INDICES TO THE COST OF VESTED PENSION BENEFITS

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INTRODUCTION

WHEN pension plans are established or modified, the actuary is frequently requested to evaluate the probable cost of various alternative vesting schedules, and he is often required to make his evaluation under circumstances that preclude a refined calculation. In addition, the complexity and time-consuming nature of the calculations usually prevent actuaries from making specific allowance for the cost of a pension plan's vesting provisions in the same manner that they traditionally have computed the effect of salary changes, of disability or death benefits, and so forth.

The primary purpose of this paper is to set forth one method of evaluating vested pension costs and to suggest a simple way for the actuary to make provision in his pension cost calculations for specific vesting schedules.

EVALUATION OF VESTED PENSION COSTS

In order to evaluate the long-term effect on pension plan costs of various vesting schedules and employment turnover characteristics, it was assumed for a typical plan that (1) entry age level annual costs provide a reasonable measure of long-range pension costs and (2) one level unit of pension benefit accrues for each year of service. With these basic assumptions, formulas were developed to derive level annual costs and corresponding accrued liabilities for retirement age 65 under ten different employment turnover assumptions for three basic vesting conditions:

Vesting Condition 1.—100 per cent vesting in accrued pension benefit at age z.

Vesting Condition 2.—50 per cent vesting in accrued pension benefit at age z and 10 per cent additional vesting each year thereafter until full vesting occurs at age $z + 5$.

Vesting Condition 3.—50 per cent vesting in accrued pension benefit at age z and 5 per cent additional vesting each year thereafter until full vesting occurs at age $z + 10$.

The basic costs were derived as follows:

Definition of Symbols

y = Age at entry into employment.

x = Attained age, $x > y$.

z = Age at which initial vesting occurs.

$q_x^{(d)}$ = Probability that a life age x will die before attaining age $x + 1$.

$q_x^{(w)}$ = Probability that a life age x will terminate employment before attaining age $x + 1$ for any reason other than death.

$q_x^{(T)}$ = Probability that a life age x will terminate before attaining age $x + 1$ for any reason, that is,

$$q_x^{(T)} = q_x^{(d)} + q_x^{(w)} .$$

$_n p_x$ = Probability that a life age x will survive to age $x + n$.

$$_n p_x = \prod_{t=0}^{n-1} (1 - q_{x+t}^{(d)}).$$

$q_x^{(ws)}$ = Probability that a life age x will terminate employment before attaining age $x + 1$ and survive to age $x + 1$.

$$q_x^{(ws)} \doteqdot q_x^{(w)}(1 - \tfrac{1}{2}q_x^{(d)}) .$$

NOTE.—The mortality rate from a standard mortality table is used in this paper both as a probability of death in the service table and as an annual rate of mortality operating independently of other causes.

$_n p_x^{(T)}$ = Probability that a life age x will still be employed at age $x + n$.

$$_n p_x^{(T)} = \prod_{t=0}^{n-1} (1 - q_{x+t}^{(T)}).$$

$(NC)_y^v$ = Level annual cost which will fund from entry age to retirement age 65 the pension benefit—with provision for a specified vesting schedule—of one unit per annum, payable monthly, for each year of service.

$(AL)_{y, x}^v$ = Accrued liability at attained age x for the pension benefits—less the value of any vested termination occurring before age x—provided by the level annual cost, $(NC)_y^v$.

<div align="center">FORMULAS</div>

<div align="center">VESTING CONDITION 1</div>

1. *Entry Age Level Annual Cost*

$$(NC)_y^v = \frac{(65 - y)\,\ddot{a}_{65}^{(12)} \cdot v^{65-y} \cdot {}_{65-y}p_y^{(T)}}{\displaystyle\sum_{k=y}^{64} v^{k-y} \cdot {}_{k-y}p_y^{(T)}}$$

$$\times \left[1 + \sum_{k=z}^{64} \frac{k - y}{65 - y} \cdot \frac{q_k^{(ws)} \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p_k^{(T)}} \right].$$

2. *Accrued Liability*

If $x \le z$, then

$$(AL)^v_{y,x} = (NC)^v_y \sum_{k=y}^{x-1} \frac{(1+i)^{x-k}}{{}_{x-k}p^{(T)}_k} = [(AL)^v_{y,x-1} + (NC)^v_y] \frac{1+i}{p^{(T)}_{x-1}}.$$

If $x > z$,

$$(AL)^v_{y,x} = [(AL)^v_{y,x-1} + (NC)^v_y$$
$$- (x-y-1)\ddot{a}^{(12)}_{65} \cdot v^{66-x} \cdot q^{(ws)}_{x-1} \cdot {}_{65-x}p_x] \frac{1+i}{p^{(T)}_{x-1}}.$$

VESTING CONDITIONS 2 AND 3

1. *Entry Age Level Annual Cost*

$$(NC)^v_y = \frac{(65-y)\ddot{a}^{(12)}_{65} \cdot v^{65-y} \cdot {}_{65-y}p^{(T)}_y}{\displaystyle\sum_{k=y}^{64} v^{k-y} {}_{k-y}p^{(T)}_y} \left[1 + 0.5 \sum_{k=z}^{64} \frac{k-y}{65-y} \right.$$

$$\left. \cdot \frac{q^{(ws)}_k \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p^{(T)}_k} + r \cdot \sum_{s=1}^{m} \sum_{k=z+s}^{64} \frac{k-y}{65-y} \cdot \frac{q^{(ws)}_k \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p^{(T)}_k} \right],$$

where $r = 0.10$ and $m = 5$ for Vesting Condition 2; $r = 0.05$ and $m = 10$ for Vesting Condition 3.

2. *Accrued Liability*

If $x \le z$, the formula is identical with that for Vesting Condition 1 for $x \le z$. If $z < x \le z + m$,

$$(AL)^v_{y,x} = \{(AL)^v_{y,x-1} + (NC)^v_y - [0.5 + r(x-z-1)]$$
$$\times (x-y-1)\ddot{a}^{(12)}_{65} v^{66-x} \cdot q^{(ws)}_{x-1} \cdot {}_{65-x}p_x\} \frac{1+i}{p^{(T)}_{x-1}},$$

where $r = 0.10$ and $m = 5$ for Vesting Condition 2; $r = 0.05$ and $m = 10$ for Vesting Condition 3.

If $x > z + m$, the formula is identical with that for Vesting Condition 1 for $x > z$.

DERIVATION OF INDICES OF VESTED PENSION COSTS

Having established the basic formulas for the entry age level annual costs and accrued liabilities, cost indices were developed from the following ratios for each of the stated vesting conditions:

Level Annual Cost Index

$$(I)_y^{NC} = \frac{(NC)_y^v}{(NC)_y},$$

where $(NC)_y$ represents the level annual cost of pension benefits with "no vesting" before age 65.

Accrued Liability Cost Index

$$(I)_{y,x}^{AL} = \frac{(AL)_{y,x}^v}{(AL)_{y,x}},$$

where $(AL)_{y,x}$ represents the "no vesting" accrued liability at attained age x for the pension benefits funded by $(NC)_y$.

The formulas for each index and comments on their characteristics are included in Appendix A.

CALCULATION OF COST INDICES

Using the above-defined relationship, calculations were made by the IBM 1620 computer to generate the indices shown in Appendix B for each of the employment turnover tables included in Appendix C. Mortality experience rates were assumed to follow the 1966 Group Annuity Table (Male 1951 Group Annuity Table with mortality improvement projected according to Scale C to 1966), and interest was assumed to average $3\frac{3}{4}$ per cent annually throughout life.

By appropriate choice of the indices shown in Appendix B, numerous sets of indices can be fixed for many typical types of vesting schedules. To illustrate how the tables can be used, tables of indices have been constructed for the following four vesting schedules, using the ten turnover tables included in Appendix B.

Vesting Schedule	Vesting Condition
A...............	100 per cent full and immediate vesting.
B...............	100 per cent vesting after fifteen years of service (no vesting before fifteen years of service).
C...............	50 per cent vesting after five years of service and 5 per cent additional vesting for each of the following ten years of service.
D...............	100 per cent vesting upon attainment of age 45 and ten years of service.

In the illustrations that follow, Table 1 includes the entry age level annual cost indices, $(I)_y^{NC}$, while Table 2 includes the corresponding accrued liability cost indices, $(I)_{y,x}^{AL}$ for the above vesting schedules. The tables of indices were constructed from Appendix B on the following conditions:

Vesting Schedule	Vesting Condition	Vesting Age
A............	1	Entry age
B...........	1	Entry age + 15
C...........	3	Entry age + 5
D...........	1	Entry age + 10 $\leqq$ Vesting age $\nleqslant$ 45

TABLE 1

ENTRY AGE LEVEL ANNUAL COST INDICES: $(I)_y^{NC} = (NC)_y^v/(NC)_y$

ENTRY AGE y	EMPLOYMENT TURNOVER TABLES									
	I	II	III	IV	V	VI	VII	VIII	IX	X
					Vesting Schedule A					
20........	1.1850	1.2465	1.2498	1.6634	1.6788	3.8353	4.0203	3.9309	3.6708	2.2295
30........	1.0445	1.1007	1.1033	1.2292	1.2371	1.6140	1.6496	1.6374	1.2540	1.4805
40........	1.0035	1.0308	1.0322	1.0646	1.0679	1.1434	1.1520	1.1483	1.0370	1.1515
50........	1.0000	1.0021	1.0029	1.0041	1.0058	1.0085	1.0119	1.0116	1.0000	1.0230
					Vesting Schedule B					
20........	1.0591	1.1330	1.1330	1.3012	1.3012	1.7900	1.7900	1.7900	1.3148	1.6267
30........	1.0024	1.0392	1.0392	1.0816	1.0816	1.1767	1.1767	1.1767	1.0427	1.1889
40........	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182
50........	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
					Vesting Schedule C					
20........	1.1347	1.2017	1.2017	1.5055	1.5055	2.7450	2.7450	2.7450	2.1094	1.9939
30........	1.0245	1.0775	1.0775	1.1704	1.1704	1.4195	1.4195	1.4195	1.1484	1.3645
40........	1.0007	1.0171	1.0171	1.0354	1.0354	1.0755	1.0755	1.0755	1.0143	1.0940
50........	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0070
					Vesting Schedule D					
20........	1.0031	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0532	1.2244
30........	1.0024	1.0392	1.0392	1.0816	1.0816	1.1767	1.1767	1.1767	1.0427	1.1889
40........	1.0000	1.0102	1.0102	1.0206	1.0206	1.0424	1.0424	1.0424	1.0000	1.0662
50........	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0010

TABLE 2

ACCRUED LIABILITY COST INDICES: $(I)_{y,s}^{AL} = (AL)_{y,s}^{v}/(AL)_{y,s}$
MALE LIVES

VESTING SCHEDULE A

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLES									
			I	II	III	IV	V	VI	VII	VIII	IX	X
20	20	25	1.1153	1.1817	1.1757	1.4727	1.4600	2.7786	2.7600	2.7667	2.1537	1.9910
		30	1.0411	1.1183	1.1163	1.3002	1.2980	2.0043	2.0173	2.0107	1.4200	1.7073
		35	0.9906	1.0707	1.0698	1.1797	1.1796	1.5640	1.5765	1.5704	1.1432	1.4649
		40	0.9655	1.0343	1.0339	1.0924	1.0929	1.2933	1.3026	1.2981	1.0261	1.2745
		45	0.9633	1.0056	1.0054	1.0264	1.0270	1.1126	1.1191	1.1160	0.9710	1.1314
		50	0.9750	0.9861	0.9861	0.9821	0.9825	0.9997	1.0040	1.0019	0.9459	1.0321
		55	0.9861	0.9825	0.9825	0.9707	0.9710	0.9618	0.9643	0.9631	0.9684	0.9852
		60	0.9941	0.9926	0.9926	0.9874	0.9875	0.9833	0.9844	0.9839	0.9862	0.9850
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999
30	30	35	1.0082	1.0667	1.0609	1.1508	1.1393	1.3925	1.3711	1.3775	1.1008	1.3477
		40	0.9828	1.0330	1.0309	1.0759	1.0723	1.1990	1.1962	1.1969	1.0077	1.2058
		45	0.9779	1.0062	1.0053	1.0184	1.0170	1.0622	1.0630	1.0626	0.9641	1.0935
		50	0.9856	0.9879	0.9874	0.9796	0.9791	0.9748	0.9761	0.9756	0.9454	1.0133
		55	0.9925	0.9845	0.9842	0.9711	0.9708	0.9508	0.9517	0.9513	0.9705	0.9771
		60	0.9970	0.9937	0.9936	0.9881	0.9880	0.9793	0.9796	0.9795	0.9878	0.9822
		65	1.0000	0.9999	0.9999	1.0000	0.9999	0.9999	1.0000	0.9999	0.9999	1.0000
40	40	45	0.9958	1.0110	1.0081	1.0238	1.0180	1.0546	1.0438	1.0483	0.9969	1.0792
		50	0.9969	0.9933	0.9923	0.9875	0.9856	0.9791	0.9759	0.9772	0.9709	1.0108
		55	0.9986	0.9890	0.9885	0.9785	0.9776	0.9590	0.9576	0.9582	0.9871	0.9797
		60	0.9995	0.9959	0.9958	0.9920	0.9917	0.9845	0.9839	0.9841	0.9952	0.9848
		65	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
50	50	55	1.0000	0.9971	0.9959	0.9942	0.9919	0.9884	0.9841	0.9843	1.0000	0.9972
		60	1.0000	0.9992	0.9990	0.9985	0.9980	0.9971	0.9960	0.9960	1.0000	0.9936
		65	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999

VESTING SCHEDULE B

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLES									
			I	II	III	IV	V	VI	VII	VIII	IX	X
20	35	25	1.0591	1.1330	1.1330	1.3012	1.3012	1.7899	1.7899	1.7899	1.3147	1.6266
		30	1.0591	1.1330	1.1330	1.3012	1.3012	1.7899	1.7899	1.7899	1.3147	1.6266
		35	1.0591	1.1330	1.1330	1.3012	1.3012	1.7899	1.7899	1.7899	1.3147	1.6266
		40	1.0084	1.0723	1.0725	1.1663	1.1671	1.4233	1.4262	1.4248	1.1375	1.3673
		45	0.9908	1.0293	1.0296	1.0726	1.0735	1.1916	1.1944	1.1931	1.0449	1.1871
		50	0.9920	1.0006	1.0007	1.0104	1.0111	1.0479	1.0500	1.0490	0.9936	1.0655
		55	0.9955	0.9905	0.9906	0.9867	0.9871	0.9893	0.9906	0.9900	0.9962	1.0038
		60	0.9981	0.9960	0.9960	0.9943	0.9944	0.9953	0.9959	0.9956	0.9983	0.9929
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	45	35	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		40	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		45	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		50	0.9992	1.0060	1.0061	1.0148	1.0151	1.0392	1.0406	1.0401	0.9908	1.0659
		55	0.9995	0.9939	0.9940	0.9897	0.9899	0.9858	0.9868	0.9865	0.9950	1.0049
		60	0.9998	0.9975	0.9975	0.9957	0.9958	0.9940	0.9944	0.9943	0.9979	0.9937
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
40	55	45	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182
		50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182
		55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9992
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999
50	65	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

TABLE 2—*Continued*

VESTING SCHEDULE C

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Tables									
			I	II	III	IV	V	VI	VII	VIII	IX	X
20	25	25	1.1346	1.2017	1.2017	1.5055	1.5055	2.7449	2.7449	2.7449	2.1094	1.9938
		30	1.0733	1.1477	1.1482	1.3625	1.3651	2.1370	2.1528	2.1455	1.5504	1.7706
		35	1.0180	1.0953	1.0958	1.2326	1.2354	1.6844	1.6985	1.6920	1.2569	1.5281
		40	0.9827	1.0493	1.0498	1.1246	1.1270	1.3626	1.3732	1.3683	1.0999	1.3108
		45	0.9743	1.0150	1.0154	1.0466	1.0484	1.1547	1.1622	1.1587	1.0200	1.1532
		50	0.9818	0.9918	0.9921	0.9944	0.9956	1.0254	1.0303	1.0280	0.9775	1.0452
		55	0.9899	0.9857	0.9858	0.9776	0.9784	0.9765	0.9793	0.9780	0.9868	0.9924
		60	0.9957	0.9939	0.9940	0.9904	0.9907	0.9897	0.9910	0.9904	0.9942	0.9881
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	35	35	1.0245	1.0774	1.0774	1.1704	1.1704	1.4195	1.4195	1.4195	1.1484	1.3644
		40	1.0001	1.0483	1.0485	1.1065	1.1075	1.2592	1.2643	1.2626	1.0619	1.2489
		45	0.9895	1.0187	1.0189	1.0435	1.0447	1.1131	1.1183	1.1166	1.0034	1.1315
		50	0.9921	0.9948	0.9950	0.9936	0.9945	1.0034	1.0075	1.0061	0.9681	1.0343
		55	0.9959	0.9880	0.9882	0.9785	0.9790	0.9664	0.9688	0.9679	0.9827	0.9881
		60	0.9983	0.9951	0.9952	0.9911	0.9913	0.9858	0.9868	0.9865	0.9929	0.9868
		65	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
40	45	45	1.0006	1.0171	1.0171	1.0353	1.0353	1.0754	1.0754	1.0754	1.0143	1.0939
		50	0.9994	1.0012	1.0013	1.0032	1.0034	1.0096	1.0104	1.0100	0.9887	1.0354
		55	0.9997	0.9938	0.9939	0.9882	0.9883	0.9784	0.9789	0.9787	0.9950	0.9963
		60	0.9999	0.9977	0.9977	0.9956	0.9956	0.9918	0.9920	0.9919	0.9981	0.9910
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
50	55	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0070
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9986
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999

VESTING SCHEDULE D

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Tables									
			I	II	III	IV	V	VI	VII	VIII	IX	X
20	45	25	1.0030	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0531	1.2243
		30	1.0030	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0531	1.2243
		35	1.0030	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0531	1.2243
		40	1.0030	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0531	1.2243
		45	1.0030	1.0473	1.0473	1.0985	1.0985	1.2139	1.2139	1.2139	1.0531	1.2243
		50	0.9995	1.0115	1.0115	1.0263	1.0264	1.0615	1.0619	1.0617	0.9989	1.0878
		55	0.9997	0.9966	0.9966	0.9956	0.9957	0.9971	0.9974	0.9972	0.9993	1.0162
		60	0.9999	0.9985	0.9986	0.9981	0.9981	0.9987	0.9988	0.9988	0.9997	0.9982
		65	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	45	35	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		40	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		45	1.0024	1.0392	1.0392	1.0815	1.0815	1.1767	1.1767	1.1767	1.0427	1.1889
		50	0.9992	1.0060	1.0061	1.0148	1.0151	1.0392	1.0406	1.0401	0.9908	1.0659
		55	0.9995	0.9939	0.9940	0.9897	0.9899	0.9858	0.9868	0.9865	0.9950	1.0049
		60	0.9998	0.9975	0.9975	0.9957	0.9958	0.9940	0.9944	0.9943	0.9979	0.9937
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
40	50	45	1.0000	1.0101	1.0101	1.0205	1.0205	1.0424	1.0424	1.0424	1.0000	1.0661
		50	1.0000	1.0101	1.0101	1.0205	1.0205	1.0424	1.0424	1.0424	1.0000	1.0661
		55	1.0000	0.9963	0.9963	0.9931	0.9932	0.9878	0.9881	0.9880	1.0000	1.0043
		60	1.0000	0.9986	0.9986	0.9974	0.9974	0.9954	0.9955	0.9954	1.0000	0.9940
		65	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999
50	60	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0009
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0009
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999

The preceding illustrative entry age level annual cost indices demonstrate that various turnover rates produce a wide range of variation in the relative costs of a given vesting schedule. Of course, it is important to recognize that, for a specific vesting schedule, an increase in the cost index, $(I)_y^{NC}$, resulting from an increase in the level of turnover rates, does not mean that the actual dollar cost of vesting increases in the same manner. This is true because a higher level of turnover rates increases the relative cost of a vesting schedule, but, at the same time, decreases the relative cost of the retirement pension. For example, for Vesting Schedule A, the entry age 20 level annual cost index for Turnover Table I is 1.1850, while the corresponding index for Table V is 1.6788. From Appendix D the "no vesting" level annual costs for these same turnover tables are 32.6048 and 19.1523, respectively. Using these factors, the entry age 20 level annual cost of vesting for Vesting Schedule A is 6.0319 (= 0.1850 × 32.6048) for Table I and 13.0006 (= 0.6788 × 19.1523) for Table V. Thus, while the relative value of the vested pension benefits increases 266.9 per cent [= (0.6788 − 0.1850)/0.1850] because of the change in turnover tables, the actual dollar increase in the cost of vested pension benefits is 115.5 per cent [= (13.0006 − 6.0319)/6.0319].

The tables of accrued liability cost indices, $(I)_{y,x}^{AL}$, vary even more widely than the entry age level annual cost indices. Naturally, when the entry age level annual cost for a specific vesting schedule generates a level annual cost index greater than 1.0000, the accrued liability cost index has to be less than 1.0000 at those durations where the tabular turnover rates are small or nonexistent. For example, using the same entry age 20 annual cost indices in the above example, the accrued liability cost index for Table I is first below 1.0000 at about duration 10 while the corresponding index for Table V decreases below 1.0000 between duration 20 and 25. In other words, considerably more time is required for the Table V accrued liability cost index to become less than 1.0000 than is required for the Table I index, because the Table V turnover rates are considerably higher and the turnover rates continue to higher attained ages.

EFFECT ON INDICES OF CHANGES IN MORTALITY AND INTEREST ASSUMPTIONS

By examination of the formulas in Appendix A, it can be observed that level annual cost indices, $(I)_y^{NC}$, are not affected by changes in the interest assumption. These indices are a function only of the mortality and turnover rate assumptions for a particular vesting age. However, the accrued liability cost indices are influenced by the interest assumption since the factor $[\ddot{a}_{x:\overline{65-x}|}^{(T)} \div \ddot{s}_{y:\overline{x-y}|}^{(T)}]$ is involved for all $x > z$. It also should be noted

that the accrued liability cost indices are the same as the level annual cost indices for all $x \leqq z$ for any given combination of mortality and turnover assumptions.

In order to evaluate the effect on the cost indices of changes in interest and mortality assumptions, indices were calculated for numerous turnover tables and entry age/vesting age combinations on both the 1966 Group Annuity Table and the 1937 Standard Annuity Table at $2\frac{3}{4}$ per cent interest per annum. A simple comparison of the resulting indices illustrates the effect on the cost indices of a change in the mortality factor, while a comparison of the results for the 1966 Group Annuity Table at $2\frac{3}{4}$ per cent per annum with the indices shown in Appendix B indicates the effect of a change of 1 per cent in the interest factor.

TABLE 3

LEVEL ANNUAL COST INDICES—TURNOVER TABLE VI

ENTRY AGE	VESTING AGE	VESTING CONDITION 1		VESTING CONDITION 2		VESTING CONDITION 3	
		1937 S.A.	1966 GAT	1937 S.A.	1966 GAT	1937 S.A.	1966 GAT
20	20	3.8481	3.8353	3.6960	3.6841	3.4728	3.4620
	30	2.3374	2.3325	2.1637	2.1595	2.0595	2.0558
	40	1.4466	1.4453	1.3732	1.3722	1.3279	1.3271
30	30	1.6160	1.6140	1.5944	1.5925	1.5537	1.5520
	40	1.3384	1.3375	1.2887	1.2879	1.2542	1.2536
	50	1.0570	1.0570	1.0367	1.0366	1.0326	1.0326
40	40	1.1437	1.1434	1.1365	1.1362	1.1216	1.1213
	50	1.0425	1.0424	1.0276	1.0276	1.0244	1.0244
50	50	1.0084	1.0085	1.0063	1.0064	1.0053	1.0053

NOTE.—Although the above indices were calculated using a $2\frac{1}{4}$ per cent per annum interest factor, the indices generated for the 1966 Group Annuity Table are identical with the indices included in Appendix B, which were based on a $3\frac{1}{4}$ per cent interest assumption.

Effect of a Change in Mortality Assumption

In general, the mortality factor has little bearing on the cost indices because the cost of a vesting schedule is most significant at the younger ages, where employment turnover rates are usually substantial and where mortality rates are very low.

Tables 3 and 4 compare for several entry age/vesting age combinations the results of calculations for a moderately heavy turnover table, Turnover Table VI. This simple comparison illustrates that differences in pre-retirement mortality levels have virtually no effect on level annual cost indices and little effect on accrued liability cost indices. In other words, even though level annual costs and accrued liabilities differ significantly with changes in mortality assumptions, the cost indices are

practically independent of mortality—whether male or female, the Standard Annuity Table or the 1951 Group Annuity Table (with or without provision for mortality improvement).

Effect of a Change in the Interest Assumption on the Accrued Liability Indices

Although a change of 1 per cent per annum in the interest assumption has more significance than a change from the 1966 Group Annuity Table to the 1937 Standard Annuity Table, even a combination of the most

TABLE 4

ACCRUED LIABILITY COST INDICES—TURNOVER TABLE VI

ENTRY AGE	VESTING AGE	DURA- TION	VESTING CONDITION 1		VESTING CONDITION 2		VESTING CONDITION 3	
			1966 GAT 2¼ Per Cent	1937 S.A. 2¾ Per Cent	1966 GAT 2¼ Per Cent	1937 S.A. 2¾ Per Cent	1966 GAT 2¼ Per Cent	1937 S.A. 2¾ Per Cent
20	20	5	2.7337	2.7488	2.8345	2.8483	2.7618	2.7741
		10	1.9492	1.9641	1.9878	2.0017	2.0444	2.0569
		15	1.5142	1.5278	1.5346	1.5474	1.5646	1.5762
		20	1.2525	1.2642	1.2647	1.2758	1.2826	1.2927
		25	1.0809	1.0906	1.0886	1.0977	1.0999	1.1082
		30	0.9769	0.9841	0.9815	0.9885	0.9886	0.9950
		35	0.9470	0.9520	0.9498	0.9546	0.9539	0.9584
		40	0.9763	0.9789	0.9775	0.9800	0.9794	0.9817
		45	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	40	5	1.4453	1.4465	1.3722	1.3732	1.3270	1.3279
		10	1.4453	1.4465	1.3722	1.3732	1.3270	1.3279
		15	1.4453	1.4465	1.3722	1.3732	1.3270	1.3279
		20	1.4453	1.4465	1.3722	1.3732	1.3270	1.3279
		25	1.2021	1.2035	1.2058	1.2069	1.1831	1.1840
		30	1.0529	1.0540	1.0552	1.0562	1.0566	1.0575
		35	0.9916	0.9924	0.9930	0.9937	0.9938	0.9944
		40	0.9962	0.9966	0.9968	0.9972	0.9972	0.9975
		45	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

liberal vesting schedule (100 per cent full and immediate vesting) and youngest entry ages generates indices that differ by less than 5 per cent. As the difference between entry age and vesting age increases, the differences between indices diminish rapidly. Also, as the turnover rates decrease, the accrued liability cost indices converge. Table 5 shows the indices developed for entry age 20 and vesting ages 20 and 40 for Turnover Table VI.

When one recognizes the degree of error "built into" any employment turnover assumption, it is reasonable to conclude that a single set of accrued liability cost indices could be used for actuarial valuations with widely different interest bases.

As a practical matter, most larger plans provide vesting only after a minimum period of five or ten years of participation, and this fact alone minimizes the differences between accrued liability cost indices generated by different interest rate assumptions. In most instances the differences between indices will be within 1–2 per cent.

