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PATTERNS IN PERSISTENCY

JOSEPH R. BRZEZINSKI

ABSTRACT

Many actuarial papers have been written about the persistency of life insurance. For the most part, such papers have dealt with the persistency performance of an individual company or the aggregate of a number of companies. This paper addresses the need for obtaining further information about the differences in life insurance persistency or lapsation among companies during the first fifteen years from issue. The information presented in the paper is subdivided between term insurance and permanent insurance. The paper examines relationships in experience among companies according to several company characteristics, country, and time of exposure, and, in doing so, also introduces actuaries to the relatively new statistical technique known as cluster analysis.

I. INTRODUCTION

Several years ago, LIMRA introduced its 1971–72 Expected Lapse Tables (*TSA*, Vol. XXVII [1975]), which it has utilized primarily as an expected table basis for the LIMRA Long-Term Lapse Study. This use of the tables as a target was a primary reason for LIMRA's departing significantly from the approach utilized by both Linton and Moorhead in developing their respective lapse tables.

Although the LIMRA tables covered various categories of business (permanent, term, pension trust, and high early cash value), each category was represented by a single table. Both Moorhead and Linton limited themselves to one overall category, but from that category evolved a family of tables representing varying levels of lapsation.

In 1924, Mr. M. A. Linton developed contract-year lapse rates and combined them with select mortality rates at entry age 40 to produce his "A" table. To illustrate the effect of varying persistency, he developed a "B" table with double the policy withdrawals. These tables were subsequently extended to thirty years from issue by the Provident Mutual Life Insurance Company.

Some time later, in an attempt to reproduce term insurance lapse rates, the Life Insurance Sales Research Bureau developed Table C. As a further extension the bureau also produced Tables "BA" and "CA" for its *Mathematical Tables*, first published in 1943.

In constructing his family of tables, Mr. E. J. Moorhead utilized LIAMA research study data from a sample of 12,000 policies sold in May, 1949, traced to May, 1958, augmented by data from forty-nine companies at durations 12, 17, 22, and 27.

These latter data were grouped into three subdivisions based on two-year persistency by number of policies. Mr. Moorhead observed that there was "no positive relationship apparent between the quality of the results at these longer durations and the early persistency shown by the LIAMA results." He referred to observations by Mr. C. F. B. Richardson on page 364 of his paper "Lapse Rates" (*TSA*, Vol. III [1951]) that lapse rates at later policy durations are extremely volatile, and concluded that "it appears unfruitful to measure with apparent precision the rates that happen to exist at any particular moment." He added that some measurement of the size of the practical variation that may exist was needed. Consequently, in addition to his Tables R, S, and T, he also produced Tables R/S, S/R, S/T, and T/S, for a total family of seven basic tables.

This paper explores the actual variations in lapse rate patterns and levels separately for permanent and term insurance based on data from twenty-six life insurance companies contributing information to the LIMRA Long-Term Lapse Study from 1974 to 1978. It is our first attempt to address a request made by Mr. Moorhead in discussing the LIMRA 1971–72 Expected Lapse Tables that LIMRA publish ratios of actual to expected terminations for aggregations of companies serving different markets, so that families of tables could be generated.

II. DATA USED

The sample chosen consists of twenty-six company-country "entities," most of which were observed separately from anniversaries in 1974 to anniversaries in 1975, from anniversaries in 1975 to anniversaries in 1976, and so forth, to anniversaries in 1978.

For the purposes of these analyses, Canadian and United States experience are kept separate. All together, eighty-seven company-country experience years are analyzed. The period from 1974–75 to 1977–78 nearly covers the period from the last recession to the beginning of the current recession. Thus the 1974–75 experience represents a significant increase in lapsation over both the 1973–74 experience and the 1971–72 experience that was used to develop the LIMRA Expected Tables. Over the four observation periods,

lapse rates were declining, but the decline varied considerably by policy year. Early duration lapse rates for 1977–78 were at or below both the 1974–75 and 1971–72 levels, while at later durations lapse rates were lower than 1974–75 but still well above 1971–72 levels. The permanent results at later durations had recovered much better than term results over the four-year period, while the opposite was true for early durations.

For the purposes of these analyses, only lapse ratios by amount of insurance were used. To keep processing costs minimal and to simplify the interpretation of results, the analyses are based on actual/expected ratios (LIMRA 1971–72 Lapse Tables) for durations 1, 2, 3–5, 6–10, 11–15, and 1–15, each reflecting the actual distribution for the company by age at issue and duration.

Preliminary analysis of the basic data indicated that any attempt to aggregate term and permanent experience could cause serious distortion of results. Consequently, the basic dichotomy of term and permanent experience was maintained throughout the analyses. Results will show the correctness of that decision.

