CHAPTER 7: COST OF A GUARANTEE

Overview

- Guarantee schemes involve a redistribution of losses due to financial institution failures. This redistribution is not of itself a cost to society, but some participants may perceive that private costs exceed the likely benefits.
- Scheme design variables determine the coverage of any guarantee. The scheme costs depend on the proportion of total liabilities covered. The incidence of guarantee scheme costs depends on the capital structure of the industry, particularly where preference arrangements are in place.
- While there are a number of theoretical possibilities for deriving cost estimates presented, all involve considerable practical problems, particularly given the relatively limited experience with financial institution failure in Australia.
- Estimation of scheme costs in the insurance sectors is made more difficult by the fact that the value of insurance liabilities is more prone than deposit liabilities to uncertainty.
- Further industry data would be required to allow the appropriate calibration of model parameters. Estimates that have been derived for the purpose of the Study do, nevertheless, fall within the (broad) range of estimates derived from international experience.
- Subject to a number of important caveats, on the basis of the evidence and theory available, the 'insurance costs' of a limited explicit guarantee in Australia are expected to be very low.
- Comparison with costs in other countries should take into account that deposit insurance and insurance guarantee premiums often involve a component for prudential supervision, a cost which Australian institutions already bear through supervisory levies.

Background

7.1 This Chapter examines a number of methods for estimating the costs of explicit guarantee schemes. None of the methods presented can provide a definitive estimate of scheme costs. Any estimates of the costs must be strongly qualified, given uncertainties about the probability, magnitude, timing and nature of financial institution failures in the future. The estimates are based upon relatively simple assumptions about the possible scope of institutional and product coverage of a guarantee (examined in Chapter 6).

7.2 A critical point to note is that the losses in insolvency will already have been incurred. A guarantee scheme, like any insurance scheme, simply involves the pooling of risks and redistribution of losses among various parties. Although this will reduce the incidence of loss for a particular group, it does so at the expense of another group of stakeholders. The essential question underlying a guarantee scheme is 'who pays?' A scheme would also involve some additional costs in terms of its administration and possible impact on industry and consumer behaviour.

7.3 Careful scheme design can serve to limit the potential costs. In particular, it is necessary to consider the structure of the sectors in which a scheme might apply. Too generous a scheme may not be sustainable, particularly in a sector with relatively few, large institutions. The viability of a scheme will also depend on the breadth of the funding base (discussed in Chapter 8).

7.4 The estimates derived in this Chapter are consistent with a range of empirical studies and international experience. In comparing the costs to that experienced in other countries, it is necessary to make appropriate allowance for the different functions performed by guarantee schemes. For example, in some countries the scheme administrator has prudential supervision functions. In Australia, these functions are already undertaken by the Australian Prudential Regulation Authority (APRA) and funded by industry, and need not be duplicated.

7.5 Much of the later material in this Chapter on estimating the insurance cost of guarantees (commencing at paragraph 7.31) is technical in nature.

Redistribution of losses and new costs

7.6 One particularly difficult aspect of financial system guarantees is how to appropriately assess their cost. An argument encountered throughout the Study has been that a guarantee scheme will entail an additional cost (to consumers or shareholders) that the industry considers is unwarranted or excessive.

7.7 This view is sometimes based on a misconception. Taken from the perspective of society as a whole, a well-designed guarantee scheme simply alters the distribution of the losses[1] associated with insolvencies which occur.[2]

7.8 The application of the insolvency regime (including preference arrangements) will determine how losses are, in the first instance, distributed among the stakeholders (managers, owners, employees, creditors and customers) of the failed firm. A guarantee scheme, which provides protection to some customers of a failed institution involves redistributing those losses more broadly across the industry and/or society.

7.9 Therefore, the task of estimating the cost of a guarantee involves two elements:

- predicting the probability and magnitude of losses associated with financial institution failure in the future; and
- examining the distribution and timing of loss-sharing among a range of stakeholders.

7.10 The first element can largely be considered independently of any guarantee (provided guarantee design features mitigate moral hazard issues). Competitive market forces will lead to occasional failures and exits from the industry. The various components of the regulatory framework, particularly market discipline and prudential regulation play a central role in determining the magnitude of losses associated with failure. APRA's resolution and closure practices for failed institutions are an important line of defence, mitigating any

1 The term 'losses' is used to reflect the deficiency of assets relative to liabilities in the case of a financial institution's insolvency. The term 'costs', when used in relation to the extent of protection afforded by a guarantee, is taken to reflect the quantum of losses borne by a particular party. This quantum may be changed by redistribution.

2 It should be noted, however, that the size of the losses may be determined by the general effectiveness of, and incentives for risk-taking created by, the regulatory framework (inclusive of any guarantees).

losses that would need to be borne by any guarantee scheme and its contributors.

7.11 The second (redistribution) element is strongly influenced by the relevant insolvency framework and the design of any guarantee scheme. The insolvency framework determines the initial distribution of losses. The design of a guarantee scheme determines how much of the loss otherwise suffered by certain stakeholders is compensated. It also determines how the losses are redistributed across society and over time.

7.12 The annual 'insurance cost' of a guarantee scheme can therefore be thought of as the total amount of compensation paid by the scheme each year to achieve the desired level of redistribution. As in any insurance arrangement, the contributions to and distributions from the scheme serve to share losses resulting from adverse events affecting participants. In the case of a guarantee scheme, the purpose of contributions is to cover the desired redistribution of losses due to financial institution failures.

7.13 A second potential cost is that a poorly designed guarantee could increase the frequency and/or cost of failures due to the behavioural responses of firms, consumers and regulators. The United States (US) Savings and Loans crisis is often highlighted as an example of this, with ineffective market discipline, regulatory forbearance and inadequate supervision leading to exceptionally large losses, in that case ultimately borne by the taxpayer.

7.14 In addition, any guarantee scheme will involve direct costs associated with its administration. From the perspective of contributing institutions, it is also possible that guarantee pricing arrangements, which do not appropriately reflect risk of failure could involve an unfair allocation of costs among participants.