POSSIBLE APPLICATIONS OF VESTING COST INDICES

Because of the complexities of calculating the costs related to specific vesting schedules, few actuaries have been able to do more than make

TABLE 5

ACCRUED LIABILITY COST INDICES—TURNOVER TABLE VI
1966 GROUP ANNUITY TABLE

ENTRY AGE	VESTING AGE	DURATION	VESTING CONDITION 1		VESTING CONDITION 2		VESTING CONDITION 3	
			2¼ Per Cent	3¾ Per Cent	2¼ Per Cent	3¾ Per Cent	2¼ Per Cent	3¾ Per Cent
20	20	5	2.7337	2.7786	2.8345	2.8692	2.7618	2.7904
		10	1.9492	2.0043	1.9878	2.0374	2.0444	2.0858
		15	1.5142	1.5640	1.5346	1.5807	1.5646	1.6052
		20	1.2525	1.2933	1.2647	1.3029	1.2826	1.3170
		25	1.0809	1.1126	1.0886	1.1184	1.0999	1.1270
		30	0.9769	0.9997	0.9815	1.0033	1.9886	1.0085
		35	0.9470	0.9618	0.9498	0.9638	0.9539	0.9668
		40	0.9763	0.9833	0.9775	0.9842	0.9794	0.9855
		45	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	40	5	1.4453	1.4453	1.3722	1.3722	1.3270	1.3270
		10	1.4453	1.4453	1.3722	1.3722	1.3270	1.3270
		15	1.4453	1.4453	1.3722	1.3722	1.3270	1.3270
		20	1.4453	1.4453	1.3722	1.3722	1.3270	1.3270
		25	1.2021	1.2049	1.2058	1.2077	1.1831	1.1847
		30	1.0529	1.0560	1.0552	1.0577	1.0566	1.0588
		35	0.9916	0.9940	0.9930	0.9949	0.9938	0.9955
		40	0.9962	0.9973	0.9968	0.9978	0.9972	0.9980
		45	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

rough approximations of the cost of vesting. Actuaries often make provision for a specific vesting schedule by using a turnover table which is somewhat more conservative than the anticipated turnover experience. Sometimes turnover tables are truncated at an age close to the average age at which the actuary anticipates benefits will become 100 per cent vested, or the turnover rates are graded to correspond roughly to the incidence of a graduated vesting schedule.

The author believes that the vesting cost indices in Appendix B can help the pension actuary obtain a reasonably accurate measure of the cost of vested pension benefits and eliminate the need for rough approxima-

tions. As stated previously, the indices of vesting costs relate to three basic vesting conditions and the specific levels of employment turnover. However, by appropriate choice of entry age, turnover table, vesting condition, and vesting age, vesting cost indices can be obtained that will be representative of the indices for male and female lives that would be generated by most combinations of mortality, interest, and turnover assumptions in use by pension actuaries today.

Illustration of the Use of Cost Indices

To develop a simple example of how the indices can be used, assume the following situation:

1. A plan provides a level unit of pension benefit for each year of service.
2. The entry age normal actuarial cost method is used.
3. Turnover Table IV from Appendix C applies.
4. Mortality experience rates follow the 1966 Group Annuity Table.
5. Interest averages $3\frac{3}{4}$ per cent annually.
6. All employees are males.
7. Expenses average 5 per cent of the level annual costs.
8. 50 per cent vesting in accrued pension credits occurs upon completion of five years of service and 10 per cent additional vesting accrues for each of the following five years of service. (Vesting Condition 2—Vesting age equals Entry age + 5).
9. Employee data are:

Entry Age	Attained Age	Number of Employees
20	25	30
25	30	25
30	40	20
35	45	15
40	50	10

Using the entry age level annual costs and accrued liabilities for Turnover Table IV from Appendix D, the normal cost and accrued liabilities—without provision for vesting—can be calculated. By multiplying each of the resulting costs by the appropriate index from Appendix B, the costs of the plan with the specified vesting schedule can be derived (for example, see Tables 6 and 7). These calculations show that the particular vesting schedule/turnover table combination increases the "no vesting" level annual cost by 22.8 per cent and increases the related accrued liability cost by about 14.0 per cent. Obviously, such simple assumptions will never exist in actual practice, and so the indices could rarely be taken directly

from the table without modification. As a practical matter, the vesting cost indices can be applied quite easily. For example, the actuary can make his cost calculations without provision for vesting; summarize his calculation results into five-year entry age groupings (i.e., ages 18–22, 23–27, etc.); and apply the level annual cost indices for the appropriate vesting condition and turnover table to the summarized level annual costs of each entry age grouping.

TABLE 6

LEVEL ANNUAL COST CALCULATION

Entry Age y (1)	"No Vesting" Level Annual Cost/Employee (2)	No. Employees (3)	"No Vesting" Level Annual Cost [=(2)×(3)] (4)	$(I)_y^{NC}$ Entry Age Level Annual Cost Index (5)	"With Vesting" Level Annual Cost [=(4)×(5)] (6)
20......	19.7587	30	592.761	1.5414	913.682
25......	29.6850	25	742.125	1.3204	979.902
30......	40.6931	20	813.862	1.1860	965.240
35......	52.4397	15	786.595	1.0990	864.468
40......	64.8032	10	648.032	1.0421	675.314
		100	3,583.375	....	4,398.606

TABLE 7

ACCRUED LIABILITY COST CALCULATION

Entry Age y (1)	Attained Age x (2)	"No Vesting" Accrued Liability/ Employee (3)	No. Employees (4)	"No Vesting" Accrued Liability [=(3)×(4)] (5)	$(I)_{y,x}^{AL}$ Accrued Liability Cost Index (6)	"With Vesting" Accrued Liability [=(5)×(6)] (7)
20.....	25	151.0471	30	4,531.413	1.5413	6,984.267
25.....	30	209.0651	25	5,226.627	1.3203	6,900.716
30.....	40	656.5156	20	13,130.312	1.1110	14,587.777
35.....	45	791.7739	15	11,876.608	1.0441	12,400.366
40.....	50	931.2956	10	9,312.956	1.0044	9,353.933
			100	44,077.916	....	50,227.059

In the same manner, the accrued liability costs—without provision for vesting—can be summarized into similar attained age groupings for each entry age grouping to develop the corresponding accrued liabilities.

Actually, there are numerous modifications of the indices shown in Appendix B that may be made to obtain measures of the cost of different types of vesting schedules. For example, assume that a vesting schedule

provides for 10 per cent vesting in accrued pension credits for each completed year of service. The level annual cost index for this vesting schedule can be obtained by modifying indices for Conditions 1 and 3. That is, when vesting age equals the entry age, the modified index equals

$$1 + 2 \cdot \{[(I)_y^{NC, \text{ Vesting Condition 3}} - 1] - 0.50[(I)_y^{NC, \text{ Vesting Condition 1}} - 1]\}.$$

For Turnover Table V and entry age 20, the modified index would be

$$= 1 + 2\ [(1.6226 - 1) - 0.5\ (1.6788 - 1)]\ ;$$
$$= 1 + 2\ [0.6226 - 0.5\ (0.6788)]\ ;$$
$$= 1 + 2\ [0.6226 - 0.3394]\ ;$$
$$= 1.5664.$$

COMMENTS ON THE USE OF COST INDICES

An examination of the assumptions used in this paper to derive the indices of pension costs will demonstrate that they have certain limitations:

1. The cost indices included in this paper are applicable directly only to the entry age normal actuarial cost method.
2. Cost indices have been developed only for certain employment turnover rate assumptions, and so the indices may not be appropriate for some actuarial valuations. It is hoped that the variety of turnover tables will allow the "mixing" of entry age cost indices so that reasonable approximations may be obtained to the cost of various vesting schedules.
3. Cost indices have been developed only for retirement age 65 and only for three basic vesting conditions.
4. The cost indices are based on the assumption that a level unit of pension credit is earned for each year of service, but this assumption may not be valid in many situations; for example, where a flat pension benefit is provided; where a limitation is imposed on the number of years of service recognized for pension benefit accruals; where the level of pension benefit credits has changed over the years since a plan's inception; and so forth.

Despite these (and perhaps other) limitations, an inspection of the formulas in Appendix A will indicate that indices can be generated quite easily for any particular combination of retirement age, vesting condition, and employment turnover table. In fact, numerous modifications can be made to these formulas so that indices could be developed for virtually any combination of factors and actuarial cost methods.

CONCLUSION

It is the hope of the author that this paper presents a different view of the problem of "pricing" pension plan vesting schedules and that the con-

cept of cost indices may be explored by pension actuaries who need prac-
tical tools in their everyday work. The method of evaluating vested pen-
sion costs that is demonstrated in this paper represents one approach to a
very complicated and important financial aspect of pension plans. If the
concept of cost indices provides a useful insight into the development of
practical methods of calculating costs of pension vesting schedules, this
paper will have served its purpose.

APPENDIX A

FORMULAS FOR INDICES OF VESTED PENSION COSTS

The level annual cost of pension benefits for retirement age 65 with
"no vesting" before age 65 is defined by the relationship:

$$(NC)_y = \frac{(65-y)\,\ddot{a}_{65}^{(12)} \cdot v^{65-y} \cdot {}_{65-y}p_y^{(T)}}{\displaystyle\sum_{k=y}^{64} v^{k-y} \cdot {}_{k-y}p_y^{(T)}},$$

and the corresponding accrued liability at age x is equal to

$$(NC)_y \cdot \sum_{k=y}^{x-1} \frac{(1+i)^{x-k}}{{}_{x-k}p_k^{(T)}}.$$

By defining a new relationship,

$$f_y^{z,x} = \sum_{k=z}^{x-1} \frac{k-y}{65-y} \cdot \frac{q_k^{(ws)} \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p_k^{(T)}},$$

the level annual cost indices, $(I)_y^{NC}$, and the accrued liability cost indices,
$(I)_{y,x}^{AL}$, can be expressed in the following manner.

A. *Level Annual Cost Indices*, $(I)^{NC}$

    1. Vesting Condition 1:

$$(I)_y^{NC} = 1 + f_y^{z,65};$$

    2. Vesting Conditions 2 and 3:

$$(I)_y^{NC} = 1 + 0.5 f_y^{z,65} + r \sum_{s=1}^{m} f_y^{z+s,65},$$

where $r = 0.10$ and $m = 5$ for Vesting Condition 2; $r = 0.05$ and $m = 10$
for Vesting Condition 3.

B. *Accrued Liability Cost Indices*, $(I)_{y,x}^{AL}$

    By definition,

$$\ddot{a}^{(T)}_{y:\overline{z-y}|} = \sum_{k=y}^{z-1} v^{k-y} \cdot {}_{k-y}p^{(T)}_y .$$

Thus, the accrued liability indices can be expressed as follows:

1. For Vesting Condition 1:

$x \leqq z,$

$$(I)^{AL}_{y,\,x} = 1 + f^{z,\,65}_y ;$$

$x > z,$

$$(I)^{AL}_{y,x} = 1 + f^{x,\,65}_y - f^{z,\,x}_y \cdot \frac{\ddot{a}^{(T)}_{x:\overline{65-x}|}}{\ddot{s}^{(T)}_{y:\overline{z-y}|}} .$$

NOTE.—Appendix E sets forth the derivation of $(I)^{AL}_{y,\,x}$ for $x > z$ for Vesting Condition 1. The derivation of $(I)^{AL}_{y,\,x}$ for $x > z$ for Vesting Conditions 2 and 3 can be similarly derived.

2. For Vesting Conditions 2 and 3:

$x \leqq z,$

$$(I)^{AL}_{y,\,x} = 1 + 0.5 f^{z,\,65}_y + r \sum_{s=1}^{m} f^{z+s,\,65}_y ;$$

$z < x \leqq z + m,$

$$(I)^{AL}_{y,\,x} = 1 + [0.5 + (x - z - 1)\,r] f^{x,\,65}_y + r \sum_{s=x-z}^{m} f^{z+s,\,65}_y$$

$$- \left(0.5 f^{z,\,x}_y + r \sum_{s=1}^{x-z-1} f^{z+s,\,x}_y \right) \frac{\ddot{a}^{(T)}_{x:\overline{65-x}|}}{\ddot{s}^{(T)}_{y:\overline{z-y}|}} ;$$

$x > z + m,$

$$(I)^{AL}_y = 1 + f^{x,\,65}_y - \left(0.5 f^{z,\,x}_y + r \sum_{s=1}^{m} f^{z+s,\,x}_y \right) \frac{\ddot{a}^{(T)}_{x:\overline{65-x}|}}{\ddot{s}^{(T)}_{y:\overline{z-y}|}} ;$$

where $r = 0.10$ and $m = 5$ for Vesting Condition 2; $r = 0.05$ and $m = 10$ for Vesting Condition 3.

Comments on the Characteristics of the Indices

1. By a slight change in the formula for $f^{z,\,x}_y$, it becomes obvious that special commutation columns can be developed for any given mortality and turnover table combination so that cost indices can be easily developed for any retirement age. For example,

$$f_y^{z,\,z} = \frac{1}{65-y} \cdot \left[\sum_{k=z}^{z-1} \frac{k \cdot q_k^{(ws)} \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p_k^{(T)}} - y \cdot \sum_{k=z}^{z-1} \frac{q_k^{(ws)} \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p^{(T)}} \right].$$

If retirement age Q replaces age 65, then the formula for $f_y^{z,\,z}$ becomes

$$\frac{1}{Q-y}({}_kW_{z,\,z}^Q - y \cdot W_{z,\,z}^Q),$$

where

$${}_kW_{z,\,z}^Q = \sum_{k=z}^{z-1} \frac{k \cdot q_k^{(ws)} \cdot {}_{Q-k-1}p_{k+1}}{{}_{Q-k}p^{(T)}},$$

and

$$W_{z,\,z}^Q = \sum_{k=z}^{z-1} \frac{q_k^{(ws)} \cdot {}_{Q-k-1}p_{k+1}}{{}_{Q-k}p^{(T)}}.$$

By developing ${}_kW_{z,\,Q}^Q$ and $W_{z,\,Q}^Q$ for all z greater than the lowest possible entry age y, useful commutation columns are derived so that calculation of indices can be easily performed.

2. The formulas for Vesting Conditions 2 and 3 can be generalized merely by changing 0.5 to r' and by redefining r and m appropriately to recognize different levels of initial vesting and periods of graded vesting.

3. An analysis of the formulas for the accrued liability indices will indicate that, as x approaches 65, $f_y^{z,\,65}$ and the ratio $\ddot{a}_{x:\overline{65-x}|}^{(T)} \div \ddot{s}_{y:\overline{x-y}|}^{(T)}$ approach zero so that the accrued iability index must be 1 at retirement age 65.

APPENDIX B

TABLE B1

ENTRY AGE LEVEL ANNUAL COST INDICES—$(I)_z^{NC} = (NC)_z^v/(NC)_z$
MALE LIVES

Entry Age y	Vesting Age z	Employment Turnover Table I — Vesting Conditions			Employment Turnover Table II — Vesting Conditions			Employment Turnover Table III — Vesting Conditions			Employment Turnover Table IV — Vesting Conditions			Employment Turnover Table V — Vesting Conditions		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
20	20	1.1850	1.1805	1.1698	1.2465	1.2423	1.2330	1.2498	1.2447	1.2350	1.6634	1.6465	1.6134	1.6788	1.6571	1.6226
	25	1.1633	1.1481	1.1347	1.2269	1.2138	1.2017	1.2269	1.2138	1.2017	1.5855	1.5414	1.5055	1.5855	1.5414	1.5055
	30	1.1113	1.0952	1.0842	1.1819	1.1672	1.1554	1.1819	1.1672	1.1554	1.4374	1.3956	1.3652	1.4374	1.3956	1.3652
	35	1.0591	1.0470	1.0405	1.1330	1.1192	1.1086	1.1330	1.1192	1.1086	1.3012	1.2667	1.2419	1.3012	1.2667	1.2419
	40	1.0214	1.0151	1.0130	1.0876	1.0753	1.0664	1.0876	1.0752	1.0663	1.1892	1.1611	1.1419	1.1892	1.1611	1.1419
	45	1.0031	1.0018	1.0017	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655	1.0985	1.0773	1.0655
	50	1.0000	1.0000	1.0000	1.0156	1.0100	1.0089	1.0156	1.0100	1.0089	1.0316	1.0203	1.0180	1.0316	1.0203	1.0180
25	25	1.0976	1.0943	1.0871	1.1598	1.1570	1.1505	1.1627	1.1590	1.1522	1.3891	1.3800	1.3609	1.3997	1.3872	1.3671
	30	1.0821	1.0721	1.0640	1.1464	1.1372	1.1285	1.1464	1.1372	1.1285	1.3463	1.3204	1.2979	1.3463	1.3204	1.2979
	35	1.0483	1.0390	1.0335	1.1147	1.1039	1.0950	1.1147	1.1039	1.0950	1.2582	1.2314	1.2106	1.2582	1.2314	1.2106
	40	1.0186	1.0132	1.0114	1.0787	1.0681	1.0601	1.0787	1.0681	1.0601	1.1697	1.1456	1.1284	1.1697	1.1456	1.1284
	45	1.0028	1.0016	1.0015	1.0438	1.0347	1.0294	1.0438	1.0347	1.0295	1.0911	1.0718	1.0608	1.0911	1.0718	1.0608
	50	1.0000	1.0000	1.0000	1.0147	1.0095	1.0084	1.0147	1.0095	1.0084	1.0298	1.0192	1.0171	1.0298	1.0192	1.0171
30	30	1.0445	1.0423	1.0380	1.1007	1.0987	1.0939	1.1033	1.1005	1.0955	1.2292	1.2237	1.2114	1.2371	1.2292	1.2161
	35	1.0344	1.0286	1.0245	1.0910	1.0842	1.0775	1.0910	1.0842	1.0775	1.2030	1.1860	1.1704	1.2030	1.1860	1.1704
	40	1.0150	1.0108	1.0092	1.0673	1.0589	1.0521	1.0673	1.0589	1.0521	1.1447	1.1256	1.1110	1.1447	1.1256	1.1110
	45	1.0024	1.0014	1.0013	1.0392	1.0313	1.0264	1.0392	1.0313	1.0264	1.0816	1.0647	1.0548	1.0816	1.0647	1.0548
	50	1.0000	1.0000	1.0000	1.0136	1.0088	1.0078	1.0136	1.0088	1.0078	1.0276	1.0178	1.0158	1.0276	1.0178	1.0158

TABLE B1—*Continued*

Entry Age y	Vesting Age s	Employment Turnover Table I			Employment Turnover Table II			Employment Turnover Table III			Employment Turnover Table IV			Employment Turnover Table V		
		Vesting Conditions			Vesting Conditions			Vesting Conditions			Vesting Conditions			Vesting Conditions		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
35	35	1.0159	1.0147	1.0125	1.0595	1.0580	1.0542	1.0614	1.0593	1.0553	1.1293	1.1255	1.1168	1.1340	1.1290	1.1197
	40	1.0102	1.0075	1.0064	1.0521	1.0467	1.0414	1.0521	1.0467	1.0414	1.1113	1.0990	1.0878	1.1113	1.0990	1.0878
	45	1.0019	1.0011	1.0010	1.0331	1.0268	1.0226	1.0331	1.0268	1.0226	1.0688	1.0553	1.0467	1.0688	1.0553	1.0467
	50	1.0000	1.0000	1.0000	1.0122	1.0079	1.0070	1.0122	1.0079	1.0070	1.0247	1.0160	1.0142	1.0247	1.0160	1.0142
40	40	1.0035	1.0030	1.0024	1.0308	1.0295	1.0265	1.0322	1.0306	1.0274	1.0646	1.0618	1.0553	1.0679	1.0642	1.0574
	45	1.0012	1.0007	1.0007	1.0246	1.0204	1.0171	1.0246	1.0204	1.0171	1.0511	1.0421	1.0354	1.0511	1.0421	1.0354
	50	1.0000	1.0000	1.0000	1.0102	1.0066	1.0059	1.0102	1.0066	1.0059	1.0206	1.0134	1.0119	1.0206	1.0134	1.0119
45	45	1.0002	1.0001	1.0001	1.0119	1.0109	1.0090	1.0126	1.0114	1.0094	1.0244	1.0222	1.0184	1.0259	1.0234	1.0193
	50	1.0000	1.0000	1.0000	1.0071	1.0047	1.0041	1.0071	1.0047	1.0041	1.0144	1.0095	1.0084	1.0144	1.0095	1.0084
50	50	1.0000	1.0000	1.0000	1.0021	1.0015	1.0013	1.0029	1.0022	1.0018	1.0041	1.0031	1.0026	1.0058	1.0044	1.0036

ENTRY AGE y	VESTING AGE s	EMPLOYMENT TURNOVER TABLE VI Vesting Conditions			EMPLOYMENT TURNOVER TABLE VII Vesting Conditions			EMPLOYMENT TURNOVER TABLE VIII Vesting Conditions			EMPLOYMENT TURNOVER TABLE IX Vesting Conditions			EMPLOYMENT TURNOVER TABLE X Vesting Conditions		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
20	20	3.8353	3.6841	3.4620	4.0203	3.8082	3.5703	3.9309	3.7486	3.5182	3.6708	3.3877	3.0999	2.2295	2.2084	2.1588
	25	3.1744	2.9095	2.7450	3.1744	2.9095	2.7450	3.1744	2.9095	2.7450	2.5246	2.3391	2.1094	2.1287	2.0588	1.9939
	30	2.3325	2.1595	2.0558	2.3326	2.1595	2.0558	2.3326	2.1595	2.0558	1.6726	1.5537	1.4961	1.8868	1.8080	1.7477
	35	1.7900	1.6807	1.6126	1.7900	1.6807	1.6126	1.7900	1.6807	1.6126	1.3148	1.2596	1.2301	1.6267	1.5574	1.5083
	40	1.4453	1.3722	1.3271	1.4453	1.3722	1.3270	1.4453	1.3722	1.3271	1.1455	1.1159	1.0989	1.4020	1.3468	1.3096
	45	1.2139	1.1662	1.1411	1.2139	1.1662	1.1411	1.2139	1.1662	1.1411	1.0532	1.0359	1.0312	1.2244	1.1835	1.1595
	50	1.0650	1.0417	1.0371	1.0650	1.0417	1.0371	1.0650	1.0417	1.0371	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
25	25	2.2440	2.1937	2.1090	2.3169	2.2428	2.1518	2.2946	2.2286	2.1391	1.6957	1.6475	1.5836	1.7816	1.7664	1.7314
	30	2.0182	1.9115	1.8354	2.0182	1.9115	1.8354	2.0182	1.9115	1.8354	1.4895	1.4166	1.3747	1.7090	1.6600	1.6154
	35	1.6699	1.5851	1.5282	1.6699	1.5851	1.5282	1.6699	1.5851	1.5282	1.2617	1.2190	1.1943	1.5404	1.4866	1.4454
	40	1.3981	1.3353	1.2949	1.3981	1.3353	1.2949	1.3981	1.3354	1.2949	1.1285	1.1031	1.0880	1.3628	1.3154	1.2820
	45	1.1976	1.1542	1.1309	1.1976	1.1542	1.1309	1.1976	1.1542	1.1309	1.0486	1.0329	1.0286	1.2089	1.1717	1.1493
	50	1.0615	1.0395	1.0351	1.0615	1.0395	1.0351	1.0615	1.0395	1.0351	1.0000	1.0000	1.0000	1.0905	1.0677	1.0581
30	30	1.6140	1.5925	1.5520	1.6496	1.6171	1.5732	1.6374	1.6087	1.5659	1.2540	1.2404	1.2187	1.4805	1.4698	1.4454
	35	1.5155	1.4621	1.4195	1.5155	1.4621	1.4195	1.5155	1.4621	1.4195	1.1935	1.1667	1.1484	1.4295	1.3955	1.3645
	40	1.3375	1.2879	1.2536	1.3375	1.2879	1.2536	1.3375	1.2879	1.2536	1.1067	1.0867	1.0738	1.3125	1.2751	1.2467
	45	1.1767	1.1389	1.1177	1.1767	1.1389	1.1177	1.1767	1.1389	1.1177	1.0427	1.0290	1.0252	1.1889	1.1565	1.1361
	50	1.0570	1.0366	1.0326	1.0570	1.0366	1.0326	1.0570	1.0366	1.0326	1.0000	1.0000	1.0000	1.0847	1.0636	1.0546
35	35	1.3096	1.2982	1.2747	1.3251	1.3096	1.2843	1.3172	1.3038	1.2794	1.1025	1.0971	1.0871	1.2816	1.2740	1.2567
	40	1.2566	1.2247	1.1985	1.2566	1.2247	1.1985	1.2566	1.2247	1.1985	1.0777	1.0648	1.0550	1.2454	1.2213	1.1995
	45	1.1489	1.1184	1.1001	1.1489	1.1184	1.1001	1.1489	1.1184	1.1001	1.0349	1.0239	1.0207	1.1623	1.1362	1.1185
	50	1.0509	1.0328	1.0291	1.0509	1.0328	1.0291	1.0509	1.0328	1.0291	1.0000	1.0000	1.0000	1.0770	1.0582	1.0499
	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0198	1.0130	1.0115

TABLE B1—*Continued*

Entry Age y	Vesting Age	Employment Turnover Table VI Vesting Conditions			Employment Turnover Table VII Vesting Conditions			Employment Turnover Table VIII Vesting Conditions			Employment Turnover Table IX Vesting Conditions			Employment Turnover Table X Vesting Conditions		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
40	40	1.1434	1.1362	1.1213	1.1520	1.1426	1.1267	1.1483	1.1399	1.1244	1.0370	1.0342	1.0287	1.1515	1.1460	1.1335
	45	1.1098	1.0897	1.0755	1.1098	1.0897	1.0755	1.1098	1.0897	1.0755	1.0239	1.0167	1.0143	1.1251	1.1078	1.0940
	50	1.0424	1.0276	1.0244	1.0424	1.0276	1.0244	1.0424	1.0275	1.0244	1.0000	1.0000	1.0000	1.0662	1.0507	1.0433
	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182	1.0120	1.0106
	60	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0011	1.0006	......
45	45	1.0513	1.0466	1.0385	1.0549	1.0493	1.0407	1.0538	1.0486	1.0401	1.0075	1.0059	1.0048	1.0692	1.0652	1.0571
	50	1.0297	1.0196	1.0172	1.0297	1.0196	1.0172	1.0297	1.0196	1.0172	1.0000	1.0000	1.0000	1.0500	1.0394	1.0335
	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0159	1.0105	1.0092
	60	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0011	1.0006	......
50	50	1.0085	1.0064	1.0053	1.0119	1.0089	1.0074	1.0116	1.0088	1.0073	1.0000	1.0000	1.0000	1.0230	1.0205	1.0171
	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0119	1.0081	1.0070
	60	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0010	1.0005	......
55	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0040	1.0032	1.0026
	60	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0000	1.0000	......	1.0007	1.0004	......