III. METHODOLOGY

A primary concern in the choice of methodology was the desire to ascertain patterns and levels of persistency that actually were occurring in the data sample, without imposing any serious restriction or preconceived notion on the form of these patterns and levels. This concern led us away from the approach of forcing the data into a mold of "good," "average," and "poor" persistency and then trying to find reasonable combinations. Instead, some variation of the statistical technique known as *cluster analysis* appeared to have greatest promise. This sort of analysis is often used in research designed to produce some taxonomical result.

A basic procedure in cluster analysis involves the following steps:

1. *Developing a measurement of "location" for each entity.* For the purpose of these analyses, the location is a six-dimensional vector of lapse ratios for years 1, 2, 3–5, 6–10, 11–15, and 1–15. Other measures were experimented with; however, they produced generally similar results, so for simplicity's sake the basic ratios were used for the final analyses.
2. *Deciding on the measure for the closeness of companies in the same cluster.* Cluster analysis has a wide variety of measures, which can produce differing results depending on the data being used and the objective of the clustering. For the purpose of these analyses, a method was chosen that used the average absolute difference in location for all dimensions of two entities being joined. If an entity was already a "cluster" of two or more company-country-year results, then the location of that entity was to be considered its centroid (i.e., the average of each dimension for all entities in the cluster).

3. *Calculating the clusters.* This is done by (*a*) finding the two closest entities and clustering them into a new entity, and (*b*) finding the closest of all entities (entities remaining, including the just-created entity) and repeating the process until all entities have been clustered into a single large entity.
4. *Constructing a "dendogram."* This shows graphically the merging of entities and the distance at which merges occur, thus assisting in interpreting the results of step 3. Block-sorting the data by quintiles of ratios for years 1–15, within which they were sorted by year 1 ratio, improved the process by leading to a dendogram in which there was some ordering of clusters according to an objective measure of "goodness."

Although this process appears to be quite complicated, in practice it is not difficult to develop or to do this sort of analysis. In fact, the results presented in this paper were completed on the author's home microcomputer in a minimal amount of time.

IV. AGGREGATE RESULTS

In an initial analysis, average lapse ratios and the standard deviations of the ratios were calculated separately for permanent and term business. In this analysis every company was given equal weight. For several companies with very small data samples, the lapse ratio patterns were very unusual. For all subsequent analyses for these companies, the unusual ratios were replaced with the years 1–15 ratio. This modification was necessary for one or two particular ratios of several companies.

Giving each company equal weight is a departure from usual actuarial technique, but in the case of this analysis it enabled us to calculate the standard deviation, an extremely useful part of this analysis. Table 1 shows the comparative means and standard deviations.

These aggregate data exhibit several notable characteristics:

TABLE 1

MEANS AND STANDARD DEVIATIONS OF LAPSE RATIOS FOR PERMANENT AND TERM INSURANCE (N = 87)

YEAR(S)	PERMANENT		TERM	
	Mean	Standard Deviation	Mean	Standard Deviation
1	104.9%	52.2%	89.9%	35.5%
2	125.4	51.2	113.1	33.6
3–5	120.1	41.0	132.9	44.0
6–10	129.1	33.4	160.7	70.4
11–15	132.5	33.9	168.4	75.2
1–15	117.7	39.5	113.7	36.1

1. Permanent ratios average slightly above LIMRA expected for year 1, about 25 percent above expected at year 2, and about 30 percent above expected after five years. Term ratios are about 10 percent below expected in the first year, but quickly grow to nearly 70 percent above expected after ten years.

   One has to expect that some difference will occur in experience for different companies and different years of experience. Examination of individual company data indicates, however, that the change over time accounts for a larger part of the difference in these results from LIMRA 1971–72 experience than being in a partially different group of companies.
2. One can assume that economic conditions have had a major impact on the lapse experience. LIMRA analysis indicates, however, that much of the term insurance shift shown in Table 1, at least for United States experience, can be traced to a shift in product mix from five-year renewable and convertible term and other term to one-year renewable and convertible term. The one-year term product has a lapse pattern that is very different from those observed for other term products, being considerably better, at least for the several years of credible experience in the Long-Term Lapse Study contributions. The trend toward competitive term products may be a significant factor in the poor later-policy-year experience for both term and permanent products, although it would appear that the adverse effect for term is nearly double that for permanent.
3. The standard deviations of term and permanent experience follow completely different patterns. The standard deviation is a measure of dispersion about the mean. When using this measure with lapse ratios, one should remember that lapse ratios follow a very skewed distribution, with a short lower tail and a longer upper tail. A lognormal distribution would fit better, but results would be more difficult to interpret and/or explain. Since conclusions about the dispersion of results would not be significantly altered by such a refinement, it has not been used.