7.15 From the perspective of a guarantee scheme, or those parties required to fund it, the value of compensation to be met by contributions can be viewed as a cost. From a societal perspective, it is better viewed as the 'extent of redistribution'. The term 'costs' is used throughout this Chapter for simplicity.

Box 7.1: Experience with other redistribution mechanisms

In the past, the mechanism for sharing of losses from financial sector insolvencies in Australia has generally involved taxpayer funding. In such cases, governments have arranged to meet the costs associated with financial assistance to some of those who would otherwise have suffered losses.

In the case of the losses associated with the State Bank of Victoria, the motoring public was asked to foot the bill. The response in that case involved the use of public money which was subsequently recouped from Victorian motorists through an additional tax on petrol.

In the case of the scheme costs associated with the failure of the HIH Group of Companies (HIH), a number of different cost-sharing mechanisms were used. The Commonwealth funded the HIH Claims Support Scheme (HCSS), which means that all taxpayers will have proportionately shared the cost. In Queensland, compensation for the Compulsory Third Party (CTP) motor vehicle insurance losses of HIH's subsidiary, FAI, will be recouped from motorists for some time. In NSW, the compensation costs associated with claims on CTP and Builders' Warranty insurance policies are being recovered from the insurance industry over approximately a five-year period.

Scheme costs

7.16 The following discussion analyses the costs of a guarantee scheme across the three categories identified above:

- insurance (or guarantee) costs: the aggregate amount of compensation paid to eligible customers which must eventually be funded from some source;
- administration and compliance costs: the costs associated with establishing, operating and maintaining the bureaucracy to support a scheme and industry's interaction with it (including costs of litigation and settlement); and
- indirect costs: the costs that a scheme might impose on society, if it were to lead to adverse behavioural responses that increased the frequency or size of failure.

Insurance (or guarantee) costs

7.17 Guarantee schemes alter the magnitude, distribution and timing of costs borne by various agents by redistributing the losses associated with financial institution failures. There are a number of relevant parameters to consider in this regard which are listed in Box 7.2.

7.18 The cost impact of some of these parameters will be independent of the scheme, but others can be influenced through scheme design.

7.19 In addition to the aggregate level of insurance-related costs, it is also relevant to consider how choices about scheme funding could impact on the distribution of costs faced by individual scheme participants. A more detailed presentation of some technical issues surrounding estimates of insurance or guarantee costs is presented in a subsequent section. The range of issues surrounding funding and pricing are considered in Chapter 8.

Administration and compliance costs

7.20 Any scheme will naturally entail administrative and compliance costs, although the magnitude of these can be mitigated by design choices. At a broad level, a choice arises as to the appropriate roles and functions of a guarantee scheme administrator. For example, the HCSS scheme and the United Kingdom's (UKs) Financial Services Compensation Scheme (FSCS) both essentially operate as a 'cash box', determining eligibility of claims and administering payouts and levies (in the case of the UK). The US Federal Deposit Insurance Corporation (FDIC) demonstrates a different approach, whereby regulatory, supervisory, resolution and compensation functions are combined — at a higher headline cost.

7.21 The former approach may be suited to Australia's circumstances, given the well-developed prudential framework. Also, reflecting the relatively smaller size of our financial system and fewer firms, it may be attractive for any scheme to be 'brought off the shelf' only when needed, rather than being an enduring part of the regulatory architecture.

7.22 Minimising administrative and compliance costs is a goal which might be achieved by maintaining APRA as the sole prudential regulator and supervisor, with a scheme having no separate supervisory role. This requires clearly defined arrangements for cooperation between APRA and the scheme and well-specified governance arrangements.

Box 7.2: Insurance and guarantee costs — determining parameters

Total loss and loss mitigating parameters

- Market share of the failed firm — a co-determinant of the total loss in insolvency.
- Extent of insolvency — a co-determinant of the total loss in insolvency.
- Generosity of the scheme — determines the proportion of the total loss to be covered (that is, the total cost). This incorporates a number of scheme components, such as institutional and product coverage and thresholds).
- Closure rules — determine the point at which regulatory action is taken to prevent further losses.

Loss-sharing parameters

- Priority arrangements — determine whether, and the extent to which, certain creditors of the failed firm are the first to bear the loss (that is, to avoid a cost to a guarantee scheme).
- Coinsurance — determines the extent to which protected customers share the loss (that is, to avoid a cost of a guarantee scheme).
- Funding — determines how (at an aggregate level) taxpayers, industry or other external parties share the cost of a guarantee scheme.
- Pricing — determines the relative contributions to meeting costs borne by those participating in the scheme.

Timing parameters

- Contribution arrangements — determine when contributions are made, and the rate at which scheme assets are accumulated or scheme debt is retired.

7.23 There would be industry compliance costs in any additional requirements to inform consumers of the status of financial products and in ensuring the appropriate record-keeping and reporting arrangements were satisfied. The latter requirements need not be particularly onerous, but may require some additional information to that currently collected by APRA.

7.24 The clarity of powers and the roles and responsibilities of APRA and any scheme in terms of failure management and resolution processes would also be important determinants of administrative costs. The interaction between APRA, the scheme and the insolvency framework are similarly important. However, it is essential to note that the appropriate assessment of such failure management costs involves comparison with those arising in the absence of a guarantee scheme, and distinguishing additional costs from redistribution of costs.

7.25 These issues are discussed in more detail in the later Chapters addressing governance and accountability issues and regulatory implications.

7.26 Table 7.1 provides some estimates of costs associated with schemes found internationally. It is important to note that in some cases (such as the FDIC in the US) some part of those administration costs will be associated with supervision, inspection and liquidation activities of the guarantee scheme. In Australia, APRA-supervised institutions already pay levies to provide the resources for APRA to exercise its functions under the prudential framework.

Indirect costs

7.27 A guarantee scheme could also have a fundamental impact on the behaviour of financial system participants.

7.28 The practical impact of a limited explicit guarantee scheme would be to create a limited range of default-free (or with coinsurance, low default risk) financial products for certain agents in the economy. As noted in Chapter 4, by diluting the consequences of risk-taking, this can give rise to moral hazard and associated behavioural problems.