TABLE B2

ACCRUED LIABILITY COST INDICES—$(I)_{v,x}^{AL} = (AL)_{v,x}^{v}/(AL)_{v,x}$

MALE LIVES

ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE I			EMPLOYMENT TURNOVER TABLE II			EMPLOYMENT TURNOVER TABLE III			EMPLOYMENT TURNOVER TABLE IV		
			Vesting Conditions			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
20	20	25	1.1153	1.1252	1.1247	1.1817	1.1912	1.1912	1.1757	1.1872	1.1877	1.4727	1.4971	1.4910
		30	1.0411	1.0454	1.0556	1.1183	1.1224	1.1316	1.1163	1.1213	1.1307	1.3002	1.3105	1.3306
		35	0.9906	0.9931	0.9989	1.0707	1.0729	1.0781	1.0698	1.0726	1.0779	1.1797	1.1853	1.1964
		40	0.9655	0.9671	0.9707	1.0343	1.0357	1.0388	1.0339	1.0356	1.0388	1.0924	1.0959	1.1026
		45	0.9633	0.9643	0.9667	1.0056	1.0065	1.0085	1.0054	1.0065	1.0085	1.0264	1.0286	1.0328
		50	0.9750	0.9757	0.9771	0.9861	0.9867	0.9879	0.9861	0.9867	0.9879	0.9821	0.9834	0.9860
		55	0.9861	0.9864	0.9872	0.9825	0.9828	0.9835	0.9825	0.9828	0.9835	0.9707	0.9714	0.9729
		60	0.9941	0.9942	0.9946	0.9926	0.9927	0.9930	0.9926	0.9927	0.9930	0.9874	0.9877	0.9883
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	25	25	1.1632	1.1481	1.1346	1.2268	1.2138	1.2017	1.2268	1.2138	1.2017	1.5855	1.5413	1.5055
		30	1.0618	1.0762	1.0733	1.1376	1.1504	1.1477	1.1385	1.1511	1.1482	1.3475	1.3743	1.3625
		35	1.0025	1.0107	1.0180	1.0814	1.0886	1.0953	1.0822	1.0893	1.0958	1.2058	1.2206	1.2326
		40	0.9729	0.9781	0.9827	1.0409	1.0452	1.0493	1.0415	1.0458	1.0498	1.1083	1.1173	1.1246
		45	0.9681	0.9714	0.9743	1.0097	1.0125	1.0150	1.0102	1.0129	1.0154	1.0364	1.0420	1.0466
		50	0.9780	0.9800	0.9818	0.9886	0.9903	0.9918	0.9889	0.9906	0.9921	0.9882	0.9916	0.9944
		55	0.9877	0.9888	0.9899	0.9839	0.9848	0.9857	0.9841	0.9850	0.9858	0.9741	0.9761	0.9776
		60	0.9948	0.9953	0.9957	0.9932	0.9936	0.9939	0.9932	0.9936	0.9940	0.9889	0.9897	0.9904
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999

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Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table I			Employment Turnover Table II			Employment Turnover Table III			Employment Turnover Table IV		
			Vesting Conditions			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
20	30	25	1.1112	1.0952	1.0841	1.1818	1.1671	1.1554	1.1818	1.1671	1.1554	1.4374	1.3956	1.3651
		30	1.1112	1.0952	1.0841	1.1818	1.1671	1.1554	1.1818	1.1671	1.1554	1.4374	1.3956	1.3651
		35	1.0307	1.0394	1.0361	1.1062	1.1142	1.1100	1.1066	1.1145	1.1102	1.2555	1.2695	1.2566
		40	0.9907	0.9961	0.9999	1.0559	1.0609	1.0648	1.0564	1.0612	1.0651	1.1385	1.1470	1.1532
		45	0.9794	0.9829	0.9853	1.0191	1.0222	1.0247	1.0195	1.0225	1.0249	1.0553	1.0606	1.0645
		50	0.9850	0.9871	0.9886	0.9944	0.9962	0.9977	0.9946	0.9964	0.9979	0.9998	1.0030	1.0054
		55	0.9916	0.9928	0.9936	0.9871	0.9881	0.9890	0.9872	0.9883	0.9891	0.9806	0.9825	0.9838
		60	0.9964	0.9969	0.9973	0.9945	0.9950	0.9953	0.9946	0.9950	0.9954	0.9917	0.9925	0.9930
		65	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999
20	35	25	1.0591	1.0470	1.0405	1.1330	1.1192	1.1085	1.1330	1.1192	1.1085	1.3012	1.2666	1.2418
		30	1.0591	1.0470	1.0405	1.1330	1.1192	1.1085	1.1330	1.1192	1.1085	1.3012	1.2666	1.2418
		35	1.0591	1.0470	1.0405	1.1330	1.1192	1.1085	1.1330	1.1192	1.1085	1.3012	1.2666	1.2418
		40	1.0084	1.0125	1.0106	1.0723	1.0769	1.0723	1.0725	1.0771	1.0724	1.1663	1.1733	1.1615
		45	0.9908	0.9934	0.9949	1.0293	1.0322	1.0345	1.0296	1.0324	1.0346	1.0726	1.0770	1.0802
		50	0.9920	0.9936	0.9945	1.0006	1.0023	1.0037	1.0007	1.0025	1.0038	1.0104	1.0131	1.0151
		55	0.9955	0.9964	0.9969	0.9905	0.9915	0.9923	0.9906	0.9916	0.9924	0.9867	0.9882	0.9893
		60	0.9981	0.9985	0.9987	0.9960	0.9964	0.9967	0.9960	0.9964	0.9967	0.9943	0.9949	0.9954
		65	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	40	25	1.0213	1.0150	1.0130	1.0875	1.0752	1.0663	1.0875	1.0752	1.0663	1.1891	1.1611	1.1418
		30	1.0213	1.0150	1.0130	1.0875	1.0752	1.0663	1.0875	1.0752	1.0663	1.1891	1.1611	1.1418
		35	1.0213	1.0150	1.0130	1.0875	1.0752	1.0663	1.0875	1.0752	1.0663	1.1891	1.1611	1.1418
		40	1.0213	1.0150	1.0130	1.0875	1.0752	1.0663	1.0875	1.0752	1.0663	1.1891	1.1611	1.1418
		45	0.9990	1.0004	1.0001	1.0389	1.0414	1.0373	1.0390	1.0415	1.0373	1.0869	1.0905	1.0810
		50	0.9971	0.9979	0.9982	1.0064	1.0079	1.0091	1.0065	1.0080	1.0091	1.0192	1.0214	1.0229
		55	0.9983	0.9988	0.9990	0.9938	0.9946	0.9953	0.9938	0.9947	0.9953	0.9916	0.9928	0.9937
		60	0.9993	0.9995	0.9995	0.9973	0.9977	0.9980	0.9974	0.9977	0.9980	0.9964	0.9969	0.9973
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE I Vesting Conditions			EMPLOYMENT TURNOVER TABLE II Vesting Conditions			EMPLOYMENT TURNOVER TABLE III Vesting Conditions			EMPLOYMENT TURNOVER TABLE IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
20	45	25	1.0030	1.0017	1.0016	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655
		30	1.0030	1.0017	1.0016	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655
		35	1.0030	1.0017	1.0016	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655
		40	1.0030	1.0017	1.0016	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655
		45	1.0030	1.0017	1.0016	1.0473	1.0373	1.0316	1.0473	1.0373	1.0316	1.0985	1.0773	1.0655
		50	0.9995	0.9997	0.9997	1.0115	1.0127	1.0103	1.0115	1.0128	1.0104	1.0263	1.0279	1.0228
		55	0.9997	0.9998	0.9998	0.9966	0.9973	0.9977	0.9966	0.9973	0.9977	0.9956	0.9965	0.9971
		60	0.9999	0.9999	0.9999	0.9985	0.9988	0.9990	0.9986	0.9988	0.9990	0.9981	0.9985	0.9987
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999
20	50	25	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		30	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		35	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		40	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		45	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		50	1.0000	1.0000	1.0000	1.0155	1.0100	1.0088	1.0155	1.0100	1.0088	1.0315	1.0202	1.0180
		55	1.0000	1.0000	1.0000	0.9988	0.9992	0.9993	0.9989	0.9992	0.9993	0.9986	0.9991	0.9992
		60	1.0000	1.0000	1.0000	0.9995	0.9997	0.9997	0.9995	0.9997	0.9997	0.9993	0.9996	0.9996
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	25	30	1.0443	1.0522	1.0527	1.1132	1.1202	1.1204	1.1072	1.1162	1.1169	1.2708	1.2869	1.2848
		35	0.9966	1.0000	1.0076	1.0679	1.0708	1.0775	1.0657	1.0695	1.0765	1.1616	1.1684	1.1825
		40	0.9722	0.9741	0.9783	1.0330	1.0346	1.0383	1.0320	1.0341	1.0379	1.0816	1.0853	1.0930
		45	0.9694	0.9705	0.9731	1.0054	1.0064	1.0085	1.0050	1.0062	1.0084	1.0206	1.0228	1.0273
		50	0.9796	0.9803	0.9818	0.9866	0.9872	0.9884	0.9864	0.9871	0.9884	0.9796	0.9809	0.9835
		55	0.9889	0.9893	0.9901	0.9832	0.9835	0.9842	0.9831	0.9835	0.9842	0.9700	0.9707	0.9722
		60	0.9954	0.9956	0.9959	0.9930	0.9931	0.9934	0.9930	0.9931	0.9934	0.9873	0.9876	0.9883
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	0.9999

Entry Age *y*	Vesting Age *s*	Attained Age *z*	Employment Turnover Table I Vesting Conditions			Employment Turnover Table II Vesting Conditions			Employment Turnover Table III Vesting Conditions			Employment Turnover Table IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
25	30	30	1.0820	1.0721	1.0639	1.1463	1.1372	1.1284	1.1463	1.1372	1.1284	1.3463	1.3203	1.2979
		35	1.0129	1.0233	1.0222	1.0918	1.0913	1.0893	1.0824	1.0917	1.0897	1.1932	1.2123	1.2056
		40	0.9813	0.9871	0.9919	1.0406	1.0457	1.0506	1.0411	1.0462	1.0510	1.0988	1.1092	1.1182
		45	0.9748	0.9783	0.9812	1.0099	1.0129	1.0158	1.0103	1.0133	1.0161	1.0307	1.0369	1.0422
		50	0.9828	0.9849	0.9866	0.9892	0.9910	0.9927	0.9895	0.9913	0.9929	0.9856	0.9892	0.9923
		55	0.9907	0.9918	0.9927	0.9846	0.9856	0.9865	0.9848	0.9857	0.9866	0.9733	0.9753	0.9770
		60	0.9961	0.9966	0.9970	0.9936	0.9940	0.9944	0.9937	0.9941	0.9944	0.9887	0.9896	0.9903
		65	0.9999	1.0000	1.0000	0.9999	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	35	30	1.0483	1.0389	1.0335	1.1146	1.1039	1.0949	1.1146	1.1039	1.0949	1.2582	1.2313	1.2106
		35	1.0483	1.0389	1.0335	1.1146	1.1039	1.0949	1.1146	1.1039	1.0949	1.2582	1.2313	1.2106
		40	1.0011	1.0066	1.0055	1.0584	1.0645	1.0612	1.0587	1.0647	1.0614	1.1342	1.1449	1.1364
		45	0.9867	0.9900	0.9919	1.0203	1.0239	1.0268	1.0206	1.0241	1.0270	1.0516	1.0579	1.0628
		50	0.9899	0.9918	0.9930	0.9954	0.9974	0.9992	0.9956	0.9976	0.9993	0.9979	1.0016	1.0045
		55	0.9945	0.9956	0.9962	0.9880	0.9891	0.9900	0.9881	0.9892	0.9901	0.9801	0.9822	0.9838
		60	0.9977	0.9981	0.9984	0.9950	0.9954	0.9958	0.9950	0.9955	0.9959	0.9916	0.9925	0.9931
		65	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	1.0000	0.9999	0.9999	1.0000	0.9999
25	40	30	1.0185	1.0131	1.0113	1.0787	1.0681	1.0601	1.0787	1.0681	1.0601	1.1697	1.1455	1.1283
		35	1.0185	1.0131	1.0113	1.0787	1.0681	1.0601	1.0787	1.0681	1.0601	1.1697	1.1455	1.1283
		40	1.0185	1.0131	1.0113	1.0787	1.0681	1.0601	1.0787	1.0681	1.0601	1.1697	1.1455	1.1283
		45	0.9972	0.9991	0.9989	1.0322	1.0357	1.0323	1.0323	1.0358	1.0324	1.0725	1.0782	1.0703
		50	0.9961	0.9972	0.9976	1.0023	1.0044	1.0059	1.0024	1.0045	1.0060	1.0102	1.0136	1.0160
		55	0.9979	0.9985	0.9987	0.9917	0.9928	0.9937	0.9918	0.9929	0.9937	0.9869	0.9888	0.9901
		60	0.9991	0.9993	0.9994	0.9965	0.9970	0.9973	0.9966	0.9970	0.9974	0.9945	0.9952	0.9958
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table I Vesting Conditions			Employment Turnover Table II Vesting Conditions			Employment Turnover Table III Vesting Conditions			Employment Turnover Table IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
25	45	30	1.0027	1.0016	1.0015	1.0437	1.0346	1.0293	1.0437	1.0346	1.0293	1.0910	1.0718	1.0608
		35	1.0027	1.0016	1.0015	1.0437	1.0346	1.0293	1.0437	1.0346	1.0293	1.0910	1.0718	1.0608
		40	1.0027	1.0016	1.0015	1.0437	1.0346	1.0293	1.0437	1.0346	1.0293	1.0910	1.0718	1.0608
		45	1.0027	1.0016	1.0015	1.0437	1.0346	1.0293	1.0437	1.0346	1.0293	1.0910	1.0718	1.0608
		50	0.9994	0.9996	0.9996	1.0091	1.0108	1.0087	1.0091	1.0109	1.0088	1.0212	1.0239	1.0194
		55	0.9996	0.9998	0.9998	0.9954	0.9963	0.9969	0.9954	0.9964	0.9969	0.9929	0.9944	0.9953
		60	0.9998	0.9999	0.9999	0.9980	0.9984	0.9987	0.9981	0.9985	0.9987	0.9970	0.9976	0.9980
		65	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999
25	50	30	1.0000	1.0000	1.0000	1.0147	1.0094	1.0084	1.0147	1.0094	1.0084	1.0298	1.0191	1.0170
		35	1.0000	1.0000	1.0000	1.0147	1.0094	1.0084	1.0147	1.0094	1.0084	1.0298	1.0191	1.0170
		40	1.0000	1.0000	1.0000	1.0147	1.0094	1.0084	1.0147	1.0094	1.0084	1.0298	1.0191	1.0170
		45	1.0000	1.0000	1.0000	1.0147	1.0094	1.0084	1.0147	1.0094	1.0084	1.0298	1.0191	1.0170
		50	1.0000	1.0000	1.0000	1.0147	1.0094	1.0084	1.0147	1.0094	1.0084	1.0298	1.0191	1.0170
		55	1.0000	1.0000	1.0000	0.9984	0.9990	0.9991	0.9984	0.9990	0.9991	0.9977	0.9985	0.9986
		60	1.0000	1.0000	1.0000	0.9993	0.9995	0.9996	0.9993	0.9995	0.9996	0.9990	0.9993	0.9994
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	30	35	1.0082	1.0138	1.0146	1.0667	1.0718	1.0719	1.0609	1.0678	1.0685	1.1508	1.1618	1.1609
		40	0.9828	0.9851	0.9899	1.0330	1.0351	1.0400	1.0309	1.0337	1.0388	1.0759	1.0804	1.0904
		45	0.9779	0.9792	0.9817	1.0062	1.0073	1.0099	1.0053	1.0067	1.0094	1.0184	1.0208	1.0260
		50	0.9856	0.9863	0.9877	0.9879	0.9885	0.9899	0.9874	0.9883	0.9897	0.9796	0.9810	0.9839
		55	0.9925	0.9929	0.9936	0.9845	0.9848	0.9855	0.9842	0.9847	0.9854	0.9711	0.9718	0.9733
		60	0.9970	0.9971	0.9974	0.9937	0.9938	0.9941	0.9936	0.9938	0.9941	0.9881	0.9884	0.9890
		65	1.0000	0.9999	0.9999	0.9999	1.0000	1.0000	0.9999	1.0000	0.9999	1.0000	0.9999	1.0000

ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE I Vesting Conditions			EMPLOYMENT TURNOVER TABLE II Vesting Conditions			EMPLOYMENT TURNOVER TABLE III Vesting Conditions			EMPLOYMENT TURNOVER TABLE IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
30	35	35	1.0344	1.0285	1.0245	1.0910	1.0842	1.0774	1.0910	1.0842	1.0774	1.2029	1.1860	1.1704
		40	0.9937	1.0001	1.0001	1.0429	1.0499	1.0483	1.0433	1.0502	1.0485	1.0972	1.1110	1.1065
		45	0.9838	0.9872	0.9895	1.0114	1.0151	1.0187	1.0118	1.0154	1.0189	1.0296	1.0369	1.0435
		50	0.9889	0.9908	0.9921	0.9908	0.9928	0.9948	0.9910	0.9930	0.9950	0.9859	0.9899	0.9936
		55	0.9942	0.9952	0.9959	0.9860	0.9870	0.9880	0.9861	0.9871	0.9882	0.9744	0.9765	0.9785
		60	0.9976	0.9980	0.9983	0.9943	0.9947	0.9951	0.9943	0.9948	0.9952	0.9895	0.9903	0.9911
		65	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000
30	40	35	1.0149	1.0107	1.0092	1.0672	1.0589	1.0521	1.0672	1.0589	1.0521	1.1446	1.1256	1.1109
		40	1.0149	1.0107	1.0092	1.0672	1.0589	1.0521	1.0672	1.0589	1.0521	1.1446	1.1256	1.1109
		45	0.9951	0.9975	0.9976	1.0241	1.0286	1.0262	1.0243	1.0288	1.0263	1.0545	1.0627	1.0569
		50	0.9951	0.9965	0.9970	0.9978	1.0002	1.0022	0.9979	1.0004	1.0024	0.9998	1.0043	1.0078
		55	0.9974	0.9982	0.9984	0.9896	0.9909	0.9919	0.9897	0.9910	0.9920	0.9817	0.9841	0.9860
		60	0.9989	0.9992	0.9993	0.9958	0.9963	0.9967	0.9958	0.9963	0.9967	0.9925	0.9935	0.9942
		65	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	1.0000	0.9999	0.9999	0.9999	1.0000	1.0000
30	45	35	1.0024	1.0014	1.0013	1.0392	1.0312	1.0264	1.0392	1.0312	1.0264	1.0815	1.0647	1.0547
		40	1.0024	1.0014	1.0013	1.0392	1.0312	1.0264	1.0392	1.0312	1.0264	1.0815	1.0647	1.0547
		45	1.0024	1.0014	1.0013	1.0392	1.0312	1.0264	1.0392	1.0312	1.0264	1.0815	1.0647	1.0547
		50	0.9992	0.9995	0.9995	1.0060	1.0084	1.0067	1.0061	1.0084	1.0067	1.0148	1.0188	1.0151
		55	0.9995	0.9997	0.9997	0.9939	0.9951	0.9959	0.9940	0.9952	0.9959	0.9897	0.9918	0.9931
		60	0.9998	0.9999	0.9999	0.9975	0.9980	0.9983	0.9975	0.9980	0.9983	0.9957	0.9966	0.9971
		65	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table I Vesting Conditions			Employment Turnover Table II Vesting Conditions			Employment Turnover Table III Vesting Conditions			Employment Turnover Table IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
30	50	35	1.0000	1.0000	1.0000	1.0136	1.0088	1.0078	1.0136	1.0088	1.0078	1.0276	1.0178	1.0158
		40	1.0000	1.0000	1.0000	1.0136	1.0088	1.0078	1.0136	1.0088	1.0078	1.0276	1.0178	1.0158
		45	1.0000	1.0000	1.0000	1.0136	1.0088	1.0078	1.0136	1.0088	1.0078	1.0276	1.0178	1.0158
		50	1.0000	1.0000	1.0000	1.0136	1.0088	1.0078	1.0136	1.0088	1.0078	1.0276	1.0178	1.0158
		55	1.0000	1.0000	1.0000	0.9979	0.9986	0.9987	0.9979	0.9986	0.9988	0.9965	0.9977	0.9980
		60	1.0000	1.0000	1.0000	0.9991	0.9994	0.9995	0.9991	0.9994	0.9995	0.9985	0.9990	0.9991
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
35	35	40	0.9953	0.9985	0.9993	1.0340	1.0377	1.0376	1.0299	1.0347	1.0351	1.0740	1.0819	1.0811
		45	0.9874	0.9887	0.9909	1.0080	1.0095	1.0131	1.0065	1.0084	1.0122	1.0193	1.0224	1.0296
		50	0.9918	0.9925	0.9936	0.9900	0.9908	0.9925	0.9894	0.9903	0.9922	0.9822	0.9837	0.9873
		55	0.9960	0.9963	0.9969	0.9863	0.9867	0.9876	0.9860	0.9865	0.9874	0.9738	0.9746	0.9763
		60	0.9984	0.9985	0.9988	0.9946	0.9948	0.9951	0.9945	0.9947	0.9951	0.9896	0.9899	0.9906
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999
35	40	40	1.0102	1.0075	1.0063	1.0520	1.0466	1.0414	1.0520	1.0466	1.0414	1.1113	1.0990	1.0877
		45	0.9933	0.9961	0.9964	1.0151	1.0202	1.0190	1.0153	1.0204	1.0191	1.0340	1.0441	1.0410
		50	0.9948	0.9961	0.9967	0.9935	0.9961	0.9985	0.9937	0.9962	0.9986	0.9895	0.9945	0.9990
		55	0.9974	0.9981	0.9984	0.9880	0.9893	0.9905	0.9881	0.9893	0.9905	0.9774	0.9799	0.9822
		60	0.9990	0.9992	0.9993	0.9953	0.9958	0.9963	0.9953	0.9958	0.9963	0.9911	0.9920	0.9929
		65	0.9999	0.9999	0.9999	0.9999	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table I Vesting Conditions			Employment Turnover Table II Vesting Conditions			Employment Turnover Table III Vesting Conditions			Employment Turnover Table IV Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
35	45	40	1.0019	1.0011	1.0010	1.0331	1.0267	1.0225	1.0331	1.0267	1.0225	1.0688	1.0552	1.0466
		45	1.0019	1.0011	1.0010	1.0331	1.0267	1.0225	1.0331	1.0267	1.0225	1.0688	1.0552	1.0466
		50	0.9990	0.9994	0.9994	1.0024	1.0053	1.0041	1.0024	1.0054	1.0042	1.0067	1.0122	1.0096
		55	0.9995	0.9997	0.9997	0.9924	0.9938	0.9948	0.9924	0.9939	0.9948	0.9860	0.9888	0.9905
		60	0.9998	0.9998	0.9998	0.9970	0.9976	0.9979	0.9970	0.9976	0.9980	0.9945	0.9955	0.9962
		65	1.0000	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
35	50	40	1.0000	1.0000	1.0000	1.0121	1.0078	1.0069	1.0121	1.0078	1.0069	1.0247	1.0159	1.0141
		45	1.0000	1.0000	1.0000	1.0121	1.0078	1.0069	1.0121	1.0078	1.0069	1.0247	1.0159	1.0141
		50	1.0000	1.0000	1.0000	1.0121	1.0078	1.0069	1.0121	1.0078	1.0069	1.0247	1.0159	1.0141
		55	1.0000	1.0000	1.0000	0.9972	0.9981	0.9983	0.9972	0.9982	0.9984	0.9950	0.9967	0.9971
		60	1.0000	1.0000	1.0000	0.9989	0.9992	0.9993	0.9989	0.9992	0.9993	0.9980	0.9987	0.9888
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
40	40	45	0.9958	0.9970	0.9975	1.0110	1.0139	1.0137	1.0081	1.0117	1.0119	1.0238	1.0295	1.0289
		50	0.9969	0.9973	0.9978	0.9933	0.9943	0.9968	0.9923	0.9936	0.9962	0.9875	0.9897	0.9945
		55	0.9986	0.9988	0.9990	0.9890	0.9894	0.9905	0.9885	0.9891	0.9902	0.9785	0.9794	0.9816
		60	0.9995	0.9995	0.9996	0.9959	0.9961	0.9965	0.9958	0.9960	0.9964	0.9920	0.9923	0.9931
		65	0.9999	0.9999	0.9999	1.0000	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000
40	45	45	1.0246	1.0204	1.0171	1.0246	1.0204	1.0171	1.0246	1.0204	1.0171	1.0510	1.0420	1.0353
		50	0.9983	1.0017	1.0012	0.9983	1.0017	1.0012	0.9984	1.0218	1.0013	0.9977	1.0044	1.0032
		55	0.9912	0.9927	0.9938	0.9912	0.9927	0.9938	0.9912	0.9927	0.9939	0.9830	0.9860	0.9882
		60	0.9967	0.9973	0.9977	0.9967	0.9973	0.9977	0.9967	0.9973	0.9977	0.9937	0.9948	0.9956
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999

TABLE B2—*Continued*

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE I			EMPLOYMENT TURNOVER TABLE II			EMPLOYMENT TURNOVER TABLE III			EMPLOYMENT TURNOVER TABLE IV		
			Vesting Conditions			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3	1	2	3
40	50	45	1.0000	1.0000	1.0000	1.0101	1.0066	1.0058	1.0101	1.0066	1.0058	1.0205	1.0134	1.0118
		50	1.0000	1.0000	1.0000	1.0101	1.0066	1.0058	1.0101	1.0066	1.0058	1.0205	1.0134	1.0118
		55	1.0000	1.0000	1.0000	0.9963	0.9976	0.9979	0.9963	0.9976	0.9979	0.9931	0.9955	0.9960
		60	1.0000	1.0000	1.0000	0.9986	0.9991	0.9992	0.9986	0.9991	0.9992	0.9974	0.9983	0.9985
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
45	45	50	0.9995	0.9997	0.9997	0.9981	1.0000	1.0001	0.9968	0.9991	0.9993	0.9966	1.0004	1.0005
		55	0.9998	0.9999	0.9999	0.9926	0.9932	0.9944	0.9922	0.9929	0.9941	0.9854	0.9867	0.9890
		60	0.9999	0.9999	0.9999	0.9976	0.9978	0.9981	0.9974	0.9977	0.9981	0.9952	0.9956	0.9963
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999
45	50	50	1.0000	1.0000	1.0000	1.0071	1.0047	1.0041	1.0071	1.0047	1.0041	1.0144	1.0095	1.0083
		55	1.0000	1.0000	1.0000	0.9956	0.9970	0.9974	0.9956	0.9970	0.9974	0.9913	0.9943	0.9949
		60	1.0000	1.0000	1.0000	0.9985	0.9990	0.9991	0.9985	0.9990	0.9991	0.9971	0.9981	0.9983
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
50	50	55	1.0000	1.0000	1.0000	0.9971	0.9978	0.9981	0.9959	0.9969	0.9974	0.9942	0.9956	0.9963
		60	1.0000	1.0000	1.0000	0.9992	0.9994	0.9995	0.9990	0.9992	0.9993	0.9985	0.9989	0.9991
		65	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE V Vesting Conditions			EMPLOYMENT TURNOVER TABLE VI Vesting Conditions			EMPLOYMENT TURNOVER TABLE VII Vesting Conditions		
			1	2	3	1	2	3	1	2	3
20	20	25	1.4600	1.4892	1.4839	2.7786	2.8692	2.7904	2.7600	2.8639	2.7831
		30	1.2980	1.3105	1.3304	2.0043	2.0374	2.0858	2.0173	2.0569	2.1014
		35	1.1796	1.1866	1.1977	1.5640	1.5807	1.6052	1.5765	1.5968	1.6196
		40	1.0929	1.0972	1.1040	1.2933	1.3029	1.3170	1.3026	1.3143	1.3275
		45	1.0270	1.0297	1.0340	1.1126	1.1184	1.1270	1.1191	1.1263	1.1343
		50	0.9825	0.9842	0.9868	0.9997	1.0033	1.0085	1.0040	1.0084	1.0133
		55	0.9710	0.9719	0.9734	0.9618	0.9638	0.9668	0.9643	0.9668	0.9696
		60	0.9875	0.9879	0.9885	0.9833	0.9842	0.9855	0.9844	0.9855	0.9867
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999
20	25	25	1.5855	1.5413	1.5055	3.1744	2.9094	2.7449	3.1744	2.9094	2.7449
		30	1.3518	1.3773	1.3651	2.1487	2.2065	2.1370	2.1753	2.2248	2.1528
		35	1.2097	1.2239	1.2354	1.6370	1.6663	1.6844	1.6574	1.6828	1.6985
		40	1.1113	1.1199	1.1270	1.3353	1.3521	1.3626	1.3495	1.3641	1.3732
		45	1.0385	1.0439	1.0484	1.1381	1.1484	1.1547	1.1477	1.1566	1.1622
		50	0.9896	0.9929	0.9956	1.0153	1.0215	1.0254	1.0215	1.0269	1.0303
		55	0.9749	0.9768	0.9784	0.9707	0.9742	0.9765	0.9743	0.9774	0.9793
		60	0.9892	0.9900	0.9907	0.9872	0.9887	0.9897	0.9887	0.9901	0.9910
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	30	25	1.4374	1.3956	1.3651	2.3325	2.1595	2.0557	2.3325	2.1595	2.0557
		30	1.4374	1.3956	1.3651	2.3325	2.1595	2.0557	2.3325	2.1595	2.0557
		35	1.2573	1.2708	1.2577	1.7300	1.7491	1.6999	1.7380	1.7546	1.7046
		40	1.1404	1.1486	1.1545	1.3888	1.3998	1.4064	1.3961	1.4057	1.4114
		45	1.0567	1.0619	1.0656	1.1706	1.1773	1.1813	1.1761	1.1819	1.1854
		50	1.0008	1.0040	1.0063	1.0351	1.0392	1.0416	1.0388	1.0424	1.0445
		55	0.9813	0.9831	0.9844	0.9820	0.9843	0.9857	0.9842	0.9863	0.9875
		60	0.9919	0.9927	0.9933	0.9921	0.9931	0.9937	0.9931	0.9940	0.9945
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

