RP09/94-95

Superannuation Schemes of UGC-funded Institutions - Analysis of Solvency Ratios

Research and Library Services Division
Legislative Council Secretariat
July 1995

Superannuation Schemes of UGC-funded Institutions
- Analysis of Solvency Ratios

Introduction

1. This paper, prepared at the request of the Legislative Council Panel on Education, is supplementary to the paper entitled "Superannuation Schemes of UGC-funded Institutions" presented to the Panel on 7 June 1995. It analyses very broadly factors accounting for the decline in solvency ratios of the superannuation schemes of the University of Hong Kong (HKU), Chinese University of Hong Kong (CUHK) and Hong Kong Polytechnic University (PolyU) in recent years.

Trend in solvency ratios

2. The solvency ratios of the superannuation schemes of HKU, CUHK and PolyU all showed increases between 1985 to 1987 and decreases from 1987 onwards. In the case of HKU, solvency ratio fell from 134% in 1988 to 99% - 100% in the last three years. As regards CUHK, the ratio decreased from 120% in 1987 to below 90% since 1990. The ratio of the scheme of the PolyU dropped from 158% in 1987 to below 100% since 1991.

Trends in scheme assets and liabilities

3. The solvency ratio compares the market value of a scheme's assets with its vested liabilities. It falls when:

(a) a scheme's assets increase, but at a slower rate than its liabilities; or

(b) a scheme's assets decrease at a faster rate than its liabilities.

4. The solvency ratios, asset values, and vested liabilities for the three universities over the period 1985 to 1994 are shown in Appendix I. It can be seen that for all the three universities, there were increases in scheme assets over the period, but the increases were outpaced by those in the vested liabilities. This has therefore resulted in the fall in solvency ratios.

5. Asset values of all three universities in fact showed spectacular gains at the beginning of the period, prior to the stockmarket crash of 1987. Growth in the remainder of the period was lack-lustre by comparison, with low or negative growth in 1988 and another year of unsatisfactory investment returns in 1991. After a comparatively strong year in 1992, scheme assets increased at a rate of between 12% to 19% in 1993 and 1994.

6. At the same time, however, liabilities increased steadily for all the three universities. In the case of HKU, its liabilities grew at a rate of around 20% a year up to 1990 but at a lower rate fluctuating around 15% in 1991 to 1993. The increase in liabilities further reduced in 1994, with a 10.3% increase over 1993. For CUHK, its vested liabilities grew at a rate of over 30% in 1986 to 1987 and over 20% 1990 and 1992. As regards PolyU, significant increases in liabilities of 53.7% and 35.2% were recorded in 1987 and 1990 respectively.

7. The average annual growth rates of the scheme assets and vested liabilities for HKU, CUHK and PolyU for the period June 1988 to June 1994 are as follows:

	HKU	CUHK	PolyU
Assets (%)	10.6	14.8	13.9
Vested liabilities (%)	16.1	17.4	19.6

Factors affecting changes in assets

Investment returns

8. Investment returns is the principal factor in determining the growth of scheme assets. Throughout the 1985/94 period, scheme funds at all three institutions have been managed by fund management and/or insurance companies, with the exception that prior to August 1985 scheme funds at PolyU were managed by the University's Investment Committee. The universities all employ several fund managers, which are among the major investment companies currently managing many other retirement scheme discretionary portfolios in Hong Kong.

9. No attempt is made to analyse the performance of individual fund managers. As far as the overall performance of the universities' schemes is concerned, poor investment return was revealed in the 1988 and 1991 valuations for all the three universities, reflecting the effects of the stockmarket crash in late 1987 and the Gulf crisis in late 1990. In the last few years, annual investment returns increased to double-digit level. The rate of return ranged from +10.3% to +20.7% for HKU, from +11.5% to +17.3% for CUHK and from +13.3% to +17.7% for PolyU. Such returns are comparable with the median returns of +12.5% to +17.9% obtained from the Measurement of Investment Performance (MIP) Survey for Hong Kong Retirement Schemes conducted by the Wyatt Company.

10. The average annual rates of return since the 1987 stockmarket crash are +11.2%, +10.9% and +11.9% for HKU, CUHK and PolyU respectively. These compare with the median return of +11.8% in the MIP Survey.