   The standard deviations of the permanent ratios are greatest in years 1 and 2, gradually decreasing over time. Dispersion of term ratios is smallest for the first two policy years and then grows with duration group to a level more than double the standard deviation of results for the first two years.

   In simple terms, this measure says that, across companies and years of experience, the lapse experience of permanent business of the various companies tends to converge with duration, while term insurance lapse experience diverges. Conceivably, this means that term insurance is more vulnerable to wide fluctuations in experience, through either replacement or lapse, than is permanent insurance. This fact probably needs much greater attention in the actuarial pricing decision and marketing decisions than ever before, since term insurance may not persist long enough to amortize its issue expense in a very competitive marketplace!
4. These data raise the question of whether or not LIMRA should revise the tables used for expected lapses in the Long-Term Lapse Study. Certainly the levels of the ratios do indicate that some revision is necessary. A further problem arises in considering the term experience. The term business in the later durations is considerably different in plan composition from the business in early durations, so one cannot be sure that term business lapse tables based on this experience will be valid for some purposes.

In order to address the quest for families of tables, the separate data samples were run through the cluster analysis procedure explained in the methodology section. Note that this procedure is nearly "assumption-free" as to what the emerging clusters of results should be. The methodology chosen does have a tendency to prefer to find more compact-circular clusters than some other clustering techniques, which can find long serpentine-type clusters. What else might one expect to find?

The Linton and Moorhead approaches illustrate two potential results. The Linton approach assumes families of lapse rates whose members parallel one another. Ironically, if one were to look only at permanent insurance for the first two policy years in the LIMRA sample of companies, and to assume that rates were normally distributed, one might end up producing A and B tables with relative characteristics similar to the Linton tables.

Mr. Moorhead based his family of tables upon much more information than did Mr. Linton. Starting with a basic trichotomy of good, average, and poor results (or, as he chose, *R*ather good, *S*o-so, and *T*errible—thank heaven for actuarial mnemonics), he advanced the state of the art considerably by observing Mr. Richardson's analyses over time and correlating early and later persistency of companies in his sample. Finding low correlations, Mr. Moorhead made the very reasonable decision to produce a number of blended tables.

If the Moorhead blends hold true, the cluster analysis should produce a family of clusters whose members reflect to some extent Mr. Moorhead's various tables. Whether or not any or all of the Moorhead patterns are observed, additional insight will be gained about patterns of persistency that do exist.

As a further note, one should remember that the Moorhead tables were designed to bear a similarity to lapse patterns exhibited for whole life continuous payment plans as reported in the LIAMA research report. The analyses of this paper are not limited to whole life continuous payment plans of insurance but include all permanent business.

V. PERMANENT BUSINESS

An overview of the results of the clustering process is shown in Chart I, which arrays company-country-year results in a dendogram for permanent business. The solid lines in the graph indicate which companies or groups of companies are combined, with the horizontal length showing the average distance between the centroids of the companies or groups when the combination occurs.

The first two entries will serve as an example. The 1977 experience for Company A, the first entry, has ratios for years 1, 2, 3–5, 6–10, 11–15, and 1–15 that are 3.6 percent different on the average from the same ratios for

Company A for 1978. After these two entities have been merged, their average ratios for years 1, 2, 3–5, 6–10, 11–15, and 1–15 are around 6 percent different on the average from the corresponding ratios for Company A for 1976.

After a little practice with the dendogram, the user will become familiar with what the clustering process is accomplishing and will better understand some of the persistency experience relationships among various companies over the period 1974–75 to 1977–78.

The clustering process does not produce an absolute result; it is left to the individual researcher to decide how many clusters or "persistency family" members exist. In some cases, some "entities" may be considered as being "sports" that do not belong to any cluster—some other means are needed to assign them to a more well-defined cluster.

Inspection of this dendogram resulted in the choice of four major clusters. (see Table 2, clusters 1, 2, 3, and 4). The clustering process resulted in four entities that did not fit too well into the basic four clusters; one was put in cluster 2 and the remaining ones were put in cluster 4, resulting in clusters 2E and 4E.

Breaking the sample in this way results in four fairly well-separated clusters that are relatively homogeneous compared with the results for all companies. The clustering has also muted the pattern of reducing dispersion of results with increasing policy duration.