7.29 Any such effects must be assessed against the existing perceptions of relevant stakeholders about the safety of those products and whether these would change with the introduction of a guarantee scheme. It may be that some stakeholders already have perceptions of a relatively broad implicit guarantee, or misinterpret the level of protection afforded by the prudential

Table 7.1: International comparison of guarantee scheme administrative costs

			Insurance			
		Banking	Life insurance	General insurance	Investments	Total
Canada						
Financial year to 31/12/2002	Operating expenses	25,662	3,769			
CAN ('000)	Employees	92	N/A			
	Compensation paid	0	-6,200			
	Levies	75,679	0			
	Size of fund	1,102,324	121,999			
United Kingdom						
Financial year to 31/03/2003	Operating expenses	1,160	594	1,657	9,005	12,416
GBP ('000)	Employees					108
	Compensation paid	62	326	130,969	63,023	194,380
	Levies	0	0	-170	56,035	55,865
	Size of fund	9,406	2,653	95,187	10,726	117,972
United States						
Financial year to 31/12/2003	Operating expenses	935,080				
USD ('000)	Employees	5311				
	Compensation Paid	942,143				
	Levies	95,090				
	Size of fund	46,022,260				

Source: Banking: http://www.fdic.gov/about/strategic/report/2003annualreport — (excludes FSLIC resolution fund), Banking: http://www.cdic.ca/bin/cdicar_e.pdf Life Insurance: http://www.compcorp.ca/aboutus/CompCorp2002AnnualReport.pdf, All schemes: http://www.fscs.org.uk/files/documents/pdfs/wthgychlgsbgaor.pdf

framework and pay less regard to risk than those who believe that no such implicit guarantee exists.

7.30 Limiting the coverage of a scheme may mean that the behaviour of the price-setting participants in financial markets, typically involved in higher value transactions, is largely unaffected such that overall effects on the flow of funds and financial intermediation is broadly unchanged.

Estimating insurance or guarantee costs

7.31 The following section explores a number of possible methods for deriving estimates of the potential costs of guarantees. It presents and discusses the results of the approaches taken during the Study.

7.32 More detailed cost estimates would be necessary under any pre-funded scheme in order to determine the required level of aggregate contributions to meet expected payouts (and accumulate a pool of funds of the desired size). It is also desirable to understand cost implications under a post-funded model, in order to estimate the appropriate capital provisioning by covered institutions. Regardless of possible scheme funding arrangements, the necessary debate should benefit from a closer appreciation of how scheme design and other variables can affect the level of protection provided by, and cost of, a scheme. Mis-estimating the costs could also lead to problems with determining appropriate premiums or levies for any guarantee scheme (Laeven 2002).

7.33 The ***costs of a guarantee scheme*** arise from the failure of a financial institution. A useful starting point is thus the ***expected loss*** (EL) to creditors from the possible failure of a particular institution within some defined time horizon (such as a year). The expected loss can be expressed as the product of three factors:

EL = PD x LGD x EAD

Where:

PD is the ***probability of default*** (failure) over the specified time horizon;

LGD is the ***loss given default*** (defined below) and;

EAD is the ***exposure at default*** (or size of the institution as measured by liabilities).

7.34 The ***loss given default*** is an expression of the extent of insolvency, measured per dollar of liabilities, that is, the proportion of the failed firm's liabilities that cannot be met.

LGD = ((Liabilities - Assets)/Liabilities)[3]

7.35 A guarantee scheme has exposure to the possible failure of any of its members. The ***expected scheme cost*** will be less than the expected loss (to all liability holders) because of the interaction of two effects. First, it is necessary to account for the impact of the ***scheme design,*** reflecting the focus of a guarantee scheme towards certain customers rather than creditors generally. In general terms, this can be captured by an estimate of the proportion of liabilities covered by a scheme. That proportion will be determined by the relevant guarantee design variables, including product coverage and monetary thresholds on compensation.

7.36 Second, it is also necessary to allow for relevant ***redistribution factors***, which reduce the external funding requirement for any scheme providing protection to a designated subset of liabilities. These include the depositor preference provisions of the *Banking Act 1959*, any relevant priorities for insurance policyholders and any coinsurance under a guarantee scheme. Preference provisions reduce the likelihood of losses affecting the value of covered liabilities (since other creditors have lower priority as claimants). Coinsurance means that should the value of the covered liabilities be affected, those customers bear part of that loss.

Thus:

Expected Scheme Cost = Expected Loss to all Creditors

- Adjustments for Scheme Design/Coverage

- Adjustment for Redistribution Factors

7.37 The total expected cost of the scheme can be calculated as the sum of the expected cost associated with each member. If contributions from members are set equal to this amount then, ignoring administrative costs, the scheme would expect to break-even each year. (Note, however, that setting contributions this way assumes that the scheme provider should get no

3 This term provides only a technical expression for the point of insolvency. A more accurate legal definition might refer to the inability of an institution to meet its liabilities, 'as and when they fall due'. The simpler approach is taken for modelling purposes.

compensation for bearing the risk associated with actual costs deviating from those expected).

7.38 The expected cost of the scheme is perhaps best calculated as a per annum figure, even though failures may occur quite infrequently (much less than one per year). To do so requires an estimate of the probability of failure within a one year horizon and of the scale of losses involved.

7.39 Both the probability of failure and scale of losses will depend crucially on other aspects of the regulatory framework, including the role of market discipline, the performance of the board and management and the effectiveness of the prudential framework.

7.40 Clearly, estimating expected losses and costs is highly problematic. The probability of default, in particular, cannot be estimated reliably since past experience may be a poor guide to the future. This is especially so in Australia's case where past experience with failure is relatively limited, and there is no basis for expecting that any two failures would be alike or as likely.

7.41 Each country's financial system structure and regulatory framework is generally unique, so overseas experience may provide only limited guidance as to what to expect. There would also be methodological problems with applying parameters from overseas experience in any model in the Australian context.

7.42 Therefore, it appears necessary to consider a range of methods for estimating the costs or expected costs of a guarantee scheme. Some possible methods are as follows:

- scenario analysis;
- expected loss estimates;
- options pricing models; and
- mathematical simulation techniques.

