

Annexure I.1: List of Reserve Bank Official Contributing to the Working Group

Officers

1. Shri B.B. Tiwari, Legal Adviser, Legal Department.
2. Shri Anand Sinha, General Manager, Department of Banking Supervision.
3. Shri Salim Ganghadharan, Deputy General Manager, Department of Banking Operations and Development.
4. Shri S.A. Dave, Deputy General Manager, Urban Banks Department.
5. Shri S.K.Kar , Assistant General Manager, Department of Banking Operations and Development.
6. Shri Somnath Chatterjee, Assistant Adviser, Department of Economic Analysis and Policy.
7. Shri L. Lakshmanan, Assistant Adviser, Department of Economic Analysis and Policy.
8. Shri B.S. Choudhary, Research Officer, Department of Economic Analysis and Policy.

Supporting Staff

1. Shri S.G. Kulkarni
2. Shri S.N. Shirodkar.

Annexure I.2. List of Organisations Providing Technical Material

1. International Monetary Fund, Washington D.C., U.S.A.
2. Federal Deposit Insurance Corporation, U.S.A.
3. Financial Services Authority, U.K.
4. Bank of Thailand.

Annexure II.1. Ratios of Deposit Coverage to per capita GDP in Selected Countries, 1999

	Coverage / 1		GDP per capita / 2		Ratio of deposit coverage
AFRICA					
Cameroon	\$	5,336	\$	600	8.9
Central African Republic	\$	3,557	\$	282	12.6
Chad	\$	3,557	\$	245	14.5
Republic of Congo	\$	3,557	\$	726	4.9
Equatorial Guinea	\$	3,557	\$	1,284	2.8
Gabon	\$	5,336	\$	4,024	1.3
Kenya	\$	1,757	\$	323	5.4
Nigeria	\$	588	\$	287	2.1
Tanzania	\$	376	\$	245	1.5
Uganda	\$	2,310	\$	280	8.2
ASIA					
Bangladesh	\$	2,123	\$	348	6.1
India	\$	2,355	\$	387	6.1
Philippines	\$	2,375	\$	880	2.7
Sri Lanka	\$	1,470	\$	825	1.8
Taiwan Province of China	\$	38,500	\$	11,633	3.3
EUROPE					
Austria	\$	24,075	\$	26,246	0.9
Belgium	\$	16,439	\$	24,947	0.7
Bulgaria	\$	1,784	\$	1,401	1.3
Croatia	\$	15,300	\$	4,688	3.3
Czech Republic	\$	11,756	\$	5,174	2.3
Denmark	\$	21,918	\$	33,307	0.7
Estonia	\$	1,383	\$	3,450	0.4
Finland	\$	29,435	\$	24,404	1.2
France	\$	65,387	\$	24,700	2.6
Germany	\$	21,918	\$	26,161	0.8
Greece	\$	21,918	\$	11,501	1.9
Hungary	\$	4,564	\$	4,631	1.0
Iceland	\$	21,918	\$	11,501	1.9
Ireland	\$	16,439	\$	21,788	0.8
Italy	\$	125,000	\$	20,633	6.1
Latvia	\$	830	\$	2,456	0.3
Lithuania	\$	6,250	\$	2,844	2.2
Luxembourg	\$	16,439	\$	39,233	0.4
Macedonia	\$	183	\$	1,480	0.1
Netherlands	\$	21,918	\$	24,143	0.9
Norway	\$	260,800	\$	32,986	7.9
Poland	\$	1,096	\$	3,896	0.3
Portugal	\$	16,439	\$	11,565	1.4
Romania	\$	3,600	\$	1,848	1.9
Slovak Republic	\$	7,900	\$	3,843	2.1
Spain	\$	16,439	\$	14,241	1.2
Sweden	\$	31,412	\$	25,743	1.2

Annexure II.2 : Effective Coverage, Formal Relationships, Legal Priorities, and Fund Targets