11. The rates of investment returns of the three universities as compared with the MIP Survey findings for 1986 to 1994 are given in Appendix II.

Factors affecting changes in liabilities

Salary changes

12. Salary increases of university staff reflect cost-of-living adjustments, seniority and promotional increments, and adjustments of the pay scale. Cost-of-living adjustments, which account for the bulk of the salary increases, are effective on 1 April each year, and follow the annual civil service pay adjustments.

13. The civil service pay adjustments for the ten years 1985-94 are shown in Appendix III. It can be seen that the largest increases took place in 1989 and 1990, at about 14% and 15% respectively, corresponding to the high inflation rate in the period. The five years 1989-93 witnessed double-digit increases, averaging 12.5%, 12.5% and 11.9% for the lower, middle and upper pay bands respectively.

14. In the period under study, there was also an one-off adjustment that took place on 1 October 1989, when a new Master Pay Scale was adopted as recommended by the 1989 Salary Structure Review by the Standing Commission on Civil Service Salaries and Conditions of Service. The overall scale realignment resulted in some job grades being revised up by one or two points along the Master Pay Scale, or, for most jobs, small pay increases of less than one point on the scale.

15. In addition, staff of PolyU had a special adjustment in October 1992 upon their conversion to the university pay scale. The realignment resulted in an estimated 3-4% salary increase on average for academic and equivalent administrative staff. Scheme members who were general grade staff were however not affected.

16. The increases in the average salary for the three universities in the period 1986 to 1994 are given in Appendix III. While salary increased at above the inflation rate in the period, investment returns are however not related to the inflation. This has given risen to little or negative real investment returns; affecting seriously the funding situation of the schemes. Indeed, the actuary of CUHK raised his concern about the impact of the escalation of salaries on the funding position of the CUHK scheme in his valuation reports in 1990 to 1992.

Changes in multiplication factor

17. In January 1986, the multiplication factors used to calculate final salary benefits in the HKU scheme were raised by 10% across-the board, from a range of 0.7 - 2.6 to the current range of 0.77 to 2.86. Factors in the CUHK scheme were increased by 10% in July 1985, also from 0.7 - 2.6 to 0.77 - 2.86. Factors for long-serving members upon normal retirement were raised further to 3.0 in July 1988. At PolyU, the factor for retirees or leaving members with more than 10 years of service was increased from 2.28 to 2.53 in July 1987.

18. Where scheme benefits are all calculated by the final salary formula, a 10% increase in multiplication factors had the effect of increasing total vested liabilities by 10% thereafter. As an indication, Appendix IV shows what the solvency ratios for HKU since 1986 would have looked like had the 10% increase not occurred, assuming no change in all other factors.

19. While such effects were no doubt taken into account by the actuaries when they advised in favour of the increases in benefits, the actual real rates of return turn out to be lower than were expected at the time when the increases in factors were proposed.

Scheme membership changes

Ageing effects

20. A scheme's vested liabilities grow with the ageing (in term of years of service) of its members.

21. In this respect the three universities have different experience, as indicated in Appendix V. For HKU, the average years of service of its scheme members remained steady at around 8 years for the period 1987 to 1994. A decreasing trend is noted for CUHK, with the average years of service fell from 9.1 in 1988 to 7.6 in 1994. As regards PolyU, the average years increased steadily from 5.5 in 1985 to 10.1 in 1994.

Departures

22. Information on departures of members from the superannuation scheme is not available from CUHK. For HKU, apart from the special departure of staff members on transfer to the Hospital Authority in 1994, the departure rate and the number of staff retired in the last few years were stable. As regards PolyU, the overall departure rate ranged from slightly over 10% to 13.2% in the last few years. In 1991 and 1992, there were only 3 and 4 retirement cases. The number increased to 15 in 1993 and 17 in 1994. As the average age of PolyU scheme members increases (from 34.7 years in 1985 to 42.4 years in 1994), the number of retirement may remain at this level or even increase further.

