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FIRST YEAR LAPSE AND DEFAULT RATES

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SINCE lapses will probably always be with us, it behooves us to try to minimize or postpone them or adjust to them as best we can. To these ends this paper presents results based on a new study and perhaps offers some new ideas on the subject.

It has been almost nine years since C. F. B. Richardson and J. M. Hartwell presented to the Society their excellent paper on "Lapse Rates" (*TSA* III, 338). They included an extensive list up to that date of published works on the subject. Since then the Life Insurance Agency Management Association has published a number of reports on lapses but little has appeared regarding them in the *Transactions*.

This paper was derived from the results of a special study of first year lapse rates and not-taken rates on a block of standard direct Ordinary policies recently paid for in the Lincoln National. The lapse rates presented in this paper are not necessarily those produced by the study. However, the relationships among them according to the various factors investigated are exactly as found in the study. Moreover the ratios of actual to expected lapses are exactly as determined by the study.

This investigation had three main purposes:

1. To identify attributes of policies and policyholders that influence lapse rates and that can be taken into consideration in the calculation of premiums and dividends.
2. To determine attributes of agents that influence lapse rates.
3. To discover or demonstrate ways to improve the persistency of new business.

In addition the study turned up some results that may prove useful in comparing lapse rates among companies.

Definitions

Unless the context clearly indicates otherwise, in this paper the following terms have the specific meanings shown here:

1. Lapse, first year lapse—a policy on which some premium is paid but on which no part of the second policy year's premium is paid.
2. Adult—a person aged 18 or older.
3. Child—a person aged 17 or younger.

4. Long term plan of insurance—Life Expectancy, Emancipator (a variation from Life Expectancy), Double Protection to Age 65.
5. Short term plan of insurance—any plan of term policy (not rider) other than Life Expectancy, Emancipator, and Double Protection to Age 65.
6. Mode—mode of premium payment.
7. Monthly—direct monthly mode as distinguished from government allotment, other salary savings, preauthorized check plan.
8. PRD, payroll deduction—government allotment and other salary savings combined.
9. Premium, annual premium—regardless of actual mode, the annual premium per policy for all benefits under the policy, including base policy, any term rider, disability benefit, double indemnity benefit, payor benefit.
10. Amount, amount of insurance—the agent's volume credit: the basic policy amount plus 100% of the amount on a level term rider or 60% of the initial amount on a decreasing term rider.
11. Age—the insurance age at issue.

Exclusions

Certain types of business, possessing special traits that seemed likely to influence the first year lapse rate, are excluded from the main part of this paper. They are dealt with, if at all, only in the L and M tables and the corresponding text. These are:

1. Substandard business.
2. Attained age term conversions.
3. Group conversions.
4. Single premium plans.
5. Joint life plans (because of the artificial age shown in the punch cards used for this study).
6. Paid-up life policies issued to implement the exercising of options on older policies.
7. Ordinary policies with companion A&S policies.
8. Pension trust life and annuity plans.
9. Individual annuity plans.
10. First year death claims (to avoid double decrement tables).

Measures of Lapse Rates

The punch cards from which this study was made supply three bases for measuring lapse rates: number of policies, amount of insurance and annual premium per policy. As may be seen from Table A, the lapse rate in total for each of the three main subgroups was highest by number of

TABLE A

First Year Lapse Rates in Three Main Groups

	Number of Policies Exposed	First Year Lapse Rates by		
		Number	Amount	Premium
Adult males..........	21,808	11.4%	10.0%	8.3%
Adult females........	4,721	10.3	8.7	7.4
Children.............	11,801	7.4	6.9	6.4
All..............	38,330	10.0%	9.7%	8.0%

TABLE B1

First Year Lapse Rates by Number and Premium

	Annual Premium Range	Number of Policies Exposed	First Year Lapse Rates by	
			Number	Premium
Adult males.......	0– 49	2,173	16.1%	15.9%
	50– 99	5,892	13.1	13.0
	100–149	4,890	12.6	12.8
	150–199	2,736	10.4	10.8
	200–249	1,565	10.2	10.6
	250–299	1,145	9.1	9.8
	300–349	728	8.0	8.6
	350–399	504	6.4	6.9
	400–449	326	6.1	6.9
	450–499	265	6.1	6.9
	500–999	1,074	4.6	5.4
	1,000 up	510	3.1	3.1
	All	21,808	11.4%	8.3%
Adult females.....	0– 49	2,086	12.4%	11.9%
	50– 99	1,230	9.4	9.6
	100–149	569	9.9	10.6
	150–199	224	9.2	9.8
	200–249	151	8.7	9.4
	250–299	116	7.0	8.3
	300–499	157	6.8	6.6
	500–999	132	2.8	3.2
	1,000 up	56	(2.2)	(2.6)
	All	4,721	10.3%	7.4%
Children..........	0– 49	7,600	8.1%	8.0%
	50– 99	2,774	6.3	6.3
	100–149	795	7.1	7.6
	150–199	275	4.8	4.9
	200–299	228	4.1	4.3
	300 up	129	2.4	2.5
	All	11,801	7.4%	6.4%

Note.—Lapse rates shown in parentheses with 50–99 policies exposed.

policies, somewhat lower by amount of insurance and still lower by premium. The reason the lapse rates in total were highest by number of policies was simply that the large policies, with their relatively low lapse rates, weighed more heavily in the totals by amount and by premium than in the totals by number of policies. However, within narrow premium

TABLE B2

FIRST YEAR LAPSE RATES BY NUMBER AND AMOUNT

	Amount Range	Number of Policies Exposed	First Year Lapse Rates by	
			Number	Amount
Adult males...	1,000– 2,499	1,442	13.6%	13.4%
	2,500– 4,999	3,841	12.9	12.9
	5,000– 9,999	7,836	11.9	12.1
	10,000–14,999	4,886	11.3	11.6
	15,000–19,999	1,438	9.4	9.8
	20,000–24,999	747	8.1	8.8
	25,000 up	1,618	6.7	6.9
	All	21,808	11.4%	10.0%
Adult females.	1,000– 2,499	2,540	10.7%	10.6%
	2,500– 4,999	1,249	10.5	10.9
	5,000– 9,999	614	10.3	10.4
	10,000–14,999	166	8.3	8.7
	15,000 up	152	5.8	4.9
	All	4,721	10.3%	8.7%
Children......	1,000–2,499	10,151	7.4%	7.3%
	2,500–4,999	922	8.1	8.4
	5,000–9,999	551	6.2	6.8
	10,000 up	177	4.6	3.4
	All	11,801	7.4%	6.9%

ranges the lapse rates were about the same by number and by premium (Table B1). Similarly, within narrow amount ranges the lapse rates were nearly identical by number and by amount (Table B2). Accordingly, in the rest of this paper the lapse rates are shown only by number of policies.

I. ATTRIBUTES OF POLICIES AND POLICYHOLDERS

The first goal of this investigation was to identify attributes of policies and policyholders that influence lapse rates and that can be taken into consideration in the calculation of premiums and dividends. The first attributes considered were: plan of insurance, amount of insurance per policy, annual premium per policy, age of the insured at issue, sex of the insured and mode of premium payment. The Richardson-Hartwell paper, various LIAMA booklets and other reports have indicated the importance of the income of the policyholder. However, income was not considered here because it is not a factor on which premiums and dividends can be directly based.

A preliminary investigation suggested that plan of insurance was important but less so than some of the other items. Hence further consideration of plan was deferred until later in the study.

Measures of Policy Size

The first year lapse rates decreased markedly with increasing amount of insurance and with increasing annual premium (Tables B1 and B2). Further investigation revealed that the downtrend of lapse rates with increasing amount was merely a reflection of the accompanying increase in premium. In other words, of the two measures of size—premium and amount—premium was the significant one. Apart from its effect on the premium, the amount of insurance had little influence on the first year lapse rate. Hence amount was discarded in favor of premium as the measure of policy size.

TABLE C

RATIOS OF ACTUAL TO EXPECTED LAPSES

Amount	Ratio* A/E	Premium	Ratio† A/E
1,000– 2,499	95%	0– 49	126%
2,500– 4,999	98	50– 99	107
5,000– 9,999	97	100–149	107
10,000–14,999	107	150–199	93
15,000 up	106	200–299	91
		300–399	74
All	100%	400–499	66
		500–999	53
		1,000 up	42
		All	100%

* Expected based on aggregate lapse rates within narrow premium ranges.
† Expected based on aggregate lapse rates within narrow amount ranges.

This conclusion was reached by arraying the exposures and the lapses into a two-way table by amount and premium simultaneously. For adult males this step divided the experience into the 120 cells consisting of every combination of 12 narrow premium ranges and 10 narrow amount ranges.

For each of the 12 premium ranges the aggregate first year lapse rate by number of policies was calculated; these rates appear in Table B1 (16.1% to 3.1%). In each of the 120 cells the exposure was multiplied by this aggregate lapse rate for the appropriate premium range. This multiplication produced an array, on adult males, of 120 "expected" lapse figures derived from rates of expected that were independent of the amount of insurance. For all 12 cells in each amount range these expected lapses were added together and compared with the corresponding total of actual lapses. The resulting ratios are shown in the left half of Table C. These ratios do not diminish with increasing amount of insurance; that is, introduction of the premium factor eliminated the downtrend by amount.

Similarly, for each of the 10 amount ranges the aggregate lapse rate was calculated; Table B2 displays these rates (13.6% to 6.7%) with the six middle ranges broadened into three. The process of the preceding paragraph was repeated, interchanging amount and premium in the above description. The resulting ratios are shown in the right half of Table C. These ratios diminish sharply with increasing premium; that is, introduction of the amount factor failed to eliminate the marked downtrend by premium.

Lapse Rates by Sex, Mode, Premium and Age

The B1 and D tables reveal clear patterns of lapse rates by mode, premium and age as well as, in adults, by sex. However, the trend shown for

TABLE D1

FIRST YEAR LAPSE RATES BY SEX, MODE AND AGE

ADULT MALES

	Number of Policies Exposed	Lapse Rate by Number
Mode		
Annual	7,707	6.2%
Semiannual	2,968	10.8
Quarterly	6,497	15.5
Monthly	3,143	16.9
Payroll deduction	1,493	9.4
Age at issue		
18–19	741	14.3%
20–24	2,699	17.0
25–29	4,203	13.8
30–34	4,574	11.9
35–39	3,689	9.9
40–44	2,666	8.1
45–49	1,624	6.8
50–54	878	7.0
55–59	470	5.6
60 up	264	4.0
All	21,808	11.4%

TABLE D2

First Year Lapse Rates by Sex, Mode and Age

Adult Females

	Number of Policies Exposed	Lapse Rate by Number
Mode		
Annual	1,751	5.6%
Semiannual	1,138	12.9
Quarterly	1,126	12.9
Monthly	372	15.4
Payroll deduction	334	12.2
Age at issue		
18–19	497	12.9%
20–24	1,045	14.1
25–29	745	10.5
30–34	674	10.2
35–39	642	9.1
40–44	433	6.6
45–49	339	6.4
50–54	185	5.1
55–59	100	5.6
60 up	61	(8.2)
All	4,721	10.3%

Note.—Lapse rates shown in parentheses with 50–99 policies exposed.

TABLE D3

First Year Lapse Rates by Sex, Mode and Age

Children

	Number of Policies Exposed	Lapse Rate by Number
Mode		
Annual	6,607	5.1%
Semiannual	2,707	9.1
Quarterly	1,602	13.0
Monthly	173	15.2
Payroll deduction	712	7.6
Age at issue		
0	3,959	6.3%
1–4	4,092	7.6
5–9	1,712	8.8
10–14	1,238	7.7
15–17	800	8.6
All	11,801	7.4%

every single factor was influenced to an unknown degree by variations stemming from the other factors.

