowings such that the surplus from sale of dwellings versus bond principal repayments is exactly equal to the principal outstanding on the short term borrowings at the end of the transaction. The Model uses Excel Goal Seek capacities to exactly calculate the initial contribution required such that at the end of the transaction all liabilities are discharged, and the accumulated cash flow is zero.

Capital (Grant), Funding Option

The Model now also contains a further comparison with on budget capital (grant), funding of public housing. All of the tenant income, rates maintenance and administration cost, and dwelling value assumptions etc are the same for the capital (grant), funding model as all other options.

The practical reality is that mainstream State Housing Authorities purchase dwellings from grant funds which are then occupied by public tenants. As existing public tenants leave, new subsidised public tenants take their place. Consequently the Model assumes the dwellings are purchased from grant funds, any shortfall/surplus in quarterly net rents after rebates is compensated by short term borrowings, and at the end of the quarter are either paid for from, or returned to, internal funds. There are no places for private tenants. Vacant dwellings are reoccupied by social housing tenants or sold. At the end of the transaction all of the remaining dwellings are sold. If, as in some of the Debt Model cases, dwellings are assumed to be sold throughout the term, these assumptions carry through to the capital (grant), funding option.

For each and every case the resultant net cash flow is discounted at exactly the rate of the weighted average cost of funds experienced in the debt option. For a more detailed explanation see Attachment 1.

Further detailed information is contained in the Text HELP file which accompanies the Model and in the Models own electronic help windows.

2.3 Definitions and Assumptions

Attachment 1 contains all of the definitions and assumptions used in the analysis. With the exception of the updating of the current bond rate, all definitions and assumptions are as per the previous analysis conducted for the Affordable Housing National Research Consortium.

3 CAPITAL (GRANT), FUNDING: THE BASE CASE

3.1 Data Inputs

The analysis that follows examines a Base Case.

Base Case: Common Assumptions And Inputs

All States in Australia were subject to the analysis. The following assumptions and inputs were common to all States in the Base Case analysis. In this analysis it is assumed that no dwellings are sold until the end of the term and as public tenants leave dwellings are re-occupied by new public tenants. The public tenancy vacancy rate includes both vacant dwellings and defaults.

Table 1: Base Case: Common Assumptions

Assumptions And Inputs	Number
Stamp Duty On Purchase	None
Commencing Inflation	2.57%
Bond Type	Fixed Rate
Initial Bond Coupon	6.29%[1]
Discount Rate: Tax	6.29%[1]
Discount Rate: Public Housing	6.29%
Dwell Price Growth p.a.	CPI
Maintenance and Rates Cost Growth p.a.	CPI
Administration Cost Growth p.a.	CPI
Assisted Tenant Initial Gross Income p.a.	$20,000
Initial % Of Assisted Tenant Income In Rent	25%
Gross Income Growth p.a.	CPI
Private Tenant Rents	Market
Tax Paying Entity	50% Super Fund – 50% Company

Source: Australian Financial Review, March 5th 2002

Table 2: Base Case: State Inputs

Variable	NSW	Vic.	Q'ld	W.A.	S.A.	Tas.	ACT	N.T.
Initial Dwelling Value 000's[1]	149.5	140.5	118.7	111.9	110.0	111.9	141.5	146.7
Operating Cost % p.a.[2]	1.5	0.7	2.0	0.5	1.9	2.0	2.1	0.6
Administration Cost % p.a.[2]	0.8	0.6	0.8	0.8	0.9	1.4	0.7	0.3
Private Rent Yields[3]	5.37	4.9	5.45	6.21	6.92	7.55	6.43	6.37
Vacancy Rate Public %[4]	0.31	1.06	0.65	0.91	2.59	1.60	0.68	0.38
Term -Years[5]	25	25	25	25	25	25	25	25

Source: Tables 1-4, Attachment 2

1 Table 1 Attachment 2,
2 Table 2 Attachment 2,
3 Table 3 Attachment 2,
4 Table 4 Attachment 2,
5 Derived from Model.

3.2 Analysis Results

The analysis has been conducted on the basis of calculating the present value of the total subsidy cost arising out of the investment of $100m in public housing whereby the tenants will have average commencing incomes of $20,000 and will pay 25% of income in rent for the term of the transaction. The assessment has been conducted for each State.

The assessment has been conducted according to the following criteria:

a) gross present value subsidy cost per $100M of dwellings purchased or built;

b) gross present value subsidy, per assisted tenant year (the number of assisted tenants, multiplied by the number of years these tenants are assisted);

c) number of initial households assisted per $100M.

d) direct income and capital gains tax paid by investors per $100M (assuming 50% of investors are Companies and 50% Superannuation Funds);

e) gross present value tax income per assisted tenant year;

f) net present value per $100M of dwellings purchased, (after deducting direct tax receipts); and

g) net present value subsidy, per assisted tenant year.

Base Case: National Outcomes.

The results of the unique housing cost outcomes for each State have been multiplied by that States percentage entitlement under the Commonwealth State Housing Agreement to obtain a weighted average national outcome for a $100 million dollar capital program. For example, NSW receives approximately one third of CSHA allocations so for a $100m national capital program NSW would be expected to spend $33million on dwellings for initially assisting 219 tenants and would receive $15million towards paying subsidy costs.

Table 3 below applies the CSHA formula and produces a weighted average outcome for Australia.

Table 3: Base Case: National Result

State	Gross Present Value $M's	Gross Per Tenant Year $	Direct Tax Receipts $M's	Tax Per Tenant Year $	Net Present Value $M's	Net Per Tenant Year $
NSW	14.83	897.54	0.00	0.00	14.83	897.54
Victoria	6.10	346.84	0.00	0.00	6.10	346.84
Queensland	6.75	324.11	0.00	0.00	6.75	324.11
Western Australia	0.89	40.25	0.00	0.00	0.89	40.25
South Australia	2.61	116.19	0.00	0.00	2.61	116.19
Tasmania	1.31	59.46	0.00	0.00	1.31	59.46
ACT	1.11	63.82	0.00	0.00	1.11	63.82
Northern Territory	0.35	20.81	0.00	0.00	0.35	20.81
Total National	33.94	1,869.03	0.00	0.00	33.94	1,869.03

If current conditions persist and if dwelling price increases match CPI long term in the eight capital cities a capital program of $100 million for a 25 year term would produce a net present value subsidy cost of $33.9million.

4 CAPITAL (GRANT), FUNDING: SENSITIVITY OUTCOMES

The above results have been subjected to a very detailed sensitivity analysis using the NSW data.

4.1 Changes In Annual Housing Cost and Income Variables

Annual housing cost and income variables were varied to assess the impact on both gross subsidy costs and gross costs per assisted tenant year. With the exception of purchasing and selling expenses, the Model makes annual assumptions about the rate of growth of both costs and incomes. These annual growth rates were subject to variation of 1%. Dwelling capital growth rates and annual rental yields were tested by plus and minus 1%. In this instance 1% does not mean that the basic assumption changes by 1% but by an additional 1% above the assumption used in the Model, for example the Model assumes long run CPI at 2.87% and dwelling capital growth rates of CPI, i.e. 2.87% p.a. In the sensitivity tests this was varied to 3.87% per annum and 1.87% per annum, a proportionate change of 35%. Similarly the operating cost commencing assumption in the Model for NSW is 1.51% so a 1% increase is a proportionate increase of 66%.

The annual variables examined in the first of the sensitivity tests are:

- capital growth rates;
- operating costs;
- purchasing expenses;
- selling expenses;
- private rental yields;
- administration costs; and
- tenant income growth rates.

The results of the first tests are set out in Graphs 1 and 2.

GRAPH 1

CAPITAL FUNDING: TOTAL HOUSING SUBSIDY COSTS:
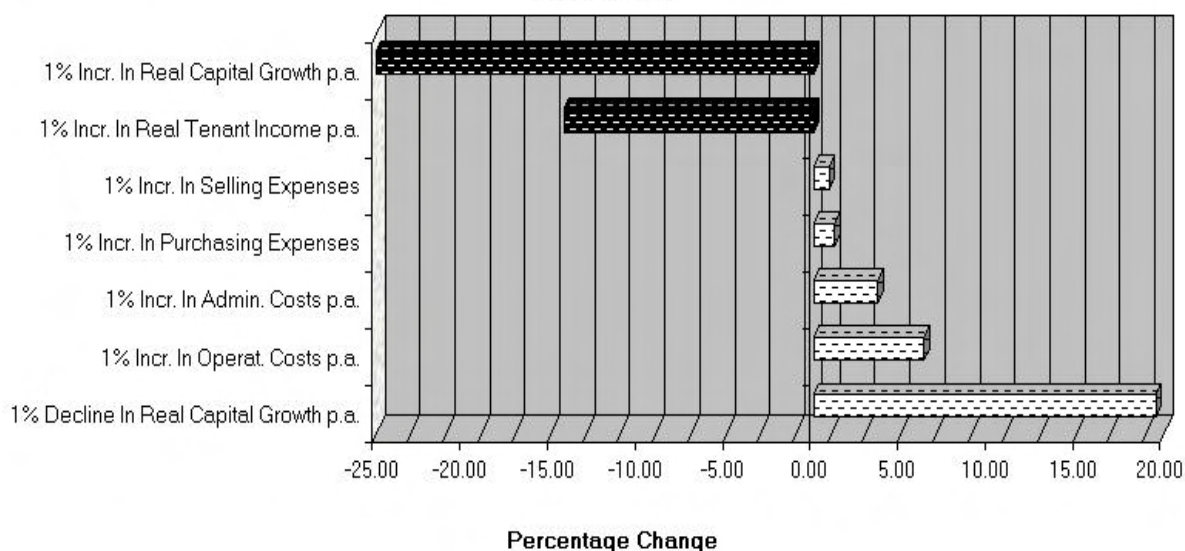BASE CASE VERSUS CHANGE IN EACH VARIABLE
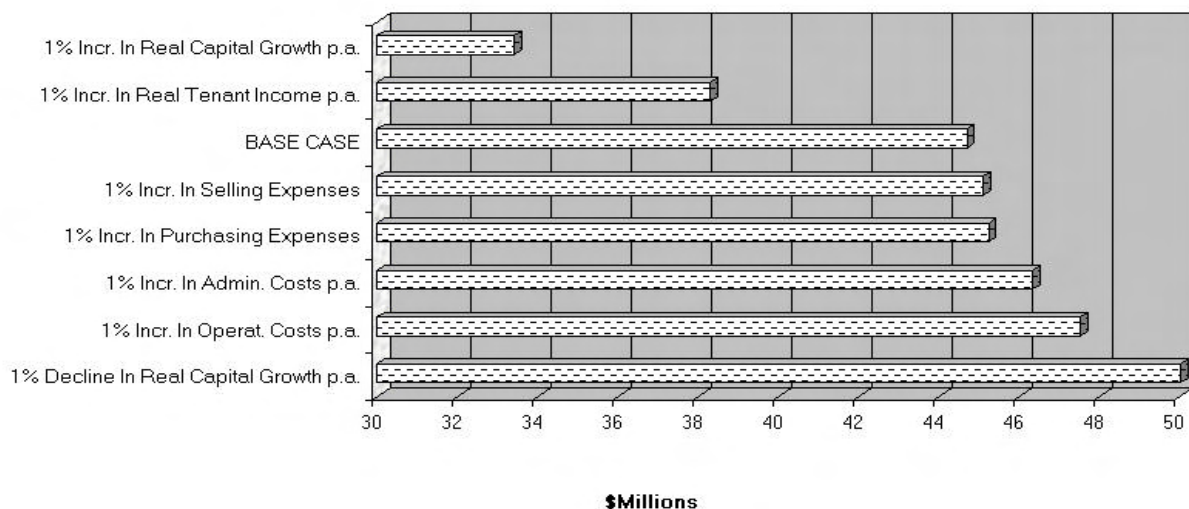
Source: HALL, J, Special Analysis

GRAPH 2

CAPITAL FUNDING: GROSS SUBSIDY PER TENANT YEAR: PERCENTAGE
CHANGE FROM BASE CASE: ANNUAL HOUSING COST AND REVENUE
VARIABLES

Percentage Change

Source HALL, J Special Analysis

The magnitude of the impact of changes in capital growth rates on both gross subsidy costs and subsidy per assisted tenant year is almost five times that of any other variable tested.

A 1% decline in annual capital growth rates, (33% less than the original assumption), increases subsidy costs by approximately 20%, with the next largest impact being a 1% increase in operating costs (66% more than the original assumption), which increases subsidy costs by approximately 6%. All other variable tests impact subsidy by less than 4%. Overall then a proportionate fall of 1% in capital growth rates, (i.e. from 2.87% to 2.84%), will result in about a 0.50% increase in subsidy costs. Because of the compounding impact of annual growth rates, a 1% increase in capital growth rates has a larger impact on reducing subsidy costs with a proportionate rise of 1% reducing subsidy costs by approximately -0.65%.