Concluding remarks

23. Major findings of this research regarding the factors affecting changes in the solvency ratio are summaried below:

On the asset side

- Investment returns reported in the 1988 and 1991 valuations were poor, reflecting the impact of the stockmarket crash and Gulf crisis in late 1987 and 1990 respectively

- Performance of the universities' fund management (on an aggregate instead of individual fund managers basis) was average, compared with other retirement fund management groups covered by the MIP Survey

On the liability side

- There were marked increase in salaries to adjust for cost-of-living corresponding to the high inflation, especially in 1989-1991

- Special upward adjustment due to the change in salary scale took place in 1989

- Special upward adjustment due to the conversion to the university salary scale for PolyU took place in 1992

- PolyU scheme members are ageing in terms of years of service

24. As benefits under defined benefits retirement schemes are related to the final salaries, it is important for a scheme's assets (through mainly its investment returns) to grow at a faster rate than its liabilities (relating mainly to salary increases).

25. The period under study coincides with that of high inflation. Salary increases of the universities, which adjust fully for the cost-of-living changes, had clearly outpaced the average investment returns, leading to a fall in the solvency ratio of their schemes.

26. Other factors, such as changes in multiplication factors and ageing of scheme members in the case of the PolyU also have some effects on the liabilities of the schemes, and in turn the solvency ratio.

RP09/94-95
Research and Library Services Division
Legislative Council Secretariat
July 1995

List of Appendices

Appendix I	Superannuation Scheme of the University of Hong Kong - Solvency Ratios, Assets and Vested Liabilities
	Superannuation Scheme of the Chinese University of Hong Kong - Solvency Ratios, Assets and Vested Liabilities
	Superannuation Scheme of the Hong Kong Polytechnic University - Solvency Ratios, Assets and Vested Liabilities
Appendix II	Investment Returns
Appendix III	Salary Increases
Appendix IV	The Effect of a Change in Multiplication Factors
Appendix V	Membership Characteristics of the HKU, CUHK and PolyU Superannuation Schemes
Appendix VI	Departures of Scheme Members

Superannuation Scheme of the University of Hong Kong - Solvency Ratios, Assets and Vested Liabilities

Valuation Date	Solvency Ratio (%)	Market Value of Assets		Vested Liabilities	
		$M	% Change Over Last Valuation	$M	% Change Over Last Valuation
Dec. 1985	127	812		638	
Dec. 1986	150	1144	+ 40.9	762	+ 19.4
Dec. 1987	NA	1252	+ 9.4	NA	NA
June 1988	134	1281	+ 2.3	954	NA
June 1989	117	1339	+ 4.5	1148	+ 20.3
June 1990	111	1525	+ 13.9	1378	+ 20.0
June 1991	97	1535	+ 0.7	1577	+ 14.4
June 1992	102	1853	+ 20.7	1818	+ 15.3
June 1993	99	2098	+ 13.2	2114	+ 16.3
June 1994	100	2341	+ 11.6	2331	+ 10.3
June 88/June 94 annualised	-	-	+ 10.6	-	+ 16.1

Sources: Actuarial valuations of the HKU superannuation scheme, 1988-94; Finance Office, HKU.

Superannuation Scheme of the Chinese University of Hong Kong - Solvency Ratios, Assets and Vested Liabilities

Valuation Date	Solvency Ratio (%)	Market Value of Assets		Vested Liabilities	
		$M	% Change Over Last Valuation	$M	% Change Over Last Valuation
June 1985	44	321		340	
June 1986	110	491	+ 53.0	446	+ 31.1
June 1987	120	718	+ 46.4	597	+ 33.9
June 1988	100	663	- 7.7	664	+ 11.1
June 1989	100	742	+ 11.8	739	+ 11.3
June 1990	96	879	+ 18.5	915	+ 23.9
June 1991	85	897	+ 2.0	1055	+ 15.3
June 1992	88	1119	+ 24.8	1275	+ 20.9
June 1993	87	1280	+ 14.4	1473	+ 15.5
June 1994	88	1520	+ 18.8	1735	+ 17.8
June 88/June 94 annualised	-	-	+ 14.8	-	+ 17.4

Source: Actuarial valuations of the CUHK superannuation scheme, 1985-94.