Scenario analysis

7.43 One fairly simplistic method involves assuming that default of a single financial institution has occurred. This involves ignoring, for the time being, the probability or frequency of such an event occurring. It therefore provides a ***cost given default***, encapsulating the loss given default and exposure at default.

7.44 This analysis (explained further in Appendix 6.1) benchmarks costs associated with failure of various sized institutions against the aggregate profile of each industry sector. It can assist in understanding the range and industry level impact of total losses that might be associated with insolvencies in each sector, and how the existing safety net and various scheme design variables might serve to limit the total cost of a guarantee.

7.45 Assumptions are embedded within this analysis, including the priority of claims over the failed firm's assets (if any), the extent to which a scheme limits or targets compensation payouts, and the market structure of the sector or sub-sector in question.

7.46 A weakness of the approach is that it assumes that all firms in a particular sector or sub-sector are homogenous in their profile of assets and liabilities. This is obviously not the case in practice. The approach also assumes an instantaneous failure, rather than some time horizon over which losses accrue.

7.47 The output of this approach is a matrix of cost estimates, varying along the dimensions of market share and extent of insolvency of the hypothetical failed firm. It is not possible for the model to provide guidance as to the probability or likelihood of any particular result being achieved.

7.48 However, the major benefit of using the model is to show how the cost to a scheme is affected by factors such as scheme design and preference arrangements; and the impact of market structure upon scheme viability.

7.49 The model assumes that the following liabilities are covered by hypothetical guarantee schemes for each relevant industry sector or sub-sector.[4]

- Australian dollar deposits of households, private unincorporated businesses and community service organisations repayable in Australia held in transaction, savings, cash management, term deposit and retirement savings accounts with locally incorporated authorised deposit-taking institutions (ADIs).

- Outstanding claims under 'personal asset and income' insurance policies offered by APRA-regulated life insurance or general insurance companies.

- Third-party claims covered by liability insurance policies offered by APRA-regulated general insurance companies.

  – Note that the cost of providing interim cover for unexpired insurance policies has not been incorporated into the model at this stage.

- Savings and income products offered by APRA-regulated entities.

  – All savings and income products are included for modelling purposes, although only a subset of products, such as complying annuities and other capital-guaranteed products would be expected to meet the relevant tests for coverage. Further discussion is contained in Chapter 6.

7.50 The assumptions underpinning this analysis were presented in Tables 6.2, 6.4 and 6.5.

7.51 The results, presented in Table 7.2, demonstrate how:

- Preference arrangements (such as depositor preference) can provide a significant shield for any guarantee scheme, but the extent of protection depends on the financial diversity of the sector in question. In the case of major banks, an asset to liability ratio of 49 per cent must be reached before any scheme costs would arise; whereas for building societies and credit unions, the critical ratio is approximately 95 per cent. In the case of insurers, scheme costs are assumed to arise immediately beyond the point of

4 Note that due to difficulties in obtaining all relevant information, the modelling assumptions do not correspond perfectly with the product coverage discussion in Chapter 6. The key differences are noted as relevant. In addition, thresholds, coinsurance and eligibility criteria are yet to be incorporated into the model as further information is required.

insolvency (100 per cent) as there is not sufficient information to calculate the correspondence between policyholder liabilities and reinsurance assets.

  - The model ignores the fact that a guarantee scheme might still serve an important role in compensating protected customers earlier than would occur through a liquidation, and would subsequently recover such amounts from the assets of the failed institution.

  - The model also assumes that the profile of liabilities remains constant, whereas from international experience it appears quite common for the relative share of subordinate (non-preferred) liabilities to reduce prior to insolvency.

  - The model ignores the reality that, particularly for life insurance and general insurance failures, the costs would be spread over time. For example, compensation payments could reasonably be expected to run for 15 years or more.

- The capacity of a scheme to cope with a given failure is linked to the market structure of the sector in question. Where a sector has fewer, larger participants (that is, the largest firm has a high market share), its (hypothetical) failure would be more destabilising to remaining participants. For example, the market share of the largest building society or credit union is much less (say 10 per cent) than that of the market share of the largest major bank, life insurer or general insurer (say 20 per cent).

7.52 The size of the funding base is also important, with a broader base resulting in lower and presumably more stable premiums expressed relative to the funding base. For example, a general insurance guarantee scheme that is funded by all classes of insurance business is estimated to involve premia per dollar of the business included in the funding base in the order of 60 per cent of a scheme funded only by protected classes of business (that is, personal and liability classes).

7.53 In order to illustrate the different financial composition of the various sub-sectors, the model presents results on the assumption that there would be different schemes for each sub-sector. This should not be interpreted as being a preferred option. Were a single ADI scheme to be created, the financial exposure of a deposit insurance scheme to building societies and credit unions would be very low because of their relatively small size. The Study was not able to obtain the information necessary to run the scenario analysis for a single ADI scheme incorporating all of the component sub-sectors.

7.54 Scheme design variables, which reduce the proportion of liabilities covered by a scheme in a failure, reduce costs in a linear fashion. More restrictive scheme design (that is, incorporating monetary thresholds, coinsurance and other eligibility criteria) would further reduce the estimates.