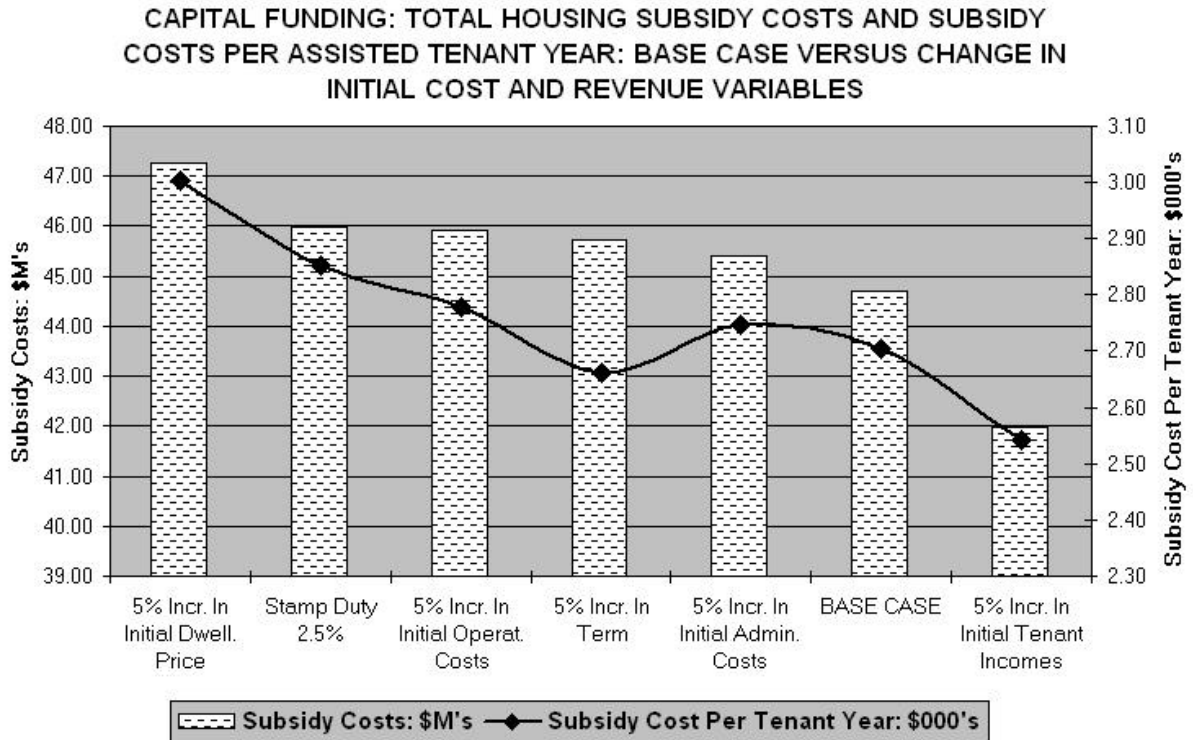## 4.2 Changes In Initial (i.e. opening or first year), Cost And Revenue Variables

Initial dwelling costs and revenues were also varied to assess the impact on subsidy costs. The annual variables that were tested are:

- 5% increase in the initial dwelling price;
- 5% increase in the initial operating costs;
- stamp duty 2.5%;
- 5% increase in the term of the transaction;
- 5% increase in initial administration costs; and
- 5% increase in initial assisted tenant incomes.

Unlike the previous analysis this analysis is proportional, i.e. the 5% increase is on an actual dwelling price, cost base or tenant income input.

Graphs 3 and 4 set out the results.

GRAPH 3

CAPITAL FUNDING: TOTAL HOUSING SUBSIDY COSTS AND SUBSIDY
COSTS PER ASSISTED TENANT YEAR: BASE CASE VERSUS CHANGE IN
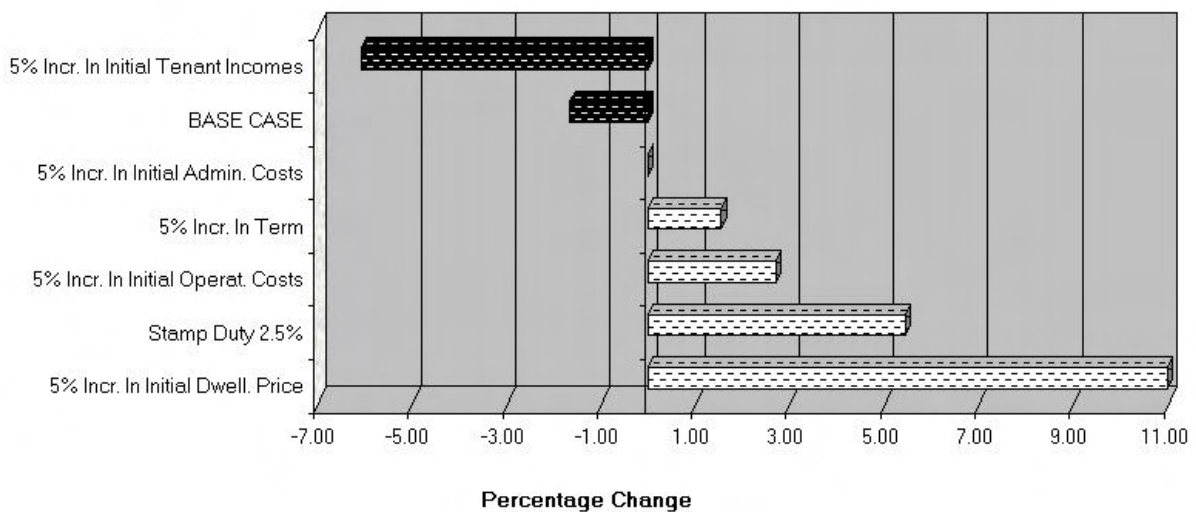INITIAL COST AND REVENUE VARIABLES

Source: HALL, J. Special Analysis

In this analysis both a 5% increase in initial dwelling prices increases both gross subsidy and subsidy per assisted tenant year by 11%. Any increase in initial dwelling prices increases the cost of the capital raising and the bond interest payment costs, and whilst approximately half this additional cost is recouped through capital appreciation there is no increment to revenues.

GRAPH 4

CAPITAL FUNDING: GROSS SUBSIDY PER TENANT YEAR: PERCENTAGE
CHANGE FROM BASE CASE: INITIAL COST AND REVENUE VARIABLES

Source HALL, J. Special Analysis

The result is that a 1% increase in initial dwelling prices will increase subsidy costs per tenant year by approximately 2%.

Within this group of variables the impact on subsidy costs of increases in initial tenant income ranks second in the scale of effects with a 5% increase reducing subsidy costs by approximately 6.1%. Therefore a 1% increase in initial tenant incomes will reduce gross subsidy and gross subsidy per assisted tenant year by approximately 1.2%.

The imposition of a 5% increase in stamp duty has the next largest impact on subsidy costs per tenant year, (5%) because even thought the cost impact is once off, it cannot be recouped from revenues (whilst the additional dwelling price impost is returned substantially through higher sales prices).
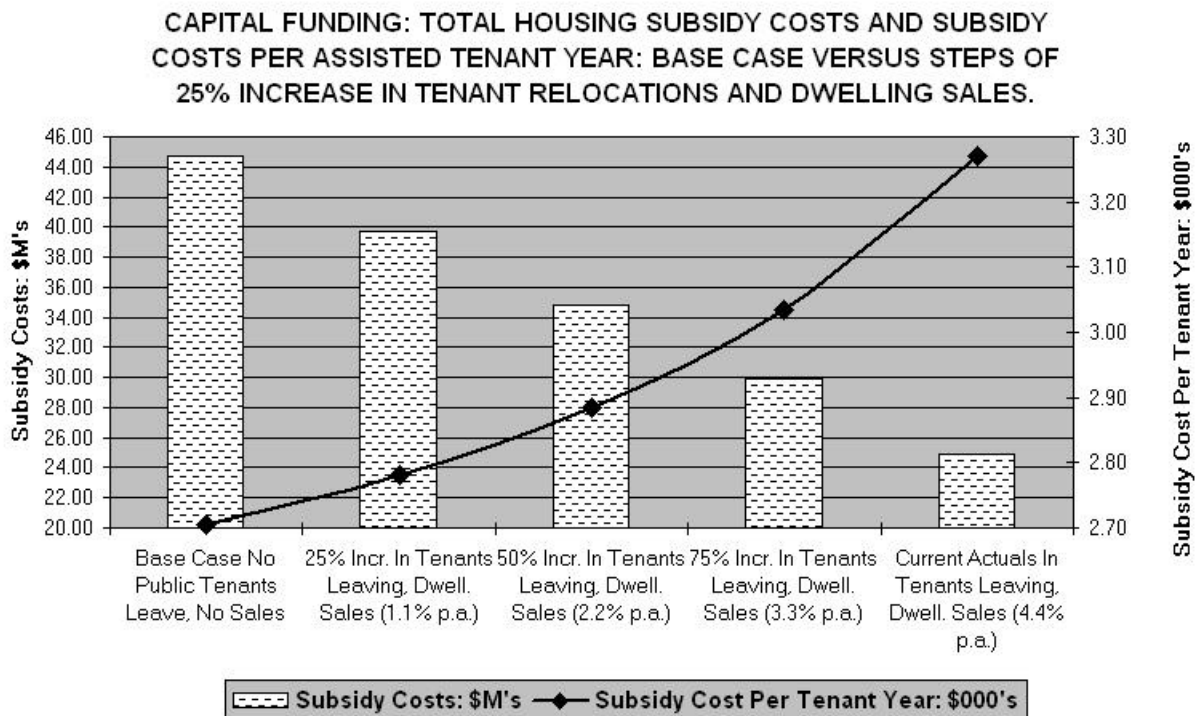
As previously reported increases in the term of the transaction increase gross subsidy costs but reduce gross subsidy per assisted tenant year.

No other variable produces a change in subsidy outcomes of more than 3%.

4.3 Combined Changes In Assisted Tenant Years And Dwelling Disposal Rates

As previously stated, the assumption in the base case capital (grant), funding option is no dwellings are sold until the end of the term (25years) and as public tenants vacate new public tenants are brought in to occupy the vacant dwellings. In reality in NSW, (the State the subject of the sensitivity testing), about 4.4% of dwellings are left by public tenants each year. Consequently we tested four options where the initial assumption of no sales and no relocations are raised proportionately by 25%, 50%, 75% and 100% of 4.4%, the current outcome. The results of the analysis are set out in Graphs 5 and 6.

GRAPH 5

CAPITAL FUNDING: TOTAL HOUSING SUBSIDY COSTS AND SUBSIDY COSTS PER ASSISTED TENANT YEAR: BASE CASE VERSUS STEPS OF 25% INCREASE IN TENANT RELOCATIONS AND DWELLING SALES.

Source: HALL, J. Special Analysis

GRAPH 6

CAPITAL FUNDING: PERCENTAGE CHANGE: TOTAL SUBSIDY COSTS AND
SUBSIDY COSTS PER ASSISTED TENANT YEAR: BASE CASE VERSUS STEPS OF
25% INCREASE IN TENANT RELOCATIONS AND DWELLING SALES
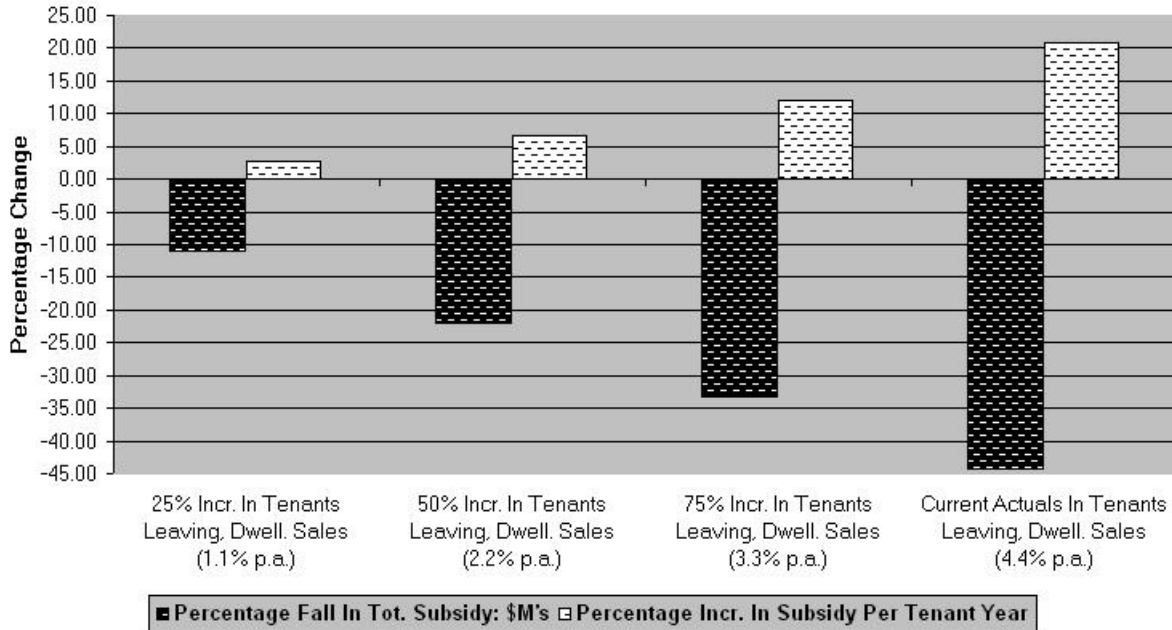
Source: HALL, J. Special Analysis

The above analysis indicates that if dwellings are sold as public tenants relocate; and 4.4% assisted tenants relocate each year, gross subsidy costs decrease by 44% to $24.9 million per $100 million capital raised.

However as has been outlined earlier the actual cost per assisted tenant year increases in each of the cases rising from $2,710 per assisted tenant year in the base case to $3,270 in the 4.4% p.a. case. This comes about for the reasons outlined earlier, i.e. the spreading of the fixed initial establishment costs over a smaller number of assisted tenant years. Also as would be expected the increase in gross subsidy costs is linear, not geometric. However because the reduction in subsidy costs per assisted tenant year is a function of an initial fixed cost, the subsidy increase per assisted tenant year per 1.1% of increase in tenant relocation, and dwelling disposal rates, increases as one moves towards 4.4%.

Each 1% of proportionate increase produces approximately a 0.8% increase in subsidy per assisted tenant year.

4.4 Capital Funding (Grant), Option: Sensitivity Test Conclusions

To summarize Graph 7 sets out the five variables which have the greatest impact on subsidy costs where the basic premise is the same in each case, i.e. what percentage change in subsidy costs per tenant year arises from a proportionate 1% change in the variable being tested?