Hence this experience was divided into every combination by sex (on children as well as adults), mode, premium and age. In addition the payroll deduction business was split between government allotment and other salary savings. On children there proved to be no significant difference in lapse rates by sex. Also, on the relatively small payroll deduction experience there was little difference between government allotment and other salary savings. The crude lapse rates, for somewhat broadened ranges, are shown in Tables E1, E2 and E3.

Graduated Lapse Rates

Graduated lapse rates, displayed in Tables F1, F2 and F3, were then developed from these crude rates. The rates on adult males and on children were graduated directly with emphasis on adhering most closely to the cells with largest exposures and to the rates in total for columns and rows. It was then discovered that, at a rather minor sacrifice of closeness of fit, the adult female graduated lapse rates could be derived as percentages of the corresponding graduated rates on adult males: 75% for annual premiums of $0 to $49; 80% for $50 to $149; 85% for $150 to $249; 90% for $250 to $349; 95% for $350 to $499; 100% for premiums of $500 up. The results of a test of this graduation appear in Table G.

The first year lapse rates were highest on adult males, a little lower on adult females and still lower on children. They decreased with increasing premium and, in adults, tended to decrease with increasing age. They were lowest on annual premium business, followed in order by payroll deduction, semiannual, quarterly and monthly. Other things being equal, monthly business clearly had higher lapse rates than quarterly business.

The graduated lapse rates of the F tables can be put to several important uses. First of all, they can be used as a simple persistency rater by agents of one company. Also they make possible more valid comparisons, within the company, of lapse rates from one calendar period to another. Moreover they, or some variation of them, can be employed to make more valid comparisons among companies.

In addition, by using these graduated lapse rates as expected lapse rates and obtaining ratios of actual lapses to expected lapses, it became possible to eliminate the influences of sex, mode, premium and age in the study of other factors. Hence in Tables H1 to N4, where both lapse rates and ratios of actual to expected lapses are shown, the ratio of actual to expected is the more reliable of the two as a measure of the influence of the particular factor being studied.

TABLE E1

Crude First Year Lapse Rates by Sex, Mode, Premium and Age

Adult Males

Age	Premium					
	0–49	50–149	150–249	250–349	350–499	500 up
			Annual			
18–29	12.1%	6.9%	9.4%	6.3%	(5.9%)	(3.9%)
30–39	10.9	7.1	4.8	2.9	4.3	0.7
40–49	9.7	5.3	4.7	3.2	2.4	1.9
50 up	–	7.2	5.2	(2.4)	(0.8)	3.3
			Semiannual			
18–29	20.2%	11.3%	4.2%	–	–	–
30–39	20.8	11.3	6.2	7.9%	(3.8%)	–
40–49	–	8.4	5.7	(4.7)	–	(1.2%)
50 up	–	(3.7)	–	–	–	–
			Quarterly			
18–29	24.6%	20.7%	15.5%	(12.8%)	–	–
30–39	20.2	14.6	11.6	13.5	(9.8%)	(9.5%)
40–49	–	10.9	14.1	12.5	(10.3)	(8.7)
50 up	–	11.9	(4.4)	(7.3)	–	(4.5)
			Monthly			
18–29	–	23.6%	19.2%	18.9%	–	–
30–39	–	20.2	17.8	14.7	(10.9%)	(9.7%)
40–49	–	16.0	13.9	9.2	(8.3)	(6.9)
50 up	–	–	–	–	–	(7.4)
			Payroll Deduction			
18–29	(18.3%)	12.7%	(9.4%)	–	–	–
30–39	–	8.8	6.8	–	–	–
40–49	–	5.3	–	–	–	–
50 up	–	–	–	–	–	–

Note.—Lapse rates shown in parentheses with 50–99 policies exposed.

TABLE E2

CRUDE FIRST YEAR LAPSE RATES
BY SEX, MODE, PREMIUM AND AGE
ADULT FEMALES

Age	Premium 0-49	50-149	150-249	250-349	350-499	500 up
			Annual			
18-29.......	8.6%	4.0%	-	-	-	-
30-39.......	7.9	4.4	(1.1%)	-	-	-
40-49.......	(4.7)	5.1	-	-	-	-
50 up.......	-	(3.2)	-	-	-	-
			Semiannual			
18-29.......	15.7%	9.7%	-	-	-	-
30-39.......	15.9	(9.9)	-	-	-	-
40-49.......	-	(3.8)	-	-	-	-
50 up.......	-	-	-	-	-	-
			Quarterly			
18-29.......	17.1%	14.1%	-	-	-	-
30-39.......	(11.4)	13.6	-	-	-	-
40-49.......	(14.7)	8.6	-	-	-	-
50 up.......	-	(7.2)	-	-	-	-
			Monthly			
18-29.......	-	(18.4%)	-	-	-	-
30-39.......	-	-	-	-	-	-
40-49.......	-	-	-	-	-	-
50 up.......	-	-	-	-	-	-
			Payroll Deduction			
18-29.......	15.5%	(14.6%)	-	-	-	-
30-39.......	-	-	-	-	-	-
40-49.......	-	-	-	-	-	-
50 up.......	-	-	-	-	-	-

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

TABLE E3

CRUDE FIRST YEAR LAPSE RATES
BY SEX, MODE, PREMIUM AND AGE

CHILDREN, BOTH SEXES

AGE	PREMIUM		
	0–49	50–149	150 up
	Annual		
0	5.2%	2.1%	(0.9%)
1–4	6.1	2.1	(0.8)
5–17	8.6	1.7	1.9
	Semiannual		
0	8.3%	4.8%	-
1–4	11.2	4.5	-
5–17	12.7	3.8	-
	Quarterly		
0	12.8%	9.7%	-
1–4	15.3	12.4	-
5–17	(24.1)	14.8	-
	Monthly		
0	-	-	-
1–4	-	-	-
5–17	-	(26.5%)	-
	Payroll Deduction		
0	5.8%	(6.1%)	-
1–4	7.9	(11.4)	-
5–17	8.1	(9.1)	-

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

TABLE F1

Graduated First Year Lapse Rates by Sex, Mode, Premium and Age

Adult Males

Age	Premium					
	0–49	50–149	150–249	250–349	350–499	500 up
	Annual					
18–29	12%	8%	7%	6%	4%	4%
30–39	11	7	6	4	3	2
40–49	9	6	4	3	2	2
50 up	9	6	4	3	2	2
	Semiannual					
18–29	20%	12%	10%	8%	6%	5%
30–39	17	10	8	7	6	4
40–49	13	8	7	6	5	4
50 up	12	8	7	6	5	4
	Quarterly					
18–29	26%	21%	16%	13%	11%	9%
30–39	20	16	12	11	9	8
40–49	15	11	10	9	8	6
50 up	13	9	8	7	6	6
	Monthly					
18–29	–	23%	21%	19%	18%	16%
30–39	–	20	17	15	13	11
40–49	–	16	13	11	9	8
50 up	–	12	10	9	8	6
	Payroll Deduction					
18–29	18%	12%	9%	8%	6%	4%
30–39	14	9	7	6	4	3
40–49	11	6	5	4	4	3
50 up	11	6	5	4	4	3

TABLE F2

Graduated First Year Lapse Rates by Sex, Mode, Premium and Age
Adult Females

Age	Premium 0–49	50–149	150–249	250–349	350–499	500 up
	Annual					
18–29	9%	6%	6%	5%	4%	4%
30–39	8	6	5	4	3	2
40–49	7	5	4	3	2	2
50 up	7	4	4	2	2	2
	Semiannual					
18–29	15%	9%	9%	8%	6%	5%
30–39	12	8	7	6	6	4
40–49	10	7	6	6	5	4
50 up	9	6	6	6	4	4
	Quarterly					
18–29	19%	16%	14%	12%	10%	9%
30–39	15	12	11	9	8	8
40–49	11	9	9	8	7	6
50 up	10	8	7	6	6	6
	Monthly					
18–29	–	19%	18%	17%	17%	16%
30–39	–	16	14	14	12	11
40–49	–	13	11	10	9	8
50 up	–	10	9	8	7	6
	Payroll Deduction					
18–29	14%	9%	8%	7%	6%	4%
30–39	11	7	6	5	4	3
40–49	8	5	4	4	4	3
50 up	8	5	4	4	3	3

TABLE F3

GRADUATED FIRST YEAR LAPSE RATES
BY SEX, MODE, PREMIUM AND AGE

CHILDREN, BOTH SEXES

Age	Premium 0–49	Premium 50–149	Premium 150 up
	Annual		
0	5%	2%	1%
1–4	6	2	1
5–17	9	2	2
	Semiannual		
0	8%	4%	3%
1–4	11	4	4
5–17	12	4	4
	Quarterly		
0	13%	9%	8%
1–4	15	12	9
5–17	24	14	12
	Monthly		
0	–	12%	10%
1–4	–	17	11
5–17	–	22	13
	Payroll Deduction		
0	6%	6%	3%
1–4	8	11	4
5–17	9	12	9

Results by Plan, etc.

Tables H1 to H3 present results by term rider and type of plan.

1. On adult males, policies with term riders consistently showed better persistency than corresponding policies without riders. On adult females the reverse was true, with a particularly high ratio of actual to expected on a small number of endowments with mortgage redemption rider.
2. On adult males, with or without term riders, the best persistency by type of plan was found on life plans, followed in order by endowments, endowment annuities and term plans. Without term riders, short term plans provided considerably better persistency (ratio of 114%) than did long term plans (131%).
3. In this study there were four different plans of term rider, three of them providing amounts of insurance decreasing by policy duration

TABLE G

TEST OF GRADUATION IN F TABLES
RATIOS OF ACTUAL TO EXPECTED LAPSES*

	Adult Males	Adult Females	Children
Mode			
Annual	100%	88%	100%
Semiannual	100	105	101
Quarterly	100	96	101
Monthly	99	104	94
Payroll deduction	101	116	95
Age at issue			
0	....	....	101%
1–4	....	....	100
5–17	....	....	99
18–29	99%	100%	....
30–39	99	100	....
40–49	102	92	....
50 up	104	110	....
Annual premium			
0– 49	102%	102%	100%
50–149	99	96	101
150–249	100	101	–
250–349	104	113	–
350–499	101	84	–
500 up	100	72	–
250 up	102	96	–
150 up	101	99	99
All	100%	99%	100%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

and the other providing level amounts. The results are not shown here by plan of rider because these exhibited no significant difference in persistency.

4. On adult females, endowments gave the lowest ratio of actual to expected by type of plan, followed in order by endowment annuities, life plans, long term plans and short term plans.
5. On children the more expensive plans tended to have better persistency.