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Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table V			Employment Turnover Table VI			Employment Turnover Table VII		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
20	35	25	1.3012	1.2666	1.2418	1.7899	1.6807	1.6126	1.7899	1.6807	1.6126
		30	1.3012	1.2666	1.2418	1.7899	1.6807	1.6126	1.7899	1.6807	1.6126
		35	1.3012	1.2666	1.2418	1.7899	1.6807	1.6126	1.7899	1.6807	1.6126
		40	1.1671	1.1739	1.1620	1.4233	1.4303	1.3957	1.4262	1.4322	1.3974
		45	1.0735	1.0778	1.0808	1.1916	1.1958	1.1985	1.1944	1.1981	1.2004
		50	1.0111	1.0137	1.0156	1.0479	1.0505	1.0521	1.0500	1.0523	1.0537
		55	0.9871	0.9886	0.9896	0.9893	0.9908	0.9917	0.9906	0.9919	0.9927
		60	0.9944	0.9951	0.9955	0.9953	0.9959	0.9963	0.9959	0.9964	0.9968
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	40	25	1.1891	1.1611	1.1418	1.4453	1.3722	1.3270	1.4453	1.3722	1.3270
		30	1.1891	1.1611	1.1418	1.4453	1.3722	1.3270	1.4453	1.3722	1.3270
		35	1.1891	1.1611	1.1418	1.4453	1.3722	1.3270	1.4453	1.3722	1.3270
		40	1.1891	1.1611	1.1418	1.4453	1.3722	1.3270	1.4453	1.3722	1.3270
		45	1.0873	1.0908	1.0812	1.2049	1.2077	1.1847	1.2061	1.2085	1.1854
		50	1.0196	1.0217	1.0232	1.0560	1.0577	1.0588	1.0571	1.0586	1.0596
		55	0.9919	0.9931	0.9939	0.9940	0.9949	0.9955	0.9947	0.9956	0.9961
		60	0.9965	0.9970	0.9973	0.9973	0.9978	0.9980	0.9976	0.9980	0.9983
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	45	25	1.0985	1.0773	1.0655	1.2139	1.1661	1.1411	1.2139	1.1661	1.1411
		30	1.0985	1.0773	1.0655	1.2139	1.1661	1.1411	1.2139	1.1661	1.1411
		35	1.0985	1.0773	1.0655	1.2139	1.1661	1.1411	1.2139	1.1661	1.1411
		40	1.0985	1.0773	1.0655	1.2139	1.1661	1.1411	1.2139	1.1661	1.1411
		45	1.0985	1.0773	1.0655	1.2139	1.1661	1.1411	1.2139	1.1661	1.1411
		50	1.0264	1.0280	1.0229	1.0615	1.0626	1.0512	1.0619	1.0629	1.0515
		55	0.9957	0.9966	0.9971	0.9971	0.9977	0.9980	0.9974	0.9980	0.9983
		60	0.9981	0.9985	0.9987	0.9987	0.9990	0.9991	0.9988	0.9991	0.9992
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table V			Employment Turnover Table VI			Employment Turnover Table VII		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
20	50	25	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		30	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		35	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		40	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		45	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		50	1.0315	1.0202	1.0180	1.0650	1.0416	1.0370	1.0650	1.0416	1.0370
		55	0.9986	0.9991	0.9992	0.9991	0.9994	0.9994	0.9992	0.9995	0.9995
		60	0.9994	0.9996	0.9996	0.9996	0.9997	0.9997	0.9996	0.9997	0.9998
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	25	30	1.2585	1.2791	1.2778	1.8109	1.8571	1.8324	1.7891	1.8459	1.8214
		35	1.1584	1.1673	1.1814	1.4622	1.4804	1.5110	1.4645	1.4880	1.5169
		40	1.0807	1.0856	1.0933	1.2374	1.2469	1.2630	1.2425	1.2551	1.2705
		45	1.0205	1.0233	1.0279	1.0822	1.0878	1.0971	1.0868	1.0941	1.1032
		50	0.9796	0.9813	0.9840	0.9840	0.9873	0.9928	0.9873	0.9917	0.9971
		55	0.9701	0.9710	0.9725	0.9542	0.9561	0.9592	0.9562	0.9586	0.9617
		60	0.9874	0.9877	0.9884	0.9803	0.9811	0.9824	0.9811	0.9821	0.9834
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	30	30	1.3463	1.3203	1.2979	2.0181	1.9114	1.8353	2.0181	1.9114	1.8353
		35	1.1961	1.2144	1.2073	1.5438	1.5825	1.5523	1.5593	1.5932	1.5615
		40	1.1014	1.1114	1.1201	1.2803	1.3006	1.3150	1.2931	1.3112	1.3241
		45	1.0327	1.0386	1.0437	1.1071	1.1189	1.1273	1.1164	1.1269	1.1345
		50	0.9869	0.9904	0.9934	0.9988	1.0058	1.0107	1.0050	1.0113	1.0157
		55	0.9741	0.9760	0.9777	0.9625	0.9664	0.9692	0.9661	0.9697	0.9722
		60	0.9890	0.9899	0.9906	0.9838	0.9855	0.9867	0.9854	0.9869	0.9880
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table V			Employment Turnover Table VI			Employment Turnover Table VII		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
25	35	30	1.2582	1.2313	1.2106	1.6698	1.5850	1.5281	1.6698	1.5850	1.5281
		35	1.2582	1.2313	1.2106	1.6698	1.5850	1.5281	1.6698	1.5850	1.5281
		40	1.1354	1.1458	1.1371	1.3465	1.3626	1.3360	1.3521	1.3664	1.3394
		45	1.0528	1.0590	1.0637	1.1455	1.1549	1.1612	1.1509	1.1592	1.1649
		50	0.9988	1.0025	1.0053	1.0216	1.0271	1.0309	1.0255	1.0305	1.0339
		55	0.9806	0.9827	0.9842	0.9753	0.9784	0.9805	0.9777	0.9805	0.9824
		60	0.9918	0.9927	0.9933	0.9893	0.9907	0.9916	0.9903	0.9916	0.9924
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0 9999
25	40	30	1.1697	1.1455	1.1283	1.3981	1.3353	1.2949	1.3981	1.3353	1.2949
		35	1.1697	1.1455	1.1283	1.3981	1.3353	1.2949	1.3981	1.3353	1.2949
		40	1.1697	1.1455	1.1283	1.3981	1.3353	1.2949	1.3981	1.3353	1.2949
		45	1.0731	1.0786	1.0707	1.1755	1.1824	1.1628	1.1778	1.1840	1.1641
		50	1.0108	1.0141	1.0164	1.0394	1.0435	1.0462	1.0416	1.0453	1.0477
		55	0.9873	0.9891	0.9904	0.9853	0.9876	0.9891	0.9867	0.9888	0.9901
		60	0.9946	0.9954	0.9959	0.9936	0.9946	0.9953	0.9942	0.9951	0.9957
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	45	30	1.0910	1.0718	1.0608	1.1976	1.1542	1.1308	1.1976	1.1542	1.1308
		35	1.0910	1.0718	1.0608	1.1976	1.1542	1.1308	1.1976	1.1542	1.1308
		40	1.0910	1.0718	1.0608	1.1976	1.1542	1.1308	1.1976	1.1542	1 1308
		45	1.0910	1.0718	1.0608	1.1976	1.1542	1.1308	1.1976	1.1542	1.1308
		50	1.0215	1.0241	1.0195	1.0525	1.0554	1.0452	1.0534	1.0560	1.0457
		55	0.9931	0.9946	0.9954	0.9927	0.9943	0.9951	0.9934	0.9948	0.9956
		60	0.9971	0.9977	0.9980	0.9968	0.9975	0.9979	0.9971	0.9977	0.9981
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE V Vesting Conditions			EMPLOYMENT TURNOVER TABLE VI Vesting Conditions			EMPLOYMENT TURNOVER TABLE VII Vesting Conditions		
			1	2	3	1	2	3	1	2	3
25	50	30	1.0298	1.0191	1.0170	1.0614	1.0394	1.0351	1.0615	1.0394	1.0351
		35	1.0298	1.0191	1.0170	1.0614	1.0394	1.0351	1.0615	1.0394	1.0351
		40	1.0298	1.0191	1.0170	1.0614	1.0394	1.0351	1.0615	1.0394	1.0351
		45	1.0298	1.0191	1.0170	1.0614	1.0394	1.0351	1.0615	1.0394	1.0351
		50	1.0298	1.0191	1.0170	1.0614	1.0394	1.0351	1.0615	1.0394	1.0351
		55	0.9977	0.9985	0.9987	0.9977	0.9985	0.9987	0.9979	0.9986	0.9988
		60	0.9990	0.9993	0.9994	0.9990	0.9993	0.9994	0.9991	0.9994	0.9994
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	30	35	1.1393	1.1541	1.1541	1.3925	1.4193	1.4100	1.3711	1.4061	1.3980
		40	1.0723	1.0785	1.0887	1.1990	1.2097	1.2300	1.1962	1.2109	1.2308
		45	1.0170	1.0203	1.0257	1.0622	1.0678	1.0784	1.0630	1.0709	1.0814
		50	0.9791	0.9809	0.9839	0.9748	0.9779	0.9839	0.9761	0.9805	0.9865
		55	0.9708	0.9718	0.9734	0.9508	0.9525	0.9558	0.9517	0.9541	0.9573
		60	0.9880	0.9884	0.9890	0.9793	0.9800	0.9814	0.9796	0.9806	0.9820
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999
30	35	35	1.2029	1.1860	1.1704	1.5154	1.4621	1.4195	1.5154	1.4621	1.4195
		40	1.0990	1.1123	1.1075	1.2483	1.2750	1.2592	1.2569	1.2810	1.2643
		45	1.0312	1.0382	1.0447	1.0880	1.1019	1.1131	1.0953	1.1081	1.1183
		50	0.9870	0.9909	0.9945	0.9893	0.9972	1.0034	0.9944	1.0017	1.0075
		55	0.9750	0.9771	0.9790	0.9587	0.9630	0.9664	0.9616	0.9656	0.9688
		60	0.9897	0.9905	0.9913	0.9826	0.9844	0.9858	0.9838	0.9855	0.9868
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

TABLE B2—*Continued*

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE V Vesting Conditions			EMPLOYMENT TURNOVER TABLE VI Vesting Conditions			EMPLOYMENT TURNOVER TABLE VII Vesting Conditions		
			1	2	3	1	2	3	1	2	3
30	40	35	1.1446	1.1256	1.1109	1.3374	1.2879	1.2535	1.3374	1.2879	1.2535
		40	1.1446	1.1256	1.1109	1.3374	1.2879	1.2535	1.3374	1.2879	1.2535
		45	1.0553	1.0632	1.0574	1.1346	1.1476	1.1327	1.1381	1.1500	1.1347
		50	1.0005	1.0049	1.0083	1.0155	1.0229	1.0279	1.0187	1.0254	1.0301
		55	0.9822	0.9845	0.9863	0.9729	0.9769	0.9797	0.9749	0.9785	0.9811
		60	0.9926	0.9936	0.9943	0.9886	0.9903	0.9914	0.9894	0.9909	0.9920
		65	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999
30	45	35	1.0815	1.0647	1.0547	1.1767	1.1388	1.1176	1.1767	1.1388	1.1176
		40	1.1815	1.0647	1.0547	1.1767	1.1388	1.1176	1.1767	1.1388	1.1176
		45	1.0815	1.0647	1.0547	1.1767	1.1388	1.1176	1.1767	1.1388	1.1176
		50	1.0151	1.0190	1.0153	1.0392	1.0448	1.0363	1.0406	1.0457	1.0371
		55	0.9899	0.9920	0.9932	0.9858	0.9888	0.9905	0.9868	0.9896	0.9912
		60	0.9958	0.9967	0.9972	0.9940	0.9953	0.9960	0.9944	0.9956	0.9963
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	50	35	1.0276	1.0178	1.0158	1.0569	1.0366	1.0325	1.0569	1.0366	1.0325
		40	1.0276	1.0178	1.0158	1.0569	1.0366	1.0325	1.0569	1.0366	1.0325
		45	1.0276	1.0178	1.0158	1.0569	1.0366	1.0325	1.0569	1.0366	1.0325
		50	1.0276	1.0178	1.0158	1.0569	1.0366	1.0325	1.0569	1.0366	1.0325
		55	0.9966	0.9978	0.9980	0.9954	0.9970	0.9973	0.9957	0.9972	0.9975
		60	0.9986	0.9990	0.9991	0.9980	0.9987	0.9989	0.9982	0.9988	0.9989
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE V Vesting Conditions			EMPLOYMENT TURNOVER TABLE VI Vesting Conditions			EMPLOYMENT TURNOVER TABLE VII Vesting Conditions		
			1	2	3	1	2	3	1	2	3
35	35	40	1.0660	1.0760	1.0762	1.1767	1.1938	1.1893	1.1616	1.1831	1.1801
		45	1.0166	1.0206	1.0281	1.0528	1.0596	1.0736	1.0491	1.0578	1.0722
		50	0.9810	0.9830	0.9867	0.9729	0.9763	0.9834	0.9718	0.9763	0.9836
		55	0.9732	0.9742	0.9761	0.9522	0.9540	0.9576	0.9518	0.9541	0.9578
		60	0.9894	0.9898	0.9905	0.9807	0.9814	0.9828	0.9804	0.9813	0.9829
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999
35	40	40	1.1113	1.0989	1.0877	1.2565	1.2247	1.1984	1.2565	1.2247	1.1984
		45	1.0348	1.0445	1.0414	1.0845	1.1035	1.0948	1.0878	1.1059	1.0968
		50	0.9901	0.9949	0.9995	0.9889	0.9985	1.0064	0.9915	1.0007	1.0083
		55	0.9778	0.9801	0.9825	0.9604	0.9653	0.9694	0.9619	0.9666	0.9705
		60	0.9912	0.9921	0.9930	0.9840	0.9859	0.9876	0.9845	0.9864	0.9880
		65	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
35	45	40	1.0688	1.0552	1.0466	1.1488	1.1183	1.1000	1.1488	1.1183	1.1000
		45	1.0688	1.0552	1.0466	1.1488	1.1183	1.1000	1.1488	1.1183	1.1000
		50	1.0070	1.0124	1.0098	1.0213	1.0305	1.0243	1.0226	1.0314	1.0250
		55	0.9862	0.9889	0.9906	0.9770	0.9817	0.9845	0.9779	0.9824	0.9851
		60	0.9945	0.9956	0.9963	0.9907	0.9926	0.9937	0.9910	0.9928	0.9939
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000
35	50	40	1.0247	1.0159	1.0141	1.0508	1.0328	1.0291	1.0508	1.0328	1.0291
		45	1.0247	1.0159	1.0141	1.0508	1.0328	1.0291	1.0508	1.0328	1.0291
		50	1.0247	1.0159	1.0141	1.0508	1.0328	1.0291	1.0508	1.0328	1.0291
		55	0.9950	0.9968	0.9971	0.9921	0.9949	0.9955	0.9924	0.9951	0.9956
		60	0.9980	0.9987	0.9988	0.9968	0.9979	0.9981	0.9969	0.9980	0.9982
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

TABLE B2—*Continued*

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE V			EMPLOYMENT TURNOVER TABLE VI			EMPLOYMENT TURNOVER TABLE VII		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
40	40	45	1.0180	1.0252	1.0254	1.0546	1.0663	1.0642	1.0438	1.0585	1.0575
		50	0.9856	0.9883	0.9934	0.9791	0.9836	0.9929	0.9759	0.9816	0.9912
		55	0.9776	0.9788	0.9811	0.9590	0.9611	0.9653	0.9576	0.9602	0.9647
		60	0.9917	0.9921	0.9930	0.9845	0.9852	0.9868	0.9839	0.9849	0.9866
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
40	45	45	1.0510	1.0420	1.0353	1.1098	1.0896	1.0754	1.1098	1.0896	1.0754
		50	0.9980	1.0047	1.0034	1.0001	1.0128	1.0096	1.0015	1.0137	1.0104
		55	0.9832	0.9861	0.9883	0.9686	0.9743	0.9784	0.9694	0.9750	0.9789
		60	0.9937	0.9948	0.9956	0 9881	0.9903	0.9918	0.9883	0.9905	0.9920
		65	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	1.0000	0.9999	0.9999
40	50	45	1.0205	1.0134	1.0118	1.0424	1.0275	1.0243	1.0424	1.0275	1.0243
		50	1.0205	1.0134	1.0118	1.0424	1.0275	1.0243	1.0424	1.0275	1.0243
		55	0.9932	0.9955	0.9961	0.9878	0.9921	0.9930	0.9881	0.9923	0.9932
		60	0.9974	0.9983	0.9985	0.9954	0.9970	0.9973	0.9955	0.9970	0.9974
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
45	45	50	0.9940	0.9985	0.9989	0.9945	1.0021	1.0021	0.9895	0.9985	0.9990
		55	0.9846	0.9861	0.9885	0.9715	0.9741	0.9786	0.9699	0.9730	0.9776
		60	0.9949	0.9954	0.9962	0.9904	0.9913	0.9928	0.9898	0.9909	0.9925
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

TABLE B2—*Continued*

Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table V — Vesting Conditions			Employment Turnover Table VI — Vesting Conditions			Employment Turnover Table VII — Vesting Conditions		
			1	2	3	1	2	3	1	2	3
45	50	50	1.0144	1.0095	1.0083	1.0296	1.0196	1.0172	1.0296	1.0196	1.0172
		55	0.9914	0.9943	0.9950	0.9835	0.9891	0.9904	0.9837	0.9892	0.9905
		60	0.9971	0.9981	0.9983	0.9944	0.9963	0.9967	0.9945	0.9963	0.9968
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
50	50	55	0.9919	0.9939	0.9949	0.9884	0.9913	0.9927	0.9841	0.9880	0.9900
		60	0.9980	0.9985	0.9987	0.9971	0.9978	0.9982	0.9960	0.9970	0.9975
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE s	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE VIII Vesting Conditions			EMPLOYMENT TURNOVER TABLE IX Vesting Conditions			EMPLOYMENT TURNOVER TABLE X Vesting Conditions		
			1	2	3	1	2	3	1	2	3
20	20	25	2.7667	2.8649	2.7852	2.1537	2.2453	2.1495	1.9910	2.0198	2.0049
		30	2.0107	2.0474	2.0938	1.4200	1.4558	1.4921	1.7073	1.7183	1.7443
		35	1.5704	1.5891	1.6127	1.1432	1.1638	1.1848	1.4649	1.4706	1.4839
		40	1.2981	1.3089	1.3225	1.0261	1.0395	1.0531	1.2745	1.2777	1.2854
		45	1.1160	1.1225	1.1308	0.9710	0.9799	0.9889	1.1314	1.1333	1.1379
		50	1.0019	1.0059	1.0110	0.9459	0.9516	0.9574	1.0321	1.0333	1.0360
		55	0.9631	0.9654	0.9683	0.9684	0.9718	0.9751	0.9852	0.9858	0.9874
		60	0.9839	0.9849	0.9861	0.9862	0.9876	0.9891	0.9850	0.9852	0.9859
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	25	25	3.1744	2.9094	2.7449	2.5245	2.2391	2.1094	2.1287	2.0587	1.9938
		30	2.1630	2.2163	2.1455	1.5649	1.6010	1.5504	1.7600	1.7966	1.7706
		35	1.6479	1.6751	1.6920	1.2266	1.2474	1.2569	1.4920	1.5107	1.5281
		40	1.3429	1.3586	1.3683	1.0803	1.0938	1.0999	1.2900	1.3008	1.3108
		45	1.1432	1.1528	1.1587	1.0069	1.0159	1.0200	1.1407	1.1472	1.1532
		50	1.0186	1.0244	1.0280	0.9691	0.9749	0.9775	1.0377	1.0416	1.0452
		55	0.9726	0.9759	0.9780	0.9819	0.9853	0.9868	0.9883	0.9904	0.9924
		60	0.9880	0.9895	0.9904	0.9921	0.9936	0.9942	0.9863	0.9872	0.9881
		65	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	30	25	2.3325	2.1595	2.0557	1.6726	1.5537	1.4961	1.8867	1.8079	1.7477
		30	2.3325	2.1595	2.0557	1.6726	1.5537	1.4961	1.8867	1.8079	1.7477
		35	1.7343	1.7520	1.7024	1.2887	1.2974	1.2719	1.5569	1.5780	1.5503
		40	1.3927	1.4030	1.4091	1.1205	1.1262	1.1289	1.3273	1.3394	1.3487
		45	1.1736	1.1798	1.1835	1.0337	1.0374	1.0392	1.1631	1.1704	1.1759
		50	1.0371	1.0409	1.0432	0.9863	0.9887	0.9899	1.0511	1.0555	1.0588
		55	0.9832	0.9854	0.9867	0.9920	0.9934	0.9941	0.9957	0.9982	1.0000
		60	0.9926	0.9936	0.9942	0.9965	0.9971	0.9974	0.9895	0.9905	0.9913
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table VIII			Employment Turnover Table IX			Employment Turnover Table X		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
20	35	25	1.7899	1.6807	1.6126	1.3147	1.2596	1.2300	1.6266	1.5574	1.5082
		30	1.7899	1.6807	1.6126	1.3147	1.2596	1.2300	1.6266	1.5574	1.5082
		35	1.7899	1.6807	1.6126	1.3147	1.2596	1.2300	1.6266	1.5574	1.5082
		40	1.4248	1.4313	1.3966	1.1375	1.1401	1.1259	1.3673	1.3780	1.3537
		45	1.1931	1.1970	1.1995	1.0449	1.0466	1.0476	1.1871	1.1935	1.1981
		50	1.0490	1.0514	1.0529	0.9936	0.9947	0.9953	1.0655	1.0693	1.0721
		55	0.9900	0.9914	0.9922	0.9962	0.9969	0.9972	1.0038	1.0059	1.0074
		60	0.9956	0.9962	0.9966	0.9983	0.9986	0.9988	0.9929	0.9938	0.9945
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	40	25	1.4453	1.3722	1.3270	1.1455	1.1158	1.0989	1.4019	1.3467	1.3095
		30	1.4453	1.3722	1.3270	1.1455	1.1158	1.0989	1.4019	1.3467	1.3095
		35	1.4453	1.3722	1.3270	1.1455	1.1158	1.0989	1.4019	1.3467	1.3095
		40	1.4453	1.3722	1.3270	1.1455	1.1158	1.0989	1.4019	1.3467	1.3095
		45	1.2055	1.2082	1.1851	1.0502	1.0512	1.0428	1.2079	1.2130	1.1942
		50	1.0566	1.0582	1.0592	0.9970	0.9976	0.9979	1.0780	1.0810	1.0831
		55	0.9943	0.9953	0.9958	0.9982	0.9986	0.9988	1.0107	1.0124	1.0135
		60	0.9975	0.9979	0.9982	0.9992	0.9993	0.9994	0.9959	0.9966	0.9971
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
20	45	25	1.2139	1.1661	1.1411	1.0531	1.0358	1.0312	1.2243	1.1835	1.1595
		30	1.2139	1.1661	1.1411	1.0531	1.0358	1.0312	1.2243	1.1835	1.1595
		35	1.2139	1.1661	1.1411	1.0531	1.0358	1.0312	1.2243	1.1835	1.1595
		40	1.2139	1.1661	1.1411	1.0531	1.0358	1.0312	1.2243	1.1835	1.1595
		45	1.2139	1.1661	1.1411	1.0531	1.0358	1.0312	1.2243	1.1835	1.1595
		50	1.0617	1.0627	1.0514	0.9989	0.9992	0.9993	1.0878	1.0900	1.0786
		55	0.9972	0.9978	0.9982	0.9993	0.9995	0.9996	1.0162	1.0174	1.0182
		60	0.9988	0.9990	0.9992	0.9997	0.9998	0.9998	0.9982	0.9988	0.9991
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