Table 7.2: Scheme payout — percentage points of remaining industry eligible capital

Major Banks				Other Domestic Banks				Foreign Subsidiary Banks			
Market share	5%	15%	25%	Market share	5%	15%	25%	Market share	5%	15%	25%
Assets to liabilities				Assets to liabilities				Assets to liabilities			
95%	-	-	-	95%	-	-	-	95%	-	-	-
85%	-	-	-	85%	-	-	-	85%	-	-	-
75%	-	-	-	75%	-	-	-	75%	-	-	-
65%	-	-	-	65%	-	-	-	65%	-	-	-
55%	-	-	-	55%	-	-	-	55%	-	-	-
45%	0.9%	2.9%	5.5%	45%	3.0%	10.1%	19.2%	45%	2.4%	7.9%	15.0%

Building Societies				Credit Unions			
Market share	5%	15%	25%	Market share	5%	15%	25%
Assets to liabilities				Assets to liabilities			
95%	0.5%	1.7%	3.3%	95%	-	-	-
85%	5.7%	19.2%	36.3%	85%	4.7%	15.8%	29.9%
75%	10.9%	36.7%	69.3%	75%	10.0%	33.4%	63.1%
65%	16.2%	54.2%	102.3%	65%	15.2%	51.0%	96.3%
55%	21.4%	71.6%	135.3%	55%	20.4%	68.5%	129.5%
45%	26.6%	89.1%	168.3%	45%	25.7%	86.1%	162.7%

Life Insurance				General Insurance			
Market share	5%	15%	25%	Market share	5%	15%	25%
Assets to liabilities				Assets to liabilities			
95%	0.3%	1.1%	2.1%	95%	0.4%	1.5%	2.7%
85%	1.0%	3.3%	6.2%	85%	1.3%	4.4%	8.2%
75%	1.6%	5.5%	10.3%	75%	2.2%	7.3%	13.7%
65%	2.3%	7.6%	14.4%	65%	3.0%	10.2%	19.2%
55%	2.9%	9.8%	18.6%	55%	3.9%	13.1%	24.7%
45%	3.6%	12.0%	22.7%	45%	4.8%	16.0%	30.2%

The results show, for example, that (assuming the existing balance sheet structures prevail), a major bank with a 25 per cent market share would need to experience major losses (an asset to liability ratio (A/L) of less than 50 per cent) before creating costs for a guarantee scheme. In this case, if the A/L is 45 per cent, 5.5 per cent of the remaining sub-sector's regulatory capital would be consumed if the guarantee scheme was industry-funded.

Table 7.2: Scheme payout — percentage points of remaining industry liabilities (continued)

Major Banks				Other Domestic Banks				Foreign Subsidiary Banks			
Market share	5%	15%	25%	Market share	5%	15%	25%	Market share	5%	15%	25%
Assets to liabilities				Assets to liabilities				Assets to liabilities			
95%	-	-	-	95%	-	-	-	95%	-	-	-
85%	-	-	-	85%	-	-	-	85%	-	-	-
75%	-	-	-	75%	-	-	-	75%	-	-	-
65%	-	-	-	65%	-	-	-	65%	-	-	-
55%	-	-	-	55%	0.0%	0.0%	0.0%	55%	-	-	-
45%	0.1%	0.3%	0.5%	45%	0.3%	0.9%	1.4%	45%	0.3%	0.8%	1.3%
Building Societies				**Credit Unions**							
Market share	5%	15%	25%	Market share	5%	15%	25%				
Assets to liabilities				Assets to liabilities							
95%	0.0%	0.1%	0.2%	95%	-	-	-				
85%	0.4%	1.3%	2.2%	85%	0.4%	1.3%	2.1%				
75%	0.8%	2.5%	4.2%	75%	0.9%	2.7%	4.4%				
65%	1.2%	3.7%	6.2%	65%	1.4%	4.1%	6.8%				
55%	1.6%	4.9%	8.2%	55%	1.8%	5.5%	9.1%				
45%	2.0%	6.1%	10.2%	45%	2.3%	6.9%	11.5%				
Life Insurance				**General Insurance**							
Market share	5%	15%	25%	Market share	5%	15%	25%				
Assets to liabilities				Assets to liabilities							
95%	0.1%	0.2%	0.4%	95%	0.2%	0.5%	0.8%				
85%	0.2%	0.7%	1.1%	85%	0.5%	1.4%	2.3%				
75%	0.4%	1.1%	1.8%	75%	0.8%	2.3%	3.8%				
65%	0.5%	1.6%	2.6%	65%	1.1%	3.2%	5.3%				
55%	0.7%	2.0%	3.3%	55%	1.4%	4.1%	6.9%				
45%	0.8%	2.4%	4.1%	45%	1.7%	5.0%	8.4%				

The results show, for example, that (assuming the existing balance sheet structures prevail), a failure of a major general insurer with a 15 per cent market share and an asset to liability ratio (A/L) of 45 per cent would involve scheme costs equivalent to 5.0 per cent of the remaining insurers' liabilities. A 15 per cent market share is representative of the HIH Group of Companies experience, however, in that case the losses appear to have been higher than the scenarios presented, with assets representing perhaps only 20 per cent of liabilities.

Expected loss estimates

7.55 The overall cost of a guarantee scheme could be estimated using forecasts of expected payouts by the scheme. Probability of failure and loss given default of each institution in the scheme could be estimated using various techniques and expected scheme costs derived through aggregation. Alternatively, average data could be used. This might be based on historical information on the proportion of institutions failing each year, the average size of failed institutions, and the degree of insolvency, or estimates of the probability of failure and loss given default of an average size institution.

7.56 Expected loss approaches have two arguable shortcomings. First, they do not allow for the scheme operator to receive any reward for risk-bearing associated with deviations of actual costs from those expected. Second, they do not address the related question of how to create a capital base for the scheme to absorb unexpected losses.

7.57 An approach more aligned to credit risk assessment used by financial institutions is to augment the expected loss by a factor to compensate for the required rate of return on risk (or economic) capital provided by the scheme operator. Since that capital (fund reserves) can be invested in, for example, risk-free bonds, the adjustment factor involves applying the excess of the required return (r_K) over the risk-free rate of interest (r_F) to the scheme capital. The cost of a guarantee (paid at the start of the year) would then be derived as:[5]

$$\textbf{Guarantee Cost} = [\textbf{Expected Loss} + (r_K - r_F) \times \textbf{Economic Capital}]/(1+r_F)$$

7.58 If the economic capital for the scheme has been accumulated from contributions by members, a case may be made for equating r_K and r_F and using expected loss pricing,[6] although this ignores the risk posed by scheme insolvency if losses exceed economic capital. Kuritzkes, Schuermann and Weiner (2002) suggest that since the government is the ultimate guarantor of fund solvency, and can diversify the risk, expected loss pricing is appropriate.