Region, Country, or Province	Deposit Accounts Covered %	Value of Deposits Covered %	Formal Relationship between DIA, BS, CB and MOF 1/	Information Sharing	Legal priority for Depositors?	Fund Target % of Deposits	Actual Fund % of Deposits
1	2	3	4	5	6	7	8
Macedonia	...	99% of deposits are in accounts covered by some insurance	DIS is a private share-holding company, overseen by the central bank.	Is inadequate: DIS is private company	Yes: for insured deposits	15% of insured deposits	1.4% of insured deposits
Noreway	99.8%	76.1%	Two DIAs are separate legal entities approved by MOF.CB & BS. Represented on the DIS's Board.	...	Yes, if bank is under public	1.5% deposits + 0.5% risk adjusted assets.	...
Romania	96%	...	DIA is independent de jure, but CB, which is BS, approves Bye Laws.	Yes	No	10% of personal deposits	...
Slovakia	...	47%	DIA is independent de jure, but is supervised by the CB.	...	No	1.5% of insured deposits	0.47% insured deposits
Sweedden	...	...	Small DIA is under MOF, consults with BS and shares its premises.	Yes	No	2.5% of total deposits	...
Turkey	100% real persons	100%	DIA managed and represented by CB, audited by the Treasury (BS).	Yes	Yes, do jure	No	5% of insured deposits
Ukraine	...	19%	The DIA is an independent organization run by the central bank	Yes, by low	...	...	10% insured deposits
UK	70% of claimants	...	DIA acts as a separate legal entity, staffed by BSA, CB is responsible only for monetary policy issues.	...	Yes, as DIA has priority over recoveries	£5m-£6m for admin. Expenses	<£3m
WESTERN HEMISPHERE							
Aregentina	95%	40%	DIA is authorized by CB and led representatives, cooperates with BS.	Yes	Yes	5% of total deposits	0.35% of total deposits
Canada	-85.90%	39.9%	CB, BS and MOF ex-officio sit on the Board of the independent DIA.	Yes	No, unsecured creditors	No.	C\$500m -0.16%
Chile	94% of time deposits	9% of value of time deposits	No DIA, close relationship between CB and BS	.Yes, significant exchanges	Yes	No	...
Columbia	98%	34%	The DIS is owned by the government and under the control of the MOF.	Probably	...	...	...
Jamaica	90%	33.5%	DIA is a separate corporation that cooperates with the CB, which is also the BS.	Yes, by law	No	Not de jure: but admin target 1% insured deposits	New scheme
Mexico	100%	100%	DIA is a trust, constituted by Federal Government and administered by CB, BS, MOF, CB are represented on the DIA's technical committee.	...	Yes	No	...
Trinidad & Tobago	96.3%	34.1%	DIA is a separate legal entity, but CB and MOF set the Bye Laws.	Yes, discretion of CB	Yes, for insured deposits.	No	...
United States	99% of accounts	65.2%	DIA is a separate legal entity, it cooperates with the CB and performs some BS functions.	Yes	Yes	By law: 1.25% of insured deposits	1.4% of insured deposits
Countries:36	Negligible to 100%	Negligible to 83%	Independent legal entities: 17 under central bank : 11 under MOF : 8 Under separate bank supervisor : 5	Yes : 20	Yes : 15 No : 18	17 have a target which ranges from 0.5% to 20%	Ranges from a deficit to 10% of insured deposits

Notes : ... Means data are not available.

1/ "DIA" is the deposit Insurance Agency, "BS" is the Banking Supervisory authority, "B" is the Central Bank, and MOF is the Ministry of Finance.

2/ The target is to be raised to this level by June 30, 2001.

3/ The DIS is only just going into operation.

Source: Garcia, G (1999) Deposit Insurance: A Survey of Actual and Best Practices', IMF Working Paper No.54, Washington D.C, p.43.

**Annexure II.3 : Best Practices for an Explicit System of Deposit Insurance
System in Normal Times and Departures from Them**