TABLE H1

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED*
BY TERM RIDER AND TYPE OF PLAN

ADULT MALES

	Number of Policies	Lapse Rate	Ratio A/E
Life plans	11,822	10.6%	92%
Without rider	7,657	10.9	99
With rider	4,165	9.9	81
Endowments	2,171	11.3%	98%
Without rider	1,011	12.4	101
With rider	1,160	10.4	95
Endowment annuities	2,062	11.6%	105%
Without rider	1,466	11.7	105
With rider	596	11.3	104
Long term plans	3,088	13.2%	115%
Without rider	1,114	15.2	131
With rider	1,974	12.1	106
Short Term plans (No riders)	2,665	12.6%	114%
All plans	21,808	11.4%	100%
Without rider	13,913	11.8	106
With rider	7,895	10.6	90

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

Comparisons between participating and nonparticipating business were hampered by the fact that, in general, this company issues only its life plans on both bases. Endowments and endowment annuities are ordinarily issued on only the participating basis and term plans on only the nonparticipating basis. On the few plans that could be compared (Table I) there was no consistent difference between participating and nonparticipating. Nonparticipating had the better persistency on the larger exposures (Ordinary Life and Life Paid-up at 65); participating had the

TABLE H2

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED* BY TERM RIDER AND TYPE OF PLAN

ADULT FEMALES

	Number of Policies	Lapse Rate	Ratio A/E
Life plans	3,075	10.8%	103%
Without rider	2,981	10.7	102
With rider	94	(11.3)	(119)
Endowments	891	9.3%	83%
Without rider	828	8.8	77
With rider	63	(16.9)	(201)
Endowment annuities	482	8.4%	90%
Without rider	477	8.4	89
With rider	5	–	–
Long term plans	178	12.6%	129%
Without rider	128	13.7	132
With rider	50	(10.0)	(118)
Short term plans (No riders)	95	(11.8%)	(139%)
All plans	4,721	10.3%	99%
Without rider	4,509	10.2	98
With rider	212	12.7	142

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

TABLE H3

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED* BY TYPE OF PLAN (NO TERM RIDERS)

CHILDREN

	Number of Policies	Lapse Rate	Ratio A/E
Life plans	8,729	8.0%	106%
Ordinary Life	2,291	9.8	139
Other life	6,438	7.3	96
Endowments	2,953	5.5%	78%
Endowment annuities	63	(13.9%)	(161%)
Term plans	56	(10.1%)	(121%)
All plans	11,801	7.4%	100%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

better persistency on the smaller exposures (20 Payment Life and 30 Payment Life).

Table J compares the results on policies issued to old Lincoln National policyholders and on those issued to new Lincoln National policyholders. The old policyholders stayed much better than the new ones, with a ratio of actual to expected lapses of only 67% versus 105%. The advantage in favor of old policyholders was particularly great on adult males.

However, the variations observed in the H, I and J tables (plan, rider, participating and nonparticipating, old and new policyholder) are much smaller than those in the F tables (sex, mode, premium and age).

TABLE I

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
BY PARTICIPATING AND NONPARTICIPATING, TERM RIDER AND PLAN
ADULT MALES

	Number of Policies Exposed	First Year Lapse Rate	Ratio A/E
Ordinary Life—nonparticipating	5,294	9.6%	86%
Without rider	2,656	9.6	95
With rider	2,638	9.5	79
Ordinary Life—participating	1,304	13.4%	115%
Without rider	1,033	13.7	118
With rider	271	12.4	104
20 Pay Life—nonparticipating	553	11.5%	107%
Without rider	476	11.7	109
With rider	77	(10.6)	(93)
20 Pay Life—participating	662	11.4%	94%
Without rider	620	11.3	94
With rider	42	–	–
30 Pay Life–without rider—nonparticipating	217	10.7%	85%
30 Pay Life—without rider—participating	163	10.4%	77%
Life Paid-up 65—nonparticipating	1,055	8.7%	66%
Without rider	630	8.1	64
With rider	425	9.6	70
Life Paid-up 65—participating	672	12.3%	96%
Without rider	467	13.5	107
With rider	205	9.4	72

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

Military Business

An investigation was conducted on business with premiums paid by government allotment. This study considered, both singly and in various combinations, the branch of service, pay grade, age at issue, length of service and marital status. The significant results are presented in Table K. When matched with other factors, neither length of service nor marital status proved important. There was not much difference by branch of service except that the army group was weighted a little more heavily at ages 18 to 24; and this subgroup experienced a 28% first year lapse rate, substantially higher than for the same age group in the other branches. Among enlisted men and commissioned officers separately, the lapse rate and the ratio decreased with rising rank. However, the lowest ranking commissioned officers showed higher ratios and lapse rates than did warrant officers and high ranking enlisted men. The few policies issued to the lowest four pay grades experienced poor persistency even though these were presumably select cases.

TABLE J

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED*

OLD AND NEW POLICYHOLDERS

	First Year Lapse Rate	Ratio A/E
Adult males		
Old policyholder	6.3%	65%
New policyholder	12.9	109
Adult females		
Old policyholder	6.7	81
New policyholder	10.6	100
Children		
Old policyholder	5.2	86
New policyholder	7.5	101
All ages, both sexes		
Old policyholder	6.3%	67%
New policyholder	10.7	105

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

The bottom section of Table K indicates that age was a factor along with pay grade. It should be noted that most of the pay grade group E1 to E5 consisted of pay grade E5.

TABLE K

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
GOVERNMENT ALLOTMENT BUSINESS
ADULT MALES

	Number of Policies Exposed	First Year Lapse Rates‡	Ratio‡ A/E
Branch of service			
Army	187	11.4%	133%
Navy, Coast Guard	289	8.2	99
Air Force	135	8.3	100
Marines	58	(8.6)	(95)
Pay grade†			
E-1 to E-3	17	((22.1%))	((192%))
E-4	18	((17.4))	((161))
E-5	82	(15.2)	(142)
E-6 to E-9	291	10.7	129
W-1 to W-4	22	((0.0))	((0))
O-1	23	((16.3))	((161))
O-2	53	(5.9)	(62)
O-3 to O-8	156	1.6	25
Pay grade† and age			
Pay grades E-1 to E-5			
18–24	54	(23.1%)	(202%)
25–34	58	(10.8)	(102)
35 up	5	–	–
Pay grades E-6 to E-9			
18–24	10	((25.0))	((230))
25–34	160	11.7	130
35 up	121	8.3	116
Pay grades W-1 to O-2			
18–24	28	((17.9))	((183))
25–34	53	(3.6)	(37)
35 up	17	((0.0))	((0))
Pay grades O-3 to O-8			
18–24	0	–	–
25–34	43	((0.0))	((0))
35 up	113	2.2	37

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

† Pay grades for Army (for other branches, the equivalent ranks)—E1, private; E2, private; E3, private first class; E4, corporal; E5, sergeant; E6–E9, staff sergeant or higher enlisted man; W1–W4, warrant officer; O1, second lieutenant; O2, first lieutenant; O3–O8, captain or higher.

‡ Ratios and lapse rates shown in single parentheses with 50–99 policies exposed, in double parentheses with 10–49 policies exposed.

Miscellaneous

Table L displays the first year lapse rates and ratios of actual to expected lapses on some kinds of business that were excluded from the main study.

Term conversions persisted well, compared with new issues at least, having a lapse rate of 4.8% and a ratio of 61%.

Group conversions showed a ratio of 115%.

TABLE L

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED*
KINDS OF BUSINESS EXCLUDED FROM MAIN GROUP

	Number of Policies Exposed	First Year Lapse Rate	Ratio A/E
Term conversions	1,904	4.8%	61%
Standard	1,748	4.4	56
Substandard	156	9.2	112
Group conversions	347	11.0%	115%
Standard	344	10.9	114
Substandard	3	–	–
Pension trust life insurance	792	6.5%	105%
Standard	671	6.7	109
Substandard	121	5.2	85
Substandard	4,746	13.3%	137%
Adult Males	4,117	13.6	139
Adult Females	493	12.3	134
Children	136	9.6	103

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

Pension trust life insurance policies experienced a relatively low first year lapse rate but a ratio of actual to expected of 105%. The low expected lapse rate stemmed from the nature of this business: nearly all policies issued at ages 30 or older; nearly all premiums payable annually; average annual premium per policy higher than on the policies in the main part of this study.

Substandard business had a ratio of actual to expected lapses of 137%, where the expected was based on the standard experience of the F tables. As seen in Table M1, the ratio varied only a little by underwriting rating. The chief exception—and a distinct one—was that policies with flat extra premiums for aviation persisted very well, especially the government allotment flat extras.

Table M2 displays the results—excluding government allotment flat extras—on substandard business issued to adult males, arrayed by mode, premium, age, rider and type of plan. By mode, premium and age the lapse rates show trends similar to but less marked than those on standard

TABLE M1

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
SUBSTANDARD BUSINESS
ADULT MALES
BY UNDERWRITING RATING

	Number of Policies Exposed	First Year Lapse Rate	Ratio A/E
Table ratings			
A (125%)	191	13.4%	142%
AA (137.5%)	157	11.6	133
B & BB (150% & 162.5%)	775	14.4	146
C (175%)	286	12.0	135
D (200%)	395	12.7	141
E (225%)	111	13.5	142
F (250%)	244	14.6	153
H (300%)	172	17.1	171
J, L & P (350%–500%)	193	15.2	149
Flat extras per $1,000†			
Govt. Allotment‡	266	2.4%	38%
Others			
$2.50	698	16.7%	145%
$3.75‡	122	9.7	100
$5.00	352	14.9	136
$7.50 up	155	14.5	148
All excluding Govt. Allot. flat extras	3,851	14.4%	143%
All	4,117	13.6%	139%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.
† Actual extras are punched to the nearest value in the punch card code, as indicated.
‡ Nearly all of these are aviation extras.

business, while the ratios of actual to expected generally show a tendency to go in the opposite direction. This is a plausible result, with the effect of being substandard superimposed upon the influences of the other factors.

II. ATTRIBUTES OF AGENTS

The foregoing material demonstrates that many factors related to the policies and policyholders influence first year lapse rates. To carry the analysis further, the N and O tables display the findings according to attributes of the agents.

Table N1 presents lapse rates and ratios of actual to expected by type of agent. Two-agent cases experienced a ratio of actual to expected of 114%; brokers' business, 94%. Not surprisingly, general agents achieved the low ratio of 79%. Soliciting agents newly appointed in the calendar year of the study had a ratio of 127%; earlier appointees whose contracts terminated in the calendar year of the study, 150%. Among soliciting agents with the company the entire year, part-timers and full-timers selling $100,000 or more volume had identical ratios of actual to expected; however, below this level of sales part-timers enjoyed lower ratios than

TABLE M2

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
SUBSTANDARD BUSINESS
EXCLUDING GOVERNMENT ALLOTMENT FLAT EXTRAS
ADULT MALES
BY MODE, PREMIUM, AGE, PLAN AND RIDER

Factor Being Studied	Number of Policies Exposed	First Year Lapse Rate	Ratio A/E
Mode			
Annual	1,230	8.3%	167%
Semiannual	454	9.8	114
Quarterly	1,213	17.7	136
Monthly	706	21.5	145
Payroll deduction	248	16.1	170
Annual Premium			
0– 49	176	20.2%	131%
50–149	1,502	16.8	136
150–249	784	14.3	131
250–349	447	13.0	156
350–499	330	13.6	204
500 up	612	8.3	175
Age at Issue			
18–29	840	21.0%	140%
30–39	1,375	14.8	134
40–49	1,090	10.6	147
50 up	546	10.8	189
Type of plan			
Life	2,299	13.9%	139%
Endowment	465	12.8	130
Endowment annuity	348	13.1	128
Long term	420	18.8	174
Short term	319	15.7	167
Without rider	2,856	14.2%	146%
With rider	995	14.7	137
All	3,851	14.4%	143%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

did ostensible full-timers. Among full-timers with the company the entire year the lapse rate and the ratio increased as the sales volume per agent decreased.

The results by the length of service and age of the agent are given in Table N2. The ratios diminish with increasing length of service, particularly during the agents' early contract years. So far as persistency of his business was concerned, youth was no handicap to an agent; in fact, for a given length of service, agents aged 20 to 35 enjoyed lower ratios than did older agents.

