

Case Study—Prevalt Industries

Prevalt Industries operates a poultry processing plant in a rural area of Missouri. The firm employs 500 workers that work two 8-hour shifts. Prevalt processes fryer chickens, which are younger, smaller birds. Workers at the plant first slaughter the birds, and then cut them into pieces. The wings and drumsticks are sold directly to a wholesale food distributor. The thighs and breasts are packaged under the Prevalt brand name and are sold in grocery stores throughout the Midwest.

Prevalt has been in the fryer processing business for twenty-five years. The fryer business has suffered through several boom and bust cycles during that time. Senior management has decided that it should diversify its operations. Two months ago, Prevalt purchased a small turkey processing facility in an adjoining state.

The turkey processing plant is relatively new. It opened for business two years ago and employs only 45 full-time workers. The plant operates a single 8-hour shift five days a week during most of the year. The operation is limited to slaughtering whole turkeys and then selling the entire bird in one package. Whole turkey demand is seasonal. In the fall, the plant adds two additional shifts and one hundred temporary workers to meet seasonal demand.

Senior management has tasked Prevalt's risk management team to evaluate the company's new hazard risk exposure following the acquisition of the turkey processing facility. The team must recommend a revised retention plan for hazard losses to senior management.

Activity 1—Evaluating Hazard Risk

Answer each of the following questions concerning hazard risk evaluation at Praval Industries.

Topics	Answers
<p>1. How might a risk management professional use qualitative information to evaluate the new level of hazard risk faced by Praval Industries?</p>	

<p>2. Why should the risk management team supplement their internal data with insurance industry data when evaluating Prevalt's hazard loss exposure?</p>	
<p>3. How would the lack of operational diversification in the past affect the evaluation of the future frequency and severity at Prevalt Industries?</p>	

<p>4. How would insurance market conditions affect Prevalt's willingness to retain or transfer any of its hazard loss exposures?</p>	
<p>5. Prevalt's plan to enter the turkey processing business creates a new and different type of strategic, financial, and operational risk for the firm. How might that affect Prevalt's willingness to retain or transfer its hazard loss exposures at the existing plant and at the new plant?</p>	

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Answers for Activity 1—Evaluating Hazard Risk

Answer each of the following questions concerning hazard risk evaluation at Praval Industries.

Questions	Answers
<p>1. How might a risk management professional use qualitative information to evaluate the new level of hazard risk faced by Praval Industries?</p>	<ul style="list-style-type: none"> • The team can draw upon the education, training, and expertise of practitioners in relevant fields to estimate loss probabilities • Subjective estimates can be used to complement objective data • Scenario analysis can be used to estimate the effects of certain types of losses under a variety of potential circumstances • Failure mode and effect analysis can use Praval's past loss experience at its Missouri plant as a base and then use their collective judgment to identify potential losses at the new plant
<p>2. Why should the risk management team supplement their internal data with insurance industry data when evaluating Praval's hazard loss exposure?</p>	<ul style="list-style-type: none"> • Internal data is preferred as long as it is credible, and Praval has sufficient loss history to project most types of hazard losses for its chicken processing plant. • Praval does not have internal data on turkey processing operations, and the new operation is only two years old and thus the internal data might not be credible. • Although the risks are similar, there may be key differences between chicken processing and turkey processing that the team is unfamiliar with. For example, the turkey processing plant is highly seasonal and relies on temporary workers to a much greater extent than the chicken processing plant. • Praval could use insurance industry data to supplement its own quantitative data.

<p>3. How would the lack of operational diversification in the past affect the evaluation of the future frequency and severity at Prevalt Industries?</p>	<ul style="list-style-type: none"> • Prevalt has operated a single plant at a single location for twenty-five years, but the new operation will alter the historical pattern of frequency and severity experienced by the company as a whole. • The turkey processing plant has only been in operation for two years, and its loss experience may not be credible. • The operational diversification should help to stabilize the company's overall frequency and severity levels because of the law of large numbers, but it may take several years for the benefit to be fully realized.
<p>4. How would insurance market conditions affect Prevalt's willingness to retain or transfer any of its hazard loss exposures?</p>	<p>Insurance markets go through a cycle of hard and soft markets. In a hard market, when prices increase, Prevalt would be less willing to purchase insurance and more willing to retain the risk. In a soft market, Prevalt could purchase insurance relatively cheaply and would normally buy more insurance and retain less of the hazard loss exposure.</p>
<p>5. Prevalt's plan to enter the turkey processing business creates a new and different type of strategic, financial, and operational risk for the firm. How might that affect Prevalt's willingness to retain or transfer its hazard loss exposures at the existing plant and at the new plant?</p>	<p>Normally, hazard risk is uncorrelated with strategic, financial, and operational risk. Therefore, when a hazard loss occurs it does not usually increase the likelihood or negative consequences of events from other types of risk. However, the addition of a new line of business may create correlations in the short run. Given that this is a major change for Prevalt, management may not have the same willingness to retain risk. Once Prevalt has generated additional experience with the new structure, the willingness to retain more risk would normally return.</p>

Steps in Estimating Hazard Losses

Educational Objective (EO)

Explain how to estimate expected losses arising from hazard risk.