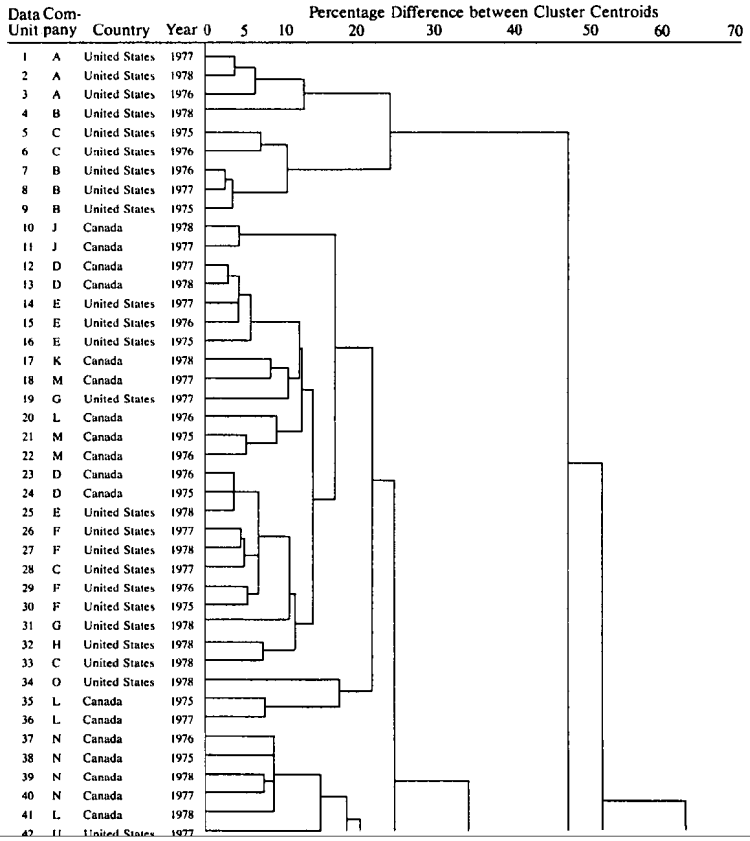
TABLE 2

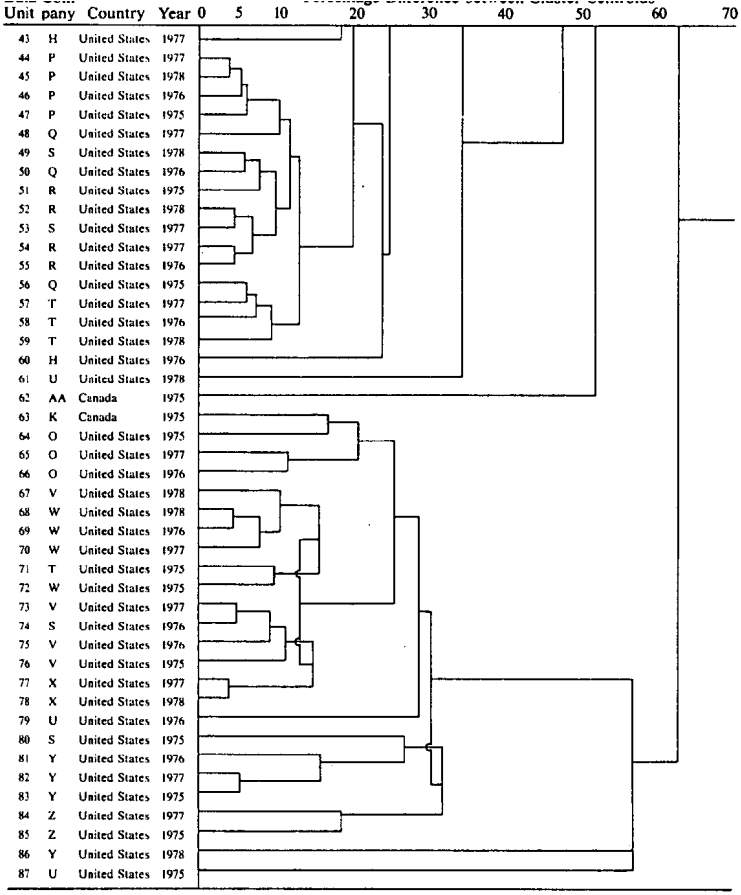
MAJOR CLUSTERS—PERMANENT

YEARS	CLUSTER					
	1	2	2E	3	4	4E
	Means					
1	49.8%	64.6%	65.0%	116.0%	147.4%	156.7%
2	52.2	85.5	88.3	139.2	177.1	178.0
3–5	64.1	104.5	103.1	115.4	160.1	162.1
6–10	73.9	121.9	120.1	120.6	164.4	165.8
11–15	75.1	126.5	127.8	126.9	162.5	162.5
1–15	59.9	90.1	90.2	120.7	160.3	164.7
	Standard Deviations					
1	11.0%	11.2%	11.2%	22.8%	46.0%	50.9%
2	20.6	14.4	20.5	19.2	29.3	39.5
3–5	10.0	13.5	15.1	17.6	23.9	43.6
6–10	15.7	19.6	21.5	12.0	20.7	21.7
11–15	17.9	23.9	24.4	17.1	23.4	27.7
1–15	12.4	9.7	9.5	11.5	22.1	27.4
N	9	27	28	24	23	26