GRAPH 7

CAPITAL FUNDING: VARIABLES WITH THE GREATEST IMPACT ON SUBSIDY COSTS: (Percentage Change In Subsidy Costs Per Assisted Tenant Year Per 1% Proportionate Change In Variable)

Percentage Change In Subsidy Costs
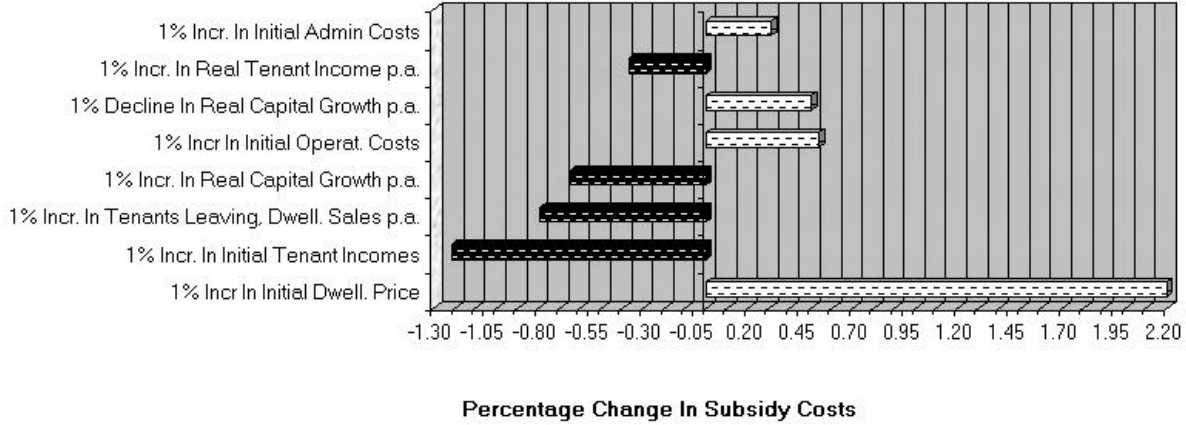
Source: HALL J Special Analysis

An increase in initial dwellings prices has the greatest impact on gross subsidy costs per assisted tenant year, (PATY), with a proportionate 1% increase doubling in its impact on subsidy costs to 2.2%. An increase of 1% in initial assisted tenant incomes will produce almost the same proportionate change in PATY, reducing them by 1.2%. A 1% increase in dwelling sales rates has the next greatest impact reducing PATY by 0.8%. A 1% proportionate increase in annual capital growth rates produces a 0.65% decrease in the subsidy cost outcome. Percentage changes to operating costs and declines in real growth rates produce about half of the impact on PATY, (1% increase 0.5% increase in subsidy costs), whilst increases in real tenant incomes per annum and initial administration costs, produce subsidy cost effects of between 40% and 30% of the nominated percentage change in the variable.

5 CAPITAL (GRANT), FUNDING OPTIONS COMPARED TO DEBT: BASE CASE

Table 4 sets out a comparison of the Base Case results for the Capital (Grant), Funding and Debt Option

Base Case: National Result: Subsidy Outcomes: Capital (Grant), Funding Compared To Debt Option

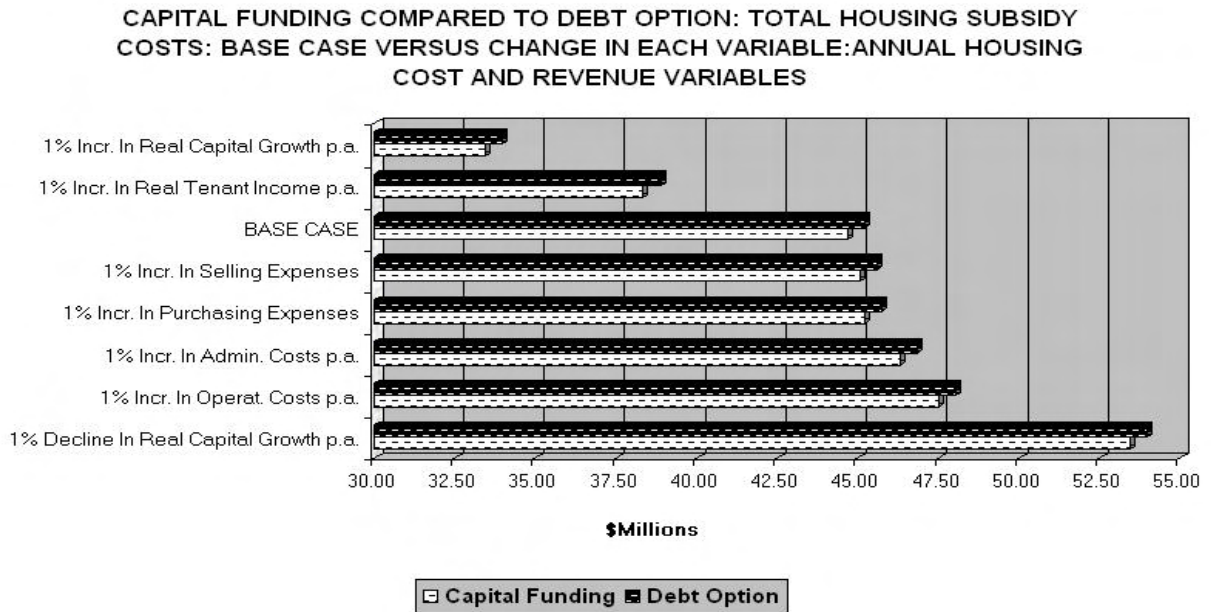| Option	Gross Present Value $M's	Gross Per Tenant Year $	Direct Tax Receipts $M's	Tax Per Tenant Year $	Net Present Value $M's	Net Per Tenant Year $
Capital (Grant), Funding	33.94	1,869	0.0	0.0	33.94	1,869
Debt	34.60	1,904	19.80	1,070	14.80	834
Difference Capital (Grant), Funding Versus Debt	-0.66	-36	+19.80	+1,070	+19.14	+1,035

If current conditions persist and if dwelling price increases match CPI long term in the eight capital cities a capital (grant), funding based program of $100m would produce a gross cost of $33.9 million for the total term of all State transactions. This gross cost is about $0.6 less than that applying to the debt option. The reason for the slightly higher costs of the Debt option is set out in Attachment 3. It should be noted, however, that because a State Capital Program would involve almost no direct tax payments, (such as tax on the interest and capital gain arising out of the bonds) the after tax position of the capital (grant), funding option is some 55% more expensive than the debt outcome.

6 CAPITAL (GRANT), FUNDING AND DEBT OPTIONS: SENSITIVITY OUTCOMES

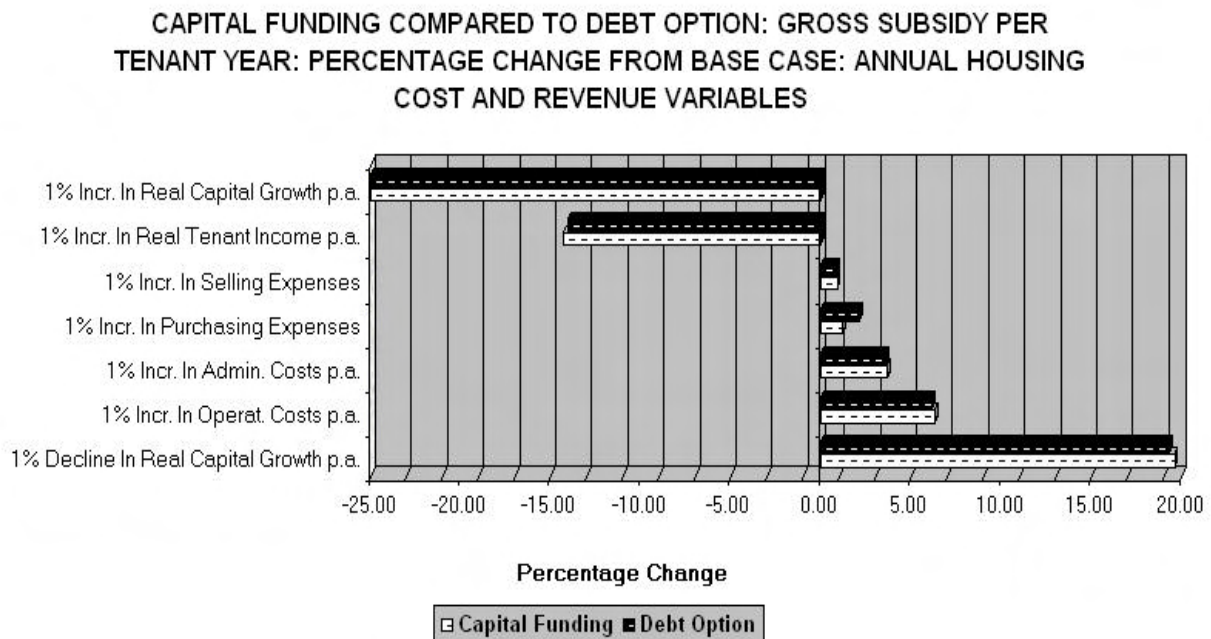## 6.1 Changes In Annual Housing Cost and Income Variables

These are the same variations as those tested in Chapter 3. The results of the first tests are set out in Graphs 8 and 9.

GRAPH 8

CAPITAL FUNDING COMPARED TO DEBT OPTION: TOTAL HOUSING SUBSIDY
COSTS: BASE CASE VERSUS CHANGE IN EACH VARIABLE:ANNUAL HOUSING
COST AND REVENUE VARIABLES

Source: HALL, J, Special Analysis

GRAPH 9

CAPITAL FUNDING COMPARED TO DEBT OPTION: GROSS SUBSIDY PER
TENANT YEAR: PERCENTAGE CHANGE FROM BASE CASE: ANNUAL HOUSING
COST AND REVENUE VARIABLES

Source HALL, J Special Analysis

The relative impact of each of the different variables is the same with capital (grant), funding as with the debt option.

A 1% decline in annual capital growth rates, (33% less than the original assumption), increases subsidy costs by approximately 20%, with the next largest impact being a 1% increase in operating costs (66% more than the original assumption), which increases subsidy costs by approximately 6%. All other variable tests impact subsidy by less than 4%. Overall then a proportionate fall of 1% in capital growth rates, (i.e. from 2.87% to 2.84%), will result in about a 0.50% increase in subsidy costs.

However the changes in subsidy percentages are slightly more muted in the debt option because of the greater magnitude of the fixed initial unrecoverable costs.

6.2 Changes In Initial (i.e. opening or first year), Cost And Revenue Variables

As with the debt option initial dwelling costs and revenues were also varied to assess the impact on subsidy costs.

GRAPH 10
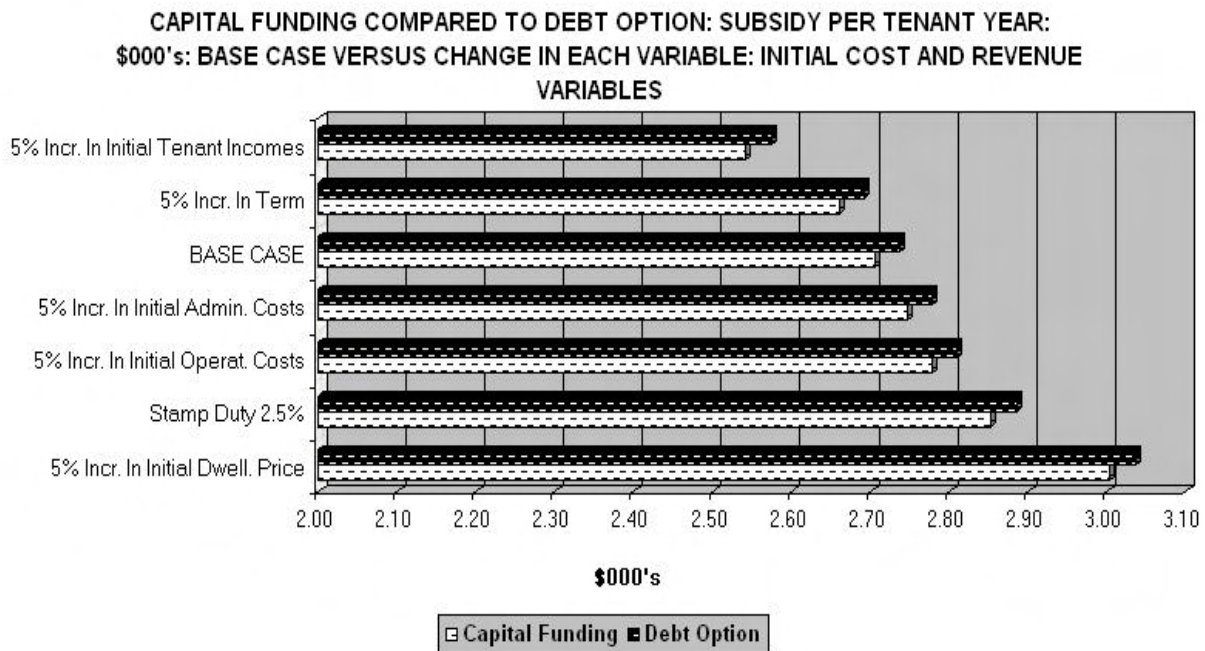
CAPITAL FUNDING COMPARED TO DEBT OPTION: SUBSIDY PER TENANT YEAR: $000's: BASE CASE VERSUS CHANGE IN EACH VARIABLE: INITIAL COST AND REVENUE VARIABLES

The impact of changes to the values of these variables is very similar in the debt option to the capital (grant), funding outcome. In this analysis a 5% increase in:

- initial dwelling prices increase both gross subsidy and subsidy per assisted tenant year by 11%;

- initial tenant incomes reduce subsidy costs by approximately 6.1%.

- in stamp duty has the next largest impact on subsidy costs per tenant year, (5%).