Instructions

Activity 1—Estimating Hazard Losses

Group Activity Followed by Large Group Discussion

Ask the participants to read **Case Study—Miller Storage**.

Divide participants into small groups and ask them to fill in the blank spaces in the worksheet in **Activity 1—Estimating Hazard Losses**.

When all groups have estimated the 20X7 expected loss cost, have each group compare their answers with the other group answers. If there are discrepancies, have the groups to try to resolve them.

Debrief:

Review the four steps in estimating hazard loss costs. Ask the students to respond to one or more of the following discussion questions:

- Can you name some appropriate exposure bases for different types of hazard losses such as workers compensation, fire, auto liability, and theft?
- How would you go about selecting an appropriate cap for the size of the individual losses in the loss development triangle?
- Where might you look for information that would be useful in selecting trend factors for losses or for the various exposure bases?

Case Study—Miller Transport

The risk manager for Miller Transport is following the four-step process to estimate Miller's expected general liability loss costs for 20X7. These are the four steps:

1. Collect and organize past data
2. Limit individual losses
3. Apply trend and loss development factors to the data
4. Forecast losses

The risk manager collected loss cost information for accident year 20X1-20X5 and organized the data into a loss development triangle.

He capped each individual loss at \$50,000 because that is Miller's retention layer for each claim. He reviewed each of the losses over \$50,000 and concluded that the \$50,000 cap on individual losses was still valid.

This is the loss development triangle he produced, along with the ultimate loss development factors:

Loss Development Triangle						Accident
	18	30	42	54	60	Year to
	Months	Months	Months	Months	Months	Ultimate
20X1	60,000	97,800	122,250	139,365	144,940	1.02
20X2	62,000	101,680	126,083	141,213		1.06
20X3	61,000	101,870	125,300			1.20
20X4	59,000	95,580				1.49
20X5	63,000					2.44
		18 to 30	30 to 42	42 to 54	54 to 60	Ultimate
20X1		1.63	1.25	1.14	1.04	1.02
20X2		1.64	1.24	1.12		
20X3		1.67	1.23			
20X4		1.62				
20X5						
Average		1.64	1.24	1.13	1.04	1.02

Using insurance industry information, he estimated the current trend in loss cost inflation to be 5 percent per year. He used that trend information to develop Incurred Loss Trend

Factors for each accident year out to 20X7. These are the trend factors for each accident year:

	Incurred Loss Trend Factor to 20X7
20X1	1.34
20X2	1.28
20X3	1.22
20X4	1.16
20X5	1.10

He then used industry information to estimate the inflation rate for the selected exposure base (Sales Revenue). He concluded that 4 percent per year was an appropriate inflation rate for sales. He recorded these actual sales and the trend factor for each accident year:

	Exposure Base Trend Factor to 20X7
20X1	30,762
20X2	25,176
20X3	27,580
20X4	33,058
20X5	29,498

He is ready to complete the process by applying the trend and loss development data to the data and then forecasting losses per \$1,000 of sales for 20X7.

Activity 1—Estimating Hazard Losses

Complete the calculations from the information provided in the case study for Miller Transport.

	Current Value of Losses	Ultimate Loss Development Factor	Ultimate Losses	Trend Factor	Trended Ultimate Losses
20X1					
20X2					
20X3					
20X4					
20X5					

	Sales (000s)	Trend Factor	Trended Sales
20X1			
20X2			
20X3			
20X4			
20X5			

	Trended Ultimate Losses	Trended Sales	Losses Per \$1,000 of Sales
20X1			
20X2			
20X3			
20X4			
20X5			

Average Losses Per \$1,000 of Sales for 20X7

Answers to Activity 1—Estimating Hazard Losses

Complete the calculations from the information provided in the case study for Miller Transport.