The most striking result on Table N2 is the pattern of ratios by length

TABLE N1

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
ALL AGES, BOTH SEXES
BY TYPE OF AGENT

	First Year Lapse Rates		Ratio A/E
	Actual	Expected	
All agents	10.0%	10.0%	100%
Two-agent cases	10.4	9.1	114
Single-agent cases	10.0%	10.1%	99%
Brokers	7.9	8.5	94
Miscellaneous	6.3	10.2	62
General agents	7.0	8.9	79
Soliciting agents	10.3%	10.2%	101%
Appointed in year of issue	14.6	11.5	127
Others, terminated in year of issue	16.1	10.7	150
With Lincoln National entire year	9.7	10.1	96
Full-timers	9.9	10.2	97
Part-timers	9.0	9.7	93
Full-timers with Lincoln National entire year, by sales in year of issue			
$100,000 up	9.8%	10.2%	96%
Top 25 agents	6.5	8.8	74
Second 25 agents	8.7	9.9	88
Others, $100,000 up	10.2	10.4	98
$0–$99,000	11.4	9.9	116
Part-timers with Lincoln National entire year, by sales in year of issue			
$100,000 up	9.2%	9.6%	96%
50,000–$99,000	8.6	9.7	89
10,000– 49,000	9.1	9.9	92
0– 9,000	9.3	9.1	103

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

of service of the agent: 122% for agents with 1 to 2 years of service, 99% with 3 to 5 years, 81% with 6 to 15 years, 79% with 16 or more years. The question immediately arises whether all or a significant part of this trend was produced by some underlying factor other than length of service of the agent. However, the figures at the bottom of Table N2 indicate that age of the agent was not responsible. Moreover, use of the ratios of actual

TABLE N2

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED*

ALL AGES, BOTH SEXES

BUSINESS FROM FULL-TIMERS WITH LINCOLN NATIONAL ENTIRE CALENDAR YEAR WHO SOLD $100,000 OR MORE†

BY AGE AND LENGTH OF SERVICE OF AGENT‡

	First Year Lapse Rates		Ratio A/E
	Actual	Expected	
Age of Agent			
20–35	10.9%	10.9%	100%
36–50	10.2	10.3	100
51–65	8.0	9.4	85
Subtotal	9.8	10.2	96
66 up	9.0	9.4	96
All	9.8	10.2	96
Length of Service#			
1–2	13.8%	11.3%	122%
3–5	10.8	10.9	99
6–15	8.1	10.0	81
16 up	6.8	8.6	79
All	9.8	10.2	96
Age and Length of Service#			
Ages 20–35			
1–2	13.8%	11.4%	120%
3–5	10.0	11.2	89
6–15	6.9	9.7	72
Ages 36–50			
1–2	14.0%	11.2%	125%
3–5	11.7	11.0	107
6–15	8.3	9.8	84
16 up	7.6	8.8	86
Ages 51–65			
1–2	12.9%	10.2%	126%
3–5	9.5	9.7	98
6–15	8.7	10.6	82
16 up	6.5	8.6	76

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

† Excluding two-agent cases. See Table N1.

‡ Age of agent: age on birthday in year of study. Length of service: number of years of Lincoln National service completed on contract anniversary in year of study.

\# Excluding agents aged 66 up.

to expected ruled out sex and age of the insured, mode of premium payment and annual premium per policy.

Also considered as an explanation for the improvement in persistency with increasing length of service of the agent was the possibility that the more experienced agents made a higher proportion of their sales to old

TABLE N3

FIRST YEAR LAPSE RATES AND
RATIOS OF ACTUAL TO EXPECTED*
ALL AGES, BOTH SEXES
BUSINESS FROM FULL-TIMERS WITH LINCOLN NATIONAL ENTIRE
CALENDAR YEAR WHO SOLD $100,000 OR MORE†
BY LENGTH OF SERVICE OF AGENT, OLD OR NEW
LINCOLN NATIONAL POLICYHOLDER

	First Year Lapse Rates		Ratio A/E
	Actual	Expected	
Length of Service of Agent; Old or New Policyholder			
1–2 years			
Old	10.6%	10.9%	97%
New	14.2	11.3	125
3–5 years			
Old	8.4	10.7	79
New	11.2	10.9	102
6 years up			
Old	5.4	9.3	58
New	8.4	9.6	87
1–2 years	13.8	11.3	122
3–5 years	10.8	10.9	99
6 years up	7.7	9.6	81
Old policyholder	6.6	9.7	68
New policyholder	10.6	10.4	102
All	9.8%	10.2%	96%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

† Excluding two-agent cases and cases from agents aged 66 up. See Table N1.

policyholders of the company. However, Table N3 demonstrates that this improvement occurred on both new and old policyholders.

Compared with experienced agents, a greater proportion of new agents will fail in the near future. Table N4 divides the data of Tables N2 and N3 according to the staying power of the agent: those whose contracts terminated in the year following the study, those terminating the second year and those surviving this period. Particularly for new agents, the business of agents nearing termination lapsed more frequently than did the business of agents destined to survive this period. Hence the two-year survivors' business shows a considerably flatter trend of ratios by length of experience than does the business of all three groups of agents combined. Very likely the agents surviving five years would experience even smaller differences in their ratios by length of service.

In summary:

1. The ratio of actual to expected first year lapses dropped from 122% for agents with 1 to 2 years of service to 99% for agents with 3 to 5 years of service and to 81% for agents with 6 or more years of service. No

TABLE N4

FIRST YEAR LAPSE RATES AND RATIOS OF ACTUAL TO EXPECTED*

ALL AGES, BOTH SEXES

BUSINESS FROM FULL-TIMERS WITH LINCOLN NATIONAL ENTIRE CALENDAR YEAR WHO SOLD $100,000 OR MORE†

BY LENGTH OF SERVICE AND SURVIVORSHIP OF AGENT

	First Year Lapse Rates		Ratio A/E
	Actual	Expected	
Agents terminating year after study			
1–2 years of service‡	19.9%	11.5%	173%
3–5	12.5	11.1	113
6 up	12.3	10.6	116
All	16.9	11.3	150
Agents terminating second year after study			
1–2 years of service‡	16.8%	11.0%	153%
3–5	(9.2)	(8.8)	(104)
6 up	10.7	9.9	108
All	13.5	10.3	131
Agents surviving			
1–2 years of service‡	12.1%	11.2%	107%
3–5	10.7	10.9	97
6 up	7.5	9.5	79
All	9.1	10.2	89
All agents			
1–2 years of service‡	13.8%	11.3%	122%
3–5	10.8	10.9	99
6 up	7.7	9.6	81
All	9.8	10.2	96

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

† Excluding two-agent cases and cases from agents aged 66 up. See Table N1.

‡ At time of policy issue.

NOTE.—Lapse rates shown in parentheses with 50–99 policies exposed.

significant difference in persistency could be demonstrated between the group with 6 to 15 years of service and the group with 16 or more years of service.

2. No significant part of this drop could be tied to: variations in type of plan of insurance; proportions of sales to new or old policyholders; proportions of sales with or without term riders; proportions of sales in or out of company sales contests; variations by sex or age of the insured, annual premium per policy or mode of premium payment.
3. However, part of this drop did reflect the fact that a greater proportion of new agents than of experienced agents are nearing termination of their contracts. As seen from Tables N1 and N4, agents nearing termination produced business of relatively poor persistency.

Quality of Business; Quality of Agent

The factors influencing lapse rates that have been discussed here fall mostly into two categories, those related to the policies or policyholders and those related to the agent. The former, taken together, can be used to establish a measure of the quality of the business from a persistency standpoint. The latter can be used to measure the quality of the agent.

Several uses have previously been suggested for the lapse rates of Tables F1, F2 and F3: as a possible persistency rater; as a device for improving the validity of comparisons of lapse rates within a single company from one time to another or among companies; as a device for measuring expected lapses in the examination of the influence of other factors.

Now a further use presents itself: as a rough measure of the quality of business from a persistency standpoint. This measure is rough because the lapse rates of the F tables depend on age, sex, mode and premium only. The relatively minor influences of plan, term rider and old or new policyholder were ignored in order to keep the F tables simple, particularly for use as a persistency rater.

However, if these expected lapse rates of the F tables are taken as a measure of the quality of the business, then the ratios of actual to expected become a measure of the quality of the agent insofar as persistency is concerned. Admittedly these ratios are influenced also to some extent by such factors as plan, old or new policyholder, etc.

These figures now give a choice of three bases for measuring the persistency performance of an agent.

1. The quality of the business written by the agent, as measured by the F tables or some modification thereof.
2. The quality of the agent from a persistency standpoint, as measured by the ratio of actual to expected. The more precise the definition of the

quality of the business, the more precise will become the definition of the quality of the agent.

3. The actual lapse rate, which is the product of the quality of the business and the quality of the agent. This is the only measurement available heretofore.

Of the three factors, the quality of the agent and the actual lapse rate cannot be determined until after the first policy year has elapsed. On the other hand, the quality of the business can be determined at the time the policy is issued or paid for.

TABLE O

PERCENTAGE DISTRIBUTION OF GENERAL AGENCIES AND SOLICITING AGENTS† BY RATIO OF ACTUAL TO EXPECTED*

Ratio	% GA	% SA
0– 49%	2%	18%
50– 69	11	19
70– 79	11	10
80– 89	13	9
90– 99	15	5
100–109	14	6
110–119	9	5
120–129	11	2
130–149	7	12
150% up	7	14
	100%	100%

* Expected based on graduated lapse rates of Tables F1, F2 and F3.

† With 50 or more policies exposed.

The N tables show all three of the above indexes of agents' persistency performance, the expected lapse rate being a measure of the quality of the business, the ratio of actual to expected being a measure of the quality of the agent, and the actual lapse rate being the product of these two.

Table O shows the dispersion in the persistency quality of the agent among general agencies and individual agents with 50 or more policies exposed to the risk of lapse. Even after discounting such factors as length of service and nearness to termination of the agent, Table O indicates a considerable difference in "persistency quality" among agents and even among agencies.

III. IMPROVING PERSISTENCY

Table P displays lapse rates by mode of premium payment within the first policy year. On all of the direct modes of premium payment the lapse rate at the time for payment of the second premium was approximately 7%: 6.2% on annual, 6.9% on semiannual, 8.0% on quarterly and 6.2% on monthly. The second premium is particularly important from a financial standpoint. Its collection doubles the amount of money received by a company on a policy and does so with little or no additional expenditure of money on the policyholder, because at this early stage the mortality cost is small and the nonforfeiture benefit is small or nonexistent.

TABLE P

LAPSE RATES WITHIN FIRST POLICY YEAR
BY NUMBER OF POLICIES
DOMESTIC, STANDARD BUSINESS—ADULT MALES

	Annual	Semi-annual	Quar-terly	Monthly	Payroll Deduc-tion	All Modes†
A. Number of policies exposed (paid for)........	7,707	2,968	6,497	3,143	1,493	21,808
B. Percent of exposed (A) lapsing at beginning of						
2nd month	....	....	....	6.2%	1.9%	1.0%
3rd "	....	....	....	2.5	0.9	0.4
4th "	....	....	8.0%	1.7	1.0	2.7
5th "	....	....	....	1.1	0.6	0.2
6th "	....	....	....	1.0	0.8	0.2
7th "	....	6.9%	2.9	1.0	0.7	2.0
8th "	....	....	....	0.9	0.4	0.2
9th "	....	....	....	0.6	0.6	0.1
10th "	....	....	2.4	0.5	0.4	0.8
11th "	....	....	....	0.4	0.3	0.1
12th "	....	....	....	0.3	0.2	0.1
13th "	6.2%	3.9	2.2	0.8	1.4	3.6
C. First year loss rate*....	0.0%	3.4%	8.1%	11.7%	5.1%	4.9%

* Percent of first year exposure lost because of lapses, considering policy out of force during grace period.
† For this particular distribution of sales by mode.