GRAPH 11

CAPITAL FUNDING COMPARED TO DEBT OPTION: GROSS SUBSIDY PER TENANT YEAR: PERCENTAGE CHANGE FROM BASE CASE: INITIAL COST AND REVENUE VARIABLES
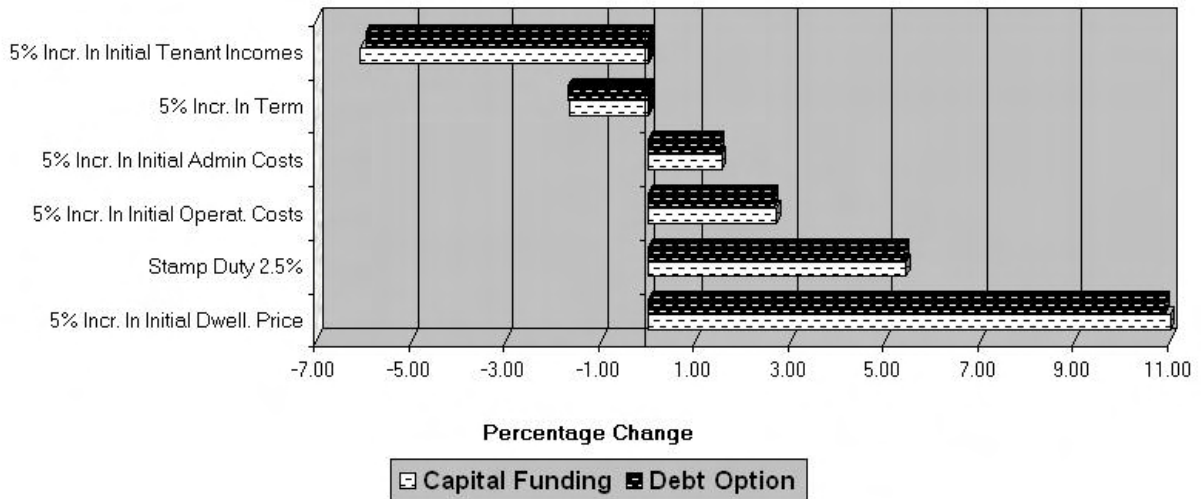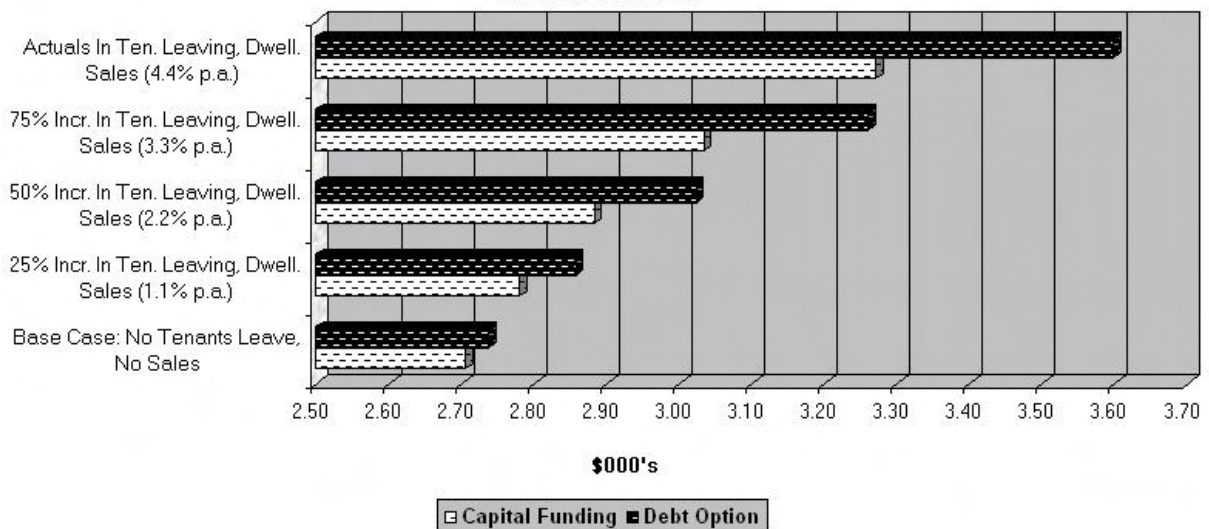

Source HALL, J. Special Analysis

6.3 Combined Changes In Assisted Tenant Years And Dwelling Disposal Rates

Graphs 12 and 13 set out the combined effect of changes in the rate at which tenants leave and dwellings are sold.

GRAPH 12

CAPITAL FUNDING COMPARED TO DEBT OPTION: SUBSIDY PER TENANT YEAR: $000's: BASE CASE VERSUS STEPS OF 25% INCREASE IN TENANT RELOCATIONS AND DWELLING SALES

Source: HALL, J. Special Analysis

GRAPH 13

CAPITAL FUNDING COMPARED TO DEBT OPTION: GROSS SUBSIDY PER
TENANT YEAR: PERCENTAGE CHANGE FROM BASE CASE: STEPS OF 25%
INCREASE IN TENANT RELOCATIONS AND DWELLING SALES
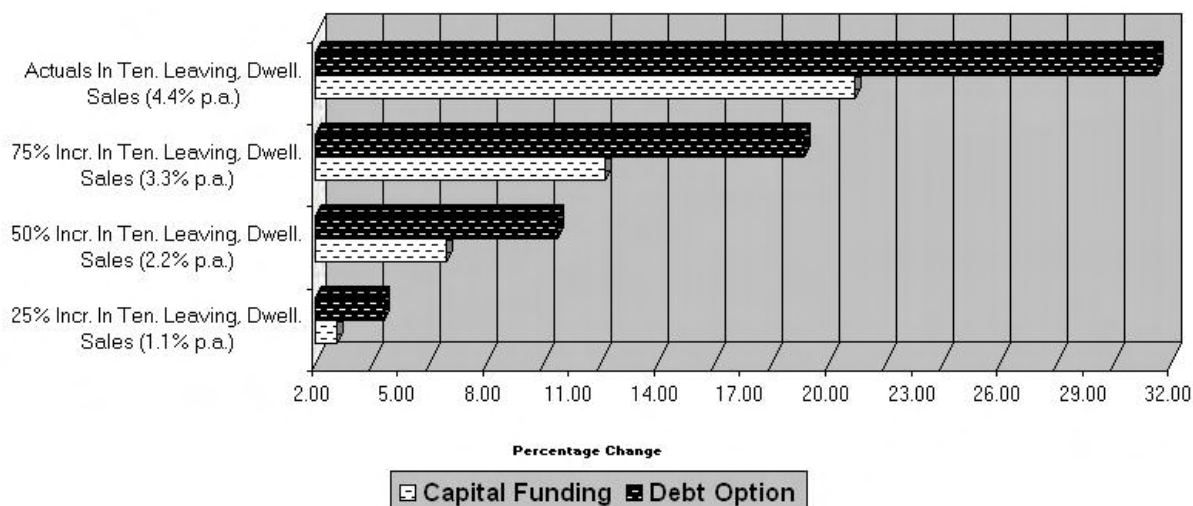
Source: HALL, J. Special Analysis

Whilst increases in dwelling sales and tenant relocations have the effect of dramatically reducing the gross subsidy costs in both options, they have the effect of increasing the present value of the subsidy per tenant year because the fixed set –up and termination costs have to be amortized over a shorter period and a smaller total number of public tenants. This higher subsidy cost per assisted or public tenant year is exacerbated in the case of the debt option, because it requires bonds to be purchased before term with the Reserve Bank pricing formula generating a premium for purchase on early redemptions.

Overall 1.1% increase in dwelling sales and tenants leaving p.a. increases subsidy costs per tenant year by 2.71% in the case of the capital (grant), funding option and 4.4% in the debt outcome. As 1.1% represents a 25% increase on sales in the base case a 1% proportionate increase in sales corresponds with about a 0.1% and a 0.2% increase in subsidy per tenant year for the capital (grant), funding and debt options respectively.

6.4 Debt And Capital (Grant), Funding Options: Rises and Falls In Interest Rates

In this test we examine the impact of rises or falls in interest rates occurring after bond prices have been set. The results are set out in Graphs 14 and 15. Under this particular test, unlike all the others, changes in interest rates have the opposite effect on the cost of the two options.

If interest rates rise after bond prices are set subsidy costs in the capital (grant), funding option rise slightly but fall significantly in the debt option, to the point where the capital (grant), funding option is 22% more expensive than the debt option. In the reverse situation (i.e. 1% decrease in interest rates) the opposite occurs and the debt option is 31% more expensive that the capital (grant), funding option.

This result comes about because under the Reserve Bank bond pricing formula should interest rates rise the price to be paid for buying back the bond will be discounted to less than the $1 originally paid for it (see explanation in the model on the precise formula for the discounting), thereby reducing substantially the real capital cost of the debt option.

A higher interest rate will increase the cost of funds in the capital (grant), funding model and reduce the net present value of the dwelling sales that occur later in this transaction. Should rates fall the same forces affect subsidy costs in opposite ways.
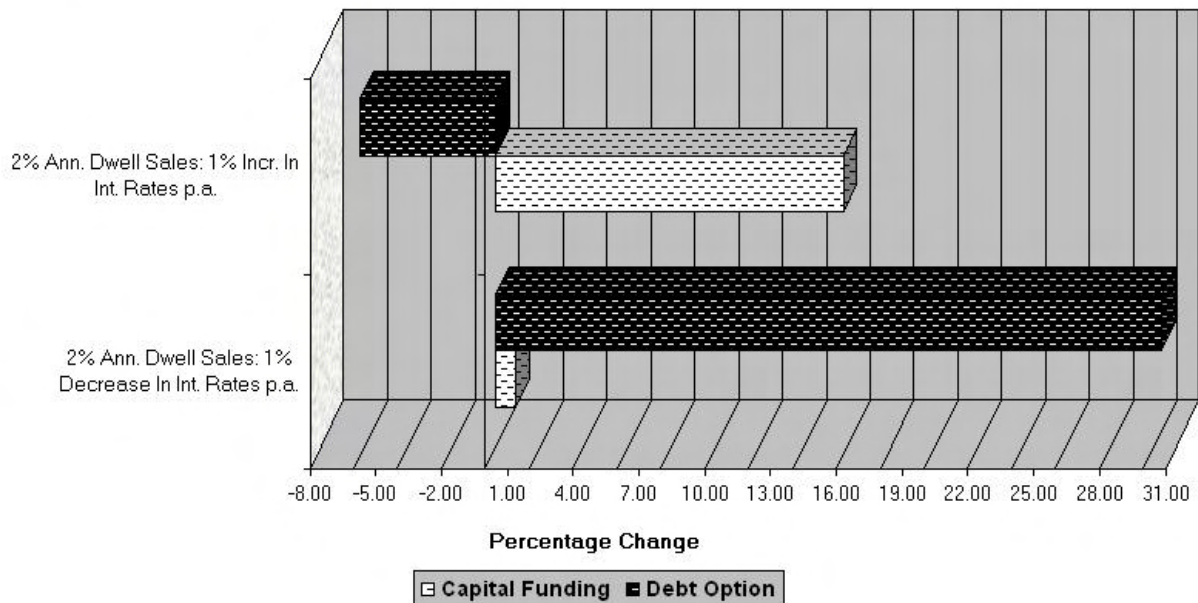
GRAPH 14

CAPITAL FUNDING COMPARED TO DEBT OPTION: SUBSIDY PER TENANT
YEAR: $000's: BASE CASE VERSUS 2% ANNUAL DWELLINGS SALES AND
CHANGES IN INTEREST RATES
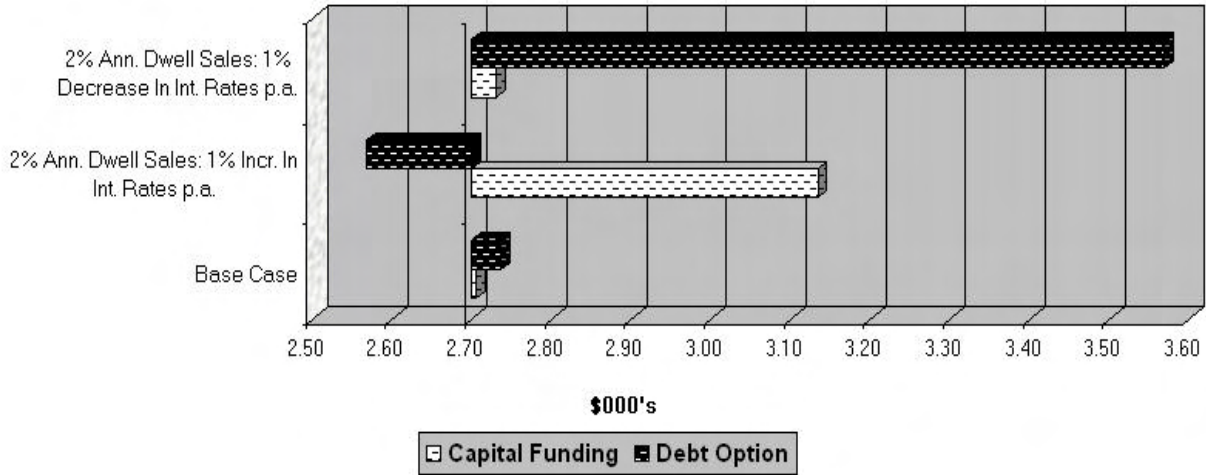
Source: HALL, J. Special Analysis

GRAPH 15

CAPITAL FUNDING COMPARED TO DEBT OPTION: GROSS SUBSIDY PER
TENANT YEAR: PERCENTAGE CHANGE FROM BASE CASE: BASE CASE
VERSUS 2% ANNUAL DWELLINGS SALES AND CHANGES IN INTEREST RATES

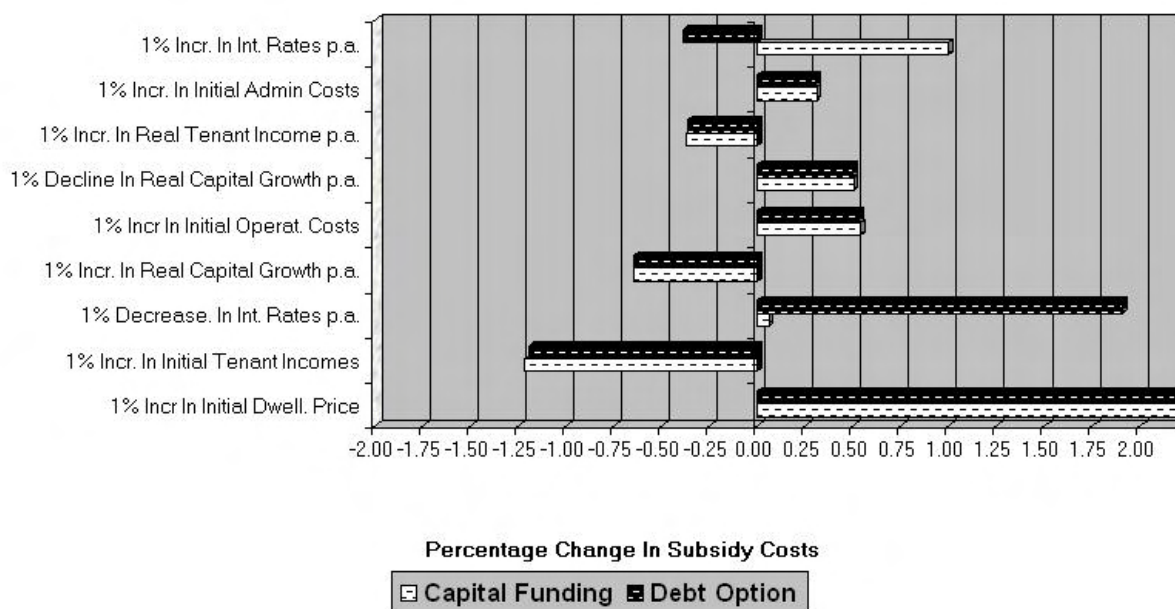
Source: HALL, J. Special Analysis

6.5 Capital (Grant), Funding And Debt Options: Sensitivity Test Conclusions

To summarize Graph 16 sets out the five variables which have the greatest impact on subsidy costs where all the basic premise is the same in each case, i.e. what percentage change in subsidy costs per tenant year arises from a proportionate 1% change in the variable being tested?