CHART I

DENDOGRAM FOR PERMANENT INSURANCE




Unit pany Country Year 0 5 10 20 30 40 50 60 70
43 H United States 1977
44 P United States 1977
45 P United States 1978
46 P United States 1976
47 P United States 1975
48 Q United States 1977
49 S United States 1978
50 Q United States 1976
51 R United States 1975
52 R United States 1978
53 S United States 1977
54 R United States 1977
55 R United States 1976
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61 U United States 1978
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63 K Canada 1975
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65 O United States 1977
66 O United States 1976
67 V United States 1978
68 W United States 1978
69 W United States 1976
70 W United States 1977
71 T United States 1975
72 W United States 1975
73 V United States 1977
74 S United States 1976
75 V United States 1976
76 V United States 1975
77 X United States 1977
78 X United States 1978
79 U United States 1976
80 S United States 1975
81 Y United States 1976
82 Y United States 1977
83 Y United States 1975
84 Z United States 1977
85 Z United States 1975
86 Y United States 1978
87 U United States 1975

These major clusters can be subdivided into even smaller groupings of companies with even more similarity of results. Tables 3–5 illustrate these subgroupings.

What can we make of these results? In general, one cannot be anything but impressed that companies are closest to themselves for the various years

TABLE 3

MINOR PERMANENT CLUSTERS—EXCELLENT AND VERY GOOD PERSISTENCY

YEARS	CLUSTER			
	1A	1B	2A	2B
	Means			
1	41.8%	56.4%	64.7%	66.1%
2	34.5	66.3	87.1	86.0
3–5	55.6	71.0	115.1	94.5
6–10	58.6	86.2	130.1	103.9
11–15	58.0	88.8	132.7	106.5
1–15	47.5	69.7	93.2	84.7
	Standard Deviations			
1	5.7%	10.2%	11.3%	7.8%
2	9.4	14.9	14.2	14.5
3–5	6.1	6.4	8.8	7.1
6–10	8.9	3.4	11.7	8.0
11–15	10.8	4.9	14.5	9.1
1–15	5.5	3.4	6.2	5.4
N	4	5	11	11

TABLE 4

MINOR PERMANENT CLUSTERS—AVERAGE PERSISTENCY

YEARS	CLUSTER		
	3A	3B	3C
	Means		
1	96.6%	112.9%	143.5%
2	124.9	149.5	138.2
3–5	98.4	122.8	122.4
6–10	115.9	121.5	122.7
11–15	145.5	119.0	120.1
1–15	106.9	122.5	133.8
	Standard Deviations		
1	3.5%	13.7%	11.6%
2	21.2	14.9	14.7
3–5	13.0	10.7	15.3
6–10	20.2	6.8	8.5
11–15	16.8	9.5	10.1
1–15	4.5	5.7	9.4
N	7	12	4

TABLE 5

MINOR PERMANENT CLUSTERS—QUESTIONABLE PERSISTENCY

YEARS	CLUSTER		
	4A	4B	4C
	Means		
1	77.5%	138.6%	206.4%
2	141.4	178.9	207.7
3–5	160.7	164.6	158.7
6–10	183.8	163.1	154.3
11–15	168.6	155.8	168.6
1–15	136.0	154.1	189.7
	Standard Deviations		
1	13.9%	16.2%	13.3%
2	7.9	14.3	27.4
3–5	17.6	10.8	39.3
6–10	22.6	14.3	26.5
11–15	17.3	22.1	30.1
1–15	17.9	8.0	14.6
N	4	12	6

of experience, and tend to stay in the same clusters of experience over time, although several companies do manage to break the pattern (for instance, Company S has made steady improvement). This result may suggest that either market, product, or environment has a major impact upon persistency, while the ability of some companies to effect some migration does suggest that there are factors under company control that can be managed to alter persistency experience.

What clues do the individual clusters and subclusters offer?

Cluster 1 is a cluster of three companies with *superb* persistency. All experience for Company A and Company B is in this cluster. Company C has two years of experience in this cluster and two years in cluster 2—consecutive years in each case. Generalizations should not be made on the basis of such a small select group.

Cluster 2 has *very good* persistency. This cluster is made up primarily of Canadian and United States companies generally associated with good persistency. Most of the Canadian experience and some of the United States experience is associated with very low early lapsation but above-average later lapsation. Most of the United States companies and some of the Canadian companies have nearly the same early lapse ratios as the average of all other companies, but considerably better later lapse ratios. Most Canadian experience for the sample is in cluster 2, although the United States companies in the cluster tended to have better later and better overall performance than the Canadian companies.