	Current Value of Losses	Ultimate Loss Development Factor	Ultimate Losses	Trend Factor	Trended Ultimate Losses
20X1	\$144,940	1.02	\$147,839	1.34	\$198,104
20X2	\$141,213	1.06	\$149,686	1.28	\$191,598
20X3	\$125,300	1.20	\$150,360	1.22	\$183,439
20X4	\$95,580	1.49	\$142,414	1.16	\$165,200
20X5	\$63,000	2.44	\$153,720	1.10	\$169,092

	Sales (000s)	Trend Factor	Trended Sales
20X1	\$30,762	1.27	\$39,068
20X2	\$25,176	1.22	\$30,715
20X3	\$27,580	1.17	\$32,269
20X4	\$33,058	1.12	\$37,025
20X5	\$29,498	1.08	\$31,858

	Trended Ultimate Losses	Trended Sales	Losses Per \$1,000 of Sales
20X1	\$198,104	\$39,068	\$5.07
20X2	\$191,598	\$30,715	\$6.24
20X3	\$183,439	\$32,269	\$5.68
20X4	\$165,200	\$37,025	\$4.46
20X5	\$169,092	\$31,858	\$5.31

Average Losses Per \$1,000 of Sales for 20X7

\$5.35

Applying Increased Limit Factors

Educational Objective (EO)

Explain how to apply increased limit factors to hazard loss estimates.

Instructions

Activity 1—Applying Increased Limits Factors

1. Ask the participants to read **Case Study—Wormwood Construction Company**.
2. Divide participants into small groups and ask them to fill the blank spaces in the worksheet in **Activity 1—Applying Increased Limits Factors**.
3. When all groups have completed the worksheet, have each group compare their answers with the other group answers. If there are discrepancies, have the groups to try to resolve them.

Debrief:

Review the calculations with the groups. For discussion, you may ask the participants one or more of the following discussion questions:

- How much should the risk management professional rely on the increased limits factors produced by the insurance advisory organization?
- Are there other sources that the risk management professional could use to refine the estimates?
- The insurance advisory organization's data includes only reported losses, while Wormwood's internal data includes both insured and retained losses. Would that affect the accuracy of these estimated loss retentions?

Case Study—Wormwood Construction Company

The board of directors of Wormwood Construction Company has directed the risk management team to forecast the effect of changing its retention level next year. Currently, Wormwood has a per claim retention of \$100,000. At that level, the team forecasts that next year's retained losses will total \$2,000,000.

Wormwood's risk management team feels that Wormwood's internal numbers are not sufficiently credible to forecast the expected cost of increased retentions accurately. The team has decided to use an increased limits factor table developed by an insurance advisory organization and apply those factors to their own internal data.

They must use the information in the insurance advisory organization's table of increased limits factors to forecast the average cost of retention at each loss limit level. That organization uses a base per claim limit of \$25,000.

The risk management team must convert the increased limits factors to the equivalent of a base of \$100,000 per claim and use those revised factors to estimate the aggregate retention levels at each of the loss limits shown in the table. From that information, they will be able to compute the marginal cost of the losses at each layer.

Loss Limit	Increased Limits Factor
\$25,000	1.00
\$50,000	1.20
\$100,000	1.55
\$200,000	1.80
\$500,000	2.20
\$1,000,000	2.50

Activity 1—Applying Increased Limits Factors

Complete the calculation worksheet from the information provided **Case Study—Wormwood Construction Company**.

Loss Limit	Increased Limits Factor	Increased Limits Factor Relative to \$100,000 Limit	Forecasted Average Loss Retention (rounded to nearest \$1,000)	Marginal Loss Retention At Each Increased Limits Layer
\$25,000	1.00			
\$50,000	1.20			
\$100,000	1.55	1.0000	\$2,000,000	
\$200,000	1.80			
\$500,000	2.20			
\$1,000,000	2.50			

Answers to Activity 1—Applying Increased Limits Factors

Complete the calculation worksheet from the information provided **Case Study—Wormwood Construction Company**.

Loss Limit	Increased Limits Factor	Increased Limits Factor Relative to \$100,000 Limit	Forecasted Average Loss Retention (rounded to nearest \$1,000)	Marginal Loss Retention At Each Increased Limits Layer
\$25,000	1.00	1.00/1.55=0.6452	\$1,290,000	\$1,290,000
\$50,000	1.20	1.20/1.55=0.7742	\$1,548,000	\$258,000
\$100,000	1.55	1.0000	\$2,000,000	\$452,000
\$200,000	1.80	1.80/1.55=1.1613	\$2,322,000	\$322,000
\$500,000	2.20	2.20/1.55=1.4194	\$2,838,000	\$516,000
\$1,000,000	2.50	2.50/1.55=1.6129	\$3,225,000	\$387,000

Estimating Hazard Loss Volatility

Educational Objective (EO)

Explain how to estimate the volatility of hazard losses..