GRAPH 16

CAPITAL FUNDING COMPARED TO DEBT OPTION: VARIABLES WITH THE
GREATEST IMPACT ON SUBSIDY COSTS: (Percentage Change In Subsidy
Costs Per Assisted Tenant Year Per 1% Proportionate Change In Variable)

Percentage Change In Subsidy Costs

☐ Capital Funding ■ Debt Option

With the exception of changes in interest rates after bond prices have been determined, all other changes to variables have much the same effect in both options. In order of impact a proportionate 1%:

- increase in initial dwelling prices increases the present value of subsidies by about 2.2%;

- increase in initial tenant incomes reduces subsidies by about 1.2%;

- increase in real capital growth per annum reduces subsidies by approximately 0.65%; and

- increase in initial operating costs increases subsidies by about 0.5%.

The impact of changes to interest rates is also substantial. A proportionate 1% increase in rates increases subsidy in the capital (grant), funding option by nearly 1% and reduces subsidy in the debt outcome by about 0.4%.

To summarize:

a) In the large majority of the cases tested the gross subsidy costs per tenant year are just slightly lower in the capital (grant), funded public housing option;

b) However, should a program of debt funding be supported by the Commonwealth, the net national cost per tenant year is significantly cheaper than grant funding of public housing. This occurs as a result of the revenue received by the Commonwealth from the taxes paid on bond interest and any capital gains on bond sales. In the debt option base case the net subsidy cost is 55% cheaper than capital (grant), funding; and

c) Furthermore, at some point in 2002 interest rates are almost certain to move off their thirty year lows. If there is a near term bond issuance for funding public housing, it is very probable that the gross subsidy cost per tenant year would be up to 25% cheaper than capital (grant), funding over the term of the transaction.

7 REFERENCES

Hall Jon And Associates, 2001, *Policy Options For Stimulating Private Sector Investment In Affordable Housing In Australia: Stage 4 Report: The Subsidy Costs Of The Preferred Option,* for the Affordable Housing National Research Consortium.

ATTACHMENT 1: DEFINITIONS AND ASSUMPTIONS

"Initial Average Dwelling Price"

is the mean/median of the two values of the cost of the construction of, or private purchase of dwellings for public housing as contained in the Productivity Commission's Report on Government Services, 2000. This value is then indexed to the change in median dwelling prices set out in the Real Estate Institutes, Market Facts, to bring to December 2000 values. Because public housing stock acquisition encompasses both spot purchases and new construction, and because the land cost component is historic, it was considered the above analysis would more closely reflect a proxy for average public housing acquisition costs. This is used as the average commencing dwelling acquisition cost in each State

"Other Purchasing Expenses"

is the cost of legal and procurement costs, but not including stamp duty, associated with acquiring the dwellings and expressed as a percentage of purchase value. This value is based upon bulk conveyancing, fixed fee experience, and procurement by tender processes.

"Initial Maintenance and Rates Costs"

is the operating cost of public housing minus interest expenses and costs of dwelling disposals as set out in the Productivity Commission's Report On Government Services 2000. These costs for each State are indexed to the weighted average CPI for the six capital cities and calculated as an annual percentage of the initial average dwelling price as at December 2000.

"Initial Administration Costs"

is the administration cost of public housing as set out in the Productivity Commission's Report On Government Services 2000. These costs for each State are indexed to the weighted average CPI for the six capital cities and calculated as an annual percentage of the initial average dwelling price as at December 2000.

"Other Selling Expenses"

is the cost of legals and other disposal costs, (but not including stamp duty) expressed as a percentage of sale value. This value is based upon bulk conveyancing fixed fee experience, and disposal by auction processes.

"Commencing Inflation"

is the weighted average inflation rate for the six capital cities for the March quarter 2001, expressed as an annual percentage and discounted back to exclude the once off effect of the GST, as implied in the difference between the real rate bond yields and the fixed rate bond yields.

"Real Interest Rate"

is the yield applying to the Benchmark 10 year Commonwealth Real Rate Bond as at Monday, the 4th March, 2002 plus 0.27% or 27 basis points being the Semi-Government Bond Spreads setting out the indicative differential between State and Commonwealth Swap Curves as at Monday, the 4th March, 2002 as set out in the Australian Financial Review of the same date

"Fixed Interest Rate"

is the yield applying to the Benchmark 10 year Commonwealth Fixed Rate Bond as at Friday, the 20th July, 2001 plus 0.27% or 27 basis points being the Semi-Government Bond Spreads setting out the indicative differential between State and Commonwealth Swap Curves as at Monday, the 4th March, 2002 as set out in the Australian Financial Review of the same date.

"Gross Private Rental Yields"

are the median weekly rents multiplied by 52 and divided by the median dwelling prices, (expressed as an annual percentage), for the six capital cities plus Darwin and as set out in the Real Estate Institute of Australia's Market Facts, December 2000.

"Assisted Tenant Vacancy Rate"

is the number of vacant public housing dwellings (after deducting untenantable dwellings) divided by the total public housing dwellings, (minus untenantable dwellings),(expressed as a percentage), as set out in the Productivity Commission's Report on Government Services, 2001

"Private Tenant Vacancy Rate"

is the vacancy rate, (expressed as a percentage), applying to private residential rental dwellings for the six capital cities plus Darwin as set out in the Real Estate Institute of Australia's Market Facts for the December quarter, 2000.

"Tenant Relocation Rate"

is the number of tenants transferring within the public housing system, (after deducting untenantable dwellings) divided by the total public housing dwellings, (minus untenantable dwellings),(expressed as a percentage), as set out in the Productivity Commission's Report on Government Services, 2001.

"Stamp Duty"

is the percentage of either initial purchase value or final sale value assumed to be paid in stamp duty.

"Discount Rate: Public Housing"

In order to ensure absolute consistency in the analysis it is important that the discount rate for capital funding exactly replicates the cost of funds in the debt option.

As the debt model calculates a capital injection such that the balance at the end is zero in essence the cost of funds in each period is the weighted average of the bond interest payment and the short term borrowing payment (if any). The annual effective cost of funds can be represented by the formula:

((BIP/(BIP+STI))*(BIR) + ((STI/(BIP+STI))*(STR)

where

BIP = Bond Interest Payment Amount

STI = Short Term Interest Payment Amount

BIR = Annual Bond Interest Rate

STR = Annual Short Term Interest Rate

So for example if the Bond Interest Payment Amount is $100, Short Term Interest Payment Amount is $50, the Annual Bond Interest Rate is 6.17% and the Annual Short Term Interest Rate is 6.62% the weighted average cost of funds for the quarterly period is:

100/150= 0.66*6.17% = 4.11% + 50/150= 0.33*6.62% = 2.220% = 6.333% and for the quarterly rate divide by 4 = 1.583%

The weighted average cost of funds for the debt model is calculated for each quarter and for that quarter this is the cost of funds allocated as the discount rate for the capital funding option.

If the cost of funds varies from period to period, for any particular period the model automatically calculates the cumulative weighted average discount rate to apply to the present valuing of the capital funding model net cash flow. In this way the cost of funds for the capital funding model is maintained exactly the same as the cost of funds in the debt funded option.

"Discount Rate Tax Receipts"

is the annual percentage rate assumed for the purposes of discounting the value of the direct tax receipts received by government to a present value.

"Real Dwelling Price, Maintenance And Rates And Administration Costs And Tenant Income Growth Rates"

if zero are assumed to be inflation, else the annual percentage change above or below inflation in the prices of these components.

"Initial Percentage Of Income In Rent"

is the assumed annual commencing proportion of the tenants gross income from all sources that is paid in rent.

"Initial Dwelling Disposal Rate"

is the assumed percentage of original dwellings sold each year.

"Tax Paying Entity"

is the assumed tax regime applying to the investor in the bonds and entities receiving interest from short term borrowings.

"Nominal Interest Rates"

is the assumed short term interest rates applying in the market at any time and used as a proxy for the required bond yield at the time of dwelling sales.

ATTACHMENT 2: DATA SOURCES

Table 1: Dwelling Prices: $000's December 2000

Variable	NSW	Vic.	Q'ld	W.A.	S.A.	Tas.	ACT	N.T.
Construction Cost	91	109	100	104	79	89	140	151
Purchasing Cost	171	125	133	103	125	117	104	117
Mean/Median	131	117	117	104	102	103	122	134
Indexed Value	149.5	140.5	118.7	111.9	110.0	112.0	141.6	146.7

PRODUCTIVITY COMMISSION, 2000, *Report On Government Services*, Table 15.4 Page 1390

REAL ESTATE INSTITUTE OF AUSTRALIA, 2000, *Market Facts, December 2000,*Table 3, Page 4

Table 2: Operating And Administration Cost Percentages.

Variable	NSW	Vic.	Q'ld	W.A.	S.A.	Tas.	ACT	N.T.
Market Val. Public Housing: $M's	12,976	5,374	4,005	2,452	3,063	695	1,207	785
Total Pub. Housing Dwellings: 000's	123.3	64.5	48.5	31.3	51.4	12.9	11.2	7.0
Av. Dwell. Val. $000's	105.2	83.2	82.5	78.2	59.6	53.8	108.1	112.4
Operating Costs Per Dwelling, Inclusive	2,664	1,956	2,558	2,685	2,991	3,326	3,347	6,472
Int. Cost $M's	68.6	67.5	13.3	67.8	53.4	15.9	6.60	39.52
Disposals Cost $M's	2.03		2.80					
Operating Costs - Interest & Disposals	2,091	911	2,226	523	1,951	2,092	2,756	814
Administration Costs Per Dwelling	1,054	749	845	834	912	1,492	944	389
Operating Costs % Of 1999 Dwelling Value	2.0	1.1	2.7	0.7	3.3	3.9	2.5	0.7
Administration Costs % Of 1999 Dwelling Value	1.0	0.9	1.0	1.1	1.5	2.8	0.9	0.3
2000 Dwelling Value	149.5	140.5	119.0	111.9	110.0	112.0	141.6	146.7
Operating Costs % Of Dec. 2000 Dwell. Val.	1.5	0.7	2.0	0.5	1.9	2.0	2.1	0.6
Administration Costs % Of Dec 2000 Dwell. Val.	0.8	0.6	0.8	0.8	0.9	1.4	0.7	0.3

Source: PRODUCTIVITY COMMISSION, 2000, *Report On Government Services*, Housing Attachment, Table 15A.2 Page 1421

PRODUCTIVITY COMMISSION, 2000, *Report On Government Services,* Table 15.5 Page 1392

PRODUCTIVITY COMMISSION, 2000, *Report On Government Services*, Table 15.4 Page 1390

REAL ESTATE INSTITUTE OF AUSTRALIA, 2000, *Market Facts, December 2000,*Table 3, Page 4

DEPARTMENTS OF HOUSING ALL STATES, 1999/2000 Annual Reports & Unpublished data.

Table 3: Private Market Rental Yields And Vacancy Rates:

December 20000

Variable	NSW	Vic.	Q'ld	W.A.	S.A.	Tas.	ACT	N.T.
Median Dwelling Prices: $000's	305.0	270.0	145.0	137.0	158.2	187.0	115.0	179.8
Median Rents: $000's p.a.	16.38	12.39	10.05	9.62	8.00	11.31	8.15	12.50
Median Rental Yields: %	5.37	4.59	6.93	7.02	5.06	6.05	7.08	6.94
Vacancy Rates: %	2.80	3.50	2.50	3.20	3.80	2.40	2.30	7.00

Source: REAL ESTATE INSTITUTE OF AUSTRALIA, 2000, *Market Facts, December 2000*, Pages 9-25

Table 4: Public Tenant Vacancy And Relocation Rates. 1999-2000

Variable	NSW	Vic.	Q'ld	W.A.	S.A.	Tas.	ACT	N.T.
Total Public Dwellings; 000's	127.5	66.0	50.6	32.7	53.5	13.4	11.7	7.4
Occupied & Untenantable Dwellings: 000's	127.1	65.3	50.3	32.4	52.1	13.2	11.6	7.4
Effective Vacancy Rate %	0.31	1.06	0.65	0.91	2.60	1.60	0.68	0.38
Households Transfering: 000's	5.628	2.242	1.713	1.776	1.043	0.363	0.357	0.305
Tenant Relocation Rate %	4.41	3.40	3.38	5.43	1.95	2.71	3.04	4.09

Source: PRODUCTIVITY COMMISSION OF AUSTRALIA, 2001, *Report On Government Services 2001*, Attachment 16A, Table 16A.1

ATTACHMENT 3: CALCULATION DIFFERENCES

In most cases the Model estimates that capital funding generates slightly cheaper subsidy costs than the debt, (bond) option. This is only due to some slightly different timing and compounding effects in the capital funding option when compared with the debt option. In the debt option the Model assumes that any cash flow shortfall is always borrowed and accrues interest. The first shortfall becomes the commencing 'borrowed' amount at the commencement of the next quarter. This shortfall accrues interest at the prevailing assumed rate. If, at the end of the next quarter, the sum of the cash flow, including the interest owed is also negative, then this is transferred as a short term borrowing for the beginning of the next quarter and so on. In this case the Model may be 'compounding' interest, i.e. generating interest on interest, (as the short term borrowings are not paid until dwellings are sold, or surpluses generated).