Best Practice	Departure from Best Practice	Practical Issues to be Resolved
1	2	3
1 Avoid incentive problems	Agency problems, moral hazard, and adverse selection	Which incentives are best? How to incorporate them in law and regulation
2 Define the system explicitly in law and regulation	The system is implicit and ambiguous	How to amend the laws and regulations to ensure transparency and certainty
3 Give the supervisor a system of prompt remedial actions	The supervisor takes no, or late remedial actions	Should these remedial powers be mandatory or discretionary?
4 Ensure that the supervisor resolves failed depository institutions promptly	Forbearance: banks that should be resolved continue to operate	The types and importance of closure policies. Should the DIA be involved?
5 Provide low coverage	There is high, even full coverage	Which types of institutions should be included in the DIS and which deposits should be covered; what is the appropriate level of coverage; should there be coinsurance?
6 Make membership compulsory	The scheme is voluntary	How to avoid adverse selection?
7 Pay deposits quickly	There are delays in payment	How to effect prompt payment?
8 Ensure adequate sources of funding to avoid insolvency	The DIS is under-funded or insolvent	Whether to choose a funded or <i>ex post</i> DIS? What are the appropriate levels for premiums and the accumulated fund? Whether to have back-up funding from the Government?
9 Risk-adjust premiums	Flat rate premiums	How to set premiums according to risk?
10 Organize good information	Bad information	What data do supervisors need?
11 Make appropriate disclosure	Little, or misleading disclosure	What should be disclosed and when?
12 Create an independent, but accountable DIS agency	Political interference and lack of accountability	Designing the DIA and its board of directors to avoid political interference, but promote accountability
13 Have bankers on an advisory not the main board	Bankers are in control	How best to avoid conflicts of interest?
14 Ensure close relations with the Lender of last resort and the supervisor	Relationships are weak	Poor lender-of-last-resort policies that raise costs to the DIS; sharing information
15 Begin an explicit, limited DIS when the banking system is sound	Begin when the system is weak so coverage is set high to avoid runs	How to resolve banking problems so that the DIS can commence?

Source: Garcia, G (1999) 'Deposit Insurance: A Survey of Actual and Best Practices', IMF Working Paper No.54, Washington D.C, p.9

Annexure IV.1

An Empirical Exercise to Determine Risk-Based Insurance Premium for Banks

In this note, we present empirical results of an exercise to determine Risk-based insurance premium using

(a) CAMELS Model and (b) Option Pricing Model

(a) CAMELS Model

For determining the premium (whether flat or risk based), the insurer exposure (expected loss) will have to be computed by forecasting income and expenses including outlays to compensate depositors of failed banks. This in turn would depend on the determination of solvency risk i.e. probability of failure. The skill in this regard is currently relatively undeveloped. In the United States, Section 302(a) of the Federal Deposit Insurance Corporation Improvement Act of 1991 mandated the introduction of risk-related premiums, and these have actually been applied since 1994. As show in Table A, the core of this system is the classification of banks into a total of nine risk categories by capital adequacy (three categories) and the evaluation of the supervisory authority (three categories) together with the setting of different insurance rates for each risk category.

Table A: Deposit Insurance Premium Rates in the United States (Fiscal 1996)
Basis Points

Bank Insurance Fund		Supervisory Groups		
		Healthy	Supervisory concern	Significant Supervisory concern
Capital Adequacy	Well capitalized	0	3	17
	Adequately capitalized	3	10	24
	Undercapitalised	10	24	27
Savings Association Insurance Fund (SAIF)		Supervisory Groups		
		Healthy	Supervisory concern	Significant Supervisory concern
Capital Adequacy	Well capitalized	23	26	29
	Adequately capitalized	26	29	30
	Undercapitalised	29	30	31

Note: The capital adequacy categories are defined by a combination of three criteria: (a) the capital (Tier 1) adequacy under the Basle Agreement; (2) the capital (Tier 1 +Tier 2) adequacy ratio under the Basle Agreement and (3) the leverage ratio (the capital (Tier1+Tier 2) divided by total assets). Financial institutions are categorized as “well capitalized” when (1) is at least 6.0 per cent, (2) is at least 10.0 per cent and (3) is at least 5.0 per cent. Financial institutions are categorized as “adequately capitalized” when (1) is at least 4.0 per cent, (2) is at least 8.0 per cent and (3) is at least 4.0 per cent. Financial institutions are categorized as “under capitalized” when (1) is less than 4.0 per cent, (2) is less than 8.0 per cent, or (3) is less than 4.0 per cent.

CAMELS Model in the Indian Context

In the Indian context, we have used a 3 x 3 matrix of CRAR (Tier 1) and CAMELS rating and the number of banks falling under each group is given in the matrix (See Table B).