How to Improve Persistency

This study does not pretend to exhaust the possibilities of factors influencing lapse rates. For instance, two areas not explored here are the training of agents and the sense of responsibility of the policyholders. Moreover, some of the factors that herein appear influential may merely reflect the effects of more fundamental factors, such as ability to pay. If so, persuading a particular class of prospects who now buy quarterly premium policies to pay annually (assuming this could be achieved) might merely raise the over-all first year lapse rate on annual premium policies. Nevertheless certain steps are suggested by the findings of this study.

Most important by far are those steps indicated by Tables F1, F2 and F3.

1. Endeavor to obtain an annual premium. Failing to do so, obtain a semiannual or place the policy on payroll deduction or other automatic method of payment. Where possible, avoid monthly and quarterly premium payments.
2. For those whose means or whose budgetary methods would presently lead them to use the quarterly or monthly mode, attempt to develop some method of automatic premium payments. Payroll deduction will serve effectively where it is available, as will the preauthorized check plan. However, it may well be that many of those who now pay monthly or quarterly do not have checking accounts suited to the preauthorized check plan.
3. Prospect in areas that will lead to policies with large premiums rather than small ones.
4. Concentrate prospecting in the middle and older adult ages and among children rather than at the young adult ages. Age group 20 to 24 gives the highest lapse rate.
5. If an agent cannot sell large policies, encourage him to solicit applications on women and children.

Other steps to consider include:

1. Prospect intensively among present policyholders of the company.
2. Redouble efforts to build up a corps of experienced soliciting agents. Table N3 indicates the improvement in persistency that would be achieved if, in the extreme case, all sales were made to old policyholders by agents with six or more years of service; the first year lapse rate and the ratio would be cut by nearly half.
3. Encourage general agents to write more business personally.
4. Once a policy is paid for, concentrate on the collection of the second premium. Even where this collection merely postpones the lapse, it substantially reduces a company's financial loss on the case.
5. Endeavor to sell permanent plans of insurance rather than term insurance.
6. Make a strong effort to secure the conversion of term policies and term riders.

Whether to Improve Persistency

The suggestions listed above are made solely from the standpoint of improving persistency. Some of them, such as encouraging general agents to write more business personally, may run counter to company policy or may be undesirable on grounds other than persistency. Similarly, a reduction in the recruiting of new agents would tend to lower the over-all first year lapse rate, but this hardly seems desirable. Conversely, stepping up a recruiting drive might increase, at least temporarily, a company's over-all first year lapse rate.

To the extent that variations in lapse rates are reflected in premium and dividend calculations it will become less important to improve the persistency of a company's new business. Granted that good persistency is desirable, if only to keep more profit-making business on the books, use of arrays of lapse rates similar to those of the F tables in the calculation of premiums and dividends would mitigate the harmful effects of high lapse rates.

IV. DEFAULT RATES

One way of looking at a not-taken is to consider it the worst form of a first year lapse, *i.e.*, one on which no premium is collected, not even one monthly. From this viewpoint the study of termination rates should begin not with the business paid for but with the business issued. To this end the term "default rate" has been adopted and defined as the ratio of first year defaults to business issued. First year defaults consist of the sum of not-takens, cancellations as of the issue date and first year lapses. Business issued consists of the sum of business paid for, not-takens and cancellations. (To avoid multiple decrement tables any policy becoming a death claim within the first policy year has been excluded from the business issued.) Of course, the first year default rate may be defined in terms of number of policies, amount of insurance or premium.

Earlier studies had revealed that, at least in this company, not-taken rates (including cancellations) increase with increasing policy size. Since this is the opposite trend from that shown in Tables B1 and B2 for first year lapse rates, Tables Q1, Q2 and Q3 are included here to show first year default rates. Comparison of these with Tables B1, D1, D2 and D3 reveals that in this experience trends of not-taken rates to a considerable extent offset trends of first year lapse rates, particularly with regard to increasing annual premium. Moreover, as demonstrated in Table R, unlike first year lapse rates, first year default rates in total were nearly identical by number, by amount and by premium.

This finding affects much of the thinking based on the patterns of first year lapse rates. For instance, at least up to the end of the first policy year, an agent is just as well off to secure 50 applications with small premiums as to secure 10 otherwise identical applications each with premiums five times as large. He can count on the higher lapse rate on the small policies to be offset by the lower not-taken rate. In fact, to the individual agent the larger number of small applications may be more desirable because it reduces his chance of being badly hurt by the loss of one large policy.

In the light of this finding, solely from the standpoint of the first year persistency of business issued, it may not be particularly in a company's interest to encourage agents to "upgrade" their prospecting. Even if the small policies suffer higher renewal lapse rates, the difference will have

TABLE Q1

FIRST YEAR DEFAULT RATES
BY SEX, MODE, PREMIUM AND AGE
ADULT MALES

	Number of Policies Exposed	Default Rates by Number
Mode		
Annual	8,906	13.8%
Semiannual	3,259	15.4
Quarterly	7,657	22.6
Monthly	3,165	17.3
Payroll deduction	1,629	13.9
Annual Premium		
$0–$49	2,356	19.7%
50– 99	6,425	17.2
100–149	5,448	17.7
150–199	3,133	17.1
200–249	1,791	16.8
250–299	1,303	15.6
300–349	849	15.8
350–399	615	16.6
400–449	393	15.7
450–499	314	14.9
500–999	1,325	15.6
1,000 up	664	16.9
Age at Issue		
18–19	835	19.8%
20–24	3,243	24.6
25–29	4,752	19.4
30–34	5,108	17.2
35–39	4,094	15.1
40–44	2,916	12.8
45–49	1,803	12.3
50–54	999	13.7
55–59	542	13.1
60 up	324	14.9
All	24,616	17.2%

relatively little effect on the proportion of business remaining in force. For instance, doubling the renewal lapse rate from 2.5% to 5.0% per year would reduce the business in force at the end of the tenth policy year by only one fifth.

To what extent trends on not-takens offset trends on first year lapses may depend partly on a company's rules and practices. For instance, an agent with an application for a large amount may be more likely to request issue of an additional policy than an agent with an application for a small amount. Moreover the company may be more likely to comply with

TABLE Q2

FIRST YEAR DEFAULT RATES
BY SEX, MODE, PREMIUM AND AGE
ADULT FEMALES

	Number of Policies Exposed	Default Rates by Number
Mode		
Annual	1,864	9.1%
Semiannual	1,212	15.9
Quarterly	1,240	17.4
Monthly	375	15.8
Payroll deduction	352	14.7
Annual Premium		
$0–$49	2,195	14.9%
50– 99	1,300	12.3
100–149	607	13.2
150–199	245	13.8
200–249	163	12.6
250–299	136	15.2
300–349	64	12.7
350–499	108	11.0
500–999	152	10.7
1,000 up	73	16.3
Age at Issue		
18–19	532	16.2%
20–24	1,137	18.0
25–29	786	13.2
30–34	709	12.8
35–39	684	12.4
40–44	450	8.8
45–49	363	10.2
50–54	206	10.9
55–59	109	10.3
60 up	67	13.1
All	5,043	13.7%

TABLE Q3

FIRST YEAR DEFAULT RATES BY SEX, MODE, PREMIUM AND AGE CHILDREN, BOTH SEXES

	Number of Policies Exposed	Default Rates by Number
Mode		
Annual	6,864	7.3%
Semiannual	2,842	11.6
Quarterly	1,747	17.1
Monthly	174	15.4
Payroll deduction	741	9.8
Annual Premium		
$0–$49	7,912	10.3%
50– 99	2,908	8.9
100–149	866	11.6
150–199	295	8.7
200–249	134	10.3
250–299	110	5.1
300 up	143	8.3
Age at Issue		
0	4,104	8.3%
1–4	4,306	10.3
5–9	1,819	11.9
10–14	1,295	10.1
15–17	844	11.4
All	12,368	9.9%

TABLE R

FIRST YEAR DEFAULT RATES IN THREE MAIN GROUPS

	Number of Policies Exposed	First Year Default Rates by		
		Number	Amount	Premium
Adult males	24,616	17.2%	17.0%	17.2%
Adult females	5,043	13.7	14.9	14.6
Children	12,368	9.9	10.2	9.9
All	42,027	14.6%	16.4%	16.2%

the request on the large case. This situation warrants further study by the companies.

However, if it is true that trends on not-takens offset trends on first year lapses, much of the life insurance industry's effort to improve the persistency of its business may be misdirected. To the extent that this effort leads the industry to forsake a particular market, it may be not only misdirected but harmful to the best interests of the industry and the community.

DISCUSSION OF PRECEDING PAPER

ERNEST J. MOORHEAD:

This paper is a mixture of enlightening ideas and perplexing observations. At the very outset the reader may be piqued by Mr. Buck's casual indication that the lapse rates have in some unexplained fashion and for some unstated purpose apparently been "touched up." Shortly thereafter he encounters Tables B1 and B2 which appear to labor the obvious, since it is clear that any desired extent of agreement between the rates in the two right-hand columns is achievable by sufficiently narrowing the premium ranges and amount ranges employed. Furthermore the reader is brought up short by what seems an anomaly in the figures in both Tables B1 and B2. In almost every individual instance the lapse rate by premium for each subgroup is higher than the corresponding lapse rate by number of policies, suggesting that the larger premiums (or amounts) are contributing more heavily to the lapses, a conclusion that is completely at odds with the general tendency exhibited for the lapse rate to decline as the premium or amount grows larger.

But then comes enlightenment in the surprising discovery displayed in Table C with, however, its discouraging implication that life insurance is treasured by its owner in direct proportion to its cost rather than to its benefits.

Mr. Buck then develops a useful procedure for isolating persistency elements undisturbed by the influence of sex, mode, premium and age. This leads directly to thought-provoking conclusions about the influence of the agent arising from Tables N1–N4. However, it should be recognized that "quality of agent" is somewhat narrowly defined by the actual/expected procedure since that technique removes credit to which some may feel the salesman is entitled for the intelligent selection of his clients.

Especially interesting is the author's cradle-to-grave analysis in which not-taken as well as lapsed policies are considered. Nevertheless, whether a not-taken policy may properly be considered "the worst form" of termination depends, does it not, on the expense burden inflicted upon the company by a policy that is never paid for compared with one that lapses after payme it of only its first premium. In any event, since underwriting is the principal cost element in the first of these, it does seem essential to distinguish between a not-taken policy that represents the sole contract applied for and the much less expensive loss of an additional policy that has cost little more than the clerical time and effort to issue it. Perhaps separation of these unlikes might have prevented the author from flirting with the disconcerting idea that high-lapse business and low-lapse business are equally desirable after all.

In my Company the practice for some years has been to observe the persistency of successive 6-month blocks of paid-for business for a fixed period (*i.e.*, to an average duration of 22 months from the end of the month paid for) which corresponds roughly to Mr. Buck's definition of a first year lapse. The lapse experience by policies of business paid for in the first 6 months of 1958 has been analyzed according to seniority of the writing agent, with the following results:

Agent's Years of Service	Surviving Agents	Terminating Agents
1–2	20.2%	33.4%
3–5	11.7	16.6
6 and over	9.8	16.8
All	14.4%	28.4%

These results are consistent with those found by Mr. Buck, except that the contrast seems even more pronounced in our Company's experience than in the author's paper. For this purpose survival and termination are recorded as at the end of the period of exposure which runs to January 31, 1960.

JAMES C. H. ANDERSON:

Mr. Buck's paper has two of the characteristics necessary to give it lasting significance: enough statistical information to reward the reader for his efforts, and a sufficient number of implications in those data to give the reader a sense of participation as he finds his impressions confirmed by Mr. Buck's demonstration.