In the capital funding option, however, because there can be no targeting of the cash flow to zero, the cash flow at the end of each period- either positive or negative - is simply present valued to current dollars and a total NPV of all the end of period cash flows calculated. Because the Model uses the discounted cash flow method for the capital funding option it is inappropriate to assume short term shortfalls are borrowed, rather, that the funds are provided for from grants or internal funds from the housing authority.

Only inter, (i.e. within the period), very short term interest is calculated for each period, and incorporated within the undiscounted cash flow summation for that period. For this reason no 'interest on interest' is being calculated in the capital funding Model. This difference in these 'compounding' effects is responsible for the slight difference in outcomes between the two options, (except where interest rates increase from initial assumptions and dwellings are sold during the term)- here the debt option is considerably cheaper that the capital funding option, (because of the discounting of the price paid for bond repurchases).

VOLUME 3: RESPONSES FROM TRAINING DAY PARTICIPANTS

1 INTRODUCTION

A training day on the project was held on Friday the 7th of June 2002 at the Department of Urban and Regional Planning at Sydney University. The training session involved:

- discussion of the Manual for raising non grant funds for housing assistance;

- demonstration of the housing subsidy model and its implications; and

- an outline of a case study of Adelaide City Council's Affordable Housing Project.

1.1 Manual Discussion

Funding and Operational Objectives

Participants remarked that the normal procedure followed with alternate funding by State Housing Authorities, (SHAs), was simply to focus on the funding and presume the existing program objectives would suffice. In many cases it was not recognised that the risks and constraints arising from non grant funding require management disciplines which imply the program objectives used in grant funded programs be modified. It was agreed that there is a strong case for developing specific program and operational objectives for off-budget or non grant funded housing assistance programs.

Financial Support, Risk Definition and Profiling

Similar comments were made in relation to these stages of the process. It was not common for explicit recognition to be given to the different components of the financial support required nor to the likelihood and impact of specific risks.

Lead Manager Processes

Agencies have indicated little experience with the process of specifying and appointing a Lead Manager although participants indicated they could perceive the benefits that would flow from following such a procedure, (identify the widest range or options etc.)

Evaluation Of Structure Options

Participants suggested that it was difficult to comprehensively identify all of the relevant criteria that should apply to the evaluation of structural options for non-grant funded housing assistance. The list of criteria provided in the Manual was considered helpful.

Treasurer's and Treasury Support

Some of the participants indicated that obtaining a government (Treasury) guarantee as part of the necessary credit support could be problematic as could the price that Treasury might want for supplying such a guarantee. It was agreed that there was little knowledge about how to price a guarantee but the difference in yields between first grade corporate paper and State debt could be a useful starting point for identify the requisite price, (i.e. usually expressed like an interest rate i.e. a percentage paid on the capital outstanding at anytime).

1.2 Model Demonstration

Differences Between States In Public Housing Operating Costs

Participants from some States remarked that the report detailed a very wide range in the public housing operating costs of the various State Governments. They commented that whilst some part of that range could be explained by economies of scale and geography, not all of the difference is due to these factors.

Operational Deficits

All those present are of the view that the operational deficits of SHAs are of grave concern and that the ability of SHAs to pursue options for 'supply side' housing assistance is severely constrained by the existing situation.

Mixing Public And Private Tenancies In Social Housing

Participants saw considerable advantages in mixing public and private tenancies in social housing. Higher net average household rents would result in improved operational income and allow internal cross subsidisation; aggregate average 'distressed tenants' proportion of total tenancies would decline reducing average per dwelling maintenance and default costs; and because of the presence of private tenants, overall estate security and management would be improved.

Stock Refreshment And Diversification

Comment was provided on the usefulness of having some debt financing of social housing as a mechanism by which existing stock could be transferred into to the debt structure and later sold, with the funds raised being used to create new public housing. Participants saw this as a desirable vehicle for culling, sorting and 'refreshing' the existing public housing asset base, with no absolute loss of dwellings.

Systemic Risks And Housing Assistance Subsidies

Some seminar attendees were surprised at just how much public housing subsidies can vary in different macro-economic environments, and how the subsidy relationship between different assistance options changes in these different contexts.

Ease Of Use And Utility Of The Model

Everybody thought that the Model was very user friendly and offered considerable utility to housing policy analysts concerned with the longer term management of appropriate housing assistance programs.

VOLUME 4: HOUSING SUBSIDY MODEL

1 INTRODUCTION

The Housing Subsidy model calculates the commencing amount of funds that should be put on deposit to pay required the rental subsidy for social housing tenants and capital shortfalls on debt repayments, (if any), for the term of the transaction. The Model assumes dwellings required to house social housing tenants are initially purchased from the proceeds of a bond issuance, and that as time goes on the proceeds of sales of the dwellings is used to repatriate the principal owed on the bonds and to provide for any operational shortfalls. In the event that the net sale value of the dwellings exceeds the bond principal outstanding the Model reduces the initial capital injection required, and makes up for any operating shortfall by short term borrowings such that the surplus from sale of dwellings versus bond principal repayments is exactly equal to the principal outstanding on the short term borrowings at the end of the transaction. The Model uses Excel Goal Seek capacities to exactly calculate the initial contribution required such that at the end of the transaction all liabilities are discharged, and the accumulated cash flow is zero.

DIAGRAM 1: OPENING SCREEN
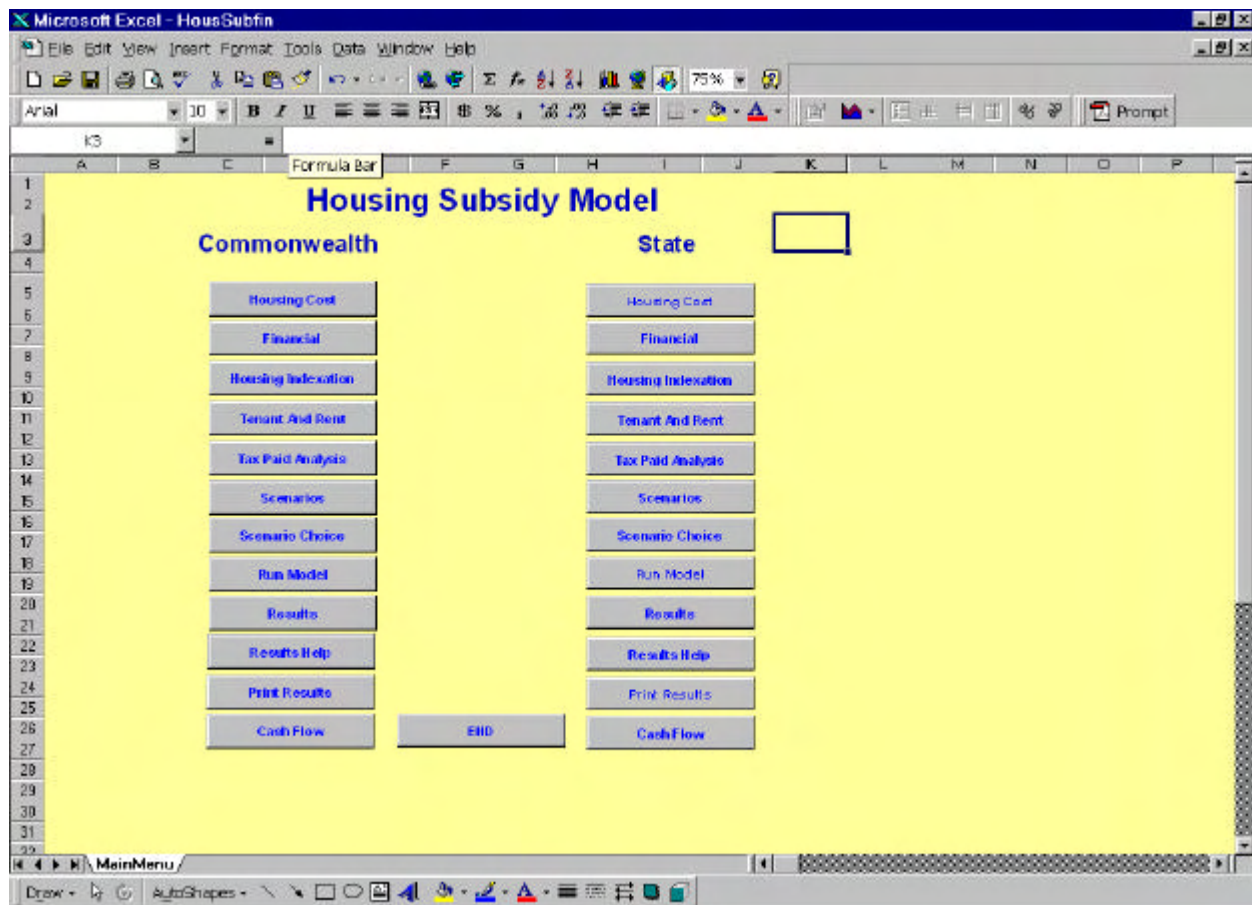
The Model has two main modules-the Commonwealth and State

These modules are identical except the State Module requires the capital contribution from the first Module before it can be run.

Rent Assistance

Using the same method, (but without any bond funding and short term borrowing), the Model also automatically calculates the commencing amount of funds that should be put on deposit (and to earn interest prior to being drawn down), to pay the required rental subsidy for the same social housing tenants should they be renting dwellings in the private sector.

In this model all assumptions about costs and revenues are the same as in the debt funded option, however the Model simply computes as subsidy the difference between the required payment according to income and the payment that would be required if market rents are being charged. As in the debt option, it is assumed all tenants leave at the end of the transaction period.

On Budget Capital Funding Of Public Housing

The Model also contains a further comparison with on budget capital funding of public housing. All of the tenant income, rates maintenance and administration cost, and dwelling value assumptions etc are always the same for the capital funding model as all other options.

The practical reality is that mainstream State Housing Authorities purchase dwellings from grant funds which are then occupied by public tenants. As existing public tenants leave new subsidised public tenants take their place. Consequently the Model assumes the dwellings are purchased from grant funds, any shortfall/surplus in quarterly net rents after rebates is compensated by short term borrowings, and at the end of the quarter are either paid for from, or returned to, internal funds. There are no places for private tenants. Vacant dwellings are reoccupied by social housing tenants or sold. At the end of the transaction all of the remaining dwellings are sold. If, as in some of the Debt Model cases, dwellings are assumed to be sold throughout the term, these assumptions carry through to the capital funding option.

Structure Of The Model

Within the first module are 7 command Dialog Boxes. These are:

- Housing Cost;
- Financial;
- Housing Index;
- Tenant/Rent;
- Tax;
- Scenarios (the only input tables in the first module)
- Scenarios Choice;

and two reporting tables;

- Commonwealth Results:(the main reporting table);
- Commonwealth Cash Flow (the second reporting table);

and two operational (hidden) spreadsheets;

- Commonwealth (the main operating spreadsheet)
- Tax Results (hidden, second operating spreadsheet).

Once the Commonwealth Module is run it pastes its results into the main State operating spreadsheet, which can then be configured and run. Set out below are the Command Windows and result table.

1.1 Housing Cost

DIAGRAM 2: HOUSING COST INPUTS

The Model provides the user with the flexibility to charge or not charge purchasing stamp duty to the transaction. Other purchasing expenses, initial maintenance and rates costs, and initial administration costs are also to be inputted as a percentage of initial dwelling value. When dwellings are sold the Model also provides the user with the option to bring stamp duty on sale to the account of the transaction.

For all other selling costs the Model calculates the required amounts as a percentage of final sale value.

1.2 Financial

This dialog box controls the key financial inputs to the Model, the type of debt instrument to be used and the term of the transaction (except where substantial sales are forecast throughout the term). The Model requires users to estimate the 'real' interest rate currently applying and calculates the nominal interest rate from the two components of CPI and Real Interest Rates.

The Real Debt or Investment Rate is the difference between the assumed inflation rate and the nominal interest rate on borrowings/interest earnings.

The Model automatically calculates nominal debt and investment rates according to the formulas $(1+n)*(1+i)-1$, where:

n = the assumed nominal debt or investment rate.

i = the Consumer Price Index (forecast) for Australia.

User have a choice between floating, fixed and real rate debt instruments. Internalised within the Model are the Reserve Bank's formulas for calculating interest payments on the Bonds, (half yearly for nominal Bonds, and quarterly for real rate Bonds) and for calculating the bond price at any early redemption, (i.e. before maturity).

The formula's for calculating Bond Prices can be further examined in the Reserve Banks Press Release NO 24, 1992, titled 'Pricing of Government Securities'.

DIAGRAM 3: FINANCIAL INPUTS

Set out below is how the calculation of bond prices actually works[1].

The price of a Treasury bond reflects the current level of interest rates, rather than the coupon interest rate on the security. For example, assume a lender invests $5,000 in a 9% 15 September 2004 bond on 15 September 1994 at a yield of 9%, giving a capital price of $100 per $100 face value.

Each year until maturity the holder of the bond will receive two coupon payment totalling $450 and in 10 years the face value of $5,000 will be repaid. The return (assuming the reinvestment of coupons at the purchase yield) is 9% per annum.

Assume that one year later the lender decides to sell the bond on the secondary market. However, in the meantime interest rates have risen and investors now require 10% on similar maturities. Hence, the price of the bond should reflect that the purchaser will want to earn at least the current market rate of 10.0%. The bond will continue to pay annual payments of $450, however, the purchaser requires a return of 10.0%.

Therefore, the purchaser will pay the previous holder less than their original outlay, in this example $4,707.75, This amount is calculated so that the annual payment of $450 plus the difference between what the new investor pays the previous holder and the face value to be received on maturity will return the purchaser 10.0% per annum over the remaining life of the bond.

This example illustrates that the capital value of a bond can change at any time in line with the overall level of interest rates and therefore an investor can make a capital gain or sustain a loss on bonds if they are sold prior to maturity.