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ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE VIII Vesting Conditions 1	2	3	EMPLOYMENT TURNOVER TABLE IX Vesting Conditions 1	2	3	EMPLOYMENT TURNOVER TABLE X Vesting Conditions 1	2	3
20	50	25	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		30	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		35	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		40	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		45	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		50	1.0650	1.0416	1.0370	1.0000	1.0000	1.0000	1.0950	1.0708	1.0608
		55	0.9991	0.9994	0.9995	1.0000	1.0000	1.0000	1.0202	1.0209	1.0172
		60	0.9996	0.9997	0.9997	1.0000	1.0000	1.0000	0.9999	1.0003	1.0004
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
25	25	30	1.7930	1.8467	1.8228	1.3144	1.3553	1.3422	1.6023	1.6246	1.6156
		35	1.4625	1.4844	1.5141	1.0948	1.1134	1.1379	1.4009	1.4097	1.4300
		40	1.2402	1.2518	1.2676	1.0001	1.0110	1.0255	1.2369	1.2415	1.2520
		45	1.0849	1.0917	1.1009	0.9566	0.9634	0.9725	1.1104	1.1130	1.1190
		50	0.9860	0.9900	0.9955	0.9385	0.9427	0.9484	1.0214	1.0229	1.0264
		55	0.9554	0.9577	0.9607	0.9651	0.9675	0.9707	0.9802	0.9811	0.9830
		60	0.9808	0.9817	0.9831	0.9851	0.9861	0.9875	0.9831	0.9835	0.9843
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	30	30	2.0181	1.9114	1.8353	1.4894	1.4166	1.3747	1.7090	1.6600	1.6154
		35	1.5542	1.5897	1.5585	1.1741	1.2021	1.1886	1.4429	1.4712	1.4545
		40	1.2889	1.3077	1.3211	1.0468	1.0633	1.0728	1.2587	1.2735	1.2869
		45	1.1133	1.1243	1.1321	0.9859	0.9962	1.0022	1.1229	1.1313	1.1390
		50	1.0029	1.0094	1.0141	0.9567	0.9631	0.9668	1.0286	1.0335	1.0380
		55	0.9649	0.9686	0.9712	0.9754	0.9791	0.9812	0.9842	0.9869	0.9893
		60	0.9848	0.9864	0.9876	0.9895	0.9910	0.9919	0.9848	0.9859	0.9870
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table VIII			Employment Turnover Table IX			Employment Turnover Table X		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
25	35	30	1.6698	1.5850	1.5281	1.2617	1.2189	1.1943	1.5403	1.4865	1.4453
		35	1.6698	1.5850	1.5281	1.2617	1.2189	1.1943	1.5403	1.4865	1.4453
		40	1.3502	1.3651	1.3383	1.0984	1.1080	1.0980	1.3094	1.3256	1.3071
		45	1.1491	1.1578	1.1636	1.0183	1.0243	1.0278	1.1519	1.1611	1.1682
		50	1.0242	1.0294	1.0329	0.9768	0.9806	0.9828	1.0455	1.0509	1.0550
		55	0.9769	0.9798	0.9818	0.9868	0.9890	0.9902	0.9934	0.9963	0.9986
		60	0.9900	0.9913	0.9921	0.9943	0.9953	0.9958	0.9887	0.9900	0.9909
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	40	30	1.3981	1.3353	1.2949	1.1285	1.1031	1.0879	1.3628	1.3154	1.2820
		35	1.3981	1.3353	1.2949	1.1285	1.1031	1.0879	1.3628	1.3154	1.2820
		40	1.3981	1.3353	1.2949	1.1285	1.1031	1.0879	1.3628	1.3154	1.2820
		45	1.1770	1.1835	1.1637	1.0372	1.0408	1.0340	1.1824	1.1905	1.1745
		50	1.0408	1.0447	1.0472	0.9886	0.9908	0.9922	1.0632	1.0680	1.0713
		55	0.9862	0.9884	0.9898	0.9935	0.9948	0.9955	1.0031	1.0057	1.0075
		60	0.9940	0.9950	0.9956	0.9972	0.9977	0.9981	0.9928	0.9939	0.9947
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
25	45	30	1.1976	1.1542	1.1308	1.0486	1.0328	1.0285	1.2088	1.1717	1.1492
		35	1.1976	1.1542	1.1308	1.0486	1.0328	1.0285	1.2088	1.1717	1.1492
		40	1.1976	1.1542	1.1308	1.0486	1.0328	1.0285	1.2088	1.1717	1.1492
		45	1.1976	1.1542	1.1308	1.0486	1.0328	1.0285	1.2088	1.1717	1.1492
		50	1.0531	1.0558	1.0455	0.9957	0.9970	0.9974	1.0786	1.0823	1.0720
		55	0.9931	0.9946	0.9954	0.9975	0.9983	0.9985	1.0115	1.0135	1.0148
		60	0.9970	0.9977	0.9980	0.9989	0.9992	0.9993	0.9964	0.9972	0.9977
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table VIII Vesting Conditions			Employment Turnover Table IX Vesting Conditions			Employment Turnover Table X Vesting Conditions		
			1	2	3	1	2	3	1	2	3
25	50	30	1.0614	1.0394	1.0351	1.0000	1.0000	1.0000	1.0950	1.0676	1.0580
		35	1.0614	1.0394	1.0351	1.0000	1.0000	1.0000	1.0950	1.0676	1.0580
		40	1.0614	1.0394	1.0351	1.0000	1.0000	1.0000	1.0950	1.0676	1.0580
		45	1.0614	1.0394	1.0351	1.0000	1.0000	1.0000	1.0950	1.0676	1.0580
		50	1.0614	1.0394	1.0351	1.0000	1.0000	1.0000	1.0950	1.0676	1.0580
		55	0.9978	0.9986	0.9987	1.0000	1.0000	1.0000	1.0180	1.0192	1.0157
		60	0.9990	0.9994	0.9994	1.0000	1.0000	1.0000	0.9991	0.9996	0.9998
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
30	30	35	1.3775	1.4099	1.4015	1.1008	1.1216	1.1210	1.3477	1.3649	1.3597
		40	1.1969	1.2103	1.2304	1.0077	1.0168	1.0314	1.2058	1.2126	1.2281
		45	1.0626	1.0697	1.0803	0.9641	0.9692	0.9772	1.0935	1.0971	1.1050
		50	0.9756	0.9796	0.9856	0.9454	0.9483	0.9530	1.0133	1.0153	1.0197
		55	0.9513	0.9535	0.9568	0.9705	0.9721	0.9746	0.9771	0.9781	0.9804
		60	0.9795	0.9804	0.9818	0.9878	0.9884	0.9895	0.9822	0.9827	0.9836
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999
30	35	35	1.5154	1.4621	1.4195	1.1934	1.1667	1.1484	1.4294	1.3954	1.3644
		40	1.2541	1.2790	1.2626	1.0484	1.0664	1.0619	1.2382	1.2598	1.2489
		45	1.0929	1.1060	1.1166	0.9866	0.9966	1.0034	1.1102	1.1214	1.1315
		50	0.9927	1.0001	1.0061	0.9584	0.9641	0.9681	1.0225	1.0287	1.0343
		55	0.9607	0.9647	0.9679	0.9775	0.9806	0.9827	0.9819	0.9852	0.9881
		60	0.9834	0.9851	0.9865	0.9907	0.9920	0.9929	0.9843	0.9856	0.9868
		65	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999
30	40	35	1.3374	1.2879	1.2535	1.1067	1.0866	1.0738	1.3125	1.2750	1.2466
		40	1.3374	1.2879	1.2535	1.1067	1.0866	1.0738	1.3125	1.2750	1.2466
		45	1.1369	1.1492	1.1340	1.0189	1.0263	1.0217	1.1485	1.1607	1.1485
		50	1.0176	1.0245	1.0294	0.9770	0.9813	0.9841	1.0436	1.0504	1.0555
		55	0.9742	0.9780	0.9806	0.9876	0.9899	0.9914	0.9931	0.9967	0.9994
		60	0.9891	0.9907	0.9918	0.9948	0.9958	0.9964	0.9889	0.9903	0.9915
		65	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE VIII Vesting Conditions			EMPLOYMENT TURNOVER TABLE IX Vesting Conditions			EMPLOYMENT TURNOVER TABLE X Vesting Conditions		
			1	2	3	1	2	3	1	2	3
30	45	35	1.1767	1.1388	1.1176	1.0427	1.0290	1.0251	1.1889	1.1564	1.1361
		40	1.1767	1.1388	1.1176	1.0427	1.0290	1.0251	1.1889	1.1564	1.1361
		45	1.1767	1.1388	1.1176	1.0427	1.0290	1.0251	1.1889	1.1564	1.1361
		50	1.0401	1.0454	1.0368	0.9908	0.9937	0.9945	1.0659	1.0171	1.0630
		55	0.9865	0.9894	0.9910	0.9950	0.9966	0.9970	1.0049	1.0080	1.0099
		60	0.9943	0.9955	0.9962	0.9979	0.9986	0.9987	0.9937	0.9950	0.9958
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
30	50	35	1.0569	1.0366	1.0325	1.0000	1.0000	1.0000	1.0847	1.0636	1.0545
		40	1.0569	1.0366	1.0325	1.0000	1.0000	1.0000	1.0847	1.0636	1.0545
		45	1.0569	1.0366	1.0325	1.0000	1.0000	1.0000	1.0847	1.0636	1.0545
		50	1.0569	1.0366	1.0325	1.0000	1.0000	1.0000	1.0847	1.0636	1.0545
		55	0.9956	0.9972	0.9975	1.0000	1.0000	1.0000	1.0148	1.0168	1.0137
		60	0.9981	0.9988	0.9989	1.0000	1.0000	1.0000	0.9978	0.9987	0.9990
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999
35	35	40	1.1691	1.1886	1.1848	1.0284	1.0392	1.0396	1.1836	1.1966	1.1935
		45	1.0511	1.0589	1.0730	0.9799	0.9844	0.9924	1.0827	1.0878	1.0993
		50	0.9725	0.9764	0.9836	0.9576	0.9598	0.9639	1.0095	1.0120	1.0177
		55	0.9521	0.9541	0.9578	0.9787	0.9798	0.9819	0.9766	0.9779	0.9808
		60	0.9806	0.9814	0.9829	0.9916	0.9920	0.9928	0.9827	0.9832	0.9843
		65	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999
35	40	40	1.2565	1.2247	1.1984	1.0776	1.0648	1.0550	1.2454	1.2212	1.1995
		45	1.0863	1.1048	1.0959	1.0001	1.0106	1.0085	1.1068	1.1229	1.1157
		50	0.9903	0.9997	1.0074	0.9679	0.9732	0.9772	1.0214	1.0293	1.0365
		55	0.9612	0.9660	0.9700	0.9838	0.9865	0.9885	0.9826	0.9866	0.9902
		60	0.9843	0.9862	0.9878	0.9936	0.9947	0.9955	0.9851	0.9867	0.9881
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999

Entry Age y	Vesting Age s	Attained Age x	Employment Turnover Table VIII Vesting Conditions			Employment Turnover Table IX Vesting Conditions			Employment Turnover Table X Vesting Conditions		
			1	2	3	1	2	3	1	2	3
35	45	40	1.1488	1.1183	1.1000	1.0349	1.0238	1.0206	1.1623	1.1361	1.1185
		45	1.1488	1.1183	1.1000	1.0349	1.0238	1.0206	1.1623	1.1361	1.1185
		50	1.0220	1.0310	1.0247	0.9855	0.9901	0.9914	1.0488	1.0574	1.0508
		55	0.9775	0.9821	0.9848	0.9927	0.9950	0.9957	0.9963	1.0006	1.0035
		60	0.9909	0.9927	0.9938	0.9971	0.9980	0.9983	0.9905	0.9922	0.9934
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999	0.9999
35	50	40	1.0508	1.0328	1.0291	1.0000	1.0000	1.0000	1.0770	1.0582	1.0498
		45	1.0508	1.0328	1.0291	1.0000	1.0000	1.0000	1.0770	1.0582	1.0498
		50	1.0508	1.0328	1.0291	1.0000	1.0000	1.0000	1.0770	1.0582	1.0498
		55	0.9923	0.9950	0.9955	1.0000	1.0000	1.0000	1.0103	1.0134	1.0108
		60	0.9968	0.9979	0.9982	1.0000	1.0000	1.0000	0.9961	0.9974	0.9979
		65	0.9999	1.0000	0.9999	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
35	55	40	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0198	1.0129	1.0114
		45	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0198	1.0129	1.0114
		50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0198	1.0129	1.0114
		55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0198	1.0129	1.0114
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	1.0003	1.0002
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
40	40	45	1.0483	1.0617	1.0603	1.9969	1.0027	1.0029	1.0792	1.0888	1.0868
		50	0.9772	0.9824	0.9919	0.9709	0.9731	0.9774	1.0108	1.0144	1.0225
		55	0.9582	0.9606	0.9649	0.9871	0.9880	0.9900	0.9797	0.9813	0.9849
		60	0.9841	0.9850	0.9867	0.9952	0.9956	0.9963	0.9848	0.9854	0.9867
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999
40	45	45	1.1098	1.0896	1.0754	1.0239	1.0166	1.0143	1.1250	1.1077	1.0939
		50	1.0009	1.0133	1.0100	0.9811	0.9869	0.9887	1.0280	1.0392	1.0354
		55	0.9690	0.9747	0.9787	0.9916	0.9941	0.9950	0.9873	0.9923	0.9963
		60	0.9882	0.9904	0.9919	0.9969	0.9978	0.9981	0.9876	0.9895	0.9910
		65	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	1.0000	0.9999

Entry Age y	Vesting Age z	Attained Age x	Employment Turnover Table VIII Vesting Conditions			Employment Turnover Table IX Vesting Conditions			Employment Turnover Table X Vesting Conditions		
			1	2	3	1	2	3	1	2	3
40	50	45	1.0424	1.0275	1.0243	1.0000	1.0000	1.0000	1.0661	1.0506	1.0433
		50	1.0424	1.0275	1.0243	1.0000	1.0000	1.0000	1.0661	1.0506	1.0433
		55	0.9880	0.9922	0.9931	1.0000	1.0000	1.0000	1.0043	1.0088	1.0069
		60	0.9954	0.9970	0.9973	1.0000	1.0000	1.0000	0.9940	0.9957	0.9965
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
40	55	45	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182	1.0119	1.0105
		50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182	1.0119	1.0105
		55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0182	1.0119	1.0105
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9992	0.9999	0.9998
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	1.0000	0.9999
40	60	45	1.0000	1.0000	....	1.0000	1.0000	....	1.0011	1.0006	....
		50	1.0000	1.0000	....	1.0000	1.0000	....	1.0011	1.0006	....
		55	1.0000	1.0000	....	1.0000	1.0000	....	1.0011	1.0006	....
		60	1.0000	1.0000	....	1.0000	1.0000	....	1.0011	1.0006	....
		65	1.0000	1.0000	....	1.0000	1.0000	....	0.9999	0.9999	....
45	45	50	0.9909	0.9993	0.9998	0.9859	0.9889	0.9909	1.0186	1.0252	1.0244
		55	0.9703	0.9732	0.9778	0.9953	0.9963	0.9970	0.9867	0.9889	0.9933
		60	0.9900	0.9910	0.9925	0.9984	0.9988	0.9990	0.9886	0.9893	0.9908
		65	1.0000	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
45	50	50	1.0296	1.0196	1.0172	1.0000	1.0000	1.0000	1.0499	1.0393	1.0334
		55	0.9836	0.9892	0.9905	1.0000	1.0000	1.0000	0.9972	1.0030	1.0021
		60	0.9945	0.9963	0.9968	1.0000	1.0000	1.0000	0.9921	0.9940	0.9951
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999

ENTRY AGE y	VESTING AGE z	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLE VIII			EMPLOYMENT TURNOVER TABLE IX			EMPLOYMENT TURNOVER TABLE X		
			Vesting Conditions			Vesting Conditions			Vesting Conditions		
			1	2	3	1	2	3	1	2	3
45	55	50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0158	1.0105	1.0092
		55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0158	1.0105	1.0092
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9983	0.9993	0.9992
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
45	60	50	1.0000	1.0000	....	1.0000	1.0000	....	1.0010	1.0005	....
		55	1.0000	1.0000	....	1.0000	1.0000	....	1.0010	1.0005	....
		60	1.0000	1.0000	....	1.0000	1.0000	....	1.0010	1.0005	....
		65	1.0000	1.0000	....	1.0000	1.0000	....	0.9999	0.9999	....
50	50	55	0.9843	0.9882	0.9902	1.0000	1.0000	1.0000	0.9972	1.0005	1.0006
		60	0.9960	0.9970	0.9975	1.0000	1.0000	1.0000	0.9936	0.9944	0.9956
		65	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	0.9999	1.0000	0.9999
50	55	55	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0119	1.0080	1.0070
		60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9973	0.9985	0.9986
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
50	60	55	1.0000	1.0000	....	1.0000	1.0000	....	1.0009	1.0005	....
		60	1.0000	1.0000	....	1.0000	1.0000	....	1.0009	1.0005	....
		65	1.0000	1.0000	....	1.0000	1.0000	....	0.9999	1.0000	....
55	55	60	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9981	0.9988	0.9989
		65	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9999
55	60	60	1.0000	1.0000	....	1.0000	1.0000	1.0000	1.0007	1.0004	....
		65	1.0000	1.0000	....	1.0000	1.0000	1.0000	0.9999	0.9999	....
60	60	65	1.0000	1.0000	....	1.0000	1.0000	1.0000	0.9999	0.9999	....

APPENDIX C

TABLE C1

NON-SELECT EMPLOYMENT TURNOVER TABLES

Age	Table					
	I	II	IV	VI	IX	X
20.........	0.054384	0.054000	0.108000	0.216000	0.330000	0.079384
21.........	.054083	.050900	.101800	.203600	.318000	.078989
22.........	.053344	.048000	.096000	.192100	.297000	.078587
23.........	.052213	.045350	.090700	.181400	.273000	.078169
24.........	.050732	.042900	.085800	.171500	.252000	.077723
25.........	.048948	.040600	.081200	.162400	.231000	.077242
26.........	.046904	.038350	.076700	.153300	.211000	.076700
27.........	.044648	.036150	.072300	.144600	.191000	.075912
28.........	.042220	.034050	.068100	.136200	.172000	.074890
29.........	.039665	.032050	.064100	.128200	.156000	.073654
30.........	.037020	.030150	.060300	.120600	.140000	.072219
31.........	.034319	.028350	.056700	.113400	.123000	.070603
32.........	.031593	.026600	.053200	.106500	.109000	.068829
33.........	.028866	.025050	.050100	.100100	.097000	.066916
34.........	.026160	.023550	.047100	.094200	.086000	.064888
35.........	.023492	.022150	.044300	.088600	.075000	.062764
36.........	.020879	.020850	.041700	.083400	.066000	.060572
37.........	.018335	.019650	.039300	.078500	.058000	.058332
38.........	.015875	.018500	.037000	.074000	.051000	.056066
39.........	.013518	.017450	.034900	.066900	.046000	.053786
40.........	.011283	.016550	.033100	.066300	.040000	.051504
41.........	.009186	.015650	.031300	.062700	.035000	.049206
42.........	.007250	.014750	.029500	.059000	.031000	.046881
43.........	.005500	.013800	.027600	.055300	.028000	.044533
44.........	.003960	.012900	.025800	.051700	.025000	.042159
45.........	.002653	.012000	.024000	.048000	.022000	.039753
46.........	.001595	.011100	.022200	.044300	.020000	.037270
47.........	.000798	.010150	.020300	.040500	.017000	.034650
48.........	.000274	.009150	.018300	.036500	.013000	.031850
49.........	.000015	.008100	.016200	.032400	.013000	.028841
50.........	0.000000	.006950	.013900	.027900	0.000000	.025627
51.........	....	.005800	.011600	.023100	....	.022260
52.........	....	.004500	.009000	.018000	....	.018837
53.........	....	.003100	.006200	.012500	....	.015472
54........	....	.001600	.003200	.006500	....	.012288
55.........	....	0.000000	0.000000	0.000000	....	.009394
56.........	....	....	....	....	....	.006847
57.........	....	....	....	....	....	.004713
58.........	....	....	....	....	....	.003024
59.........	....	....	....	....	....	.001767
60.........	....	....	....	....	....	.000901
61.........	....	....	....	....	....	.000367
62.........	....	....	....	....	....	.000094
63.........	....	....	....	....	....	.000000
64.........	....	....	....	....	....	.000000
65.........	....	....	....	....	....	0.000000

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SELECT EMPLOYMENT TURNOVER TABLES

DURATION	ENTRY AGE y						
	20	25	30	35	40	45	50
Employment Turnover Table III							
0	0.081250	0.068750	0.056250	0.037500	0.025000	0.016250	0.010000
1	.073750	.061250	.048750	.031250	.022500	.015000	.008750
2	.061250	.050000	.037500	.025000	.018750	.012500	.006250
3	.050000	.038750	.030000	.022500	.016250	.010000	.003750
4	.043750	.032500	.025000	.020000	.015000	.008750	.002500
5	0.040600	0.030150	0.022150	0.016550	0.012000	0.006950	0.000000
(Same as Employment Turnover Table II at attained ages $y+5$ and over)							
Employment Turnover Table V							
0	0.162500	0.137500	0.112500	0.075000	0.050000	0.032500	0.020000
1	.147500	.122500	.097500	.062500	.045000	.030000	.017500
2	.122500	.100000	.075000	.050000	.037500	.025000	.012500
3	.100000	.077500	.060000	.045000	.032500	.020000	.007500
4	.087500	.065000	.050000	.040000	.030000	.017500	.005000
5	0.081200	0.060300	0.044300	0.033100	0.024000	0.013900	0.000000
(Same as Employment Turnover Table IV at attained ages $y+5$ and over)							
Employment Turnover Table VII							
0	0.325000	0.275000	0.225000	0.150000	0.100000	0.065000	0.040000
1	.295000	.245000	.195000	.125000	.090000	.060000	.035000
2	.245000	.200000	.150000	.100000	.075000	.050000	.025000
3	.200000	.155000	.120000	.090000	.065000	.040000	.015000
4	.175000	.130000	.100000	.080000	.060000	.035000	.010000
5	0.162400	0.120600	0.088600	0.066300	0.048000	0.027900	0.000000
(Same as Employment Turnover Table VI at attained ages $y+5$ and over)							
Employment Turnover Table VIII							
0	0.276000	0.234000	0.191000	0.127000	0.085000	0.055000	0.034000
1	.255000	.214000	.171000	.109000	.079000	.050000	.031000
2	.220000	.180000	.135000	.090000	.067000	.045000	.024000
3	.190000	.150000	.111000	.080000	.061000	.040000	.016000
4	.175000	.134000	.100000	.075000	.057000	.036000	.010000
5	0.162400	0.120600	0.088600	0.066300	0.048000	0.027900	0.000000
(Same as Employment Turnover Table VI at attained ages $y+5$ and over)							

APPENDIX D

TABLE D1

Entry Age Level Annual Costs and Accrued Liabilities without Provision for Vesting
Male Lives

Entry Age y	Attained Age x	Employment Turnover Tables									
		I	II	III	IV	V	VI	VII	VIII	IX	X
		Entry Age Level Annual Cost $(NC)_y$									
20	....	32.6048	30.8724	30.5665	19.7587	19.1523	6.2112	5.4533	5.8081	5.4549	13.8770
		Accrued Liability $(AL)_{y,x}$									
20	25	216.1438	200.6975	205.2709	151.0471	157.7626	68.7789	73.8032	71.4509	96.3636	100.5622
	30	537.0254	484.4697	489.1909	404.6855	412.2200	238.4539	244.8051	241.8311	398.5051	279.3509
	35	962.6173	857.8476	862.5178	774.3128	782.2811	556.7439	564.2427	560.7307	911.6164	578.7530
	40	1,471.5178	1,330.9038	1,335.3249	1,271.3588	1,279.3109	1,061.5007	1,069.7279	1,065.8737	1,534.3648	1,039.8009
	45	2,042.7475	1,923.0906	1,927.0753	1,915.6070	1,923.0941	1,790.8758	1,799.3016	1,795.3526	2,225.2426	1,696.7959
	50	2,701.8534	2,660.0328	2,663.3869	2,719.5988	2,726.1185	2,738.5200	2,746.3715	2,742.6889	3,004.6207	2,567.1163
	55	3,543.6437	3,557.7545	3,560.2482	3,648.2818	3,653.2084	3,758.6086	3,764.7484	3,761.8646	3,764.7311	3,595.1696
	60	4,673.0522	4,680.8950	4,682.2824	4,731.2124	4,733.9417	4,792.5174	4,795.9061	4,794.3076	4,795.8936	4,751.2251
	65	6,262.1935	6,262.1924	6,262.1957	6,262.1923	6,262.1713	6,262.1512	6,262.0957	6,262.1060	6,262.0890	6,262.1600

Note.—Benefit equal to one unit per year of service from entry age to age 65.

TABLE D1—*Continued*

Entry Age *y*	Attained Age *z*	Employment Turnover Tables									
		I	II	III	IV	V	VI	VII	VIII	IX	X
		Entry Age Level Annual Cost $(NC)_y$									
25	....	42.1595	39.3759	39.0111	29.6850	28.9128	14.7418	13.3691	13.8285	19.8371	21.3611
		Accrued Liability $(AL)_{y,z}$									
25	30	271.0614	246.4818	252.1120	209.0651	218.6611	134.6586	146.1662	142.3149	215.8301	153.1699
	35	644.3013	580.3687	585.9382	528.9254	539.0748	403.5884	417.1792	412.6306	627.9533	413.4794
	40	1,105.2939	1,010.5914	1,015.8639	971.0343	981.1643	843.3469	858.2644	853.2716	1,164.7115	820.1419
	45	1,635.7917	1,554.0138	1,558.7659	1,552.9511	1,562.4907	1,489.1889	1,504.4769	1,499.3600	1,786.1639	1,406.1810
	50	2,254.6696	2,233.6895	2,237.6896	2,286.8950	2,295.2048	2,338.4293	2,352.6908	2,347.9171	2,503.6439	2,189.4271
	55..	3,042.5650	3,065.2430	3,068.2172	3,144.1782	3,150.4614	3,265.8972	3,277.0732	3,273.3317	3,224.3931	3,123.6220
	60	4,094.1593	4,106.7671	4,108.4222	4,150.6397	4,154.1273	4,218.2934	4,224.5014	4,222.4222	4,195.2241	4,182.5043
	65	5,566.3896	5,566.3960	5,566.4005	5,566.3917	5,566.3807	5,566.3892	5,566.3802	5,566.3810	5,566.3888	5,566.3897
		Entry Age Level Annual Cost $(NC)_y$									
30	....	52.0399	48.4298	48.0308	40.6931	39.8342	26.9537	25.1653	25.7758	37.8091	31.4054
		Accrued Liability $(AL)_{y,z}$									
30	35	320.7631	294.4877	300.5777	269.3175	280.6082	213.9799	231.6876	225.6419	300.5931	219.5632
	40	734.0621	682.3255	688.0900	656.5156	667.7854	585.1776	604.6147	597.9780	747.3268	570.9423
	45	1,224.3911	1,177.7690	1,182.9637	1,176.9276	1,187.5414	1,146.4871	1,166.4081	1,159.6052	1,301.0988	1,086.6020
	50	1,803.8579	1,801.3133	1,805.6848	1,842.5455	1,851.7925	1,900.0681	1,918.6535	1,912.3053	1,962.5824	1,785.5005
	55	2,538.8393	2,568.2470	2,571.4955	2,631.2665	2,638.2606	2,743.1818	2,757.7489	2,752.7709	2,654.7574	2,631.6098
	60	3,513.7994	3,530.1459	3,531.9505	3,565.1737	3,569.0599	3,627.3795	3,635.4762	3,632.7056	3,578.2300	3,602.1855
	65	4,870.5954	4,870.5974	4,870.5951	4,870.5972	4,870.5938	4,870.5975	4,870.5971	4,870.5885	4,870.5958	4,870.5961

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ENTRY AGE y	ATTAINED AGE x	EMPLOYMENT TURNOVER TABLES									
		I	II	III	IV	V	VI	VII	VIII	IX	X
		Entry Age Level Annual Cost $(NC)_y$									
35	. . . .	61.7472	58.0475	57.7457	52.4397	51.7976	41.6269	40.2367	40.8857	53.5813	43.7423
		Accrued Liability $(AL)_{y,x}$									
35	40	365.4913	345.9122	350.2736	332.3041	340.7299	300.2558	315.3651	308.3113	359.1745	295.2927
	45	815.3522	794.1812	798.1120	791.7739	799.7095	776.3651	791.8507	784.6211	844.1896	741.0910
	50	1,354.9735	1,362.7568	1,366.0655	1,390.2398	1,397.1539	1,436.1228	1,450.5704	1,443.8253	1,446.0521	1,358.0862
	55	2,036.5194	2,066.6569	2,069.1167	2,112.3341	2,117.5643	2,200.4102	2,211.7345	2,206.4475	2,103.0349	2,121.2825
	60	2,934.2177	2,950.9700	2,952.3382	2,976.3576	2,979.2649	3,025.3126	3,031.6073	3,028.6683	2,971.1887	3,011.4943
	65	4,174.7942	4,174.7965	4,174.7989	4,174.7942	4,174.7943	4,174.7939	4,174.7945	4,174.7936	4,174.7937	4,174.7994
		Entry Age Level Annual Cost $(NC)_y$									
40	. . . .	71.2544	68.3227	68.0724	64.8032	64.2766	57.7111	56.5682	57.0633	67.1732	57.7818
		Accrued Liability $(AL)_{y,x}$									
40	45	409.0477	402.0334	405.2916	398.9992	405.5063	390.5283	403.2588	397.7431	415.1928	376.3213
	50	908.3229	916.9971	919.7387	931.2956	936.9645	957.5176	969.3946	964.2482	953.8442	913.2282
	55	1,535.8320	1,559.7143	1,561.7510	1,588.3823	1,592.6698	1,646.1507	1,655.4595	1,651.4253	1,569.0773	1,597.3521
	60	2,355.5456	2,368.8214	2,369.9520	2,384.7556	2,387.1375	2,416.8644	2,422.0380	2,419.7947	2,374.0254	2,413.0983
	65	3,478.9977	3,479.0009	3,478.9974	3,479.0003	3,478.9973	3,478.9991	3,478.9981	3,478.9959	3,479.0003	3,478.9980

TABLE D1—*Continued*

Entry Age y	Attained Age x	EMPLOYMENT TURNOVER TABLES									
		I	II	III	IV	V	VI	VII	VIII	IX	X
		Entry Age Level Annual Cost $(NC)_y$									
45	....	80.9624	79.3569	79.2039	77.6701	77.3531	74.2163	73.5314	73.8104	79.6865	72.8426
		Accrued Liability $(AL)_{y,x}$									
45	50	459.4316	462.9168	464.5926	466.9265	470.3401	474.5341	481.6514	478.7524	473.6622	457.9072
	55	1,033.5079	1,046.5859	1,047.8310	1,060.3244	1,062.9067	1,088.4577	1,094.0360	1,091.7639	1,043.9004	1,065.2633
	60	1,775.9628	1,783.2321	1,783.9233	1,790.8674	1,792.3028	1,806.5048	1,809.6049	1,808.3424	1,781.7389	1,810.0824
	65	2,783.1990	2,783.1997	2,783.1976	2,783.1974	2,783.1977	2,783.1976	2,783.1966	2,783.1976	2,783.1983	2,783.1961
		Entry Age Level Annual Cost $(NC)_y$									
50	....	91.6154	91.1974	91.0260	90.7747	90.4269	89.9086	89.1991	89.3179	91.6154	88.1560
		Accrued Liability $(AL)_{y,x}$									
50	55	523.5998	526.8897	528.2865	530.3328	533.1659	537.3879	543.1668	542.1995	523.4856	531.1586
	60	1,192.3611	1,193.9925	1,194.7694	1,195.9062	1,197.4809	1,199.8277	1,203.0395	1,202.5022	1,192.1008	1,205.9266
	65	2,087.8554	2,087.3987	2,087.3999	2,087.3985	2,087.3986	2,087.3987	2,087.3981	2,087.3987	2,087.3996	2,087.3976

NOTE.—Benefit equal to one unit per year of service from entry age to age 65.