The graduated first year lapse rates exhibited in Tables F1, F2 and F3 warrant the close inspection of any company contemplating a revision of its premium rates or dividends. The impact upon premiums for non-participating insurance is even greater than one would expect from a casual inspection of the exhibited results. For adult males, lapse rates are highest when the loss to the company upon lapse is greatest; that is, at the younger ages, for the more frequent modes of premium payment and for the smaller amounts of premium, lapse rates and first year surplus drains are both at a maximum.

It is to be expected that many people will question the applicability of these lapse rates to another company. Obviously, there is a sound basis for such a question, but this is much less the case for an array of lapse rates such as Mr. Buck exhibits than for a simple scale of lapse rates by duration only, or perhaps by duration and broad plan type.

I have read and reread the last paragraph of Section III of this paper; in this paragraph Mr. Buck says, in effect, that the importance of improving persistency diminishes if premium rates or dividends appropriately reflect differences in persistency due to items such as sex, mode of payment, age and amount of premium. In general, I endorse those views. However, it is still of interest to make an effort to improve the basic persistency of the business by upgrading both prospect and agent.

Among the many implications of the data Mr. Buck has given us are these: If the minimum reduction of the basic policy on account of improved persistency were reflected in the premium rates for the term rider, which also enjoys favorable persistency, would those premium rates not be startlingly low? Would companies whose present underwriting requirements on military business reflect rank alone be better off with a requirement that reflected age alone, with perhaps a more liberal treatment of those under the required age who are married?

The competitive implications of lapse rates are even more numerous. Recognition of the phenomenally good persistency on juvenile business would lead to a general reduction in premium rates on juvenile insurance; such a step was taken two years ago by one prominent stock company. Differences in persistency by mode of payment can be accurately reflected only by a general change in the loading scheme for fractional premiums; companies failing to follow this scheme will find themselves badly overpriced on annual premiums for larger policies and higher premium forms, and perhaps with loss leaders on smaller policies and lower premium forms. An interesting possibility is that of offering a reduced premium rate (perhaps justified by consolidated billing) to old policyholders purchasing new insurance, particularly if the mode of payment is monthly in both cases.

Mr. Buck did not mention one of the most direct methods of encouraging good persistency—that of making the compensation of agents relate more closely to the pattern of company profits. A level or near-level commission scale, accompanied by a financing arrangement which would permit the agent to capitalize part of his potential renewal commissions, would accomplish this result.

Mr. Buck has given us something both informative and stimulating and I congratulate him on a fine piece of work

CHARLES F. B. RICHARDSON:

Mr. Buck is to be congratulated on this monumental piece of work, which makes a great contribution to our knowledge of this subject in many areas which previously have not been investigated.

At the beginning of the paper he makes it clear that the lapse rates quoted are not the actual rates revealed by the study and I understand they have been reduced by a fixed percentage. This, I think, detracts somewhat from the value of the results, particularly because the relationship between the various factors may well be distorted by this procedure. For example, in a company with a 20% lapse rate there may well be a

TABLE

INTERCOMPANY TERMINATION STUDY
ALL PLANS BY AMOUNTS OF INSURANCE
For Policy Year Ending in 1958

Company	Policy Year			
	1st	2nd	3rd to 5th Combined	6th to 10th Combined
1	10.3%	4.5%	3.8%	3.2%
2	20.5	8.0	5.2	3.3
3	13.0	4.6	2.9	*
4	12.1	7.8	4.4	*
5	17.5	6.7	4.5	3.8
6	13.1	7.4	3.5	*
7	19.6	6.1	4.4	3.6
8	17.8	*	*	*
9	19.4	6.7	4.2	2.8
10	10.0	7.9	6.8	4.5
11	8.5	4.9	4.5	*
12	12.2	4.1	6.8	3.8
13	6.4	2.8	2.4	1.8
14	20.7	8.3	5.9	4.3
15	16.8	5.3	2.6	*
16	18.5	8.1	4.9	3.1

* Not available.

greater difference between the effect of the various factors that make up this total result than there would be in the case of a company with a first year rate of, say, 8%.

Table 1 shows the very large variation between the lapse rates of various companies. These figures were obtained in an intercompany study which I made a year ago. Among these 16 companies the range from the lowest to the highest is over 3 times on the first year rate and even in the 6th to 10th years the range is 2½ times.

We made a detailed study of our own experience on 1957 issues and Tables 2 to 5 give the more important results. These are the actual lapse

TABLE 2

FIRST YEAR LAPSE RATIOS BY PLAN AND PREMIUM FREQUENCY

Plan	Premium Mode	Number of Policies	Amount of Insurance
Life	Annual	8.2%	6.7%
	Semiannual	16.7	13.2
	Quarterly	27.8	25.5
	Monthly	38.1	33.9
	MONY-Matic	13.2	13.0
	All Modes	21.9%	18.8%
Endowment	Annual	8.6%	6.9%
	Semiannual	17.8	15.9
	Quarterly	28.6	27.8
	Monthly	37.3	38.0
	MONY-Matic	14.3	12.5
	All Modes	23.7%	23.3%
Level Term	Annual	14.5%	10.7%
	Semiannual	20.4	16.9
	Quarterly	29.0	28.3
	Monthly	33.2	32.8
	MONY-Matic	13.2	14.2
	All Modes	22.3%	20.6%
Mtg. Protection+Income Prov.	Annual	16.6%	22.8%
	Semiannual	24.6	21.6
	Quarterly	25.5	26.6
	Monthly	22.0	20.7
	MONY-Matic	8.9	5.5
	All Modes	21.3%	22.5%
Term Riders	Annual	....	9.8%
	Semiannual	....	13.7
	Quarterly	....	24.2
	Monthly	....	33.0
	MONY-Matic	....	14.0
	All Modes	....	21.4%
Juvenile	Annual	7.8%	6.2%
	Semiannual	20.1	20.0
	Quarterly	22.9	22.4
	Monthly	28.3	28.5
	MONY-Matic	13.6	13.5
	All Modes	14.0%	13.9%
All Plans	All Modes	21.1%	19.4%

TABLE 3

FIRST YEAR LAPSE RATIOS
BY PREMIUM FREQUENCY AND TYPE OF CONTRACT

Premium Mode	Contract	Number of Policies	Amount of Insurance
Annual	Mature Agents	7.8%	6.8%
	Financed Agents	15.0	13.6
	Total	8.8%	7.5%
Semiannual	Mature Agents	15.7%	12.7%
	Financed Agents	28.2	25.9
	Total	18.2%	14.8%
Quarterly	Mature Agents	23.6%	22.9%
	Financed Agents	36.1	35.4
	Total	27.3%	26.0%
Monthly	Mature Agents	29.7%	28.5%
	Financed Agents	45.5	45.3
	Total	35.4%	34.0%
MONY-Matic	Mature Agents	11.0%	11.0%
	Financed Agents	21.9	21.9
	Total	13.3%	13.3%
All Modes		21.1%	19.4%

TABLE 4

FIRST YEAR LAPSE RATIOS
BY TYPE OF CONTRACT AND POLICY SIZE

Contract	Policy Size	Number of Policies	Amount of Insurance
Mature Agents	Under $ 5,000	16.2%	17.3%
	$ 5,000– 9,999	21.1	21.4
	10,000– 24,999	15.3	15.0
	25,000 and over	10.5	10.6
	All Sizes	17.0%	15.5%
Financed Agents	Under $ 5,000	31.0%	33.3%
	$ 5,000– 9,999	39.2	39.2
	10,000– 24,999	32.0	31.9
	25,000 and over	28.6	28.1
	All Sizes	34.1%	34.4%
Total	All Sizes	21.1%	19.4%

rates and were not adjusted in the manner employed by Mr. Buck. From Table 2 it will be seen that endowment and decreasing term plans have the worst experience and, as usual, juvenile the best.

Table 3 shows that new agents have a rate twice that of mature agents on annual, semiannual and preauthorized monthly check business, and a rate of 1½ times on quarterly and monthly. Preauthorized monthly check business shows a lapse rate of twice that on annual business but only 40% of the high rate given by regular monthly business.

Table 4 shows a result that we did not expect, namely, that the worst rate was experienced in the size group $5,000–$10,000. This was true for all types of agents. This may be due to the effect of quantity discount, sales being made for $5,000 when the prospect cannot afford as much as

TABLE 5

FIRST YEAR LAPSE RATIOS
BY POLICY SIZE AND PREMIUM FREQUENCY

Policy Size	Premium Mode	Number of Policies	Amount of Insurance
Under $5,000..........	Annual	9.6%	9.5%
	Semiannual	20.7	20.0
	Quarterly	27.7	27.9
	Monthly	33.1	36.1
	MONY-Matic	13.7	13.8
	All Modes	19.8%	21.4%
$ 5,000–$ 9,999.......	Annual	9.4%	9.6%
	Semiannual	16.1	16.5
	Quarterly	29.8	29.7
	Monthly	39.7	39.7
	MONY-Matic	14.8	14.9
	All Modes	26.2%	26.6%
$10,000–$24,999.......	Annual	7.9%	7.9%
	Semiannual	12.9	12.7
	Quarterly	23.2	22.7
	Monthly	32.1	31.9
	MONY-Matic	11.9	12.4
	All Modes	18.9%	18.5%
$25,000 and over.......	Annual	6.0%	5.9%
	Semiannual	10.0	9.8
	Quarterly	23.2	24.0
	Monthly	25.3	25.6
	MONY-Matic	11.9	13.0
	All Modes	11.9%	11.8%
All Sizes..........	All Modes	21.1%	19.4%

that. It also shows that for new agents the rates are uniformly high even for the highest size group.

Table 5 gives the results by size and premium frequency, the outstanding features being that monthly and quarterly business show an excessively high rate for all the size groups, even for policies of $25,000 and over.

Our study includes all types of business and includes the special classes which were correctly excluded in Mr. Buck's study. Our business contains practically no pension trust business, but does include a normal proportion of such items as substandard and term conversions.

Mr. Buck has used an interesting new technique in computing the ratio of actual to expected lapses for various individual factors after first taking account of age, mode and sex to find the influence of other factors. It is interesting to note that the plan showing the lowest rate by a substantial margin is life with rider. It seems probable that a higher proportion of these cases involve programming based on needs and are, presumably, better sold than cases that are not programmed.

Table L is particularly interesting and I do not know of any other published data on these special classes of business. The results on term conversions are surprisingly good. While the pension trust figures are nearly average, I think it is highly probable that this class of business may have a higher than normal renewal lapse rate.

Table N is interesting, but it is important to remember that the ratios of actual to expected considerably understate the difference in the actual lapse rates because new agents, as Mr. Buck points out, write a substantially greater proportion of business with inherently high rates. For example, we have made studies on the first quarter lapse rate on monthly and quarterly business for new agents and mature agents. On life insurance we find that for terminated agents the rate is over $2\frac{1}{2}$ times that on mature agents, while for Accident and Sickness business the rate on terminated agents is nearly twice that on mature agents. Because of these adverse results we defer a substantial amount of the credit allowed on monthly and quarterly business under our agents' financing plan and this has substantially improved the results. Table N4 gives some very interesting data on this point. I have often conjectured that there may well be a correlation between lapse rates and survival of new agents. It would be interesting to make a study of, say, the first quarter lapse rate on quarterly and monthly business written by new agents to see whether there is such a correlation. If it could be established, this could be a very useful postselection tool, especially as this type of data can be obtained rather early in an agent's career.

Table O was of particular interest to us because we recently introduced into our manager compensation formula a special factor which penalizes a manager with an excessive lapse rate. Table 6 shows the range in the actual lapse rate, although this cannot be compared directly with Mr. Buck's Table O because his comparison is based on the ratio of actual to expected. However, this does indicate the tremendous range in the quality of the business produced by the various agencies.