7.59 Ignoring the cost of capital and using expected loss pricing is controversial, but has the advantage that it avoids problems associated with

5 If the premium (P) is received at the start of the year and invested with the capital reserves (K) at the risk free rate of return (r_F), the expected end of year cash flow (given an expected payout of EL) is: $(P+K)(1+ r_F) - EL$. If the required rate of return on capital is r_K, the zero NPV premium is derived from: $(P+K)(1+ r_F) - EL = K(1+ r_K)$, giving $P = EL/(1+ r_F) + K(r_K - r_F)/(1+ r_F)$.

6 If $r_K > r_F$ annual contributions would exceed expected payouts, generating a surplus requiring repayment to members.

determining the appropriate cost of capital (r_K). Its main deficiency is that it ignores unexpected losses which impose a cost (in the form of the opportunity cost of economic capital) on the scheme and which should therefore be incorporated into pricing.

Expected loss estimates and scenario analysis

7.60 It is possible to apply expected loss approaches to the scenario analysis outlined earlier — although subjective judgement is involved. The first step involves choosing a size of institution and degree of insolvency which is thought to best reflect the 'typical' failure in the industry. By then applying a probability of failure to that typical failure it is possible to derive an estimate of an expected loss and expected cost to the scheme. Given the subjective nature of such an approach it is not pursued further here.

Option pricing techniques

7.61 An alternative approach, favoured by financial economists, is to use an option pricing model to estimate the cost of a guarantee. This approach draws on the conceptual equivalence between providing a guarantee over liabilities of an institution and writing a put option[7] over the assets of the institution. (Further explanation is provided in Appendix 6.1).

7.62 In a simple version of this approach, applied to banks, where it is assumed that insured and uninsured deposits have priority over other creditors, the key parameters are the current market value of the institution's assets, the value of deposit liabilities, the volatility of asset values, the current level of interest rates, and the term over which the insurance applies. Option pricing theory provides a solution for the fair value of an institution's insurance premium, payable to the guarantee scheme, typically expressed as a number of basis points per dollar of insured deposits. A feature of the approach is that the fair value premium, per dollar of insured deposits, is invariant to the proportion of deposits which are insured.

7.63 Fair pricing of deposit insurance means the insurance premium is equivalent to the cost difference between issuing insured deposits at a risk-free rate of interest (possible because of the guarantee) and issuing uninsured

7 A put option is a contract which involves the writer, in return for receiving a premium from the option holder, undertaking an obligation to buy a financial instrument during a given period at a pre-determined price. Source: adapted from <http://www.anz.com.au/edna/dictionary.asp>.

deposits (in the absence of a guarantee scheme) at a higher interest rate which reflects the risk of default.

7.64 The option pricing model can be used to generate an implied estimate of ***probability of default*** and ***loss given default***.

7.65 The option pricing approach is based on the assumption that the guarantor is able to perfectly hedge the risk associated with the guarantee (by using the premium paid for the option guarantee to take a position in the underlying asset). Alternatively, if the option writer does not hedge the position, there is an exposure to risk associated with changes in the value of the underlying asset. This cost is reflected in the fair price calculation and will involve a risk premium over the simple expected loss approach.

7.66 In practice, the option pricing approach is complicated by the following issues.

- It has rather limiting assumptions concerning the term over which the insurance applies. (The simple model assumes a single, for example annual, period).

- It involves complications in terms of what closure rule applies, that is, the point at which regulatory action is taken. (The simple model assumes that closure occurs and the option is exercised at the end of the period if the institution's assets become worth less than the value of insured liabilities).

- It does not readily address the effect of closure on the market value of certain assets. (In particular, 'franchise value' where the market value of the organisation while it continues in operation exceeds its realisable value upon liquidation complicates matters).

- The value of assets and liabilities may behave quite differently to what is assumed in the model. In particular, asset values may exhibit marked instantaneous drops just prior to failure, while uninsured liabilities may be withdrawn by sophisticated investors (reducing the stock of assets and altering balance sheet relativities) prior to a failure. The applicability of the model's assumptions to the behaviour of insurance liability values is also open to debate.

7.67 More generally, a practical difficulty is that the market value of assets and asset volatility of a financial institution are not directly observable and can only, at best, be imputed from observation of the price and volatility of its

traded equity. Therefore, it is not possible to apply it directly to unlisted financial institutions. [8]

Box 7.2: Results from option pricing model

The fair value guarantee premiums derived from an option pricing approach are particularly sensitive to two key parameters, asset volatility (σ) and the ratio of priority liabilities or equivalently basis points per dollar (for example, deposits for ADIs, policyholder liabilities for life companies, all liabilities for general insurers) to assets (d).

Building societies and credit unions have, on average, a value of d in the range 0.85-0.9. Banks have much lower values due to their high level of non-priority liabilities and associated depositor preference buffer. Life and general insurance companies have values of d in the region of 0.7-0.8. The higher is d, the more expensive will be a guarantee, since there is a smaller buffer of non-priority liabilities to absorb declines in asset values (the model assumes the firm's equity buffer will have already been eroded).

Asset volatility (σ) describes the dispersion of possible rates of return on assets around their expected value. Higher values indicate more risky assets. Estimates of bank asset volatility (derived from bank equity price behaviour) in the region of 2-3 per cent per annum are typical, but assuming somewhat higher values may be appropriate to reflect risks not fully captured in the option pricing model. Figures of 2-3 per cent would seem appropriate for ADI's engaging in traditional lending activities. For insurance firms, the volatility concept relates as much to liabilities as to assets, and is best interpreted as a volatility of the capital position. A figure somewhat in excess of 7-8 per cent for general insurance and 4-5 per cent for life insurance is not unrealistic.

The table below demonstrates the fair value premiums for different values of d and σ, derived from a commonly used option pricing model of deposit insurance. The premiums are expressed as cents per $100 of guaranteed liabilities. Thus for an institution with d=0.925, σ = 3 per cent, (such that the fair value premium is 0.6 basis points) and total deposits of $1 billion of which 50 per cent were insured, the premium amount would be: $1,000 million x 0.5 x 0.00006 = $30,000.

8 Falkenheim and Pennacchi (2003) use a 'market comparable' approach to indirectly apply the option pricing approach to unlisted institutions.