Cluster 3 consists of companies with *about average* experience. This cluster has a pronounced higher than average ratio for year 2 lapsation, with lapse ratios centering around 120 percent of LIMRA 1971–72 expected thereafter. Subclusters appear to be defined mostly by variation in year 1 and year 2 experience. The companies in this cluster are primarily large United States companies.

Cluster 4 is the least homogeneous group and the group with the *worst* persistency relative to the LIMRA 1971–72 Expected Tables. This cluster is characterized by lapsation of about 150 percent of expected in the first year, 175 percent of expected in the second year, and 160 percent of expected thereafter. This experience appears questionable.

In fairness to the companies involved, we should remember that the 1971–72 tables account primarily for variations in type of business and age at issue but do not take into account other factors related to persistency, such as mode, income, or policy size. Consequently, it is possible that the variation exhibited in these clusters may be attributable to widely differing distributions of such business.

Other research is necessary to clarify the actual situation. The work described in this paper produces the most logical clustering of persistency results, but unfortunately provides little explanation as to why the differences occur. We do suggest that either market, product, or environment is important. It is hoped that LIMRA will try to pursue some of this research. In the meantime, the research described herein gives some indication of the variation actually experienced in the United States and Canada and would be useful in constructing persistency tables for permanent business, as was done by Mr. Moorhead.

VI. TERM BUSINESS

Chart II presents the dendogram illustrating the result of the clustering process for term insurance. The company coding is the same as for the permanent dendogram; however, the distance scale is twice that of the permanent dendogram. The major reason for the scale change is the much larger dispersion among major clusters and subclusters.

Five major clusters emerge from the analysis, with eleven subclusters. Although there is less homogeneity within these clusters than within those for permanent insurance, they are also more widely separated from one another. (See Tables 6–9.)

Although there are five major clusters of term insurance persistency patterns, about half of the company years of experience fall into cluster 2. Cluster 2 and cluster 3 are fairly similar except during the first five policy

TABLE 6

Major Clusters—Term Insurance

Years	Cluster				
	1	2	3	4	5
	Means				
1	46.5%	74.6%	126.6%	118.0%	129.0%
2	62.3	107.8	138.9	127.1	147.7
3–5	65.1	125.9	137.9	163.8	222.4
6–10	79.4	147.4	143.1	201.5	343.6
11–15	116.3	148.4	144.8	210.5	357.9
1–15	59.1	101.6	133.5	140.9	188.8
	Standard Deviations				
1	10.7%	16.0%	21.1%	30.3%	41.7%
2	21.3	20.6	17.8	27.2	45.7
3–5	21.4	14.1	23.8	22.5	59.3
6–10	21.1	32.8	15.2	23.9	71.2
11–15	29.4	40.7	42.8	35.5	85.0
1–15	13.5	13.2	13.0	16.4	29.7
N	11	43	15	11	7

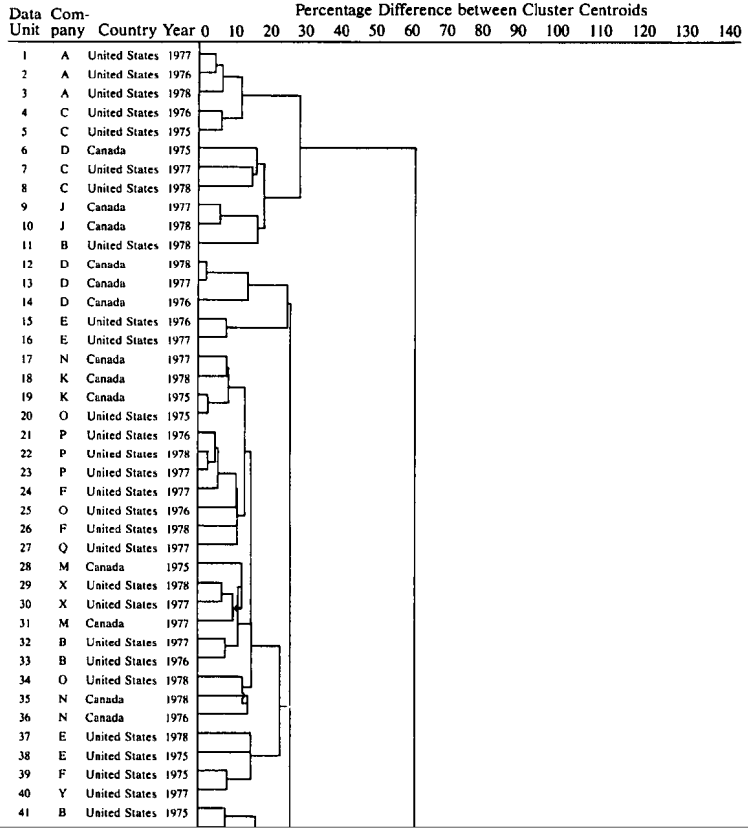
TABLE 7

Minor Term Clusters—Excellent Persistency

Years	Cluster	
	1A	1B
	Means	
1	40.0%	51.9%
2	42.5	78.9
3–5	45.9	81.1
6–10	59.3	96.1
11–15	108.4	122.9
1–15	46.6	69.4
	Standard Deviations	
1	4.3%	11.7%
2	6.8	12.4
3–5	12.4	10.9
6–10	6.8	10.6
11–15	14.2	38.1
1–15	2.8	8.7
N	5	6