Superannuation Scheme of the Hong Kong Polytechnic University - Solvency Ratios, Assets and Vested Liabilities

Valuation Date	Solvency Ratio (%)	Market Value of Assets		Vested Liabilities	
		$M	% Change Over Last Valuation	$M	% Change Over Last Valuation
June 1985	119	178		150	
Feb. 1986	134	238	+ 33.9	178	+ 18.7
June 1987	158	432	+ 81.4	273	+ 53.7
June 1988	125	408	- 5.4	327	+ 19.9
Feb. 1989	124	456	+ 11.7	367	+ 12.2
June 1990	107	529	+ 16.2	497	+ 35.2
June 1991	93	547	+ 3.3	587	+ 18.2
June 1992	94	656	+ 20.0	699	+ 19.2
June 1993	92	749	+ 14.1	813	+ 16.2
June 1994	93	890	+ 18.9	958	+ 17.9
June 88/June 94 annualised	-	-	+ 13.9	-	+ 19.6

Source: Actuarial valuations of the PolyU superannuation scheme, 1985-94.

Appendix II

Investment Returns (%)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	6.88/6.94
HKU	+ 35.8 *	+ 6.4 *	+ 11.7 *	+ 6.0	+ 15.6	+ 1.3	+ 20.7	+ 10.3	+ 14.2	+ 11.2
CUHK	+ 45.2	+ 40.1	- 8.2	+ 7.7	+ 16.2	+ 0.2	+ 17.3	+ 11.5	+ 13.2	+ 10.9
PolyU	NA	+ 41.7 #	- 9.1	+ 12.3		+ 1.3	+ 17.7	+ 13.3	+ 15.3	+ 11.9
Wyatt MIP@ median return	NA	NA	+ 14.9 *	+ 7.8	+ 16.3	+ 0.1	+ 17.9	+ 12.5	+ 17.1	+ 11.8

Sources: Finance Office, HKU; *Report of the Trustees*, 1.1.88-30.6.90 of the HKU superannuation scheme; actuarial valuations of the CUHK superannuation scheme, 1986-92; Bursar's Office, CUHK; actuarial valuations of the PolyU superannuation scheme, 1987-93; Finance Office, PolyU.

The above percentages are annualised rates, for years ending June except where stated otherwise.
* For the calendar years 1986 and 1987 and the period Dec. 1987 / June 1988 respectively.
# For the period Feb. 1986 / June 1987.
@ The Measurement of Investment Performance Survey for Hong Kong Retirement Schemes, by The Wyatt Company (H.K.) Limited.
NA = Not Available

Appendix III

Salary Increases (%)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	6.88/6.94
HKU	+ 10.7*	+ 7.3*	+ 14.0*	+ 15.9	+ 17.7	+ 9.2	+ 7.9	+ 11.8	+ 12.0	+ 12.4
CUHK	+ 10.6	+ 6.8	+ 6.4	+ 18.8	+ 17.5	+ 11.4	+ 8.0	+ 9.9	+ 11.4	+ 12.8
PolyU										
-Average salary †	+ 4.8#	+ 7.8#	+ 7.0	+ 16.2		+ 9.3	+ 5.1	+ 11.9	+ 9.9	+ 11.3
-Continuing members ‡	NA	+ 9.6#	+ 11.5	+ 20.7		+ 15.5	+ 14.4	+ 14.2	NA	+ 17.1 ##
Civil Service Pay Adjustment (%), middle pay band	+ 7.0	+ 6.4	+ 9.9	+ 14.8	+ 15.0	+ 10.4	+ 11.2	+ 9.8	+ 9.5	+ 12.0
Hang Seng Consumer Price Index, % change year-on-year	+ 5.3	+ 6.4	+ 8.7	+ 10.9	+ 11.3	+ 11.1	+ 9.7	+ 9.5	+ 10.0	+ 10.4

Sources: Actuarial valuations of the HKU superannuation scheme, 1988-94; Finance Office, HKU; Bursar's Office, CUHK; actuarial valuations of the PolyU superannuation scheme, 1985-94; Civil Service Branch, Government Secretariat; *Hong Kong Monthly Digest of Statistics.*

The salary changes shown above are annualised rates, over the year ending June except where stated otherwise.
* For the calendar years 1986 and 1987 and the period 12.87/6.88 respectively.
# For the periods 6.85/2.86 and 2.86/6.87 respectively.
For the period 6.88/6.93.
† This is the change in average salary of all members.
‡ This is the salary change in respect of members in service throughout the inter-valuation period.
NA = Not available.