Table 7.3: Guarantee costs — basis points per dollar of insured liability

Asset volatility (per cent)	Priority liabilities/assets				
	0.8	0.9	0.925	0.95	0.97
2	0.0	0.0	0.0	0.5	7.1
3	0.0	0.0	0.6	6.5	27.9
4	0.0	0.6	4.6	21.5	56.9
5	0.0	3.7	14.6	43.9	89.9

Mathematical simulations

7.68 Yet another approach is to view the overall exposure of a guarantee scheme as a portfolio of positions involving credit (counterparty) risk to participating institutions. By modelling that credit risk for each institution as some function of underlying economy wide and institution-specific factors, it is possible to derive a distribution of possible losses for the scheme. Such an approach can incorporate correlation effects (due to the role of economy-wide factors) and thus estimate risks to the scheme from the possibility of concurrent multiple failures.[9]

7.69 While this approach provides an estimate of the average (expected) cost of the scheme, its main benefit lies in deriving the probability distribution of actual costs around that average. A target level of fund reserves, which limits the probability of fund insolvency (due to an unexpected level of failures) to some desired small level can then be derived.

7.70 Common results from such modelling include the following:

- the required level of fund reserves will be larger the greater is the influence of economy-wide factors relative to idiosyncratic factors; and
- the greater is the concentration of the industry (when there are a fewer and/or relatively large institutions) the greater is the required level of fund reserves.

7.71 These results are important in considering funding and pricing of a scheme.

9 See Kuritzkes, Schuermann and Weiner (2002) for an application of this approach to the Federal Deposits Insurance Corporation.

Results from other studies and international experience

7.72 In assessing international experience with deposit insurance and insurance guarantee schemes, it is important to recognise that in other countries premiums often involve a component for prudential supervision. In Australia, this cost is already borne by financial institutions which pay annual statutory levies to cover APRA's costs. The additional cost from an Australian perspective would be primarily that associated with the insurance costs of a guarantee scheme rather than the prudential supervision costs.

7.73 A recent paper by the FDIC provides a summary of experiences with the 34 bank and thrift failures experienced in the US between 1997 and 2002 (FDIC 2003). This failure rate is around 0.2 per cent per annum (or 1 in every 500 institutions). While it is not suggested that Australia should expect to replicate this experience, the article provides some useful insights into the incidence and management of failure in practice.

7.74 One key insight from the study is into the loss given default that might be expected for deposit-taking institutions. Asset recoveries involved a write-down of a weighted average of 30.1 per cent of pre-failure assets. After allowing for closure and liquidation expenses, the average loss to non-equity stakeholders was in the order of 38 per cent of claims (shared between unsecured creditors, including the deposit insurance fund and uninsured depositors). Loss rates associated with larger institutions are found to be higher (in contrast to experience of earlier years), in part due to the complexity of their operations. The study also documents the fact that the actual value of assets post-failure might be quite different to that most recently reported.

7.75 It is noteworthy that since the early 1990s the US safety net has included national depositor preference, in addition to deposit insurance. Nonetheless, the balance sheets of failed institutions have not always contained sufficient subordinated liabilities to prevent losses to uninsured depositors or the FDIC, particularly once the costs of resolution are factored in. It should be noted that the balance sheet profile of these institutions may be quite different to that prevailing in Australia.

7.76 Bohn and Hall (1995, 1997) found that the typical resolution costs for failed property and casualty insurers in the US were much higher than those for banks, with deficiencies equal to about half of the pre-insolvency assets (that is, asset to liability ratios of 50 per cent or less). They also found some evidence that the existence of an insurance guarantee scheme embedded moral

hazard within the system, increasing the incidence and costs of insurance failures — with the problem being relatively worse for long-tail classes of insurance.

7.77 Ratings agencies are another potential source of information for the historical default rates and losses associated with corporate bonds. Some attempts have been made to incorporate this, and other financial market data into guarantee scheme cost estimates (FDIC 2000).

7.78 The general conclusion to be drawn from this evidence is that higher-rated institutions should logically pose a lower expected cost to any guarantee scheme, reflecting their lower probability of default and expected losses. Higher rated institutions, however, tend to be the largest competitors in a given industry and can significantly increase the capital base required for a scheme to deal with unexpected losses.

7.79 Applying this approach generally would not be possible, given that only the larger financial institutions obtain a credit rating. Moreover, this form of analysis focuses on the probability of a default in which creditors lose money (that is, an asset to liability ratio of less than one); and not the probability of a default in which depositors or a guarantee scheme experience losses (an even lower ratio). The differences between the two could be considerable given priority arrangements.

7.80 Another place to look in examining the likely cost of guarantee schemes is to the practitioners' experience, gathered from those countries with pre-funded, risk-based systems. The following table documents the estimated premiums which would apply for different categories of banks and thrifts based on expected loss pricing in the US.

Table 7.4: 'Expected Loss' based premiums in the US — 1984 to 1999 (basis points)

Capital	Supervisory rating		
	A	B	C
1. Well Capitalised	3.7	8.9	17.8
2. Adequately Capitalised	10.3	20.7	50.3
3. Undercapitalised	19.8	41.6	96.8

Source: Federal Deposit Insurance Corporation (FDIC), Keeping the Promise: Recommendations for Deposit Insurance Reform, April 2001.

7.81 These figures indicate the sensitivity of required premiums to the financial strength of the insured banks. On average the premium required to equate revenue with fund expenses and insurance losses over the period

1980-1999 was 11.2 basis points (FDIC 2000), compared to 1 basis point over the period 1934-1979. Much of that higher figure for 1980-1999 reflects the effects of the thrift crisis where there were many under-capitalised and poorly rated institutions which failed; and which pre-dated the introduction of depositor preference arrangements as a cost mitigation strategy.

7.82 Where private deposit insurance schemes co-exist with government-sponsored arrangements, such as in the US and Canada, estimates of the premiums range between 10c and 25c per $100 of deposits. The insurance companies offering such cover would usually limit the total amount payable in relation to the failure of an individual institution (FDIC 2000). It is not clear to what extent risk-based premiums may be implemented in private schemes.