The relationship between yield and price is inverse, if interest rates rise, the capital value of the bond will decrease. Conversely if interest rates fall, the capital value will increase.

Users can also choose to set the discount rate for the calculation of the present value of direct tax payments, at the Bond rate or at such other rate as considered appropriate. Finally the user can set the term of the transaction for any period from 1 to 40 years. It should be noted that if a dwelling disposal rate is entered that results in a shorter term, the Model assumes the Bond is prepaid, and the Bond Price at the time of the last redemption is that arising from the Reserve

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[1] **RESERVE BANK, 1992,** *Pricing of Government Securities'* **Press Release NO 24**

Banks Bond Pricing formula. All values other than the term should be imputed as percentages and inflation should be greater than zero.

Discount Rate For On Budget Capital Funding Option

In order to ensure absolute consistency in the analysis it is important that the discount rate for capital funding exactly replicates the cost of funds in the debt option.

As the debt model calculates a capital injection such that the balance at the end is zero in essence the cost of funds in each period is the weighted average of the bond interest payment and the short term borrowing payment (if any). The annual effective cost of funds can be represented by the formula:

((BIP/(BIP+STI))*(BIR) + ((STI/(BIP+STI))*(STR)

where

BIP = Bond Interest Payment Amount

STI = Short Term Interest Payment Amount

BIR = Annual Bond Interest Rate

STR = Annual Short Term Interest Rate

So for example if the Bond Interest Payment Amount is $100, Short Term Interest Payment Amount is $50, the Annual Bond Interest Rate is 6.17% and the Annual Short Term Interest Rate is 6.62% the weighted average cost of funds for the quarterly period is:

100/150*6.17%+ 50/150*6.62%=6.33% (the quarterly rate is 6.33%/4 or 1.583%)

The weighted average cost of funds for the debt model is calculated for each quarter and for that quarter this is the cost of funds allocated as the discount rate for the capital funding option. If the cost of funds varies from period to period, for any particular period the model automatically calculates the cumulative weighted average discount rate to apply to the present valuing of the capital funding model net cash flow. In this way the cost of funds for the capital funding model is identical to the cost of funds in the debt funded option.

1.3 Housing Index

DIAGRAM 4:PRICE AND COST GROWTH INPUTS

These indexation functions set down the real percentage by which the initial dwelling prices, maintenance and rates and administration costs increase or decrease each year. If zero is inserted then dwelling prices increase by inflation and maintenance, rates and administration costs are maintained at the same percentage of dwelling value that is inserted in the transaction at the beginning. If a plus or minus percentage is included the original cost or price is adjusted in the first year by the following formula.

$(1+c)*(1+i)-1$, where:

c = the Cost or Price Growth Rate.

i = the Consumer Price Index (forecast) for Australia.

i.e. if inflation is say 2.5% and cost growth is 1% real then $100 becomes

100+{100 ((1+0.01)*(1+0.025)-1))} = 103.525*

or if real cost growth is –1%

100+{100 ((1-0.01)*(1+0.025)-1))} = 101.475.*

The process is repeated for the second year and so on. Figures should be inserted as percentages. If only CPI increases are assumed zero is inserted in each of the three boxes.

1.4 TenantRent

Tenant Relocation Rate And Dwelling Disposal Rate

This Dialog Box relates to tenant income and rent variables. All other inputs are percentages. The Model provides the user with the choice of having rent calculated as a percentage of income or as a percentage of gross private rental yields. The Model requires you to insert a percentage in the Gross Private Yields box for the purposes of calculating the rent that private tenants will pay. This percentage is the annual gross rent expressed as a percentage of the dwelling value or price. For example if the weekly rent is $200 and the dwelling value is $100,000 the private rental yield is:

(200*52)/100,000 = 10.4%

DIAGRAM 5: RENT YIELDS, TENANT INCOME AND MOBILITY INPUTS

The Assisted Tenant Vacancy Rate relates to the number of dwellings occupied by assisted tenants which are unoccupied and defaulting tenants as a proportion of total assisted dwellings i.e. 1 vacant or defaulting dwelling for 100 dwellings =1%. The Private Tenancy Vacancy Rate is the number of dwellings occupied by private tenants which are unoccupied or defaulting as a proportion of total dwellings occupied by private tenants.

The Tenant Relocation Rate pertains to the proportion of initial dwellings that are vacated by assisted tenants each year. When inserting this number be careful to check that the rate multiplied by the number of years of the transaction does not exceed 100%.

Similarly the Dwelling Disposal Rate pertains to the proportion of the initial dwellings that are sold each year. This needs to be checked in the same way as the Tenant Relocation Rate. In the Automatic Scenarios if the dwelling sales rate results in a shorter term than has previously been inserted the Model automatically shortens the term accordingly. If total dwellings remaining exceeds assisted tenants the Model automatically assume the residual additional dwellings are occupied by private tenants who pay the full private rental yield.

In the case of the capital funding model it is assumed that all dwellings are occupied by public tenants.

1.5 Tax

HousSubMod permits the user to test the impact of different taxpaying entities on the net subsidy payable by the Commonwealth and the States. The Model calculates a net income and capital gain schedule for the option being run. This schedule is then subject to a cash flow analysis of income and capital gains tax payable throughout the term of the transaction. The cash flow is discounted, (at the chosen discount rate) to quantify the present value of the direct Commonwealth tax paid.

DIAGRAM 6: TAX INPUTS
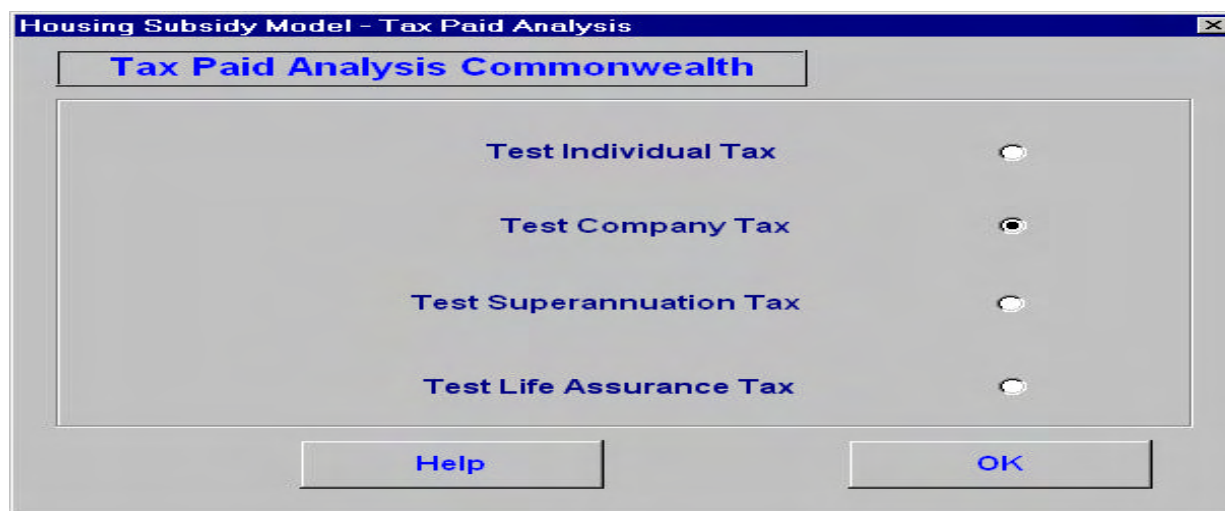
The assumptions pertaining to the tax treatment of the various entities have been provided by professional accountants and are set out in the Help box in the Tax Inputs window of the Model.

1.6 Scenarios and Scenarios Choice

DIAGRAM 7: SCENARIO INPUTS

Scenario	CPI	Real Int Rates	Nominal Interest Rates	Dis Rate	RDP	R Main & Rates	R Admin	R Tenant Inc	Gross Priv Rent	Term	Tenant Rel Rate	Dwell Disposal Rate
Base Case	2.57%	3.63%	6.29%	6.29%	0%	0%	0%	0%	5.37%	25	0%	2%
B	1.50%	2.00%	3.53%	3.53%	-1.00%	-0.50%	-0.50%	-1.00%	8.75%		2.00%	1.00%
C	8.00%	4.50%	12.86%	12.86%	2.00%	1.00%	1.00%	1.00%	7.00%		6.00%	8.00%

The Model provides for up to three automatic and six manual economic scenarios to be tested. Under the Automatic Scenarios the annual percentage rate applied in the Scenario is used each and every year, i.e. on a 'straight line' basis. In the first Automatic Scenario ('Base Case') the values inputted in the Financial Dialog Box are also inputted in the Scenario so that the nominal and real interest rates applying to the Bonds are the same as that applying in the remaining assumption set.

In all of the subsequent scenarios the bond coupon is fixed at the yield outlined in the Financial Dialog Box but inflation and real rates in the assumed environment are different to that set out for the Bonds. These external interest rates are taken as the proxy for yields in the Reserve Bank's formula and enable the user to quantify the impact of changing interest rates on Bond Redemption Prices and hence the capital risk. Moreover if any Scenario other the Base Case is inputted the chosen scenario values override all values inserted in the Dialog Boxes other than the Bond Coupon rate.

The functions of each of the Columns in the Scenario Sheet are:

- Column A sets out which Scenario, i.e. "Base Case", "B", or "C";
- Column B provides for an assumed inflation rate over the development period,
- Column C, the real rate that is to apply to future interest rates;
- Column D the nominal interest rates applying throughout the term;
- Column E the discount rates applying to present valuing the tax position;
- Column F real (i.e. above or below inflation) dwelling price growth per annum;
- Column G real (i.e. above or below inflation) maintenance and rates cost growth per annum;
- Column H real (i.e. above or below inflation) adminstration cost growth per annum;
- Column I real (i.e. above or below inflation) tenant income growth per annum;
- Column J gross private rental yields per annum;
- Column K the term (derived);
- Column L the proportion or the original assisted tenants that will relocate every year, (remembering that the percentage multiplied by the term cannot exceed 100%); and
- Column M the proportion or the original dwellings that will be sold each year, (remembering that the percentage multiplied by the term cannot exceed 100%);

Directly below the Automatic Scenarios commencing at Row 21 are the Manual Economic Scenarios. Under the Manual Economic Scenarios each table contains a specific economic scenario that can be modified. These scenarios allow for non straight line economic conditions, (i.e. cyclical with peaks and troughs), to be tested. Column A contains the Year with up to 40 years able to be tested. Columns B to M can be modified by the user by entering data in the relevant cell. The Columns reiterate the variables outlined in the Automatic Scenario.

As with the automatic scenarios these numbers are expressed as an annual percentage rate. Any assumed inflation rate must be greater than zero. Care must be taken to ensure that the tenant relocation rate percentage multiplied by the term does not exceed 100% and similarly with the dwelling disposal rate.

The existing manual scenarios are:

Manual 1: Base Case, assisted tenants relocate from 5th year, dwellings sold from 5 year;
Manual 2: Base Case first five years, low inflation low real rates, years 6-15, high inflation real rates years 16-25, no prepayments, tenant relocation rate 3% per annum;
Manual 3: Scenario B but no dwellings sold before term: 25 years;
**Manual 4:** Scenario B commencing: high inflation and real rates years 5-10;
Manual 5: Scenario C with no dwelling sales before term; and
Manual 6: Scenario C commencing: low inflation low real rates years 6-10.

1.7 Scenarios Choice

By Clicking on the Automatic or Manual buttons in the dialog box the model will set for either Automatic or Manual Scenarios. These numbers correspond with the six manual scenarios contained in Tables 1 to 6.

DIAGRAM 8: CHOOSING SCENARIOS
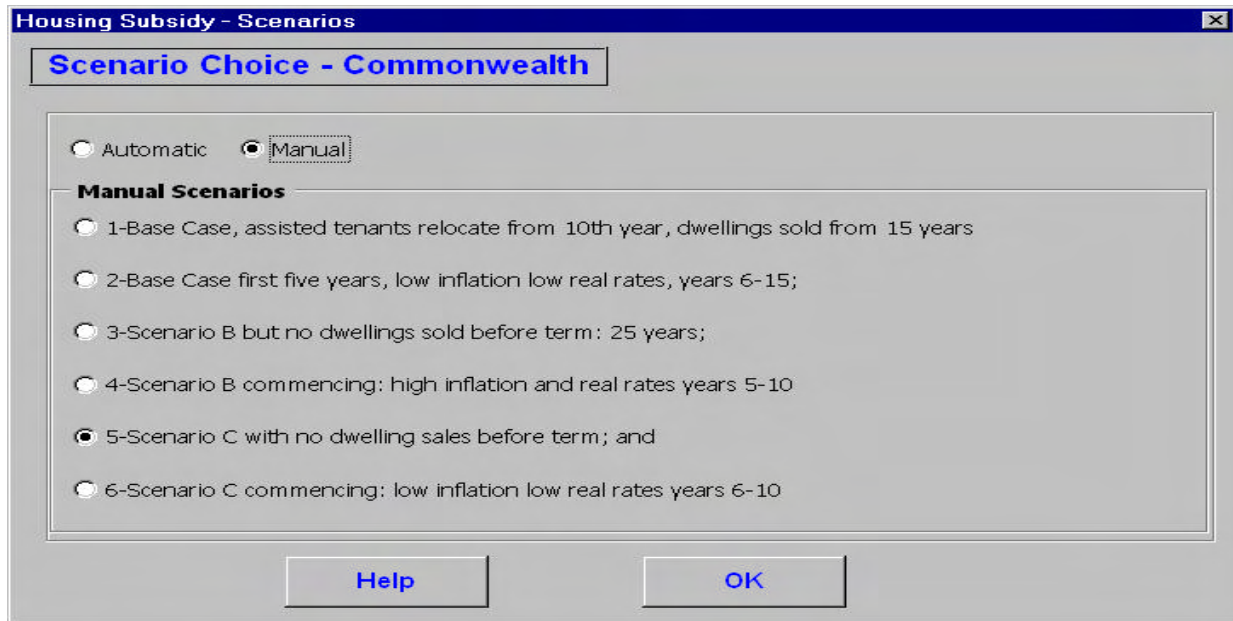
1.8 Result Tables

The results analysis sets out all of the details for the particular case and the quantified outcomes. These outcomes essentially comprise six components three for Bonds and three for Rent Assistance. The outputs are:

Bonds

- gross capital contribution required per $100million;
- the present Commonwealth per $100million; and
- net capital contribution after direct tax per $100million

Rent Assistance

- gross capital contribution required per $100million rental assets;
- the present value of direct tax receipts to the Commonwealth per $100million rental assets; and
- net capital contribution after direct tax per $100million rental assets.