In the section headed "Default Rates," Mr. Buck mentions the lapse rate at the time of payment of the second premium. This indicates that on quarterly business about half of the first year's lapses occur at the end

TABLE 6

DISTRIBUTION OF AGENCIES BY RATIO OF LAPSE RATE TO COMPANY AVERAGE

Ratio to Average	Percentage of Agencies
0– 49%	4%
50– 69	18
70– 89	22
90– 99	15
100–109	10
110–119	10
120–129	5
130–149	6
150 up	10
	100%

of the first quarter and on monthly about one-third of them. These results are very similar to those given in a recent study made by the Life Insurance Agency Management Association entitled "Persistency 1949–1958." This is a particularly interesting study and gives us some valuable data which we can compare with the Linton Tables. It shows, among other things, that the lapse rate after the first year is not proportional to the first year rate. After the second policy year the renewal lapse rates appear to be affected very little by the experience in the first 2 years. It seems to me, as I believe Mr. Moorhead has pointed out recently, that we need some standard tables of lapse rates which reflect present-day experience.

E. JAMES MORTON:

Mr. Buck has concluded from the analysis which resulted in his Table C that first year lapse rates are independent of the amount of insurance. He states that "the downward trend of lapse rates with increasing amount was merely a reflection of the accompanying increase in premium."

The following hypothetical situation was constructed in order to demonstrate another possible interpretation of the Table C ratios.

P = Premium Class
A = Amount Class
X = Age at Issue Class

EXPOSED TO RISK

X	$P=1$			$P=2$			$P=3$		
	$A=1$	$A=2$	$A=3$	$A=1$	$A=2$	$A=3$	$A=1$	$A=2$	$A=3$
1.......	4,000	3,000	2,000	2,000	2,000	2,000	0	1,000	2,000
2.......	3,000	2,000	1,000	2,000	2,000	2,000	1,000	2,000	3,000
3.......	2,000	1,000	0	2,000	2,000	2,000	2,000	3,000	4,000

NUMBER OF FIRST YEAR LAPSES

X	$P=1$			$P=2$			$P=3$		
	$A=1$	$A=2$	$A=3$	$A=1$	$A=2$	$A=3$	$A=1$	$A=2$	$A=3$
1.......	540	390	250	270	260	250	0	130	250
2.......	285	180	85	190	180	170	95	180	255
3.......	110	50	0	110	100	90	110	150	180

This distribution results in the following lapse rates by premium class and amount class:

P	By Premium Class			A	By Amount Class		
	Exposed to Risk	Lapses	Lapse Ratio		Exposed to Risk	Lapses	Lapse Ratio
1.......	18,000	1,890	.105	1.......	18,000	1,710	.095
2.......	18,000	1,620	.090	2.......	18,000	1,620	.090
3.......	18,000	1,350	.075	3.......	18,000	1,530	.085

Splitting the distribution into nine Premium-Amount cells, we obtain:

EXPOSED TO RISK

P	$A=1$	$A=2$	$A=3$
1..........	9,000	6,000	3,000
2..........	6,000	6,000	6,000
3..........	3,000	6,000	9,000

Using the average lapse rates by premium class only and applying these rates to each cell in the above distribution, we obtain "expected" lapses, as below:

"EXPECTED" LAPSES BASED ON PREMIUM CLASS LAPSE RATIOS

P	$A=1$	$A=2$	$A=3$
1............	945	630	315
2............	540	540	540
3............	225	450	675
Total.....	1,710	1,620	1,530
Ratio A/E....	100%	100%	100%

Note that the ratios of actual to expected by amount class are a uniform 100% which seems to indicate that the amount class has no influence on the lapse rate.

Reversing the process:

"EXPECTED" LAPSES BASED ON AMOUNT CLASS LAPSE RATIOS

P	$A=1$	$A=2$	$A=3$	Total	Ratio A/E
1......	855	540	255	1,650	115%
2......	570	540	510	1,620	100
3......	285	540	765	1,590	85

Since the ratio of actual to expected diminishes by premium class we might be tempted to ignore amount class in future analyses.

As it happens, the numbers of first year lapses in the original distribution were obtained synthetically. In fact, it was assumed that the first year lapse rate is completely defined as $q_A + q_X$, where q_A depends only on the amount of insurance and q_X depends only on the age at issue.

Here are the values of q_A and q_X which were used:

A	q_A	X	q_X
1.......	.050	1.......	.085
2.......	.045	2.......	.045
3.......	.040	3.......	.005

From these rates the following combined lapse rates by A and X result:

A	X	q_A+q_X	A	X	q_A+q_X	A	X	q_A+q_X
1	1	.135	2	1	.130	3	1	.125
1	2	.095	2	2	.090	3	2	.085
1	3	.055	2	3	.050	3	3	.045

These are the rates (completely independent of premium class) which were applied to the appropriate exposures in the original distribution to obtain the number of lapses.

I believe that it is fair to conclude that there can be situations in which the dependence of the lapse rates on age, mode of payment or other variables may lead to a spurious indication, under a "Table C" type analysis, that the variation in these rates by "size" depends principally on amount of premium rather than amount of insurance.

NEIL W. MACINTYRE:

The publication of Mr. Buck's very timely paper gives me the opportunity to describe some work that we in MONY have recently done in connection with the question of lapses that may be of some general interest. We attempted to come up with numerical answers to some rather fundamental questions here. These are:

(1) What is the loss if the policy is terminated after one premium payment?

(2) What is the cost to the Company of a high first year lapse rate?

To a considerable extent the answers to these questions are subjective and philosophical and one definitive numerical figure that would satisfy all possible criteria is not possible. In general, a somewhat different answer to the question would be forthcoming if the analysis of the effect of the cost of lapses is made using the marginal, rather than the average cost approach. When costs are discussed, unless otherwise specified, costs will be average and will take into account all expenses, direct or indirect.

There are different philosophies as to the amount of surrender value that should be paid to the withdrawing policyholder. One basis that seems reasonable to me is that the equitable surrender value to be paid is one such that the Company would be in the same financial position at the time of termination of the policy as if the insurance had not been sold. That is, the acquisition costs will have been repaid and the mortality costs taken into account. Expressed another way, the surrender value paid should be one such that the cost to the persisting policyholder is not affected by the fact that there has been a termination. Despite this clear theoretical approach to the amount that should be allotted to the terminating policyholder, in practice it is necessarily sometimes disregarded. For example, it is obvious that in the event of termination after paying one monthly or quarterly premium or even one annual premium, at most plans and ages, the Company has suffered a "loss." It is equally clear as to who pays for these. In a mutual company, assuming an equitable distribution of dividends, it is those policyholders who are in the same class as the policyholder that terminates; they share the cost of these losses in the form of lower dividends. This is not, of course, necessarily inequitable to the individual who continues to pay premiums, since equity is not maintained on an individual basis but rather by groups or classes. Sufficient justice is done to the individual if at the outset he appears to have the same chance of loss or gain, belongs to the same mortality class, etc., as any other individual in the group.

With the use of actuarial funds (asset shares), for most plans and at most ages it can be demonstrated that after a policy has been in force for 3 or 4 years a policy has paid its acquisition and other costs. That is, at these and later policy durations the cash value is such that it is equal to or less than the difference between accumulated premiums with interest and the accumulation of all costs with interest. Hence, at this time, if no account is taken of the possible loss of future premium income and increase in unit costs because of the diminution of the in-force, a Company need not concern itself with terminations.

a) Loss if Policy Is Terminated after Payment of One Premium

In order that an idea may be obtained of the possible cost to the Company in the event of termination after one premium payment, we have computed the "loss" for the ordinary life plan at issue age 40. This plan was taken as representative for our portfolio. As noted earlier, the numerical answers to this relatively simple problem will depend on the philosophy used in the analysis of expenses and the methods used in the distribution of these, *i.e.*, the amount of these distributed on a per policy basis, the amount on a per $1,000 of new business basis, per $100 of first year commissions, etc.

Two types of calculations have been made here, one taking into account all expenses, direct and indirect, and the other using a modified marginal cost approach. Both calculations take into account the subsidy paid to new agents. Under the modified marginal cost philosophy, the only costs assessed against a particular block of policies were the so-called "variable" ones plus a minimum of overhead. The variable costs are those that are assumed to vary directly with the number of policies issued.

If, at the termination of a policy, the premiums collected are in excess of these expenses, the Company is in a better financial position than if the policy had not been issued. This is true since *part* of the indirect expenses have been absorbed by this policy.

Using the all expense approach, under our method of assessing expenses, the absolute loss increases with policy size. Expressed as a percentage of premium, however, the loss decreases with policy size. Using the marginal expense approach, if an annual premium is paid, we reach

LOSS PER POLICY, TAKING EXPENSES INTO ACCOUNT, IF POLICY IS TERMINATED AFTER ONE PREMIUM PAYMENT

POLICY SIZE	ALL EXPENSES		MARGINAL EXPENSES	
	Monthly Premium	Annual Premium	Monthly Premium	Annual Premium
	(i) Loss expressed in terms of dollars			
$10,000	$ 52	$ 72	$ 28	$ 0
15,000	61	92	31	−10
25,000	81	131	37	−30
	(ii) Loss expressed as a percentage of premium paid			
$10,000	209%	26%	111%	0%
15,000	165	22	83	− 2
25,000	131	19	61	− 4

the break-even point or are in the black for the three policy sizes illustrated. We also made some additional calculations using the marginal cost approach, to determine the length of time that a policy for various sizes has to be in force to reach the break-even point. This varied from $1\frac{3}{4}$ years for a $2,000 size policy to only $\frac{1}{3}$ year for a $25,000 size.

b) Effect on Dividends of High First Year Lapses

To determine the possible effect of high first year lapses on dividends, we have computed actuarial funds over a 20 year period for the ordinary life plan at issue age 40 using our current asset share assumptions, with a variation for the first year lapse rate. Under the one assumption, the first year lapse rate is 10% and under the other, 20% (approximately our current experience). The 10% would seem an objective of improvement within possible reach under our existing philosophy, while the 20%

figure is close to our current experience. For both funds the same persistency rates for the 2nd and later years (75% Linton A) have been used. Our experience indicates that the termination rates in the later years are approximately the same whether or not the first year persistency is relatively high or low. This phenomenon has been commented on in a recent LIAMA lapse study. The difference in surplus at the end of 20 years reflects the effect of the higher first year lapse rate on costs. Assuming that this difference in the surplus is paid out in dividends over a 20 year period, with the more favorable first year lapse experience the dividend could be \$.06 or \$.07 per year higher. This gives us a measure of the possible difference in annual dividends occasioned by a higher first year termination rate, assuming the same unit renewal costs.

c) Effect on Dividends of Reduction in Unit Renewal Costs Arising from Larger In-force

It would seem almost axiomatic that a larger in-force should result in lower unit net costs. In order to get a possible measure of the effect of an increase of the in-force on renewal unit costs, we have projected, on a model office basis, our present in-force for 20 years together with a level annual production of a billion dollars. We have assumed:

(A) a first year lapse rate for new business equal to 10%;

(B) a first year lapse rate equal to 20%.

As in (*b*) the same renewal persistency rates were used for the two model offices. At the end of 10 years, Model Office A has \$12.0 billion in force and B \$11.2 billion, a difference of \$800 million. At the end of 20 years, the figures are \$16.1 billion and \$14.6 billion, a difference of \$1.5 billion. We considered the supervisory cost of the line departments and the entire costs of the staff departments as fixed and essentially independent of the amount of the in-force. The remainder of the renewal expenses were considered as variable and increasing in a one-for-one ratio with the increase of the in-force.

The total renewal costs were then calculated by applying factors to the in-force in the two model offices. Next, the unit renewal costs were calculated.