7.83 In the academic literature, a variety of option pricing models have been used in estimating the fair value of deposit insurance. Estimates for the fair value of deposit insurance vary widely, depending upon the assumptions, model, bank characteristics and country considered.

7.84 Laeven (2002) documents the range of official premiums and provides estimates of the value of deposit insurance using the same option based approach for a sample of banks across 14 countries using data for the period 1991-1998. This study found that official premiums ranged between 0 and 72 basis points in the countries studied (up to 72 cents per $100 of deposits). Those schemes with premia at the upper end were generally in countries with less developed banking systems.

7.85 The estimated average value of deposit insurance from the option pricing approach across all countries considered was 35.1 basis points. Estimates for developed economies were generally much lower, at 0.18 basis points for Germany, 0.40 basis points for the US, 1.34 basis points for the UK, 2.37 basis points for France, and 12.4 basis points for Japan (0.18, 0.4 cents, 1.3 cents, 2.37 cents and 12.4 cents per $100 of deposits respectively).

7.86 In the case of the US, Laeven's estimate can be compared with other studies such as Pennachi (2000) who estimated an annual average fair premium for deposit insurance for a sample of listed banks of 4.06 basis points (4 cents per $100 of deposits) assuming a one year period between inspections and an initial capital adequacy ratio of 6.58 per cent. While his average fair value estimates range from around 1 to 8 basis points depending on assumptions made, they reinforce the impression that for a well-capitalised ADI sector, fair premiums are relatively low. Pennachi's results also

demonstrate significant variability in fair premiums across institutions, depending upon their risk characteristics (as also reflected in Table 7.3).

7.87 Laeven (2002) notes that assumptions made about frequency and strength of regulatory action in option pricing models generally leads to some underestimation of the value of deposit insurance.

7.88 Cummins (1988) developed an option pricing model for insurance guarantee funds, extending the deposit insurance approach to reflect uncertain insurance liabilities. Estimates of fair premiums depend upon asset to liability ratios and volatility of the capital position, but spanned the average premium charged by US Guarantee Funds between 1970-84 of 2. 5 basis points.

Discussion of results

7.89 The capital structure of financial institutions, together with regulatory actions are key considerations in understanding the potential losses in insolvency and the costs of any guarantee scheme.

7.90 Capital adequacy requirements provide the initial buffer to protect a financial institution's creditors against the unexpected. A large capital buffer should reduce the chance of a guarantee scheme incurring costs, particularly if regulators take action when that buffer approaches zero. In practice, regulatory action may not occur precisely at this point.

7.91 The profile of assets and liabilities of each institution is also relevant. Particularly relevant, given the design of the existing framework, are the physical location of assets and liabilities, the relative proportions of foreign and domestic business, and the extent of subordinated debt. Where applicable, priority arrangements such as depositor preference serve to create a further sizeable buffer against those customers losing money or a limited guarantee scheme incurring costs when an institution fails.

7.92 For example, the US introduced national depositor preference arrangements in the early 1990s and these appear to have been associated with sharp reductions in the costs of the FDIC.

7.93 Coinsurance arrangements, to the extent they were embedded in a guarantee scheme, would also reduce the costs of such a scheme by requiring customers to bear a proportion of losses.

7.94 While Australia's experience with financial institution failure is relatively limited, international experience provides some guide as to what to expect in terms of probability of failure and loss given failure and thus guarantee scheme costs. Nonetheless, even internationally, there have been few failures of highly rated financial institutions, so there is limited information upon which to assess the probability of failure among such institutions (which form a major part of Australia's financial system).

7.95 Loss given default is also difficult to estimate. The losses associated with particular historical instances of insolvency can be observed, as can the costs borne by guarantee schemes operating internationally. This may help in determining appropriate scenarios on which to focus attention. The size distribution of firms in a given sector is a relevant issue in considering the cost to remaining participants of a single failure. The capacity of a scheme to cope with multiple failures is difficult to model, but must not be ruled out.

7.96 An important lesson emerging from international experience for attempts to model guarantee scheme costs is that as an institution heads towards failure, it is common for significant changes in the balance sheet structure to be observed. First and foremost, there is no assurance that the value of assets will correspond with reported values. Australia's own experience with HIH showed that the true value of insurance liabilities can also deviate significantly from that reported.

7.97 The following quote from the FDIC (2000) is instructive in this regard:

> *'Reported information at times has been notoriously inaccurate. The FDIC's most costly bank failures in recent years have occurred rather abruptly among institutions that had consistently reporting strong earnings and profitability.'*

7.98 All of the theoretical models used to estimate guarantee costs rely on the use of accurate information, and concerns about the reliability of accounting data reported by financial institutions which fail serves to reduce confidence in the robustness of estimated results. Similarly, those models face significant practical challenges, such as the appropriate assumptions to make about the probability of failure. Changing assumptions about this probability — for example, from a 1 in every 250 year event per institution to a 1 in every 200 year event — has very significant implications for model estimates of scheme costs.

7.99 Models of guarantee scheme costs also require assumptions to be made about the losses associated with failure. The validity of results clearly hinge upon practical issues such as whether the assets will in fact be available

for distribution, whether the liabilities have been appropriately estimated, or whether possible changes in the balance sheet composition and scale as failure approaches have been allowed for in the modelling process.

7.100 The modelling approaches also tend to assume a gradual slide into failure. This may not adequately reflect the impact of once-off shocks that could affect asset or liability values nor capture the inter-relationships between fortunes of institutions covered by the scheme. In essence, the models tend to assume a world of orderly failure rather than crisis, and thus shed little light on the viability of such schemes in times of systemic crises.

7.101 Recognising all of these caveats, an assessment of evidence and theory suggests that in the current Australian environment, the cost of a limited explicit guarantee scheme would be very low — reflecting the low probability of failures which would involve losses to priority claimants (depositors or policyholders). Some observers may interpret that as indicating little reason for introduction of a scheme. Others, more concerned with clarifying the extent of government support arrangements and wary of statistical projections about the future, may view it as more relevant to the design and funding arrangements for a scheme.