APPENDIX E

DERIVATION OF ACCRUED LIABILITY INDICES
FOR VESTING CONDITION 1

Since

$$(NC)_y = \frac{(65-y)\,\ddot{a}_{65}^{(12)} \cdot v^{65-y} \cdot {}_{65-y}p_y^{(T)}}{\ddot{a}_{y:\overline{65-y}|}^{(T)}}$$

and

$$(AL)_{y,x} = (NC)_y \cdot \sum_{k=y}^{x-1} \frac{(1+i)^{x-k}}{{}_{x-k}p_k^{(T)}} = (NC)_y \cdot \ddot{s}_{y:\overline{x-y}|}^{(T)},$$

then

$$(NC)_y^v = (1 + f_y^{z,\,65})(NC)_y,$$

where

$$f_y^{z,\,65} = \sum_{k=z}^{64} \frac{k-y}{65-y} \cdot \frac{q_k^{(ws)} \cdot {}_{64-k}p_{k+1}}{{}_{65-k}p_k^{(T)}}.$$

Thus, for $x > z$

$$(AL)_{y,x}^v = (1 + f_y^{z,\,65})(NC)_y \cdot \ddot{s}_{y:\overline{x-y}|}^{(T)}$$

$$- \sum_{k=z}^{x-1} \left[\frac{k-y}{65-y} \cdot \frac{{}_{64-k}p_{k+1} \cdot q_k^{(ws)}}{{}_{65-k}p_k^{(T)}} \right] \left[(65-y)\,\ddot{a}_{65}^{(12)} \cdot {}_{65-x}p_x^{(T)} \cdot v^{65-x} \right].$$

If $(AL)_{y,x}^v$ is divided by $(AL)_{y,x}$, then

$$(I)_{y,x}^{AL} = 1 + f_y^{z,\,65} - \sum_{k=z}^{x-1} \frac{k-y}{65-y} \cdot \frac{{}_{64-k}p_{k+1} \cdot q_k^{(ws)}}{{}_{65-k}p_k^{(T)}} \cdot \frac{\ddot{a}_{y:\overline{65-y}|}^{(T)}}{\ddot{a}_{y:\overline{x-y}|}^{(T)}}$$

$$= 1 + f_y^{z,\,65} - f_y^{z,\,x} \cdot \frac{\ddot{a}_{y:\overline{65-y}|}^{(T)}}{\ddot{a}_{y:\overline{x-y}|}^{(T)}}$$

$$= \frac{(1 + f_y^{z,\,x} + f_y^{z,\,65})\,\ddot{a}_{y:\overline{x-y}|}^{(T)} - f_y^{z,\,x} \cdot \ddot{a}_{y:\overline{65-y}|}^{(T)}}{\ddot{a}_{y:\overline{x-y}|}^{(T)}}$$

$$= \frac{\ddot{a}_{y:\overline{x-y}|}^{(T)} + f_y^{z,\,65} \cdot \ddot{a}_{y:\overline{x-y}|}^{(T)} - f_y^{z,\,x}\,[\,\ddot{a}_{y:\overline{65-y}|}^{(T)} - \ddot{a}_{y:\overline{x-y}|}^{(T)}\,]}{\ddot{a}_{y:\overline{x-y}|}^{(T)}}$$

$$= 1 + f_y^{x,\,65} - f_y^{x,\,z} \left(\frac{v^{x-y} \cdot {}_{x-y}p_y^{(T)} \cdot \ddot{a}_{x:\overline{65-x}|}^{(T)}}{\ddot{a}_{y:\overline{x-y}|}^{(T)}} \right)$$

$$= 1 + f_y^{x,\,65} - f_y^{x,\,z} \cdot \frac{\ddot{a}_{x:\overline{65-x}|}^{(T)}}{\ddot{s}_{y:\overline{x-y}|}^{(T)}} \,.$$

DISCUSSION OF PRECEDING PAPER

WILLIAM K. WHITE:

In my discussion of the paper by Mr. Marples, entitled "Cost of Vesting in Pensions," it is stated that many of the comments would apply to a considerable extent equally to Mr. McGinn's paper.[1] This applies particularly to the comments that we are especially fortunate to have papers at this time presenting somewhat different mathematical techniques and that the concepts presented will be useful timesaving tools to many actuaries for their pension plan valuations. There are two additional comments that I would like to make.

First, while it is realized that it was not within the scope of what Mr. McGinn intended to cover, some discussion of why figures were developed for a number of different turnover assumptions would unquestionably be of interest to a layman who might read his paper. This, of course, would include a commentary on why a particular table would be used in a given situation, pointing out that, although the selection of the table will influence the level of deposits from time to time to provide for vesting, the actual experience under the plan will determine the real cost. The obvious objective is to select that table which seems, under the circumstances in a particular case, to be most likely to come closest to what may be expected in the way of actual experience.

I was particularly interested in Mr. McGinn's study of the impact of changes in mortality and interest assumptions on the estimated cost of vesting. His conclusion—that in both cases the degree of error introduced by applying the same set of factors to rather widely divergent assumptions is well within the degree of error one reasonably expects in the turnover assumption itself—confirms a suspicion that we had had but had not previously seen verified.

DOUGLAS R. BUTT:

When valuing the liabilities of a pension plan, the actuary cannot hope to produce precisely accurate forecasts, and thus any time that he spends trying to develop accurately, to the last decimal point, the cost of minor benefits is largely wasted. I am, therefore, always pleased to read a paper such as Mr. McGinn's, which provides the material for useful rules of thumb or approximate calculations.

[1] See pp. 277 ff.

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My comments on the paper are minor and probably quite obvious to those actuaries actively involved with pension matters. They may, however, be of use to others, not as familiar with this field, who may decide to use Mr. McGinn's indices.

I believe that the indices can be used, regardless of the funding technique used in the valuation, since entry age normal costs, as Mr. McGinn states, should be a reasonable measure of long-range costs. If, say, the unit credit cost technique is used in the valuation and further indices are developed under this technique, these latter indices should be clearly identified as representing changes in the required deposit rates. The entry age normal indices should still give a reasonable indication of what the long term will bring.

Mr. McGinn's formulas cannot be used for contributory pension plans, as his no-vesting normal cost formulas do not allow for withdrawal values equal to the employees' contributions, usually with interest.

A feature of contributory plans, which would make a revision of these formulas of little value, is the provision that an employee may withdraw his contributions in lieu of taking a vested pension. It is very likely that all younger employees and most older ones will take their cash, even to their financial disadvantage. Various surveys bear this out. (This observation does not, of course, apply to legislated vesting, of the form emerging in the various provinces of Canada—compulsory vesting and locking-in of employee contributions after age 45 and ten years of service. However, the cost of such vesting is somewhat academic, as the employer has no choice in the matter.)

Thus the employer's cost of noncompulsory vesting under a contributory plan is the excess of the cost of the vested benefit over the employee's accumulated contributions, when the employee decides to leave his contributions in the fund. Under most plans the employee's accumulated contributions are more than enough to purchase his pension accrual up to age 40 and in many cases to higher ages. Considering the relatively low incidence of termination after age 40, and the high likelihood that terminating employees will take their cash, the conclusion one reaches is that, for most normal contributory plans, any reasonable vesting provision can be included at virtually no cost to the employer.

CHARLES E. FARR:

Dan McGinn is to be complimented for bringing us the results of his work. He has defined and derived expressions for the additional estimated cost associated with the inclusion of a vesting provision in a pension plan. These expressions are termed cost indices.

Mr. McGinn has limited his investigation to a single actuarial cost method and to a benefit formula under which the earned retirement benefit increases uniformly with service. Within these boundaries, he has produced a considerable volume of numerical cost indices, using ten different turnover assumptions, three basic types of vesting schedules, one mortality assumption, one interest assumption, one retirement-age assumption, and various combinations of entry age, vesting age, and attained age. Further, he demonstrates that changes in the mortality assumption or the interest assumption have a minor effect on the indices.

The projected benefit actuarial cost method dealt with by Mr. McGinn is individual level cost with supplemental liability (entry age normal cost method). He derives two cost indices, one applicable to the level cost and the other applicable to the supplemental liability. His example, demonstrating how the indices can be used, shows how the level cost indices are applied to the level costs computed without provision for vesting, grouped by entry age, and how the supplemental liability indices are applied to the supplemental liabilities computed without provision for vesting, grouped by entry age and attained age. The approach developed by Mr. McGinn uses a precise and detailed calculation of an estimated cost under a particular actuarial cost method. It may be helpful to mention briefly a modification of his approach which is less detailed in application but which can be used with several actuarial cost methods.

Projected benefit actuarial cost methods generally involve the calculation of the present value of the normal retirement benefit. It is proposed here to adjust for the estimated additional value of the superimposed vesting provision by applying a single factor to the present value of the normal retirement benefit. The use of a single factor rather than a whole family of factors is made possible by assuming a single entry age. The nature of this factor is clear, being the ratio, at the assumed single age of entry, of (a) the present value of vested benefits originating upon the assumed future occurrence of employee withdrawal to (b) the present value of the deferred normal retirement benefit.

These factors are already calculated by Mr. McGinn and are shown in his Appendix B tables of Entry Age Level Annual Cost Indices. His Entry Age 30, Vesting Condition 1, and Employment Turnover Tables I and IV will be taken as examples. These cost indices, reduced in each case by unity in order to represent the additional cost, are reproduced in the table on page 246.

When a plan begins, some employees will be younger than the age at which vesting commences and some will be older. It should be clear that the percentage opposite the vesting age in the table applies to those em-

ployees at or below the vesting age but that the percentage opposite the attained age in the table applies to those employees older than the vesting age. In other words, the table could be entered with the greater of the employee's attained age or his age when vested. For example, if vesting occurs after fifteen years (assumed to be at age 45 since assumed entry age is 30), the 0.0816 figure in the Table IV column is appropriate on the effective date of the plan not only for new entrants but also for all employees age 45 or younger. For employees already age 50 on the effective date, the 0.0276 figure applies, and so on.

Although it may at first seem appropriate to proceed as above in using the lower percentages for those in the initial group older than the age at which vesting occurs, the long-range estimated cost of vesting associated with specified assumptions of turnover and entry age is best represented

For Vesting After:		Additional Cost of Vesting, Assuming Entry Age 30	
Years	Age	Table I	Table IV
0	30	0.0445	0.2292
5	35	.0344	.2030
10	40	.0150	.1447
15	45	.0024	.0816
20	50	0.0000	0.0276

by the single percentage opposite the vesting age. The estimated cost for new entrants becomes dominant as the effect of the initial employee group wears off.

To implement this method, then, the factors of the type shown above are applied to the present value of normal retirement benefits appropriately grouped. If the long-range view is taken, a single factor is applied to the total present value of normal retirement benefits. The result is the estimated additional present value due to the vesting provision.

As brought out in Mr. McGinn's paper, factors can be calculated for many different vesting provisions. Factors for full vesting after n years of service are illustrated above. Factors for partial vesting after n years, graded up to full vesting over an additional period of years, are easily available. Under the assumption of a single entry age, a vesting provision which involves both years of service and attainment of a given age can be reduced to a single parameter. These types account for most vesting provisions.

Although the assumption that the accrued pension (in which there is

partial or full vesting) is proportionate to service will permit the application of this method to many plans which are a function of service only, it nevertheless restricts its application to some extent. A large proportion of existing and new plans involves salary as well as service in the benefit formula. In those valuations in which a salary-increase assumption is not employed, accrued pension is assumed to be proportionate to service, and the method is applicable. Actuarial losses will appear to the extent that the assumption of level salary fails. However, when a salary increase assumption is felt necessary, appropriate modifications can be made in the calculation of the factors, if desired, in order to reflect the less-than-proportionate benefit accrual. The modification is greater under a final average salary benefit formula than under a career average salary benefit formula because of the greater disparity in the former case between the normal retirement benefit based on final average salary and the retirement benefit accrued for vesting purposes based on salary at or just prior to withdrawal.

In conclusion, I wish to express my appreciation to Dan McGinn for his timely examination of one aspect of pension costs.

EDWIN F. BOYNTON:

The tables presented in Mr. McGinn's paper should be useful to all pension actuaries in estimating the cost of vesting, particularly in indicating the relative cost of alternative vesting schedules. The paper presents an approach to the cost of vesting that we have been using for several years in The Wyatt Company. About six or seven years ago we were casting about for some fairly simple approach for estimating vesting costs, particularly for negotiation purposes. We arrived at the same conclusion as Mr. McGinn did—that the present value of prospective vested benefits, expressed as a percentage of the corresponding age retirement value, is independent of the interest rate, making it possible to derive a single set of factors for each service table in common use.

Our approach was somewhat simpler than proposed by Mr. McGinn. For one thing, we discovered, as did the author, that the application of the factors would produce a relatively large increase in normal cost but would often result in a net decrease in the accrued liability function. However correct it might be theoretically, it is sometimes awkward to explain to an unsophisticated employer or at the bargaining table why an improvement in vested benefits reduces the accrued liability under the plan. Therefore, we determined "vesting loading factors," as we call them, for the present value of benefits only. We commonly apply the factors only to the present value of age benefits and determine the total present value

of future vested benefits as a percentage of total present value of age benefits. The percentage so determined is applied uniformly to both normal cost and accrued liability items. The net effect on the contribution level, including amortization of the accrued liability, is probably about the same as using separate factors for normal cost and accrued liability.

We also applied the vesting loading factors to sample age distributions to get some measure of the effect on vesting costs of the age distribution, withdrawal assumption, and vesting eligibility conditions. Table 1 shows illustrative cost increases for vesting as a percentage of age retirement costs for males. The "young" group has an average age of 36; the "average" group, 41; and the "old" group, 45. Scale 1 turnover starts at 7.5 per cent turnover at age 20; Scale 2 at 15 per cent; Scale 3 at 22.5 per cent, and Scale 4 at 30 per cent, all grading down to no turnover around age 50 or so.

TABLE 1

PERCENTAGE INCREASE IN NORMAL RETIREMENT COSTS FOR VESTING

Vesting Requirements		Withdrawal Scale			
Age	Service	1	2	3	4
Young Group (Age 36)					
Any	10	3.4%	8.0%	12.5%	19.8%
Any	15	1.4	3.7	5.8	9.3
40	10	2.3	6.2	10.2	14.8
40	15	1.3	3.6	5.7	8.5
45	15	0.7	2.4	4.3	6.4
Average Group (Age 41)					
Any	10	1.9%	4.7%	7.5%	10.0%
Any	15	0.7	2.1	3.4	4.6
40	10	1.5	4.1	6.7	9.2
40	15	0.7	2.0	3.4	4.6
45	15	0.5	1.6	2.9	4.1
Old Group (Age 45)					
Any	10	1.0%	2.5%	3.9%	5.3%
Any	15	0.4	1.1	1.9	2.6
40	10	0.8	2.2	3.7	5.0
40	15	0.3	1.1	1.9	2.6
45	15	0.2	0.9	1.7	2.4

Before deriving the vesting factors, we first arrived at the "loading factor" concept in connection with the calculation of disability costs. Several of our offices normally apply entry age normal cost funding for disability benefits. At one point, several years ago, we had developed several new service tables for a wide range of interest rates and did not feel inclined to work out all the commutation functions necessary to calculate disability costs for each separate table. After some testing, we found a scale of loading factors varying by attained age which, when multiplied by the age retirement cost functions, would satisfactorily approximate the corresponding disability cost functions, and we have since used such factors extensively in developing disability costs. We discovered that, as a practical matter, the variation by service table was not particularly significant, since disability costs are negligible at the younger ages, where withdrawal rates vary the widest. Unlike the vesting factors, there is some variation by interest rate, and we adopted a rule of thumb of a fixed percentage increase in the disability loading factor for each $\frac{1}{4}$ per cent increase in interest. The variation by interest rate is due to the lesser impact of interest on a temporary life annuity than on a deferred life annuity.

These so-called loading factors are particularly adaptable to computer valuation programs, and we have built these factors directly into our principal pension-valuation systems. Instead of calculating the entire cost function from several stored commutation columns, only a single multiplication is required to multiply the age retirement cost by the applicable factor. It saves a considerable amount of computer storage and simplifies coding of tables for development of disability and vesting costs.

Despite the usefulness of the vesting loading factors or indices, in the majority of our cases we empirically adjust for vesting costs by selection of conservative withdrawal rates, and the principal use of the vesting factors has been in the derivation of the costs of alternative vesting schedules. Except under the most stable of employment conditions, no great credence should be given to the dollar level of vesting costs, per se, determined by any actuarial formula.

ROBERT F. LINK:

Mr. McGinn's paper is an interesting collection of tables and mathematics. Actuaries who wish to avoid voluminous calculations may find some useful material for horseback guesses.

When we read papers on vesting costs and the associated mathematical techniques, our thoughts are drawn to the paradox of such costs. The actuary tends to be conservative by nature and therefore uses termination

rates for pension plans that are lower than rates he actually expects. This produces age pension costs that are higher than most probable costs. That is, they are conservative. When he is asked to quote the cost of vesting, he falls into a trap; use of the same turnover rates produces a cost of vesting that is lower than the expected cost.

When an actuary uses the unit credit cost method, he frequently omits entirely any allowance for withdrawal from employment. Thus, as Mr. Marples points out in his paper (pp. 277 ff.), he does not change his cost figures when a vesting provision is introduced. Yet the vesting has a cost, and he may be asked to quote it.

Mr. McGinn shows that the interest assumption does not affect the additional normal cost of a vesting provision when expressed as a percentage of the normal cost of a plan with no vesting. I tried to "general reason" this and decided that I agreed. Mr. McGinn's tables also reveal that the percentage relationship between basic plan normal costs and normal costs for vesting is not affected by the withdrawal rates applicable to the period before vesting commences. This is a little more surprising but plausible after thought.

A major group of funding methods requires a total liability for all future benefits. To use Mr. McGinn's principles, we need factors for future benefit liability, recognizing entry age, attained age, and vesting age. I think that the entry age level annual cost indices of Mr. McGinn's Appendix B may be used for this purpose. Omitting the complications of graded vesting, you would select the factor under Vesting Condition No. 1 on the basis of entry age as given and vesting age equal to the higher of the actual vesting age or attained age. In Mr. McGinn's notation, slightly extended,

$$(I)_{x,y}^{TL} = (I)_y^{NC} \, ,$$

taking z equal to the higher of x or vesting age.

Mr. McGinn has used as far as possible the multiple-decrement notation from chapter xii of Jordan's *Life Contingencies*. Jordan says, on page 265:

A uniform notation for multiple-decrement functions has never been generally adopted, and in view of the complexity of the situations analyzed by multiple-decrement techniques, it is probably most convenient to assign symbols according to the nature of each problem under consideration.

Mr. McGinn has followed this advice in developing additional notation. One problem in the development of notation is to decide how much use to make of the corners. That is, what provision should be made for displaying parameters? There are no precise guides, and it is easy to over-

load. However, Mr. McGinn might have considered the merits of a notation that indicates, at least, retirement age (r), the nature of the additional benefit under consideration (B), qualitative description of the additional benefit (i), and age at which vesting commences (z). In this case, the additional benefit is vesting, and the qualitative description is "vesting condition." With this extension, $(I)_y^{NC}$ might become $_z^r(INC)_y^{Bi}$.

It would now be slightly easier to express the total liability, as the following shows:

$$_z^{65}(ITL)_{x,y}^{V_1} = _{z'}^{65}(INC)_y^{V_1} ,$$

where z' equals the higher of z and x.

Also, this revised notation would encompass other ancillary benefits, such as widows' benefits or disability pensions. The literature on this subject should be surveyed before making any changes. As Jordan suggests, a uniform, complete, and consistent notation is probably unattainable.

<div align="center">(AUTHOR'S REVIEW OF DISCUSSION)</div>

<div align="center">DANIEL F. McGINN:</div>

I will first comment on the various points raised by those who discussed my paper and then indicate the relatively simple modifications to my paper's formulas which may be made to make the indices adaptable to virtually any situation.

Mr. White has asked why figures were developed for so many different turnover tables and has suggested that I comment on when an actuary should use a specified turnover table. The following are the reasons why so many figures were developed:

1. Since the President's Committee Report on Private Pensions was published, numerous broad-brush statements have been made concerning the cost of vesting. I believe that the variety of tables included in my paper provides a useful reference to demonstrate both the wide range that exists in the relative cost of vesting schedules and the relationship between the relative cost of vesting schedules and the underlying employment turnover tables.

2. I believe that the relationships which exist among several of the turnover tables are such that the tables of indices provide a useful insight into the effect of variations in turnover levels on the relative cost of vesting. For example, among the Nonselect Turnover Tables, Table II has turnover rates equal to one-half the Table IV rates, while the Table IV rates are one-half the Table VI rates. Also, the Select Employment Turnover Tables grade into these Nonselect Turnover Tables. These relationships show both the change in the relative cost of vesting if turnover rates double or quadruple and also demonstrate the minor effect of select turnover rates on the relative cost of vesting.

3. As a practical matter, I think that these tables provide a reasonably wide range of vesting factors useful to pension actuaries without computer facilities and give pension actuaries handy reference tables for making quick approximations of the relative cost of various vesting schedules. Such tables may be very valuable at the bargaining table in evaluating alternative vesting schedules.

With regard to when a specific turnover table should be used, the choice must depend upon the judgment of the actuary. Since employment turnover is extremely volatile and greatly influenced by the movement of the economy, neither past nor present turnover experience of an employed group is necessarily a proper criterion in choosing the correct turnover table. However, since most actuaries must rely upon prior experience in establishing the actuarial basis of a pension plan, usually a pension actuary will attempt to review an employer's particular turnover experience and analyze current trends—both geographically and in the industry—to arrive at a reasonable index to the level of a company's turnover and to fix the effect of age and service on the incidence of turnover rates. Unfortunately, the actuary must usually base his choice of turnover rates on an employer's impressions rather than on statistical information.

As difficult as it is to establish a reasonable index to the level of turnover for an employer group, the difficulties are often compounded when union-negotiated pension plans are involved, because turnover experience must be measured by the proportion of accrued pension credits forfeited on account of breaks in service. Sometimes a break in service occurs when no hours are worked in one, two, or three plan years; in other instances a break in service occurs when 500 hours are not worked in a two-year period; and so forth. In addition, the existence of reciprocity agreements may preclude the forfeiture of accrued pension credits.

Because of these reasons and many other factors, no pension actuary can predict the actual cost of vesting; rather, all an actuary can do is to adopt that specific turnover table which reflects the nature of the plan, the covered group of employees, and the composition of plan provisions. After a given plan has been in existence for several years, the pension actuary must modify his assumptions to reflect actual emerging experience.

Perhaps in this discussion it will be useful to demonstrate concretely the range in which an actuary's cost estimates may fall, depending upon his choice of turnover table and vesting schedule. If we refer to the numerical illustration included in my paper, the "no vesting" level annual cost is $3,583, if Turnover Table IV is appropriate. If a 100 per cent immediate vesting schedule is adopted (i.e., Vesting Condition 1, vesting

age = entry age), the resulting level annual cost is \$4,595. In other words, the addition of a 100 per cent immediate vesting schedule produces a "maximum" cost equal to 128 per cent of the "minimum" cost (= \$4,595 ÷ \$3,583). If this Table IV "minimum" cost is represented by an index of 100, it is now obvious that the level annual costs of all possible vesting schedules for Table IV will fall within the range 100–128. By making similar calculations for all turnover tables shown in Appendix C of the paper and relating all costs to the "minimum" level annual cost for Turnover Table IV (with an index of 100), we develop the range of cost indices shown in the accompanying tabulation for this particular hypothetical group of participants.

	INDEX TO LEVEL ANNUAL COST		
EMPLOYMENT TURNOVER TABLE	Minimum Cost (No Vesting)	Maximum Cost (100 Per Cent Immediate Vesting)	RATIO (=MAXIMUM COST÷ MINIMUM COST)
I.	132	141	107%
II.	124	139	112
III.	123	138	112
IV.	100	128	128
V.	98	126	129
VI.	64	111	173
VII.	61	104	170
VIII.	62	106	171
IX.	81	111	137
X.	78	120	154

This tabulation shows that the selection of a particular turnover table from among the ten tables shown in Appendix C results in "no vesting" costs ranging from an index of 61 to an index of 132. Likewise, in this illustration the 100 per cent immediate vesting costs range from an index of 104 to an index of 141, and a choice of alternative vesting schedules can increase estimated maximum vesting costs from 7 to 73 per cent, depending upon which turnover table is chosen.

The foregoing calculations demonstrate the dramatic impact of variations in turnover assumptions on the total estimated pension plan costs and the estimated cost of vesting. However, as is the case with all the actuaries' other assumptions, the vesting factors employed in valuations are estimates; actual experience alone will determine the true cost of vesting.

The value of the mathematical technique presented in my paper is that it permits the actuary to provide for the precise relative costs of

vesting based on his judgment of appropriate and realistic assumptions of employment turnover.

Turning now to the points brought out in the other discussions, I heartily agree with Mr. Butt's comments regarding the cost of vested pension benefits under contributory pension plans. Since virtually every contributory plan involves conditional vesting, our experience has illustrated that, when employees with vested pensions terminate, most employer funds are released because terminating employees prefer to cash-out their accumulated contributions, even though it means forfeiture of the employer-paid portion of their vested pensions. Therefore, most vesting schedules in contributory plans add little to the employer's cost for the retirement benefits.

Mr. Farr suggests that "the long-range estimated cost of vesting associated with specified assumptions of turnover and entry age is best represented by the single percentage opposite the vesting age." If a quick, simple approximation to the cost of vesting is required, a single average entry age approach may be acceptable, but, for purposes of regular annual valuations, I believe that a more precise approach is mandatory since the age/service distribution of a covered group can change radically from one year to another as a result of economic and other factors. Certainly it seems that use of a single average entry age is not appropriate when vesting is a function of service only. Also, with the increasing use of computers in actuarial valuations, more precision can be attained at little additional cost.

Mr. Farr also states that "actuarial losses appear to the extent the assumption of level salary fails." I believe that this statement refers to the fact that the indices developed in my paper were based on accruals of level units of pension credits for each year of service and implies that the use of indices based on a salary scale would produce a more conservative estimate of the cost of vesting. Admittedly, actuarial losses will accrue to any salary plan in which salaries increase more than anticipated. However, as Mr. Marples points out in his paper, the most conservative estimate of the relative cost of vesting is determined by assuming an accrual of a level unit of pension credit each year. Consequently, use of the indices included in my paper with salary plans produces conservative results—reducing the degree of actuarial loss attributable to salary increases.

