4.22 In-force Exposure by Date

Policy	Effective Date	Expiration Date	Number of Houses Insured	In-Force Exposure a/o 01/01/11	06/15/11	01/01/12
A	10/01/10	03/31/11	1.00	1.00	0.00	0.00
B	01/01/11	06/30/11	1.00	1.00	1.00	0.00
C	04/01/11	09/30/11	1.00	0.00	1.00	0.00
D	07/01/11	12/31/11	1.00	0.00	0.00	0.00
E	10/01/11	03/31/12	1.00	0.00	0.00	1.00
F	01/01/12	06/30/12	1.00	0.00	0.00	1.00
Total			6.00	2.00	2.00	2.00

Calculation of Blocks of Exposures

The preceding section illustrated how to convert the total exposure of individual policies into written, in-force, earned, and unearned exposures. Advances in computing power have enabled such techniques to be applied to individual policies. On the other hand, some companies may have policy information summarized on a monthly or quarterly basis and will need to calculate the exposures for the block of policies using this summarized data. In such a case, it is customary for the practitioner to treat all policies as if they were written on the mid-point of the period. For example, when data is summarized on a monthly basis, all policies are assumed to be written on the 15th of the month. This practice is often referred to as the "15th of the month" rule or the "24ths" method. This will be a good approximation as long as policies are written uniformly during each time period. If this approach is applied to longer periods (e.g., quarters or years), the assumption of uniform writings is less likely to be reasonable.

To clarify the application of this rule, consider the following example in which a company begins writing annual policies in 2010 and writes 240 exposures each month.

The in-force exposures represent the total exposures from active policies at a given point in time. While it is reasonable to assume that some of the 240 exposures written in July were in-force as of the first day of the month, the "15th of the month" rule assumes that none of the exposures from the July policies contribute to the in-force exposures as of July 1, 2010. This is because the rule assumes all the July policies are written on July 15th. Table 4.23 shows the in-force exposures as of July 1, 2010; January 1, 2010; and July 1, 2011, respectively.

4.23 Aggregate In-force Calculation

Written Month	Exposure	Assumed Effective Date	In-force Exposures a/o 07/01/10	01/01/11	07/01/11
Jan-10	240	01/15/10	240	240	0
Feb-10	240	02/15/10	240	240	0
Mar-10	240	03/15/10	240	240	0
Apr-10	240	04/15/10	240	240	0
May-10	240	05/15/10	240	240	0
Jun-10	240	06/15/10	240	240	0
Jul-10	240	07/15/10	0	240	240
Aug-10	240	08/15/10	0	240	240
Sep-10	240	09/15/10	0	240	240
Oct-10	240	10/15/10	0	240	240
Nov-10	240	11/15/10	0	240	240
Dec-10	240	12/15/10	0	240	240
Total	2,880		1,440	2,880	1,440

As discussed earlier, the earned exposures represent the portion of the policy for which coverage has already been provided as of a certain point in time. Since the assumption is that all policies for a given month are written on the 15th of the month, the written exposures for annual policies will be earned over a 13-month calendar period: 1/24 of the exposure will be earned in the second half of the month in which it was written, 1/12 (or 2/24) of the exposure will be earned in each of the next 11 months (i.e., months 2 through 12), and the final 1/24 of the exposure will be earned in the first half of month 13. Table 4.24 shows the distribution of earned exposures to Calendar Years 2010 and 2011, respectively.

4.24 Aggregate Earned Exposure Calculation

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Assumed	Earning Percentage		Earned Exposures	
Written Month	Exposures Written	Effective Date	2010	2011	2010	2011
Jan-10	240	01/15/10	23/24	1/24	230	10
Feb-10	240	02/15/10	21/24	3/24	210	30
Mar-10	240	03/15/10	19/24	5/24	190	50
Apr-10	240	04/15/10	17/24	7/24	170	70
May-10	240	05/15/10	15/24	9/24	150	90
Jun-10	240	06/15/10	13/24	11/24	130	110
Jul-10	240	07/15/10	11/24	13/24	110	130
Aug-10	240	08/15/10	9/24	15/24	90	150
Sep-10	240	09/15/10	7/24	17/24	70	170
Oct-10	240	10/15/10	5/24	19/24	50	190
Nov-10	240	11/15/10	3/24	21/24	30	210
Dec-10	240	12/15/10	1/24	23/24	10	230
Total	2,880				1,440	1,440

(4) = Portion of exposure earned in 2010.

(5) = Portion of exposure earned in 2011.

(6) = (2) x (4)

(7) = (2) x (5)

Though the above examples demonstrate the "15th of the month" rule on calendar year data, the same principles apply to policy year aggregation.

EXPOSURE TREND

As will be discussed in several subsequent chapters, the fundamental insurance equation requires that income (premium) equals outgo (loss and loss adjustment expenses and underwriting expenses), and target profit during the period in which the rates will be in effect. The chapters on premium and loss discuss trending procedures to adjust historical figures to the levels expected in the future.

For some lines of business, the exposure measure used is sensitive to time-related influences such as inflation. For example, payroll and sales revenue are highly influenced by inflationary pressures. In these lines of business, it may be prudent to measure the trend in historical exposures over time in order to project exposure levels in the future. These trends can be measured via internal insurance company data (e.g., workers compensation payroll) or via industry indices (e.g., average wage index). The way in