Instructions

Activity 1—Estimating Hazard Loss Volatility

Group Activity Followed by Large Group Discussion

Ask the participants to read **Case Study—Barnley Properties**.

Divide participants into small groups and ask them to fill the blank spaces in the worksheet **Activity 1—Estimating Hazard Loss Volatility**.

When all groups have completed the worksheet, have each group compare their answers with the other group answers. If there are discrepancies, have the groups to try to resolve them.

Debrief:

Review the calculations with the groups. For discussion, you may ask the participants one or more of the following discussion questions:

- How volatile are the Barnley numbers?
- How comfortable should the board of directors feel about the loss cost estimates?
- Would the estimated monthly loss cost become more volatile or less volatile if Barnley increased the deductible in its property insurance from \$5,000 to \$10,000 or \$25,000? Why or why not?

Case Study—Barnley Properties

The board of directors of Barnley Properties has asked the risk manager to provide a summary of the retained property damage loss costs and the volatility of those retained loss costs for a set of apartment complexes that Barnley owns in Tampa, Florida.

First, the risk manager obtained information on monthly claim counts over the past five years. While a few of the months had no retained property losses at all during the month, the majority of the months had three or four reported claims. The highest number of claims in any single month was five. He summarized the occurrences in the following table:

Number of Claims Reported During the Month	Number of Occurrences
No Claims	3
One Claim	6
Two Claims	9
Three Claims	15
Four Claims	18
Five Claims	9
Total	60

The risk manager took a sample of fifty claim reports to estimate the average loss severity. He classified each of the fifty claims into one of five severity ranges, based on the amount of the loss that was retained by Barnley. For those claims where the claim cost exceeded Barnley's insurance deductible of \$5,000, the risk manager recorded \$5,000 as the severity. After completing the data collection process, he summarized the results in this table:

Severity Range	Number of Occurrences
\$0 - \$499	11
\$500 - \$999	21
\$1,000 - \$1,499	10
\$1,500 - \$1,999	6
\$20,000 and higher	2
Total	50

Based on the probability distributions of claims counts and loss severity ranges, the risk manager computed the expected monthly retained loss cost. To provide the board with some idea about the variability of the monthly average, he developed a confidence

interval estimate, based on these distributions. He found that he could be 75 percent sure that the actual monthly aggregate retained loss cost will fall between 40 percent of the average and 160 percent of the average.

The risk manager then produced a short worksheet that summarized his calculations for the board.

Activity 1—Estimating Hazard Loss Volatility

Complete the calculation worksheet from the information provided in the case study for Barnley Properties.

(1) Number of Claims Reported During the Month	(2) Number of Occurrences	(3) Probability	(4) (1) x (3)
No Claims	3		
One Claim	6		
Two Claims	9		
Three Claims	15		
Four Claims	18		
Five Claims	9		
Total	60		

(1) Severity Range	(2) Number of Occurrences	(3) Probability	(4) Midpoint of Severity Range	(5) (3) x (4)
\$0 - \$1,499	4			
\$1,500 - \$1,999	6			
\$2,000 - \$3,499	9			
\$3,500 - \$4,999	15			
\$5,000 and higher	16			
Total	50			

Average number of monthly claims

Average cost per claim

Expected monthly retained claim cost

75th Percentile Confidence Interval is between

and

Answers to Activity 1—Estimating Hazard Loss Volatility

Complete the calculation worksheet from the information provided in the case study for Barnley Properties.

(1) Number of Claims Reported During the Month	(2) Number of Occurrences	(3) Probability	(4) (1) x (3)
No Claims	3	0.05	0
One Claim	6	0.10	0.1
Two Claims	9	0.15	0.3
Three Claims	15	0.25	0.75
Four Claims	18	0.30	1.2
Five Claims	9	0.15	0.75
Total	60	1.00	3.1

(1) Severity Range	(2) Number of Occurrences	(3) Probability	(4) Midpoint of Severity Range	(5) (3) x (4)
\$0 - \$1,499	4	0.08	750	60
\$1,500 - \$1,999	6	0.12	1,750	210
\$2,000 - \$3,499	9	0.18	2,750	495
\$3,500 - \$4,999	15	0.30	4,250	1,275
\$5,000 and higher	16	0.32	5,000	1,600
Total	50	1.00		3,640

Average number of monthly claims

3.1

Average cost per claim

3,640

Expected monthly retained claim cost

11,284

75th Percentile Confidence Interval is between

4,514 and 18,054