Mr. Boynton has pointed out the difficulty inherent in explaining why a more liberal vesting schedule may increase the normal cost of a plan substantially while decreasing the accrued liability. I agree that this apparent anomaly may be cumbersome to explain, but I think that a pension

actuary is often faced with other equally difficult explanations. It seems
to me that the difficulty lies primarily with the characteristics of the
actuarial cost method and that the problem could be eliminated (if neces-
sary) by using another cost method. I do find Mr. Boynton's reference to
"loading factors" quite intriguing; it certainly would be helpful if Mr.
Boynton would demonstrate the precise approach that he used to develop
these.

As useful as Mr. Boynton's "loading factors" may be, the approach
described by him in the last paragraph of his discussion is not appropriate.
First, it is quite obvious—by simply referring to the tables included in
my paper—that choosing a conservative turnover table automatically
produces age pension costs that are higher than most probable costs.
(This fact was indicated in Mr. Link's discussion.) Consequently, all
estimated vesting costs will be lower than the expected costs, and the
total of the estimated age pension and vesting costs is too high. Again,
Mr. Boynton's last sentence—if accepted—must also be true of the
dollar cost of the basic retirement pension. If we cannot convert, with
some relative validity, our actuarial assumptions into dollar estimates of
costs, then what is the value of actuarial judgment in the field of pension
plans?

In addition to his comments about the effects of using conservative
turnover tables, Mr. Link has indicated some apparent deficiencies in
the symbolism I have used. I agree that the symbolism can be improved
and welcome his suggestions.

As I stated in the "Comments" section of my paper, "Numerous
modifications can be made to these formulas so that the indices could be
developed for virtually any combination of factors and actuarial cost
methods."

By generalizing the definition of $f_y^{z,x}$, it can be shown that indices can
be developed quite easily to reflect salary factors and different actuarial
cost methods. Thus let

$$f_y^{z,x} = \sum_{k=z}^{x-1} (t)_y \cdot \frac{q_k^{(ws)} \cdot {}_{Q-k-1}p_{k+1}}{{}_{Q-k}p_k^{(T)}} .$$

With this generalized definition, we can examine (1) the nature of the
indices required for the unit credit and aggregate cost methods (including
"frozen liability" cost methods) when the benefit is a level unit of pension
credit for each year of service and (2) the definition of $(t)_y$ and the method
of applying the indices when salary scales and different actuarial cost
methods are employed.

Unit Credit Cost Method

Under the unit credit cost method, the number of level units of pension credits earned from entry age to attained age x is $(x - y)$. Thus, when the normal retirement age is Q, the "no vesting" accrued liability at age x for an accrued pension credit is

$$(x - y) \cdot v^{Q-x} \cdot {}_{Q-x}p_x^{(T)} \cdot \ddot{a}_Q^{(12)} \, ,$$

and the current-year cost for a level unit of pension credit is

$$v^{Q-x} \cdot {}_{Q-x}p_x^{(T)} \cdot \ddot{a}_Q^{(12)} \, .$$

By letting $(t)_y = 1$, the vesting indices are determined by the following relationship.

1. For Vesting Condition 1:

$x \leqq z$,

$$(I)_{y,x} = 1 + f_y^{z,Q} \, .$$

$x > z$,

$$(I)_{y,x} = 1 + f_y^{z,Q} \, .$$

2. For Vesting Conditions 2 and 3:

$x \leqq z$,

$$(I)_{y,x} = 1 + 0.5 f_y^{z,Q} + r \sum_{s=1}^{m} f_y^{z+s,Q} \, .$$

$z < x \leqq z + m$,

$$(I)_{y,x} = 1 + [\, 0.5 + (x - z - 1)\, r\,] f_y^{x,Q} + r \sum_{s=x-z}^{m} f_y^{z+s,Q} \, .$$

$x > z + m$,

$$(I)_{y,x} = 1 + f_y^{z,Q} \, .$$

NOTE.—The same indices apply to both the accrued liability and current-year costs. Also, the indices must be applied to the costs of both accrued and current service pension credits after they are summarized by attained age for each entry age. You should also note that, when $(t)_y = 1$, $f_y^{z,x} = W_{z,x}^Q$, as defined in the paper.

Aggregate Cost Method

As with the entry age normal cost method, this method is of the "projected benefit" variety, and so $(t)_y = (k - y)/(Q - y)$ in the formula for $f_y^{z,x}$ when level units of pension credits are earned from entry age until normal retirement age Q. Under this method, it is necessary to separate for each entry age–attained age combination the "no vesting" single-sum liability, so that appropriate indices may be applied. For example, for

entry age y, the projected benefit is $(Q - y)$, and the single-sum liability at attained age x for projected benefits is

$$(Q - y) \cdot v^{Q-x} \cdot {}_{Q-x}p_x^{(T)} \cdot \ddot{a}_Q^{(12)} \ .$$

Thus, the indices required for Vesting Condition 1 would be

$x \leqq z$,

$$(I)_{y.x} = 1 + f_y^{z,Q} \ .$$

$x > z$,

$$(I)_{y.x} = 1 + f_y^{z,Q} \ .$$

Since the vesting age z can differ for any specified entry age, the formulas for the level annual cost under this method become:

1. For Vesting Condition 1:

$$\left[\sum_{u=y}^{Q-1} \sum_{k=u}^{z_u} (Q-u) \cdot v^{Q-k} \cdot {}_{Q-k}p_k^{(T)} \cdot \ddot{a}_Q^{(12)} \cdot (1 + f_u^{z_u,Q}) \cdot l_{u,k} \right.$$

$$\left. + \sum_{u=y}^{Q-1} \sum_{k=z_u+1}^{Q-1} (Q-u) \cdot v^{Q-k} \cdot {}_{Q-k}p_k^{(T)} \cdot \ddot{a}^{(12)} \cdot (1 + f_u^{k,Q}) \cdot l_{u,k} - F \right] \Big/$$

$$\sum_{k=y}^{Q-1} l_k \cdot \ddot{a}_{k:\overline{Q-k}|}^{(T)} \ .$$

2. For Vesting Conditions 2 and 3:

$$\left[\!\!\left[\sum_{u=y}^{Q-1} \sum_{k=u}^{z_u} (Q-u) \cdot v^{Q-k} \cdot {}_{Q-k}p_k^{(T)} \cdot \ddot{a}_Q^{(12)} \cdot \left(1 + 0.5 f_u^{z_u,Q} \right.\right.$$

$$\left. + r \sum_{s=1}^{m} f_u^{z_u+s,Q} \right) \cdot l_{u,k} + \sum_{u=y}^{Q-1} \sum_{k=z_u+1}^{z_u+m} (Q-u) \cdot v^{Q-k} \cdot {}_{Q-k}p_k^{(T)} \cdot \ddot{a}_Q^{(12)}$$

$$\cdot \left\{ 1 + [0.5 + (k-z-1)r] f_u^{k,Q} + r \sum_{s=k-z_u}^{m} f_u^{z_u+s,Q} \right\} l_{u,k}$$

$$\left. + \sum_{u=y}^{Q-1} \sum_{k=z_u+m+1}^{Q-1} (Q-u) \cdot v^{Q-k} \cdot {}_{Q-k}p_k^{(T)} \cdot \ddot{a}_Q^{(12)} \cdot (1 + f_u^{k,Q}) l_{u,k} - F \right]\!\!\right] \Big/$$

$$\sum_{k=y}^{Q-1} l_k \cdot \ddot{a}_{k:\overline{Q-k}|}^{(T)} \ ,$$

where

F = the fund asset;

$l_{u,k}$ = number of participants at attained age k with entry age u;

l_k = total number of participants at attained age k;

z_u = vesting age corresponding to specified entry age u.

Effect on Indices of Other Factors

All the formulas presented in this paper relate to a most simple type of benefit formula. Indices based on the assumption of a level unit of pension credit per year of service should be quite appropriate in cost calculations made for collectively bargained (or negotiated) pension plans. Also, when salary scales are not employed, such indices can be used to develop a reasonably accurate measure of vesting costs for corporate-type "salary" pension plans even though the assumption of a level unit accrual will normally result in a conservative cost estimate.

In order to develop more precise measures of vesting costs for pension plans involving projected benefit formulas, the factors, $f_y^{z,x}$, may be modified to reflect salary scales and care must be taken in applying the resulting indices in actuarial cost estimates. For example, if all assumptions used in this paper are retained *except* that a salary scale is utilized in the actuarial cost calculations, then the projected units of benefit at retirement age Q for entry age y will not be $Q - y$ but rather

$$\frac{1}{s_y} \sum_{g=y}^{Q-1} s_g$$

for a career average benefit formula and

$$\frac{1}{5\,s_y} \cdot \left(\sum_{g=Q-5}^{Q-1} s_g \right) \cdot (Q-y)$$

for a final five-year-average benefit formula. Thus, the formula for $(t)_y$ has to be changed as follows for attained age k.

1. Career average benefit formula:

$$(t)_y = \frac{\displaystyle\sum_{g=y}^{k-1} s_g}{\displaystyle\sum_{g=y}^{Q-1} s_g}.$$

2. Final five-year average benefit formula:

$$t)_y = \frac{\displaystyle\sum_{g=k-5}^{k-1} s_g}{\displaystyle\sum_{g=Q-5}^{Q-1} s_g} \cdot \frac{k-y}{Q-y}.$$

It can be readily seen that, if the salary factor s_k is not in a select form, introduction of a salary scale does not complicate unduly the calculation of indices in this theoretical situation.

Practical Complications

Complications can arise when vesting costs are required for actuarial valuations of existing pension plans—primarily when benefits are based on career average earnings and a salary scale is employed. In effect, the projected benefits for a particular participant comprise specific accrued pension credits *plus* projected future benefit accruals based on an assumed salary scale. This situation can be handled by applying indices based on level unit accruals to accrued pension benefit costs and applying indices based on salary scales to projected future benefit costs.

Comments

Because of the complexities involved in providing for the costs of vesting, many actuaries may question the need for such a degree of apparent accuracy when the basic actuarial assumptions depend on the actuary's judgment. On the other hand, the relative cost of vesting—for a specified employment turnover assumption—can have a dramatic effect on the total cost of a pension plan, and the additional work required to measure the cost of vesting in most instances is well worthwhile. Also, by the use of computers, a large portion of the additional work can be absorbed without an inordinate increase in the actuary's time and effort.

Included as a part of this discussion are the commutation functions $_kW^{65}_{z,65}$ and $W^{65}_{z,65}$ (see Tables 1–5), to which reference was made in Appendix A of the paper. In addition, the basic 1966 Group Annuity Table (see Table 6) and a table of $N^{(T)}_z$ for each employment turnover table (see Tables 7–11) are also included, so that additional vesting cost indices may be developed.

TABLE 1

NONSELECT COMMUTATION FUNCTIONS—$_kW^{65}_{z,65}$ AND $W^{65}_{z,65}$

z	EMPLOYMENT TURNOVER TABLE I		EMPLOYMENT TURNOVER TABLE II		EMPLOYMENT TURNOVER TABLE IV	
	$_kW^{65}_{z,65}$	$W^{65}_{z,65}$	$_kW^{65}_{z,65}$	$W^{65}_{z,65}$	$_kW^{65}_{z,65}$	$W^{65}_{z,65}$
20......	32.669884	1.217145	36.257898	1.258298	114.744770	4.244635
21......	30.257216	1.096512	33.817604	1.136283	103.409390	3.677866
22......	27.874990	0.983072	31.532856	1.027486	93.402673	3.201355
23......	25.546602	0.877237	29.390611	0.930111	84.523553	2.797759
24......	23.291134	0.779173	27.376239	0.842529	76.595646	2.453067
25......	21.123794	0.688867	25.478039	0.763438	69.480055	2.156585
26......	19.056082	0.606158	23.687055	0.691798	63.067491	1.900082
27......	17.096357	0.530784	21.999107	0.626877	57.279768	1.677477
28......	15.250038	0.462402	20.410178	0.568028	52.048987	1.483745
29......	13.520320	0.400627	18.914237	0.514602	47.309159	1.314465
30......	11.908321	0.345040	17.505541	0.466026	43.003217	1.165985
31......	10.413680	0.295219	16.178597	0.421794	39.081573	1.035263
32......	9.034916	0.250743	14.928156	0.381458	35.501008	0.919761
33......	7.769690	0.211204	13.751385	0.344683	32.229797	0.817536
34......	6.615213	0.176220	12.638948	0.310973	29.222009	0.726391
35......	5.568366	0.145431	11.588414	0.280075	26.454648	0.644998
36......	4.625940	0.118504	10.595211	0.251698	23.901478	0.572050
37......	3.784637	0.095135	9.654874	0.225577	21.539029	0.506426
38......	3.041160	0.075041	8.763014	0.201473	19.346143	0.447159
39......	2.392139	0.057961	7.917576	0.179225	17.309122	0.393553
40......	1.833922	0.043648	7.114256	0.158627	15.410114	0.344861
41......	1.362490	0.031862	6.346439	0.139431	13.627319	0.300291
42......	0.973496	0.022374	5.614503	0.121579	11.956486	0.259539
43......	0.661858	0.014954	4.918840	0.105016	10.393750	0.222331
44......	0.421541	0.009366	4.262249	0.089746	8.940912	0.188544
45......	0.245436	0.005363	3.642792	0.075668	7.589466	0.157829
46......	0.125232	0.002692	3.060978	0.062739	6.336774	0.129992
47......	0.051540	0.001090	2.517349	0.050921	5.180558	0.104856
48......	0.013921	0.000290	2.014987	0.040232	4.124142	0.082380
49......	0.000737	0.000015	1.557084	0.030692	3.171134	0.062525
50......	0.000000	0.000000	1.146978	0.022323	2.325518	0.045268
51......	0.000000	0.000000	0.790739	0.015198	1.597001	0.030697
52......	0.000000	0.000000	0.489530	0.009292	0.985355	0.018704
53......	0.000000	0.000000	0.252567	0.004735	0.506994	0.009505
54......	0.000000	0.000000	0.086885	0.001609	0.174051	0.003223
55......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
56......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
57......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
58......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
59......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
60......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
61......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
62......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
63......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
64......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

TABLE 1—*Continued*

z	EMPLOYMENT TURNOVER TABLE VI		EMPLOYMENT TURNOVER TABLE IX		EMPLOYMENT TURNOVER TABLE X	
	$_kW^{65}_{z,65}$	$W^{65}_{z,65}$	$_kW^{65}_{z,65}$	$W^{65}_{z,65}$	$_kW^{5}_{z,65}$	$W^{65}_{z,65}$
20......	728.805280	30.060751	183.080180	6.387745	1,149.706200	51.476011
21......	594.544130	23.347694	171.342530	5.800862	803.177840	34.149591
22......	490.378840	18.387442	160.053210	5.263276	568.316630	22.965724
23......	408.390390	14.660694	149.216320	4.770689	411.632380	15.843713
24......	343.006180	11.817902	138.833100	4.319245	305.805640	11.242551
25......	290.209520	9.618041	128.902690	3.905478	231.714790	8.155433
26......	247.067330	7.892354	119.421870	3.526245	178.806340	6.039095
27......	211.595650	6.528058	110.387610	3.178773	140.162570	4.552796
28......	182.179730	5.438579	101.814790	2.861261	111.505780	3.491433
29......	157.603640	4.560862	93.710246	2.571813	89.858499	2.718316
30......	136.910070	3.847290	86.073337	2.308471	73.023518	2.137799
31......	119.355240	3.262129	78.897815	2.069287	59.833944	1.698147
32......	104.356630	2.778303	72.172785	1.852351	49.537208	1.365994
33......	91.466170	2.375476	65.883245	1.655804	41.277421	1.107876
34......	80.303287	2.037206	60.011749	1.477879	34.524070	0.903229
35......	70.564166	1.750762	54.538365	1.316897	28.953909	0.739400
36......	62.023465	1.506742	49.442237	1.171293	24.383659	0.608822
37......	54.487506	1.297410	44.701244	1.039599	20.557386	0.502537
38......	47.805721	1.116821	40.293135	0.920461	17.329723	0.415302
39......	41.844885	0.959957	36.195688	0.812633	14.584030	0.343047
40......	36.494079	0.822756	32.387723	0.714993	12.172028	0.281201
41......	31.652814	0.701725	28.849055	0.626526	10.119828	0.229896
42......	27.271265	0.594858	25.562265	0.546361	8.352864	0.186799
43......	23.312598	0.500604	22.512212	0.473741	6.805719	0.149963
44......	19.737960	0.417473	19.684912	0.407989	5.419286	0.117720
45......	16.507331	0.344049	17.067914	0.348512	4.187962	0.089735
46......	13.598238	0.279403	14.650435	0.294790	3.107358	0.065722
47......	10.985314	0.222600	12.425504	0.246422	2.125116	0.044369
48......	8.652567	0.172967	10.390599	0.203126	1.288994	0.026579
49......	6.592275	0.130044	8.546333	0.164704	0.646991	0.013203
50......	4.793278	0.093330	6.895610	0.131016	0.000000	0.000000
51......	3.263568	0.062736	5.441879	0.101941	0.000000	0.000000
52......	2.007566	0.038108	4.186704	0.077330	0.000000	0.000000
53......	1.032557	0.019358	3.127635	0.056963	0.000000	0.000000
54......	0.354725	0.006569	2.257548	0.040547	0.000000	0.000000
55......	0.000000	0.000000	1.564211	0.027707	0.000000	0.000000
56......	0.000000	0.000000	1.030840	0.018009	0.000000	0.000000
57......	0.000000	0.000000	0.638615	0.011005	0.000000	0.000000
58......	0.000000	0.000000	0.365604	0.006216	0.000000	0.000000
59......	0.000000	0.000000	0.188132	0.003156	0.000000	0.000000
60......	0.000000	0.000000	0.082918	0.001373	0.000000	0.000000
61......	0.000000	0.000000	0.028430	0.000465	0.000000	0.000000
62......	0.000000	0.000000	0.005874	0.000095	0.000000	0.000000
63......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
64......	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

TABLE 2

SELECT COMMUTATION FUNCTIONS—$_kW^{65}_{x,65}$ AND $W^{65}_{x,65}$
EMPLOYMENT TURNOVER TABLE III

(Entry Age y)

DURA-TION	ENTRY AGE 20		ENTRY AGE 25	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	39.837877	1.429842	28.961915	0.898099
1......	35.889664	1.232431	25.699929	.767620
2......	32.432603	1.067810	22.885528	.659373
3......	29.646918	0.941188	20.643939	.576352
4......	27.413255	0.844072	18.934681	.515307
5......	25.478039	0.763438	17.505541	0.466026
	(Same as those calculated under Table II at attained ages $y+5$ and over)			

DURA-TION	ENTRY AGE 30		ENTRY AGE 35	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	20.611725	0.566488	13.408437	0.330504
1......	17.968760	.478390	11.660674	.280568
2......	15.735218	.406340	10.221083	.240579
3......	14.046349	.353563	9.072506	.209537
4......	12.705290	.312925	8.037366	.182296
5......	11.588414	0.280075	7.114256	0.158627
	(Same as those calculated under Table II at attained ages $y+5$ and over)			

DURA-TION	ENTRY AGE 40		ENTRY AGE 45	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	8.285682	0.187038	4.245378	0.088736
1......	7.097375	.157331	3.450371	.071069
2......	6.028527	.131261	2.709970	.054973
3......	5.138947	.110081	2.088906	.041759
4......	4.364630	.092073	1.587730	.031318
5......	3.642792	0.075668	1.146978	0.022323
	(Same as those calculated under Table II at attained ages $y+5$ and over)			

DURA-TION	ENTRY AGE 50			
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$		
0......	1.633430	0.031813		
1......	1.116084	.021466		
2......	0.661471	.012552		
3......	0.333931	.006253		
4......	0.135881	.002516		
5......	0.000000	0.000000		
	(Same as those calculated under Table II at attained ages $y+5$ and over)			

TABLE 3

Select Commutation Functions—$_kW^{65}_{s,65}$ and $W^{65}_{s,65}$
Employment Turnover Table V
(Entry Age y)

DURATION	ENTRY AGE 20		ENTRY AGE 25	
	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$
0.........	133.303630	5.137842	83.194681	2.688213
1.........	113.343660	4.139843	70.507320	2.180718
2.........	97.412987	3.381239	60.369140	1.790788
3.........	85.597803	2.844186	52.828158	1.511493
4.........	76.750159	2.459506	47.373824	1.316695
5.........	69.480055	2.156585	43.003217	1.165985

(Same as those calculated under Table IV at attained ages $y+5$ and over)

DURATION	ENTRY AGE 30		ENTRY AGE 35	
	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$
0.........	52.916554	1.487293	31.361001	0.781161
1.........	44.514724	1.207232	26.680626	.647436
2.........	37.837430	0.991835	22.969952	.544362
3.........	33.052619	0.842310	20.109745	.467059
4.........	29.401376	0.731666	17.598209	.400966
5.........	26.454648	0.644998	15.410114	0.344861

(Same as those calculated under Table IV at attained ages $y+5$ and over)

DURATION	ENTRY AGE 40		ENTRY AGE 45	
	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$
0.........	18.226872	0.413246	8.922607	0.186752
1.........	15.396815	.342494	7.183817	.148113
2.........	12.916642	.282002	5.596267	.113601
3.........	10.894657	.233860	4.284948	.085700
4.........	9.167737	.193699	3.240206	.063935
5.........	7.589466	0.157829	2.325518	0.045268

(Same as those calculated under Table IV at attained ages $y+5$ and over)

DURATION	ENTRY AGE 50	
	$_kW^{65}_{s,65}$	$W^{65}_{s,65}$
0.........	3.348183	0.065222
1.........	2.279889	.043856
2.........	1.345330	.025531
3.........	0.676471	.012668
4.........	0.272451	.005045
5.........	0.000000	0.000000

(Same as those calculated under Table IV at attained ages $y+5$ and over)

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TABLE 4

SELECT COMMUTATION FUNCTIONS—$_kW^{65}_{x,65}$ AND $W^{65}_{x,65}$
EMPLOYMENT TURNOVER TABLE VII
(Entry Age y)

DURATION	ENTRY AGE 20		ENTRY AGE 25	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0.........	1012.407600	43.824863	404.503140	14.073014
1.........	720.881470	29.248552	300.800760	9.924919
2.........	533.378990	20.319863	231.154770	7.246227
3.........	418.391250	15.093148	186.588040	5.595607
4.........	344.312390	11.872328	157.937650	4.572379
5.........	290.209520	9.618041	136.910070	3.847290

(Same as those calculated under Table VI at attained ages $y+5$ and over)

DURATION	ENTRY AGE 30		ENTRY AGE 35	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0.........	189.419380	5.556084	88.686079	2.255249
1.........	145.123780	4.079564	71.574962	1.766360
2.........	114.386730	3.088046	59.110303	1.420120
3.........	94.742976	2.474179	50.143834	1.177783
4.........	80.969643	2.056805	42.685377	0.981508
5.........	70.564166	1.750762	36.494079	0.822756

(Same as those calculated under Table VI at attained ages $y+5$ and over)

DURATION	ENTRY AGE 40		ENTRY AGE 45	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$_kW^{65}_{x,65}$
0.........	44.601991	1.020040	19.744873	0.414362
1.........	36.509399	0.817725	15.599154	.322235
2.........	29.791228	0.653867	11.941569	.242722
3.........	24.572748	0.529618	9.014160	.180437
4.........	20.289807	0.430015	6.741901	.133098
5.........	16.507331	0.344049	4.793278	0.093330

(Same as those calculated under Table VI at attained ages $y+5$ and over)

DURATION	ENTRY AGE 50	
	$_kW^{65}_{x,65}$	$W^{65}_{x,}$
0.........	6.969480	0.135830
1.........	4.690856	.090258
2.........	2.738388	.051974
3.........	1.366060	.025583
4.........	0.547676	.010142
5.........	0.000000	0.000000

(Same as those calculated under Table VI at attained ages $y+5$ and over)

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TABLE 5

SELECT COMMUTATION FUNCTIONS—$_kW'^{65}_{x,65}$ AND $W'^{65}_{x,65}$
EMPLOYMENT TURNOVER TABLE VIII
(Entry Age y)

DURA-TION	ENTRY AGE 20		ENTRY AGE 25	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	867.930200	36.802162	360.546410	12.350552
1......	659.142480	26.362776	282.387940	9.224214
2......	512.525660	19.381023	225.455620	7.034508
3......	413.817870	14.894305	186.375220	5.587086
4......	344.312390	11.872328	158.684850	4.598145
5......	290.209520	9.618041	136.910070	3.847290

(Same as those calculated under Table VI at attained ages $y+5$ and over)

	ENTRY AGE 30		ENTRY AGE 35	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	170.255830	4.931596	80.501918	2.028127
1......	136.235110	3.797572	67.025261	1.643080
2......	110.777250	2.976350	56.640443	1.354613
3......	93.580853	2.438963	48.789054	1.142413
4......	80.969643	2.056805	42.266994	0.970780
5......	70.564166	1.750762	36.494079	0.822756

(Same as those calculated under Table VI at attained ages $y+5$ and over)

	ENTRY AGE 40		ENTRY AGE 45	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	40.977405	0.931745	18.120433	0.378759
1......	34.399435	.767296	14.700908	.302769
2......	28.666029	.627457	11.697844	.237485
3......	24.078664	.518234	9.074294	.181665
4......	20.089220	.425456	6.799665	.134277
5......	16.507331	0.344049	4.793278	0.093330

(Same as those calculated under Table VI at attained ages $y+5$ and over)

	ENTRY AGE 50	
	$_kW^{65}_{x,65}$	$W^{65}_{x,65}$
0......	6.377789	0.124066
1......	4.461067	.085732
2......	2.738936	.051965
3......	1.421513	.026630
4......	0.547676	.010142
5......	0.000000	0.000000

(Same as those calculated under Table VI at attained ages $y+5$ and over)

TABLE 6

1966 GROUP ANNUITY TABLE

(Male 1951 Group Annuity Table with Mortality Improvement
Projected According to Scale C to 1966)

Age x	$q_x^{(d)}$	Age x	$q_x^{(d)}$	Age x	$q_x^{(d)}$
10......	0.000400	45......	0.002960	80......	0.090120
11......	.000400	46......	.003370	81......	0.099320
12......	.000410	47......	.003810	82......	0.108780
13......	.000420	48......	.004290	83......	0.118740
14......	.000430	49......	.004810	84......	0.129080
15......	.000440	50......	.005360	85......	0.139540
16......	.000450	51......	.005950	86......	0.150600
17......	.000460	52......	.006570	87......	0.162180
18......	.000480	53......	.007230	88......	0.174090
19......	.000490	54......	.007920	89......	0.186950
20......	.000510	55......	.008640	90......	0.200590
21......	.000530	56......	.009400	91......	0.212560
22......	.000550	57......	.010180	92......	0.225160
23......	.000570	58......	.011020	93......	0.238520
24......	.000600	59......	.011910	94......	0.252770
25......	.000630	60......	.012880	95......	0.268030
26......	.000660	61......	.013970	96......	0.284460
27......	.000690	62......	.015200	97......	0.302220
28......	.000730	63......	.016620	98......	0.321520
29......	.000770	64......	.018270	99......	0.342530
30......	.000820	65......	.020220	100......	0.365460
31......	.000870	66......	.022520	101......	0.390540
32......	.000930	67......	.024930	102......	0.417980
33......	.000990	68......	.027310	103......	0.450100
34......	.001060	69......	.029760	104......	0.489200
35......	.001140	70......	.032550	105......	0.537610
36......	.001220	71......	.036030	106......	0.597620
37......	.001310	72......	.039910	107......	0.671550
38......	.001420	73......	.044120	108......	0.761720
39......	.001530	74......	.048720	109......	0.870430
40......	.001660	75......	.053690	110......	1.000000
41......	.001820	76......	.059320		
42......	.002030	77......	.065900		
43......	.002290	78......	.073300		
44......	0.002610	79......	0.081360		