CHART II

DENDOGRAM FOR TERM INSURANCE



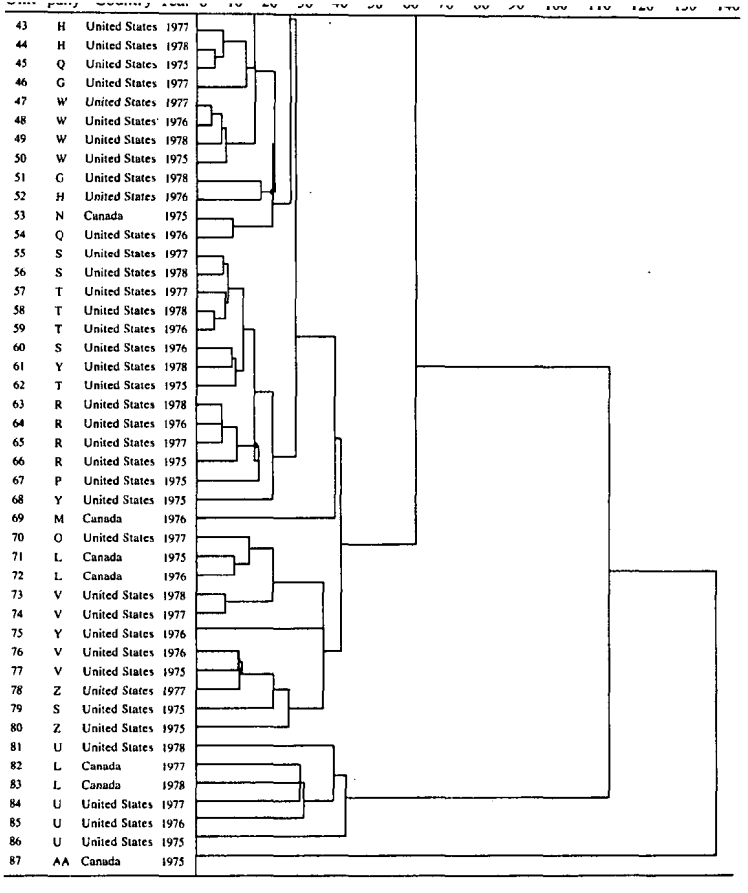

Unit party Country Year
43 H United States 1977
44 H United States 1978
45 Q United States 1975
46 G United States 1977
47 W United States 1977
48 W United States 1976
49 W United States 1978
50 W United States 1975
51 G United States 1978
52 H United States 1976
53 N Canada 1975
54 Q United States 1976
55 S United States 1977
56 S United States 1978
57 T United States 1977
58 T United States 1978
59 T United States 1976
60 S United States 1976
61 Y United States 1978
62 T United States 1975
63 R United States 1978
64 R United States 1976
65 R United States 1977
66 R United States 1975
67 P United States 1975
68 Y United States 1975
69 M Canada 1976
70 O United States 1977
71 L Canada 1975
72 L Canada 1976
73 V United States 1978
74 V United States 1977
75 Y United States 1976
76 V United States 1976
77 V United States 1975
78 Z United States 1977
79 S United States 1975
80 Z United States 1975
81 U United States 1978
82 L Canada 1977
83 L Canada 1978
84 U United States 1977
85 U United States 1976
86 U United States 1975
87 AA Canada 1975

TABLE 8

Minor Term Clusters—Good Persistency

Years	Cluster			
	2A	2B	2C	2D
	Means			
1	47.5%	74.9%	75.1%	83.9%
2	106.8	94.5	135.1	119.5
3–5	125.4	118.5	142.6	132.0
6–10	120.7	139.4	116.5	177.1
11–15	208.2	125.9	94.5	174.5
1–15	87.4	95.8	106.9	113.3
	Standard Deviations			
1	7.7%	10.7%	21.6%	12.7%
2	29.8	13.3	9.4	13.3
3–5	19.4	9.4	15.1	11.6
6–10	7.5	23.2	7.5	32.3
11–15	20.0	21.4	4.9	27.8
1–15	13.2	8.7	13.7	8.4
N	5	20	4	14