Table B: The 3 x 3 Matrix used and the number of banks in each group: 1998-99

		Supervisory Ratings		
		A	B	C and below
		Number of Banks		
Capital Adequacy (Tier 1)	Well capitalized (More than 9 per cent)	12	37	7
	Adequately capitalized (Between 4 and 9)	1	15	20
	Undercapitalised (Less than 4)	-	-	4
		Deposits (Rs. Crore)		
		Supervisory Ratings		
		A	B	C and below
Capital Adequacy (Tier 1)	Well capitalized (More than 9 per cent)	50,982	94,576	12,729
	Adequately capitalized (Between 4 and 9)	2,915	12,8725	2,59,288
	Undercapitalised (Less than 4)	-	-	22,008

We simulated the data given in Table B with premium rate varying between 5 paisa for Rs. 100 and 24 paisa (for the riskiest bank) as shown in Table C which would yield an annual premium of Rs.930 crore for 1998-99. Given this premium structure, and projected deposit growth it would take 4 years to attain the prescribed 2 per cent DIF fund. These results are somewhat at variance to the results obtained using option pricing formula discussed below.

Table C: Proposed Premium Rates Per Rupee

		Deposits (Rs. Crore)		
		Supervisory Ratings		
		A	B	C and below
Capital Adequacy (Tier 1)	Well capitalized (More than 9 per cent)	0.0005	0.0006	0.0009
	Adequately capitalized (Between 4 and 9)	0.0010	0.0012	0.0016
	Undercapitalised (Less than 4)	0.0017	0.0019	0.0024

(b) Estimating Fair Premium Rates for Deposit Insurance using Option Pricing Theory

Fair premium rates for deposit insurance were calculated for three banks (Bank A, B and C) for the years 1997-98 and 1998-99, using option pricing theory (Black-Scholes formula) by adopting a somewhat modified version of the Merton¹ method. According to this method, the deposit insurance is expected to cover a bank's net liabilities [i.e. liabilities (B) *minus* assets (V)]. Assuming that B is constant and V follows a lognormal process, insurance premium is akin to a put option on the bank's assets, with the deposit insurance corporation (or government) being the option writer. The fair insurance premium, P, to be charged to the banks for this (put) option is given as:

$$P = B.e^{-rT}.N(x + \sigma_v.T^{0.5}) - V.N(x),$$

$$\text{where } x = \frac{\ln(B/V) - (r + 0.5.\sigma_v^2).T}{\sigma_v.T^{0.5}}$$

¹ Merton R.C., 'An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees,' *Journal of Banking and Finance*, 1, 1977, pp. 3-11.

In the above equation, 'r' is the continuously-compounded risk-free interest rate, ' σ_v ' is the volatility in the returns to the bank's assets, 'T' is the time to maturity of the bank's liabilities and 'N(.)' is the cumulative probability distribution for a standard normal distribution. It may be noted in this context, however, that σ_v cannot be easily obtained since the returns to a bank's assets are not directly observed. The standard technique in this case is to instead obtain the returns to the bank's equity and the volatility therein (σ_E) and then calculate σ_v via the theoretical relationship between the two. In this note, however, σ_v is assumed to be identical to σ_E , as a matter of simplification and first approximation.

Data on the daily stock prices in respect of each of the banks for 1997-98 and 1998-99 were culled out using the 'KnightRider' package. Daily stock market returns were then obtained as the natural logarithm of stock price relatives (ratio of stock prices of two consecutive trading days) and the standard deviation of this series was calculated. The standard deviation was then annualised by multiplying it by $T^{0.5}$. Two different sets of values were taken for time, 'T': in the first case, T was taken as the ratio of the number of 'trading' days (which varied between 231 and 241) to 365, and in the second case, T was taken as 1 (or 365 days). The risk-free interest rate, 'r', was taken as the yearly average implicit cut-off yield on 364-Day Treasury Bills [with the annual rate duly converted into a continuously-compounded one using the formula, $r_{\text{continuous}} = \ln(1+r_{\text{annual}})$]. Data on the banks' assets ('V') and liabilities including paid-up capital, were obtained from their respective balance sheets. 'B' was taken as total liabilities (= total assets) *minus* paid-up capital.

The deposit insurance premium rates (i.e. P/B) for the three banks for the years 1997-98 and 1998-99 for the two different values of T, using the option pricing formula, are set out below.

T = No. of Trading Days / 365			
	Bank A	Bank B	Bank C
1997-98	0.0780	0.1332	0.0710
1998-99	0.1254	0.1364	0.1024
T = 1 (or 365 days)			
1997-98	0.1178	0.2089	0.1228
1998-99	0.1952	0.2164	0.1703