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TABLE 7

NONSELECT EMPLOYEE TURNOVER TABLES—$N_x^{(T)}$

Age	Table I	Table II	Table IV
20	67,719,646.0	70,307,809.6	46,387,316.0
21	62,951,656.9	65,518,886.2	41,598,392.6
22	58,608,278.3	61,154,665.3	37,483,426.5
23	54,650,520.3	57,164,526.7	33,923,058.8
24	51,041,403.6	53,505,329.1	30,822,707.9
25	47,746,351.4	50,140,348.7	28,107,159.3
26	44,733,425.7	47,038,079.9	25,715,906.2
27	41,973,376.7	44,171,224.8	23,599,687.5
28	39,439,622.6	41,515,784.6	21,717,751.9
29	37,108,173.4	39,050,614.7	20,036,235.6
30	34,957,509.9	36,757,187.1	18,527,052.6
31	32,968,400.1	34,619,204.3	17,166,780.5
32	31,123,733.3	32,622,318.1	15,935,809.7
33	29,408,306.9	30,753,848.5	14,817,637.3
34	27,808,658.1	29,002,493.7	13,798,219.7
35	26,312,860.9	27,358,397.8	12,865,847.9
36	24,910,372.7	25,812,725.7	12,010,456.4
37	23,591,874.2	24,357,618.8	11,223,446.9
38	22,349,116.7	22,986,059.5	10,497,441.0
39	21,174,809.6	21,691,783.5	9,826,093.6
40	20,062,523.0	20,469,138.6	9,203,872.8
41	19,006,572.3	19,313,052.8	8,625,990.0
42	18,001,961.7	18,219,044.6	8,088,355.7
43	17,044,319.5	17,183,000.4	7,587,316.7
44	16,129,856.6	16,201,159.9	7,119,614.2
45	15,255,312.7	15,270,034.4	6,682,290.9
46	14,417,916.8	14,386,483.8	6,272,749.8
47	13,615,318.6	13,547,608.9	5,888,653.6
48	12,845,570.9	12,750,754.5	5,527,906.7
49	12,107,064.3	11,993,424.0	5,188,582.1
50	11,398,499.4	11,273,277.6	4,868,910.4
51	10,718,840.5	10,588,121.6	4,567,266.6
52	10,067,258.9	9,935,859.7	4,282,125.2
53	9,442,965.2	9,314,560.7	4,012,113.5
54	8,845,189.7	8,722,347.5	3,755,913.5
55	8,273,186.3	8,157,436.1	3,512,290.2
56	7,726,224.3	7,618,126.7	3,280,083.7
57	7,203,587.0	7,102,801.7	3,058,203.9
58	6,704,575.4	6,610,771.9	2,846,354.2
59	6,228,496.7	6,141,354.2	2,644,240.3
60	5,774,682.4	5,693,889.4	2,451,578.5
61	5,342,480.6	5,267,734.6	2,268,092.0
62	4,931,266.1	4,862,273.5	2,093,515.4
63	4,540,451.8	4,476,927.2	1,927,599.5
64	4,169,489.0	4,111,154.6	1,770,111.4
65	3,817,877.0	3,764,462.1	1,620,838.4
66	3,485,165.7	3,436,405.8	1,479,589.5

TABLE 7—*Continued*

Age	Table VI	Table IX	Table X
20	24,320,010.9	46,193,440.8	16,297,532.5
21	19,531,087.5	41,425,451.7	11,529,543.4
22	15,914,631.0	37,196,964.8	8,452,800.2
23	13,140,434.1	33,445,406.5	6,431,876.5
24	10,981,641.0	30,115,602.9	5,063,589.4
25	9,279,513.2	27,158,862.3	4,105,550.9
26	7,921,256.2	24,532,202.1	3,415,393.7
27	6,825,525.8	22,197,631.7	2,904,264.9
28	5,932,001.3	20,121,517.7	2,515,885.7
29	5,195,900.8	18,273,730.3	2,213,301.9
30	4,583,557.5	16,627,409.7	1,972,030.9
31	4,069,466.5	15,158,691.9	1,775,937.6
32	3,634,121.7	13,846,456.5	1,613,547.7
33	3,262,461.1	12,672,050.8	1,476,415.4
34	2,942,718.5	11,619,057.9	1,358,769.9
35	2,665,687.3	10,673,045.0	1,256,488.1
36	2,424,105.5	9,821,357.9	1,166,485.9
37	2,212,151.5	9,052,913.6	1,086,341.9
38	2,025,145.7	8,358,011.9	1,014,287.2
39	1,859,284.7	7,728,174.4	948,956.0
40	1,711,475.7	7,156,000.3	889,287.1
41	1,579,185.6	6,635,013.4	834,508.4
42	1,460,342.6	6,159,554.1	783,909.3
43	1,353,185.7	5,724,663.9	736,934.7
44	1,256,205.4	5,325,994.8	693,153.4
45	1,168,113.7	4,959,727.5	652,232.8
46	1,087,817.4	4,622,503.5	613,880.3
47	1,014,367.3	4,311,351.5	577,836.7
48	946,946.9	4,023,634.1	543,907.9
49	884,842.7	3,756,981.7	511,886.0
50	827,425.0	3,509,255.9	481,555.2
51	774,141.8	3,278,518.9	452,841.4
52	724,492.7	3,063,013.2	425,313.8
53	678,028.4	2,861,156.6	398,939.1
54	634,343.9	2,671,539.3	373,684.7
55	593,069.1	2,492,924.7	349,519.1
56	553,859.8	2,324,245.0	326,411.4
57	516,394.3	2,164,594.2	304,331.3
58	480,622.4	2,013,214.0	283,249.3
59	446,494.5	1,869,478.3	263,136.2
60	413,962.6	1,732,883.5	243,963.8
61	382,980.0	1,603,026.5	225,704.4
62	353,501.8	1,479,588.0	208,331.7
63	325,486.0	1,362,316.9	191,820.8
64	298,893.3	1,251,013.2	176,148.6
65	273,687.8	1,145,515.6	161,294.0
66	249,837.2	1,045,688.9	147,237.9

TABLE 8

SELECT EMPLOYEE TURNOVER TABLE—$N_x^{(T)}$
TABLE III

Age	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35
20.......	65,960,802.4	....	....	....
21.......	61,171,879.0	....	....	....
22.......	56,933,208.7	....	....	....
23.......	53,151,007.5	....	....	....
24.......	49,730,621.6	....	....	....
25.......	46,600,581.3	43,667,912.8	....	....
26.......	43,717,323.9	40,784,655.4	....	....
27.......	41,052,860.4	38,198,283.2	....	....
28.......	38,584,886.8	35,859,604.2	....	....
29.......	36,293,751.1	33,719,718.6	....	....
30.......	34,162,233.1	31,738,504.3	29,923,942.9	....
31.......	32,175,185.9	29,892,432.8	28,077,871.4	....
32.......	30,319,274.4	28,168,193.0	26,399,983.6	....
33.......	28,582,713.6	26,554,836.3	24,862,908.9	....
34.......	26,954,999.6	25,042,603.9	23,438,325.9	....
35.......	25,426,972.2	23,622,985.8	22,107,786.1	21,365,314.3
36.......	23,990,420.4	22,288,353.3	20,858,758.8	20,116,287.0
37.......	22,638,040.2	21,031,920.7	19,682,915.5	18,958,923.1
38.......	21,363,309.4	19,847,628.5	18,574,585.6	17,879,557.3
39.......	20,160,405.7	18,730,067.5	17,528,706.8	16,866,576.4
40.......	19,024,076.2	17,674,357.6	16,540,711.7	15,913,564.1
41.......	17,949,606.7	16,676,119.1	15,606,501.6	15,014,774.7
42.......	16,932,832.4	15,731,482.5	14,722,455.3	14,164,247.1
43.......	15,969,930.0	14,836,895.7	13,885,248.4	13,358,783.0
44.......	15,057,404.8	13,989,111.9	13,091,842.5	12,595,459.2
45.......	14,192,014.2	13,185,118.7	12,339,418.4	11,871,563.3
46.......	13,370,839.9	12,422,204.7	11,625,438.6	11,184,654.2
47.......	12,591,187.3	11,697,866.7	10,947,560.3	10,532,477.9
48.......	11,850,588.7	11,009,811.8	10,303,637.9	9,912,970.2
49.......	11,146,723.7	10,355,884.5	9,691,654.1	9,324,190.1
50.......	10,477,417.7	9,734,064.3	9,109,718.0	8,764,318.3
51.......	9,840,632.0	9,142,457.1	8,556,057.0	8,231,649.6
52.......	9,234,418.1	8,579,252.8	8,028,977.0	7,724,554.1
53.......	8,656,981.2	8,042,783.7	7,526,917.4	7,241,530.3
54.......	8,106,576.6	7,531,429.2	7,048,361.4	6,781,119.0
55.......	7,581,546.2	7,043,648.7	6,591,867.5	6,341,933.3
56.......	7,080,310.4	6,577,974.7	6,156,062.1	5,922,651.7
57.......	6,601,365.7	6,133,010.4	5,739,637.9	5,522,016.5
58.......	6,144,071.6	5,708,160.6	5,342,038.1	5,139,491.9
59.......	5,707,793.2	5,302,835.5	4,962,710.7	4,774,546.8
60.......	5,291,917.9	4,916,465.9	4,601,122.9	4,426,668.9
61.......	4,895,848.3	4,548,496.8	4,256,755.4	4,095,358.3
62.......	4,519,011.4	4,198,395.9	3,929,110.0	3,780,135.8
63.......	4,160,869.3	3,865,663.3	3,617,719.0	3,480,551.4
64.......	3,820,919.1	3,549,831.9	3,322,145.2	3,196,184.4
65.......	3,498,702.0	3,250,475.5	3,041,989.6	2,926,651.1
66.......	3,193,805.4	2,967,210.8	2,776,893.6	2,671,606.4

TABLE 8—*Continued*

Age	Entry Age 40	Entry Age 45	Entry Age 50
20..........	....	....	....
21..........	....	....	....
22..........	....	....	....
23..........	....	....	....
24..........	....	....	....
25..........	....	....	....
26..........	....	....	....
27..........	....	....	....
28..........	....	....	....
29..........	....	....	....
30..........	....	....	....
31..........	....	....	....
32..........	....	....	....
33..........	....	....	....
34..........	....	....	....
35..........	....	....	....
36..........	....	....	....
37..........	....	....	....
38..........	....	....	....
39..........	....	....	....
40..........	15,578,702.2	....	....
41..........	14,679,912.8	....	....
42..........	13,836,705.4	....	....
43..........	13,043,741.1	....	....
44..........	12,295,282.1	....	....
45..........	11,587,214.7	11,464,387.9	....
46..........	10,916,758.5	10,793,931.7	....
47..........	10,280,203.1	10,160,090.5	....
48..........	9,675,533.8	9,560,381.9	....
49..........	9,100,856.1	8,991,777.3	....
50..........	8,554,394.4	8,451,556.3	8,383,881.6
51..........	8,034,484.1	7,937,896.0	7,870,221.3
52..........	7,539,534.6	7,448,896.4	7,382,731.7
53..........	7,068,080.2	6,983,109.5	6,919,745.8
54..........	6,618,696.7	6,539,128.2	6,479,193.0
55..........	6,190,030.3	6,115,615.0	6,059,204.9
56..........	5,780,791.2	5,711,295.7	5,658,615.1
57..........	5,389,752.0	5,324,957.4	5,275,840.5
58..........	5,016,389.7	4,956,083.4	4,910,369.2
59..........	4,660,185.8	4,604,161.6	4,561,693.8
60..........	4,320,640.2	4,268,697.9	4,229,324.6
61..........	3,997,265.2	3,949,210.4	3,912,784.2
62..........	3,689,593.0	3,645,237.0	3,611,614.7
63..........	3,397,184.3	3,356,343.6	3,325,386.1
64..........	3,119,628.6	3,082,124.6	3,053,696.5
65..........	2,856,551.2	2,822,209.9	2,796,179.3
66..........	2,607,615.3	2,576,266.7	2,552,504.7

TABLE 9

SELECT EMPLOYEE TURNOVER TABLE—$N_x^{(T)}$
TABLE V

Age	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35
20.......	40,848,388.1	....	....	....
21.......	36,059,464.7	....	....	....
22.......	32,196,061.3	....	....	....
23.......	29,023,527.4	....	....	....
24.......	26,341,933.7	....	....	....
25.......	24,017,205.2	21,072,877.9	....	....
26.......	21,973,909.0	19,029,581.7	....	....
27.......	20,165,626.2	17,332,178.7	....	....
28.......	18,557,535.5	15,897,623.6	....	....
29.......	17,120,700.6	14,654,144.5	....	....
30.......	15,831,122.1	13,549,371.7	12,031,247.6	....
31.......	14,668,786.3	12,554,564.9	11,036,440.8	....
32.......	13,616,936.8	11,654,319.9	10,186,247.7	....
33.......	12,661,472.2	10,836,567.6	9,447,395.0	....
34.......	11,790,392.5	10,091,037.7	8,789,321.3	....
35.......	10,993,692.5	9,409,167.2	8,193,718.6	7,649,227.1
36.......	10,262,771.2	8,783,594.5	7,648,955.8	7,104,464.3
37.......	9,590,281.4	8,208,031.5	7,147,742.5	6,619,370.7
38.......	8,969,918.5	7,677,082.2	6,685,379.8	6,181,603.6
39.......	8,396,260.8	7,186,106.3	6,257,826.9	5,781,309.3
40.......	7,864,581.1	6,731,058.1	5,861,560.6	5,413,393.6
41.......	7,370,787.8	6,308,435.6	5,493,531.3	5,073,503.2
42.......	6,911,386.3	5,915,248.1	5,151,134.6	4,757,285.5
43.......	6,483,255.2	5,548,824.0	4,832,044.0	4,462,591.9
44.......	6,083,609.8	5,206,779.8	4,534,184.0	4,187,505.7
45.......	5,709,923.1	4,886,952.9	4,255,671.3	3,930,287.5
46.......	5,359,975.9	4,587,443.8	3,994,851.8	3,689,409.8
47.......	5,031,770.9	4,306,543.3	3,750,237.0	3,463,497.8
48.......	4,723,517.5	4,042,718.8	3,520,492.5	3,251,319.1
49.......	4,433,569.2	3,794,560.9	3,304,390.9	3,051,740.2
50.......	4,160,414.1	3,560,775.8	3,100,805.4	2,863,720.5
51.......	3,902,663.6	3,340,175.0	2,908,701.2	2,686,304.2
52.......	3,659,014.3	3,131,642.9	2,727,106.7	2,518,594.2
53.......	3,428,293.0	2,934,175.6	2,555,147.6	2,359,782.9
54.......	3,209,373.6	2,746,809.2	2,391,984.5	2,209,095.1
55.......	3,001,200.8	2,568,640.5	2,236,830.9	2,065,804.4
56.......	2,802,783.6	2,398,821.2	2,088,948.3	1,929,228.7
57.......	2,613,190.5	2,236,554.1	1,947,642.4	1,798,726.9
58.......	2,432,167.9	2,081,622.2	1,812,724.2	1,674,124.4
59.......	2,259,464.5	1,933,810.4	1,684,006.3	1,555,248.2
60.......	2,094,837.8	1,792,911.2	1,561,308.1	1,441,931.4
61.......	1,938,051.3	1,658,722.2	1,444,453.4	1,334,011.2
62.......	1,788,878.2	1,531,049.3	1,333,273.0	1,231,331.5
63.......	1,647,105.5	1,409,710.2	1,227,608.2	1,133,745.7
64.......	1,512,534.2	1,294,534.5	1,127,310.6	1,041,116.8
65.......	1,384,982.6	1,185,366.8	1,032,244.9	953,319.8
66.......	1,264,287.5	1,082,067.3	942,289.4	870,242.2

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TABLE 9—*Continued*

Age	Entry Age 40	Entry Age 45	Entry Age 50
20...........	....	....	....
21...........	....	....	....
22...........	....	....	....
23...........	....	....	....
24...........	....	....	....
25...........	....	....	....
26...........	....	....	....
27...........	....	....	....
28...........	....	....	....
29...........	....	....	....
30...........	....	....	....
31...........	....	....	....
32...........	....	....	....
33...........	....	....	....
34...........	....	....	....
35...........	....	....	....
36...........	....	....	....
37...........	....	....	....
38...........	....	....	....
39...........	....	....	....
40...........	5,186,076.0	....	....
41...........	4,846,185.6	....	....
42...........	4,535,504.5	....	....
43...........	4,250,073.2	....	....
44...........	3,985,834.0	....	....
45...........	3,740,006.2	3,660,054.1	....
46...........	3,510,790.4	3,430,838.3	....
47...........	3,295,815.7	3,217,741.6	....
48...........	3,093,909.4	3,019,201.2	....
49...........	2,903,993.0	2,833,350.3	....
50...........	2,725,076.3	2,658,568.0	2,615,317.9
51...........	2,556,249.6	2,493,861.6	2,450,611.5
52...........	2,396,659.1	2,338,166.0	2,295,884.4
53...........	2,245,536.6	2,190,731.7	2,150,247.0
54...........	2,102,144.3	2,050,838.9	2,012,550.5
55...........	1,965,791.0	1,917,813.3	1,881,785.9
56...........	1,835,827.6	1,791,021.6	1,757,376.1
57...........	1,711,644.0	1,669,868.6	1,638,499.2
58...........	1,593,074.0	1,554,192.3	1,524,996.0
59...........	1,479,953.1	1,443,832.1	1,416,709.1
60...........	1,372,122.5	1,338,633.0	1,313,486.4
61...........	1,269,427.2	1,238,443.9	1,215,179.6
62...........	1,171,718.7	1,143,119.9	1,121,646.5
63...........	1,078,857.4	1,052,525.0	1,032,753.5
64...........	990,713.0	966,531.8	948,375.8
65...........	907,166.6	885,024.4	868,399.6
66...........	828,111.1	807,898.4	792,722.5

TABLE 10

SELECT EMPLOYEE TURNOVER TABLE—$N_x^{(T)}$
TABLE VII

Age	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35
20........	19,168,216.7	....	....	....
21........	14,379,293.3	....	....	....
22........	11,265,962.3	....	....	....
23........	9,151,987.9	....	....	....
24........	7,614,746.3	....	....	....
25........	6,430,247.8	4,981,275.7	....	....
26........	5,489,042.3	4,040,070.2	....	....
27........	4,729,754.9	3,382,932.0	....	....
28........	4,110,586.1	2,905,143.6	....	....
29........	3,600,504.5	2,537,046.3	....	....
30........	3,176,180.7	2,237,505.6	1,764,942.1	....
31........	2,819,941.0	1,986,546.8	1,513,983.3	....
32........	2,518,268.8	1,774,029.0	1,326,718.6	....
33........	2,260,726.5	1,592,599.1	1,181,576.2	....
34........	2,039,160.8	1,436,513.3	1,062,794.4	....
35........	1,847,192.1	1,301,277.7	962,157.8	838,250.7
36........	1,679,788.1	1,183,347.1	874,961.3	751,054.2
37........	1,532,914.5	1,079,879.6	798,458.8	679,712.0
38........	1,403,328.8	988,590.9	730,961.0	619,627.7
39........	1,288,395.4	907,624.3	671,095.1	567,582.3
40........	1,185,971.2	835,470.1	617,744.9	522,004.1
41........	1,094,300.7	770,891.5	569,996.1	481,654.9
42........	1,011,948.4	712,877.3	527,100.7	445,407.1
43........	937,694.0	660,567.7	488,423.3	412,723.7
44........	870,491.4	613,225.9	453,419.0	383,144.1
45........	809,448.1	570,223.1 .	421,623.1	356,275.6
46........	753,806.6	531,025.6	392,640.8	331,784.7
47........	702,909.3	495,170.2	366,129.7	309,381.9
48........	656,190.2	462,258.2	341,795.0	288,818.3
49........	613,155.1	431,941.4	319,379.2	269,876.2
50........	573,367.5	403,912.3	298,654.9	252,363.5
51........	536,444.9	377,901.6	279,422.8	236,112.0
52........	502,040.5	353,664.9	261,502.3	220,968.9
53........	469,843.1	330,982.9	244,731.3	206,797.2
54........	439,571.8	309,657.9	228,963.7	193,473.4
55........	410,970.4	289,509.2	214,065.9	180,884.5
56........	383,800.3	270,368.8	199,913.5	168,925.6
57........	357,838.5	252,079.7	186,390.5	157,498.6
58........	333,050.3	234,617.4	173,478.8	146,588.1
59........	309,401.3	217,957.5	161,160.5	136,179.1
60........	286,858.2	202,076.7	149,418.3	126,256.8
61........	265,388.7	186,952.3	138,235.3	116,807.1
62........	244,961.7	172,562.3	127,595.3	107,816.2
63........	225,548.1	158,886.2	117,483.1	99,271.4
64........	207,120.6	145,904.7	107,884.5	91,160.6
65........	189,654.4	133,600.4	98,786.6	83,473.0
66........	173,127.0	121,957.6	90,177.8	76,198.6

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TABLE 10—*Continued*

Age	Entry Age 40	Entry Age 45	Entry Age 50
20			
21			
22			
23			
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26			
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31			
32			
33			
34			
35			
36			
37			
38			
39			
40	479,005.9		
41	438,656.7		
42	403,719.5		
43	373,137.0		
44	345,930.6		
45	321,472.1	307,660.2	
46	299,373.7	285,561.8	
47	279,159.6	265,709.7	
48	260,604.8	247,787.7	
49	243,513.2	231,442.9	
50	227,711.3	216,386.7	209,368.9
51	213,047.3	202,452.4	195,434.6
52	199,383.4	189,468.4	182,613.3
53	186,596.0	177,317.3	170,761.4
54	174,573.6	165,893.2	159,698.6
55	163,214.4	155,099.3	149,272.7
56	152,423.6	144,845.5	139,403.7
57	142,112.7	135,047.7	129,973.7
58	132,268.0	125,692.8	120,970.0
59	122,875.7	116,767.8	112,380.0
60	113,922.7	108,260.2	104,191.8
61	105,396.1	100,157.7	96,393.6
62	97,283.5	92,448.7	88,974.1
63	89,573.4	85,122.1	81,922.7
64	82,255.0	78,167.6	75,229.4
65	75,318.4	71,575.8	68,885.2
66	68,754.7	65,338.4	62,882.1

TABLE 11

SELECT EMPLOYEE TURNOVER TABLE—$N_{x}^{(T)}$
TABLE VIII

Age	Entry Age 20	Entry Age 25	Entry Age 30	Entry Age 35
20.......	21,354,317.1	....	....	....
21.......	16,565,393.7	....	....	....
22.......	13,225,887.0	....	....	....
23.......	10,829,585.7	....	....	....
24.......	9,029,299.5	....	....	....
25.......	7,624,763.9	6,453,010.8	....	....
26.......	6,508,716.7	5,336,963.6	....	....
27.......	5,608,381.3	4,513,649.0	....	....
28.......	4,874,193.4	3,890,437.6	....	....
29.......	4,269,356.9	3,398,289.7	....	....
30.......	3,766,208.8	2,995,430.6	2,553,101.2	....
31.......	3,343,792.2	2,659,463.5	2,217,134.1	....
32.......	2,986,079.8	2,374,958.5	1,955,426.4	....
33.......	2,680,695.1	2,132,072.1	1,746,532.1	....
34.......	2,417,970.0	1,923,115.0	1,572,556.9	....
35.......	2,190,339.9	1,742,070.4	1,423,649.3	1,314,295.6
36.......	1,991,837.8	1,584,192.4	1,294,628.6	1,185,274.9
37.......	1,817,680.1	1,445,676.6	1,181,431.1	1,076,852.7
38.......	1,664,021.9	1,323,465.0	1,081,557.6	983,867.8
39.......	1,527,737.7	1,215,071.9	992,976.8	902,427.5
40.......	1,406,286.5	1,118,476.2	914,037.0	830,322.0
41.......	1,297,586.8	1,032,022.2	843,385.3	766,141.6
42.......	1,199,936.2	954,356.1	779,915.2	708,485.1
43.......	1,111,887.7	884,327.1	722,686.3	656,498.1
44.......	1,032,201.0	820,948.7	670,892.4	609,448.3
45.......	959,817.8	763,379.2	623,845.5	566,710.9
46.......	893,840.0	710,904.1	580,961.9	527,755.3
47.......	833,487.5	662,903.2	541,734.7	492,121.3
48.......	778,089.5	618,842.9	505,727.7	459,412.6
49.......	727,059.9	578,256.8	472,560.0	429,283.0
50.......	679,880.9	540,733.4	441,895.2	401,427.0
51.......	636,099.3	505,912.1	413,438.6	375,576.9
52.......	595,303.7	473,465.6	386,922.9	351,489.8
53.......	557,124.9	443,100.4	362,108.0	328,947.7
54.......	521,230.1	414,551.8	338,777.6	307,754.1
55.......	487,315.3	387,578.1	316,734.2	287,729.5
56.......	455,097.6	361,954.3	295,793.9	268,707.0
57.......	424,312.7	337,470.0	275,784.9	250,530.5
58.......	394,919.4	314,092.6	256,680.4	233,175.7
59.......	366,877.0	291,789.5	238,453.9	216,618.4
60.......	340,146.0	270,529.4	221,079.8	200,835.4
61.......	314,688.1	250,281.8	204,533.1	185,804.1
62.......	290,466.4	231,017.5	188,789.9	171,502.7
63.......	267,446.4	212,708.8	173,827.8	157,910.8
64.......	245,595.7	195,330.1	159,625.7	145,009.3
65.......	224,884.8	178,857.9	146,164.4	132,780.8
66.......	205,287.2	163,271.2	133,426.8	121,209.6

TABLE 11—*Continued*

Age	Entry Age 40	Entry Age 45	Entry Age 50
20...............	....	....	....
21...............	....	....	....
22...............	....	....	....
23...............	....	....	....
24...............	....	....	....
25...............	....	....	....
26...............	....	....	....
27...............	....	....	....
28...............	....	....	....
29...............	....	....	....
30...............	....	....	....
31...............	....	....	....
32...............	....	....	....
33...............	....	....	....
34...............	....	....	....
35...............	....	....	....
36...............	....	....	....
37...............	....	....	....
38...............	....	....	....
39...............	....	....	....
40...............	790,935.5	....	....
41...............	726,755.1	....	....
42...............	670,255.3	....	....
43...............	620,199.0	....	....
44...............	575,282.5	....	....
45...............	534,729.5	523,446.6	....
46...............	497,972.3	486,689.4	....
47...............	464,349.0	453,314.2	....
48...............	433,485.9	422,862.3	....
49...............	405,056.4	394,943.6	....
50...............	378,772.2	369,225.8	360,686.3
51...............	354,380.8	345,449.2	336,909.7
52...............	331,653.0	323,294.2	314,894.5
53...............	310,383.0	302,560.3	294,459.2
54...............	290,385.4	283,066.8	275,364.6
55...............	271,490.9	264,648.6	257,387.7
56...............	253,541.9	247,152.1	240,371.1
57...............	236,391.2	230,433.7	224,111.3
58...............	220,015.8	214,471.0	208,586.5
59...............	204,392.9	199,241.9	193,775.2
60...............	189,500.6	184,725.1	179,656.6
61...............	175,317.6	170,899.6	166,210.4
62...............	161,823.3	157,745.4	153,417.2
63...............	148,998.5	145,243.8	141,258.6
64...............	136,825.1	133,377.2	129,717.6
65...............	125,286.7	122,129.5	118,778.6
66...............	114,368.6	111,486.5	108,427.6