If this difference in unit renewal costs were distributed in dividends, it would amount to about 2¢ per thousand of in-force, both at the end of 10 and at the end of 20 years. Combining this increase in dividends with that arising from the difference in first year costs, the total differences in dividends in Model Office A as compared to that of B would be 8¢ or 9¢ per year.

Under our assumptions this is a measure of the "cost" of a first year termination rate of 20% compared to one of 10%.

Other Aspects

There are, of course, other rather intangible aspects of the question, difficult if not impossible to measure numerically. These would include the possibility that a larger in-force would give us more policyholders for "repeat" business, thus further increasing sales. Also, it has been conjectured that high terminations adversely affect the average mortality because of antiselection, *i.e.*, that the impaired risks keep their insurance in force and the healthy lives withdraw. The favorable combination of these factors could further decrease unit costs and hence help competitively. The chain reaction could be extended. In this connection, note that there is presumably some optimum size for any particular company, beyond which a larger in-force does not necessarily decrease unit costs. The optimum size would vary by company and, with the advent of the electronic processing machines, is probably somewhat larger today than in the immediate past.

From the field underwriter's point of view, a better persistency of the business would increase his income and a company might be able to obtain the same total volume from a smaller select group of successful agents. Hence, agency rebuilding objectives could be attained and it would be necessary to hire fewer new agents than under present conditions. Subsidies payable to new men would be minimized.

From the policyholder's point of view, there is no question but that the elimination of voluntary terminations would substantially reduce the average annual cost of providing the life insurance benefits for his family. Under our present methods of operation, the cost of life insurance is substantially higher in the earlier years than in the later. This is so since it is necessary to liquidate the heavy acquisition expenses in a relatively short period. The awkward questions as to why the 2 or 3 year costs of life insurance to a terminating policyholder are so high would be minimized by the elimination of voluntary terminations.

MAURICE B. ROBERTS:

The accompanying table showing lapse rates developed by Government Personnel Mutual Life Insurance Company will, I believe, be of interest to companies which may contemplate writing insurance on military risks.

We have been keeping persistency rates since 1951 and the lapse rates shown are typical of those for previous years. Since practically all of this business was paid for by Class "E" government allotments, the table is representative of lapse rates by this method of premium payment.

On the basis of our lapse studies, we introduced, in 1957, a new agency contract basing the commission rates on military rank and age. We believe that this has been very successful in changing our market from the lower ranking to higher ranking military personnel. The volume of our business issued and paid for on the five lowest pay grades has decreased from 75% in 1956 to 27% in 1959. The volume of business issued and paid for on officers of the rank of First Lieutenant and higher, and equivalent ranks, has increased from 13% in 1956 to 48% in 1959. At the same time, we do not feel it proper to discontinue writing the lower ranking military personnel completely, as some companies have done. To follow this path, we believe, is to invite intervention by the federal government.

As to the effect of the commission adjustment on our agency force, we believe it is significant that we have lost no agents that we really regretted losing.

GOVERNMENT PERSONNEL MUTUAL LIFE INSURANCE COMPANY
FIRST YEAR LAPSE RATES BY MILITARY RANK
(No Dependents or Civilians)

Pay Grade (Army Military Rank or Equivalent)	Business Issued			Lapse Rates		
	1956	1957	First Six Months 1958	1956	1957	1958
E-1	$ 198,000	$ 424,417	$ 41,000	38.9%	33.5%	46.3%
E-2	15,332,294	9,385,743	1,712,384	38.2	32.1	30.0
E-3	5,909,815	8,359,643	2,624,739	35.9	31.0	36.0
E-4	3,511,966	4,443,652	1,665,332	34.6	28.1	27.0
E-5	4,514,844	4,823,671	1,753,491	34.2	24.5	26.9
E-6	2,246,239	3,031,996	1,717,068	19.3	15.1	22.9
E-7	579,663	1,173,862	544,398	14.1	16.0	7.7
Warrant Officer	796,749	572,334	130,000	12.0	11.4	0.0
2nd Lieutenant	1,176,500	3,213,647	1,076,667	15.5	11.5	14.6
1st Lieutenant	2,285,795	5,076,211	1,982,000	12.9	11.2	13.3
Captain	1,704,526	3,544,502	1,862,802	9.0	7.4	4.6
Major	802,394	1,327,534	388,667	2.8	9.2	1.7
Lt. Colonel	327,394	571,187	160,000	0.0	3.5	1.2
Colonel	143,864	266,667	63,000	0.0	16.9	0.0
General	10,000	0	0	0.0	....	....
Class III (E-1 through E-5)	$29,466,919	$27,437,126	$ 7,796,946	36.7%	29.8%	30.8%
Class II (E-6 through 2nd Lt.)	4,799,151	7,991,839	3,468,133	16.7	13.5	17.0
Class I (Officers—1st Lt. and up)	5,273,973	10,786,101	4,456,469	8.9	9.4	8.0
All Pay Grades	$39,540,043	$46,215,066	$15,721,548	30.6%	22.2%	21.3%

(AUTHOR'S REVIEW OF DISCUSSION)

NORMAN F. BUCK:

My thanks go to those people who have taken the time to prepare discussions of this paper.

The lapse rates in Mr. Roberts' table show the same pattern as my Table K, even to the extent of lower rates on warrant officers than on second lieutenants. Moreover, his company's new agency contract bases the commission rates on age as well as military rank, a pattern that is also borne out by Table K.

Mr. Macintyre's discussion supplements the paper neatly by exploring some of the financial implications of varying lapse rates and by showing one of the uses to which the results of lapse rate studies may be put.

In a most interesting way Mr. Anderson has dealt with some of the implications of the findings in the paper.

In a study such as this, one of the chief problems is to isolate and measure the influence of the many factors simultaneously at work. Mr. Morton rightly calls attention to the danger of obtaining spurious results. Unfortunately, to demonstrate his point, he has constructed a hypothetical situation that differs in at least two important respects from the situation actually studied.

1. *Age.* Into a comparison between the two factors of premium and amount of insurance he has injected a third factor, age, and has assigned to it an overwhelmingly greater variation in lapse rates than to either of the two factors being compared. His lapse rates vary by age from .085 to .005, a proportion of 17 to 1. On the other hand, they vary by amount merely from .050 to .040, a proportion of 1.25 to 1. By premium they vary not at all, a proportion of 1 to 1.

2. *Distribution.* Since the annual premium on a standard policy is fixed primarily by the age, plan and amount of insurance, Mr. Morton's distribution of exposures involves certain anomalies by plan of insurance. Even more importantly, under this distribution the introduction of the variation in lapse rates by age (.085, .045 and .005 replacing a uniform .045) increases by 240 the actual lapses in premium class 1 with no change in total for the corresponding amount class 1. It decreases by 240 the actual lapses in premium class 3 with no change in total for the corresponding amount class 3. Such a combination of results seems highly unlikely in actual experience.

Even so, neither of these assumptions as to age and distribution will in itself produce Mr. Morton's effect. It takes a combination of the two to eliminate the trend in ratios by amount and induce a trend by premium.

Some readers may be interested in the results of a further test, made during the course of the study, of the trend in persistency by amount of insurance. In each of several groups by amount of insurance, the number of actual lapses was compared with the number of expected lapses based on the F tables. These expected lapses in turn were functions of the four factors sex, mode, premium and age. The resulting ratios of actual to expected lapses showed no trend, either up or down, by amount of insurance. These ratios, for all ages and both sexes combined, were as follows:

RATIOS OF ACTUAL TO EXPECTED LAPSES

Amount	Ratio A/E* by Number
$ 1,000–$ 2,499	99%
2,500– 4,999	103
5,000– 9,999	98
10,000– 14,999	103
15,000 up	99
All	100%

* Expected based on Tables F1, F2 and F3.

Because of their known interest and broad experience in the study of persistency, I am particularly pleased that the paper has elicited discussions from Mr. Moorhead and Mr. Richardson. Both have supplied data from the records of their own companies that tend to supplement and confirm certain findings presented in the paper.

Both have commented on the fact that the lapse rates presented in the paper were not the Lincoln National's actual rates. This modification was made on the ground that it was less important to show the actual lapse rates than to adjust them to some convenient base. Actual lapse rates, even in any one company, will probably vary from time to time; but the over-all base rate of 10% can continue to serve as a handy reference point.

It may well be, as Mr. Richardson suggests, that the relationships among the various factors will differ according to the over-all level of lapse rates. However, this possibility must always be kept in mind in using the published figures, regardless of whether the over-all base is 10% or some other figure. The problem will exist in comparing a 20% company with a 15% or 10% company, regardless of the base chosen for the published figures.

Mr. Moorhead mentions the need "to distinguish between a not-taken policy that represents the sole contract applied for and the much less expensive loss of an additional policy that has cost little more than the clerical time and effort to issue it." His comment emphasizes the point made in the second last paragraph of the paper. This situation warrants further study by the companies.

	Number of Policies Exposed	Pseudo Lapse Rate	True Not-Taken Rate	Additional Not-Taken Rate	Pseudo Lapse plus True Not-Taken Rate	Default Rate
Mode						
Annual	8,906	5.4%	4.7%	3.7%	10.1%	13.8%
Semiannual	3,259	9.8	3.3	2.2	13.2	15.4
Quarterly	7,657	13.1	6.6	2.9	19.7	22.6
Monthly	3,165	16.9	0.3	0.2	17.1	17.3
Payroll deduction	1,629	8.7	4.4	0.8	13.1	13.9
Annual Premium						
$ 0–$ 49	2,356	14.9%	2.9%	1.9%	17.8%	19.7%
50– 99	6,425	12.0	3.7	1.4	15.7	17.2
100– 149	5,448	11.3	4.4	2.0	15.7	17.7
150– 199	3,133	9.1	5.7	2.2	14.9	17.1
200– 249	1,791	8.9	5.3	2.6	14.2	16.8
250– 299	1,303	8.0	4.8	2.8	12.8	15.6
300– 399	1,464	6.2	5.4	4.5	11.6	16.1
400– 499	707	5.1	5.4	4.9	10.5	15.4
500– 999	1,325	3.7	4.5	7.3	8.3	15.6
1,000 up	664	2.4	7.1	7.4	9.4	16.9
Age at Issue						
18–19	835	12.7%	5.2%	1.9%	17.9%	19.8%
20–29	7,995	13.0	6.9	1.6	19.9	21.6
30–39	9,202	9.9	3.8	2.6	13.7	16.3
40–49	4,719	6.9	2.4	3.3	9.3	12.6
50–59	1,541	5.7	2.5	5.3	8.2	13.5
60 up	324	3.3	3.9	7.7	7.1	14.9
All	24,616	10.1%	4.5%	2.6%	14.6%	17.2%

We have done some additional work along these lines on the material of this paper. In the process we established definitions for several types of rates. In each case the denominator is the number of policies issued, *i.e.*, the sum of business paid for, not-takens and cancellations. The numerators are as follows:

1. Pseudo lapse rate—first year lapses. (On the lapse rate the denominator is the business paid for; on the pseudo lapse rate the denominator is the business issued.)
2. True not-taken rate—single policies issued but not taken; plus the

first of several policies issued on the same papers, none of which is taken.

3. Additional not-taken rate—policies issued but not taken, where either:
   (*a*) at least one other policy issued on the same papers is paid for; or
   (*b*) failing this, one other policy issued on the same papers is counted as a true not-taken.

The sum of these three rates is, of course, the default rate.

For the largest group of policies, those on adult males, the rates were as shown in the table on page 313.

Not surprisingly, the pseudo lapse plus true not-taken rate shows some trend downward with increasing annual premium, about halfway between the sharper downtrend of the pseudo lapse rate and the constant pattern of the default rate.