TABLE 9

Minor Term Clusters—Average-to-Questionable Persistency

Years	Cluster				
	3A	3B	4A	4B	5A
	Means				
1	131.5%	130.7%	90.1%	140.1%	119.6%
2	135.1	154.9	107.6	152.6	168.7
3–5	138.4	126.9	159.1	178.6	187.3
6–10	153.1	125.7	209.9	190.7	315.6
11–15	145.8	116.2	239.3	191.2	409.6
1–15	136.5	132.8	127.7	156.0	177.1
	Standard Deviations				
1	14.3%	17.7%	16.2%	15.7%	40.7%
2	8.3	10.7	17.3	5.2	8.3
3–5	7.9	7.7	13.0	12.6	34.2
6–10	9.5	7.9	17.5	29.0	19.0
11–15	11.8	10.2	17.3	28.2	25.9
1–15	7.3	6.1	9.9	7.1	30.4
N	8	5	5	5	4

years, where they differ initially by 52 percent and then gradually converge. Clusters 3, 4, and 5 are fairly close in years 1 and 2, but then diverge widely.

Except perhaps for the relationship between clusters 1 and 2, previous research sheds little light on potential factors that could be related to persistency in the manner indicated by either major or minor clusters. These results also cast doubt on the applicability of the Moorhead blending method for term insurance. Once again, it is important to note that Mr. Moorhead indicated use of his tables for permanent insurance only.

These data provide no real answer to the important question as to why these differences in persistency exist. One can speculate upon several explanations:

1. The best persistency probably is associated with competitive term products—at least during the first five years from issue. Persistency thereafter is largely a matter of how competitive the premium stays, especially on renewable products. Some companies permit old term plans to renew at premiums equal to "ratebook at time of issue" or "ratebook at renewal," whichever is less. One would expect better persistency for such business—conceivably persistency that is "too good" if ratebooks at renewal have less competitive rates than at issue.
2. Studies have shown that the best term persistency exists on riders. The higher the proportion of rider business, the better the persistency.
3. Studies have also shown that poorer persistency is associated with renewable term for which premiums increase. The apparent superiority of one-year renewable and convertible may be related not only to its tendency to be priced very competitively but also to the fact that the premium increase is much more gradual than for, say, five-year renewable and convertible, where the increase in each renewal period can be quite dramatic. If so, one can expect that one-year renewable and convertible persistency eventually will deteriorate as costs become excessive and annual premium increases exceed some consumer tolerance level for increased cost.
4. Term persistency probably is more sensitive than permanent persistency to agents' compensation practices. This sensitivity may be greatest for term with short renewal periods. If so, arguments for raising term compensation levels to those of permanent insurance are spurious. The apparent trend in the industry to raise term compensation levels may make a difficult situation worse.

   There is some talk in the industry of "leveling" commissions. The place to start may be term insurance. After all, it makes more sense to set a term commission as the level actuarial equivalent of the permanent insurance "average lifetime annual commission" than to have a permanent commission scale for term insurance and (given heavy lapses) end up paying an average annual commission approaching the first-year permanent insurance rate!
5. Studies have shown that good term insurance persistency is associated with the long-term products, although those products probably will not have persistency as good as that of permanent insurance.

VII. CONCLUSION

The results of the preceding analyses provide a sharp contrast between term and permanent insurance. In many ways, the permanent insurance results offer considerable evidence that, in explaining persistency, one has to look at product, market, company, and environment. In addition, the analyses indicate that we cannot look only at early (say, thirteen-month) results in deciding where efforts can be made to improve persistency.

With term insurance, one may have to put primary emphasis upon product, market, and agents' compensation to minimize persistency problems. Term definitely requires a review beyond thirteen months from issue.

Both term and permanent clustering indicate a tendency for a company to stay in the same cluster over time. Each cluster is fairly well defined, and there is a relatively small number of them. This result implies a need for individual companies to monitor more closely their own ongoing trends in long-term persistency. While intercompany studies are very useful, the usefulness may be somewhat limited if only overall results are presented. Studies should be subdivided to show results for groups of companies that exhibit similar patterns of lapse rates or ratios.

Lapse rate or ratio patterns probably are not uniquely delineated by a particular value. That is, one cannot infer a probable future "history" of a particular policy or block of business just from knowing a first-year lapse rate or an overall lapse rate. For predicting performance of permanent insurance, however, it is not necessary to know as much as for term.

This analysis does suggest that, if it is desirable to produce a table of lapse experience that is representative of the industry as a whole, a small sample of companies contributing to a study such as the LIMRA Long-Term Lapse Study could be made representative of what is going on in the industry.

More research is needed, both in determining the composition of factors influencing persistency results (and therefore usable as clustering variables) and in expanding on the basic ideas in this paper to produce new families of persistency tables that are relevant to the needs of the life insurance business in the 1980s.