Appendix IV

The Effect of a Change in Multiplication Factors

With effect from 1 January 1986, the multiplication factors used in the calculation of Final Salary benefits in the University of Hong Kong staff superannuation scheme were increased by 10 per cent across-the-board, from a range of 0.7 to 2.6, to the current range of 0.77 to 2.86. The following table shows what the solvency ratios would be if vested liabilities were calculated with the factors before the change.

Date	Solvency ratios (%)	
	Actual	Using 1985 multiplication factors
31.12.86	150	165
31.12.87	NA	NA
30.6.88	134	148
30.6.89	117	128
30.6.90	111	122
30.6.91	97	107
30.6.92	102	112
30.6.93	99	109
30.6.94	100	111
31.3.95	99	109

NA = not available

Appendix V

Membership Characteristics of the HKU, CUHK and PolyU Superannuation Schemes

HKU				CUHK				PolyU			
Valuation date	No. of members	Average years of scheme service	Average age (years)	Valuation date	No. of members	Average years of scheme service	Average age (years)	Valuation date	No. of members	Average years of scheme service	Average age (years)
12.85	2473	NA	35.6	6.85	1562	NA	NA	6.85	1425	5.5	34.7
12.86	2574	NA	35.9	6.86	1647	NA	NA	2.86	1475	5.8	34.9
12.87	2605	8.0	36.6	6.87	1681	8.8	NA	6.87	1552	6.5	40.0
6.88	2612	8.1	36.8	6.88	1716	9.1	NA	6.88	1555	7.0	40.3
6.89	2660	8.2	37.1	6.89	1791	8.2	NA	2.89	1546	8.2	40.6
6.90	2709	8.2	37.6	6.90	1874	8.1	NA	6.90	1485	9.0	41.1
6.91	2829	8.0	37.5	6.91	1997	7.9	NA	6.91	1514	9.3	41.3
6.92	3074	7.8	37.8	6.92	2211	7.7	NA	6.92	1635	9.6	41.9
6.93	3173	7.9	38.3	6.93	2392	7.5	38.7	6.93	1686	9.6	41.9
6.94	3042	8.2	39.0	6.94	2521	7.6	39.0	6.94	1699	10.1	42.2

Sources: actuarial valuations of the HKU superannuation scheme, 1988-94; Finance Office, HKU: actuarial valuations of the CUHK superannuation scheme, 1985-94; Bursar's Office, CUHK: actuarial valuations of the PolyU superannuation scheme, 1985-94.

NA = not available.

Departures of Scheme Members

	1986	1987	1988	1989	1990	1991	1992	1993	1994
HKU									
Total No. of departures	123†	170†	212	355	340	330	267	310	416#
% of members	*4.9†*	*6.6†*	*8.1†*	*13.4*	*12.7*	*11.9*	*9.0*	*9.9*	*13.4*
Departures due to									
Retirement	NA	NA	NA	NA	NA	37	29	31	33
Resignations/terminations	NA	NA	NA	NA	NA	286	232	275	228
Others	NA	NA	NA	NA	NA	7	6	4	155#
CUHK	NA	NA	NA	NA	NA	NA	NA	NA	NA
PolyU									
Total No. of members	NA		142	201		161	202	186	170‡
% of members	*NA*		*9.1*	*13.2*		*10.7*	*12.8*	*11.2*	*10.0‡*
Departures due to									
Retirement	NA		9	11		3	4	15	17‡
Resignations/terminations	69		131	190		157	197	167	151‡
Others	NA		2	-		1	1	4	2‡

Sources: *Report of the Trustees*, 1991-94, of the HKU superannuation scheme; Finance Office, HKU; actuarial valuations of the PolyU superannuation scheme, 1986-94.
All figures are annualised, for years ending June except where stated otherwise.
NA = Not available.
† For the calendar years 1986 and 1987 and the period 12.87/6.88 respectively.
‡ For the period 6.93/4.94.
# Including 144 transfers to Hospital Authority.