On Budget Capital Funding For Public Housing

- gross capital contribution required per $100million rental assets;
- the present value of direct tax receipts to the Commonwealth per $100million rental assets; and
- net capital contribution after direct tax per $100million rental assets.

The Model also sets out the capital contribution per assisted tenant year as some options assume no subsidised tenants vacating during the term of the transaction and whilst they requires a larger capital injection provide for more assisted tenant years.

In most cases the Model estimates that capital funding generates slightly cheaper subsidy costs than the debt, (bond) option. This is only due to some slightly different timing and compounding effects in the capital funding option when compared with the debt option. In the debt option the Model assumes that any cash flow shortfall is always borrowed and accrues interest. The first shortfall becomes the commencing 'borrowed' amount at the commencement of the next quarter. This shortfall accrues interest at the prevailing assumed rate. If, at the end of the next quarter, the sum of the cash flow, including the interest owed is also negative, then this is transferred as a short term borrowing for the beginning of the next quarter and so on. In this

case the Model may be 'compounding' interest, i.e. generating interest on interest, (as the short term borrowings are not paid until dwellings are sold, or surpluses generated).

In the capital funding option, however, because there can be no targeting of the cash flow to zero, the cash flow at the end of each period- either positive or negative - is simply present valued to current dollars and a total NPV of all the end of period cash flows calculated. Because the Model uses the discounted cash flow method for the capital funding option it is inappropriate to assume short term shortfalls are borrowed, rather, that the funds are provided for from grants or internal funds from the housing authority.

Only inter, (i.e. within the period), very short term interest is calculated for each period, and incorporated within the undiscounted cash flow summation for that period. For this reason no 'interest on interest' is being calculated in the capital funding Model. This difference in these 'compounding' effects is responsible for the slight difference in outcomes between the two options, (except where interest rates increase from initial assumptions and dwellings are sold during the term)- here the debt option is considerably cheaper that the capital funding option, (because of the discounting of the price paid for bond repurchases).

1.9 Commonwealth Cash Flow

This Module sets out the actual modeled cash flow for the particular case being tested.

1.10 State Modules.

All of the rest of the sheets are an identical model for running a State outcome with the *State* sheet the main operating sheet. The Model automatically inserts the calculated Commonwealth initial capital contribution based on the assumption set in the Commonwealth Module. State operators can then adjust the assumptions made in the Commonwealth Module and run the State outcome and quantify any surplus or additional State contribution required.

ATTACHMENT 1: CALCULATING BOND PRICES:

(from Reserve Bank Press Release No. 92-94)

The Yield On An Investment

In the context of equities the yield is simply the dividend earnings as a percentage of the price paid for the share. For example, the yield on a share which cost $8.00 with an annual dividend payment of $0.50 is 6.25%.

$$\text{i.e.} \quad \frac{0.50}{8.00} \quad X \quad \frac{100}{1}$$

For fixed interest securities (such as Treasury bonds) the corresponding concept is called the 'running' yield. The running yield on a bond with an annual coupon payment of $12.00 which was purchased[2] for $98.00 is 12.245%.

$$\text{i.e.} \quad \frac{12.00}{98.00} \quad X \quad \frac{100}{1}$$

The running yield is valid only for comparisons at a point in time. It is a simple interest concept with no account being taken of the reinvestment of interest earning. Reinvestment of coupons becomes relevant when an investment runs for a number of years.

The yields at which bonds are bid for at tender and traded in the secondary market are based on a different concept altogether. This concept is the 'yield to maturity' (also called 'redemption yield'). The 'yield to maturity' takes into account the time value of money.

The Elements Of A Fixed Interest Security

A fixed interest security pays periodic fixed interest (or coupon) payments throughout the term[3] and repays the face value on maturity.

The price of the bond is equal to the present value of this future income stream. The present value is obtained for each separate payment by discounting the amount of that payment back using the redemption yield to the date of settlement.

Compounding And Discounting

Before looking at an example of the calculation of price for a fixed interest security it is instructive to discuss the meaning of compounding and discounting. The concept of compound interest involves the re-investment of interest earned at each rest.

For example, consider a sum of $100 invested for a period of two years at an interest rate of 10% compounded annually.

	Principal	=		$100
At end of Year 1:	Interest	=	$100 X 10% =	$ 10
	New sum	=		$110

This calculation can be expressed as 100(1 + i) where i is the annual interest rate.

The $110 is now invested for a further year at 10% pa.

	Principal	=	$110
At end of Year 2:	Interest	=	$110 X 10% = $11
	Final sum	=	$121

This can be expressed as 100 (1 + i) (1+i) or $100(1+i)^2$

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[2] The purchase price to be used in such calculations is net of accrued interest.

[3] For Treasury Bonds interest is paid every six months

Thus, in our example the sum of principal and interest at the end of ^{n} periods is given by

$$100 (1 + i)n$$

The calculation of the present value of a sum of principal and interest [i.e. $100 (1 + i)^n$] that has been compounded over ^{n} periods is given by.

$$\frac{100(1 + i)^n}{(1 + i)^n}$$

To generalise, any amount (X) invested at i% compounded over ^{n} periods, will rise to:

$$y = X (1 + i)^n$$

Likewise, the present value of an amount (Y) which is the result of compounding an amount (X) at i% over n periods is given by:

$$X = \frac{Y}{(1+i)^n}$$

In this example, compounding and discounting are based on annual rests using an annual interest rate. Since most fixed interest securities feature interest payments at six monthly rests the appropriate yield[4] for use in compounding and discounting is the six monthly yield (i.c. the nominal annual yield divided by 2).

Yields and Present Value Calculations

As mentioned in 2 above, the cash flows arising from ownership of fixed-interest securities comprise two components.

- the right to receive interest (coupon) payments - usually at six monthly intervals; and

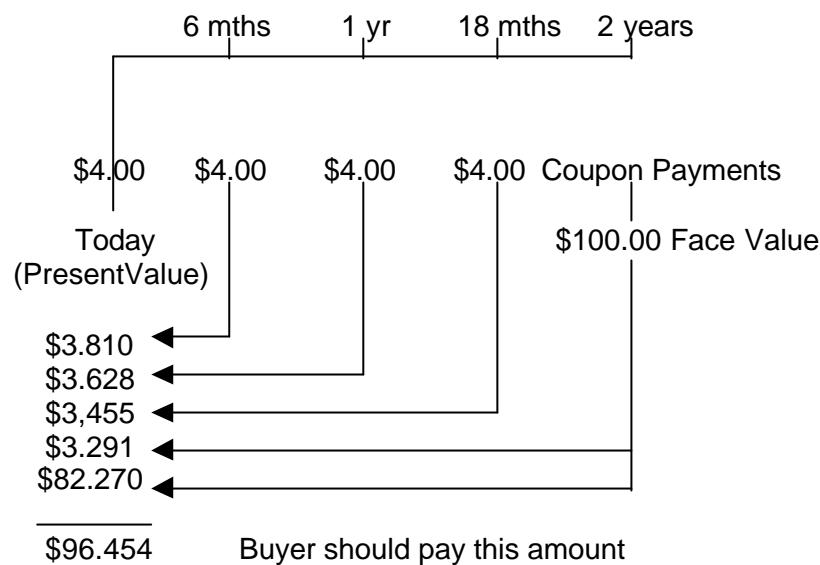- the right to receive the face value of the bond at maturity.

So we can think of the price of a bond as being the present value of the stream of payments which it generates where the current market yield is used as the discount rate.

As an example consider a Treasury bond which has a $100 face value, two years to maturity and a coupon rate of 8 per cent p.a. payable six-monthly. If the market yield is 10% p.a., what price would a buyer be justified in paying for this bond? (note that this is just another way of asking what is the present value of the stream of payments generated by the security).

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[4] **To generalise the appropriate yield factor is that which matches the frequency of interest payments.**

The time line below shows the calculation of the present value or price of the bond with each individual component (cash flow) valued[5]

	6 mths	1 yr	18 mths	2 years

$4.00 $4.00 $4.00 $4.00 Coupon Payments

Today $100.00 Face Value
(PresentValue)

$3.810
$3.628
$3,455
$3.291
$82.270
_____
$96.454   Buyer should pay this amount

Hence to determine the present value of a bond;

- Calculate the present value of the interest payments e.g. $14.184
- Calculate the present value of the face value   e.g. $82.270
- Add the two present values   e.g. $96.454

Treasury Bonds

The formulae which the Bank uses are:

Basic formula   P = $v^{f/d}\left[\ g(1+a\,\overline{\underset{n}{\rceil}})+100v^n\ \right]$

p   =   the price per $100 face value

v   = $\dfrac{1}{1+i}$

where 100i = the half-yearly yield (per cent) to maturity in formulae (1) and (2), or the annual yield (per cent) to maturity in formula (3).

f   =

the number of days from the date of settlement to the next interest-payment date in formulae (1) and (2) or to the maturity date in formulae (3)*

d   =   the number of days in the half year ending on the next interest payment date.

g   =   the half-yearly rate of coupon payment per $100 face value.

n   =   the term in half years from the next interest-payment date to maturity.

$$a_{\overline{n}\rceil}\ =\ v+v^2+......+v^n=\dfrac{1-v^n}{1}$$

Treasury Capital Indexed Bonds

Indexed bonds are essentially the same as non-indexed bonds except that the yield is expressed in real terms and the future interest and maturity payments are expressed in constant (base-date) dollars.

_____

[5] **The present value of the coupon payment due at period n is: X = Y 1 (1 + i)^n For period 3, for example, the present value = $4.00 /(1.05)^3 = $4.00/$_{1.157625}$ = $3.455**

This requires the use of an indexation factor to convert the bond price from base-date dollars to current (settlement) date dollars. Otherwise, the calculation of yields/prices for indexed bonds is the same as for their non-indexed counterparts.

Thus, the basic formula used by the Bank for Treasury Capital Indexed Bonds is as follows.

$$v^{f/d}\left[\ g(1+a\frac{}{n|})+100v^n\ \right]\frac{K_t(1+\frac{p}{100})}{100}$$

where p, v, f, d, g, an, and n all have meanings analogous to those given previously:-

v = where 100 i = the quarterly real yield (per cent) to maturity.

f = the number of days from the date of settlement to the next interest-payment date.

d = the number of days in the quarter ending on the next interest-payment date.

g = the rate of quarterly coupon payment per $100 face value.

N = the term in quarters from the next interest-payment date to maturity.

$$a_{n|} = v+v^2+\text{----------}+v^n = \frac{1+v^n}{i}$$

The Ks are indexation factors (also known in the market as "the nominal value of the principal" or 'capital value") supplied by the issuer:-

K$_t$ - 1 is the indexation factor at the previous interest-payment date.

K$_t$ is the indexation factor at the next interest-payment date.

The relationship between successive K values is as follows:

K$_t$ = $\frac{K_t-1\ [1+p]}{[1\ 100]}$ where

p = the average percentage change in the Consumer Price Index over the two quarters ending in the quarter which is two quarters prior to that in which the next interest payment falls (for example, if the next interest payment is in November, p is based on the average movement in the Consumer Price Index over the two quarters ending the preceding June quarter).

$$= \frac{100}{2}\frac{[CPI_t-1]}{[CPI_{t-2}1]}\ \text{rounded to two decimal places.}$$

where CPI$_t$ is the Consumer Price Index for the second quarter of the relevant two quarter period, and

CPI$_{t-2}$ is the Consumer Price Index two quarters previously.

The second part of the formula above simply interpolates values for K between the relevant interest-payment dates, so as to provide a basis for converting the base-date price given by the first part of the formula into dollars of the day.

As indicated, the K values are provided by the issuer. This is normally done according to a formula set out in the prospectus. Indexation factors are usually set at 100 on the day which is one interest-payment period (one quarter in the case of Treasury Capital Indexed Bonds) prior to the date of the first interest payment. While the first interest payment need not be a full quarterly payment, it is standard practice for it to be so; if it isn't, the formula can be adapted accordingly.

It should be noted that in this housing subsidy analysis there are no bond redemptions between interest periods. For that reason f$^{/d}$ is not relevant.

Selling Prior to Maturity

The price of a Treasury bond reflects the current level of interest rates, rather than the coupon interest rate on the security. For example, assume a lender invests $5,000 in a 9% 15 September 2004 bond on 15 September 1994 at a yield of 9%, giving a capital price of $100 per $100 face value.

Each year until maturity the holder of the bond will receive two coupon payment totalling $450 and in 10 years the face value of $5,000 will be repaid. The return (assuming the reinvestment of coupons at the purchase yield) is 9% per annum.

Assume that one year later the lender decides to sell the bond on the secondary market. However, in the meantime interest rates have risen and investors now require 10% on similar maturities. Hence, the price of the bond should reflect that the purchaser will want to earn at least the current market rate of 10.0%. The bond will continue to pay annual payments of $450, however, the purchaser requires a return of 10.0%. Therefore, the purchaser will pay the previous holder less than their original outlay, in this example $4,707.75, This amount is calculated so that the annual payment of $450 plus the difference between what the new investor pays the previous holder and the face value to be received on maturity will return the purchaser 10.0% per annum over the remaining life of the bond.

This example illustrates that the capital value of a bond can change at any time in line with the overall level of interest rates and therefore an investor can make a capital gain or sustain a loss on bonds if they are sold prior to maturity.

The relationship between yield and price is inverse, if interest rates rise, the capital value of the bond will decrease. Conversely if interest rates fall, the capital value will increase.

Before purchasing bonds an investor should consider what interest rates are likely to do in the future, especially if they need to sell the bonds before maturity.