

Equivalence of the 3 Methods of Estimating Bad Debts

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Abstract: *When first learned, the three (3) methods of estimating bad debts appear distinct from one another. But upon closer examination, all three methods actually exhibit a common attribute that is at the same time unique for each business entity. Having known this shared feature led this researcher to establish equivalence and identify the formulas to convert experience rates compliant with the requirements of all three methods. Hence, a business entity may now effectively vary its approach in estimating doubtful accounts without having to be concerned that such new approach may either lead to a result that is far less accurate or compel it to veer away from existing policies and practices it uses to monitor overdue accounts.*

Keywords: bad debts, accounts receivable, overdue accounts, doubtful accounts, experience rates.

1. Introduction

In current accounting literature, we usually find three (3) methods of estimating bad debts. These refer to (a) aging the accounts receivable approach, (b) percent-of-receivables approach and (c) percentage-of-sales approach. Since each of the foregoing methods comply with internationally accepted accounting standards, business entities tend to adopt such method that it deems best suited to its monitoring of overdue accounts.

Typically, business entities with limited resources and capabilities resort to either the percent-of-receivables approach or percentage-of-sales approach. This is because both approaches only require a single/composite rate when computing bad debts estimates. Thus, going by either approach will be fairly easy to apply.

On the other hand, business entities which prefer the aging the accounts receivable approach employ a more structured way in analyzing their bad debts. As its name implies, this approach entails more than one experience rate which are to be applied to each class of accounts receivable. The aging the accounts receivable approach is considered more accurate and scientific because the likelihood of non-payment is correlated with the length of time accounts receivable is reported as being overdue.

Be that as it may, all three methods do share one thing in common and that is, each one provides an approximate calculation of a business entity's bad debts drawn from its historical account of receivables doubtful of collection. It is based on this premise that this researcher asserts equivalence of the three (3) methods of estimating bad debts.

This means to say that regardless of the approach implemented, any business entity required to present its accounts receivable at net realizable value will also be reasonably expected to report a bad debt estimate that will closely resemble its own historical account of receivables doubtful of collection. Merriam-Webster defines

equivalence as the relation holding between two statements if they are either "both true" or "both false" so that to affirm one and to deny the other would result in a contradiction.¹

2. Methodology

To simplify the concept of estimating bad debts, this section will provide information as follows:

- Bad Debts Estimate – An Overview
- Accounting Equation of Allowance for Bad Debts
- Methods of Estimating Allowance for Bad Debts

The last part of this section (Methods of Estimating Allowance for Bad Debts) will focus on how business entities use their own experience rates to estimate bad debts. Please note further that definitions used in the section (Methods of Estimating Allowance for Bad Debts) were all lifted from either local or international literature to emphasize that such methods are regarded around the globe by Certified Public Accountants (CPAs) as different from one another.

The illustrations provided in the section (Methods of Estimating Allowance for Bad Debts) are alike in terms of results but varied in terms of the approach employed. This is so that the critical variables can be isolated, identified and analyzed.

3. Bad Debts Estimate – An Overview

To entice customers to buy their products and/or engage their services, most (if not, all) business entities offer credit terms. However, not all customers who buy on credit are treated equally. This is because customers are discriminated upon by business entities based on their credit scores.

¹ Definition of Equivalence, <http://www.merriam-webster.com/dictionary/equivalence>

Presented below is an approximate breakdown of how an individual's *credit score*² is determined:

1) Payment history	35%
2) Outstanding debt	30%
3) Length of time you've had credit	15%
4) Number of inquiries on your report	10%
5) Types of credit you currently have	10%
Total Credit Score	<u>100%</u>

Given the elements considered to arrive at an individual's credit score, it becomes apparent as to why business entities would prefer to transact with customers with better-than-average credit ratings compared to those bearing poor credit scores.

In contrast with those bearing poor credit scores, customers with above-average credit ratings are less likely to default or incur delay in the payment of their debts.

It is in this context that business entities are required by current accounting standards to estimate their Bad Debts Expense and to provide for an Allowance for Bad Debts in their financial statements.

The effect of recognizing an Allowance for Bad Debts is to reduce the face value (or original invoice amount) of Accounts Receivable at *net realizable value*³. To illustrate,

Accounts Receivable	P	xxx
Less: Allowance for Bad Debts		<u>xxx</u>
Net Realizable Value of Accounts Receivable	P	<u>xxx</u>

4. Accounting Equation of Allowance for Bad Debts

Following is the accounting equation to determine the balance of Allowance for Bad Debts as of the end of the current year⁴.

$$ABD_{BEG} + BD_{CY} + REC_{CY} = ABD_{END} + WRT_{OFFS}$$

Where,

ABD_{BEG}	Allowance for Bad Debts, Beginning Balance
BD_{CY}	Bad Debts Expense, Current Year
REC_{CY}	Recoveries of Accounts Written Off, Current Year
ABD_{END}	Allowance for Bad Debts, Ending Balance
WRT_{OFFS}	Write-Offs ⁵

To facilitate analysis of the three (3) methods used to estimate Bad Debts Expense, we will assume *moving forward* that during the current year there will be **zero recoveries** ($REC_{CY} = 0$) and **zero write-offs** ($WRT_{OFFS} = 0$) such that,

$$ABD_{BEG} + BD_{CY} + 0 = ABD_{END} + 0$$

Or,

$$ABD_{BEG} + BD_{CY} = ABD_{END} \tag{Equation 1}$$

5. Methods of Estimating Allowance for Bad Debts

There are the three (3) methods of estimating Allowance for Bad Debts, namely:

1. Aging the accounts receivable (statement of financial position) approach⁶

The aging of accounts receivable involves an analysis of the accounts where they are classified into *not due* or *past due*. Past due accounts are further classified in terms of the length of the period they are past due. The common classifications are:

- a. Not due
- b. 1 to 30 days past due
- c. 31 to 60 days past due
- d. 61 to 90 days past due
- e. 91 to 120 days past due
- f. 121 to 180 days past due
- g. 181 to 365 days past due
- h. More than 1 year past due
- i. Bankrupt or under litigation

The allowance is then determined by multiplying the total of each classification by the rate or percent of loss experienced by the entity for each category.

The major argument for the use of this method is the more accurate and scientific computation of the Allowance for Bad Debts, and consequently, the accounts receivable are fairly presented in the statement of financial position at net realizable value.

⁵ Write-offs refer to accounts proved to be worthless or uncollectible.

⁶ Estimating doubtful accounts – aging, percentage of accounts receivable and percentage of sales, Chapter 6 – Accounts Receivable, page 279-280, FINANCIAL ACCOUNTING Volume One 2012 Edition, Conrado T. Valix, Jose F. Peralta and Christian Aris M. Valix

² How Credit Scores Work by Lee Ann Obringer, How Stuff Works, <http://money.howstuffworks.com/personal-finance/debt-management/credit-score.htm>

³ Net realizable value is defined as the amount of cash expected to be collected or the estimated recoverable amount. Refer to the section "Accounts Receivable" on page 271, FINANCIAL ACCOUNTING Volume One 2012 Edition, Conrado T. Valix, Jose F. Peralta and Christian Aris M. Valix

⁴ The term "current year" may refer to either a **calendar year** (which ends December 31) or **fiscal year** (which ends on any other month-end except for December 31).

The objection to the aging method is that it violates the matching process.

Moreover, this method could become prohibitively time consuming if a large number of accounts are involved.

Illustration 1

Table 1: The following data are summarized in aging the accounts receivable of Sabrina Mae Company as of December 31, 2011

	(a)	(b)	(a x b)
	<u>Accounts Receivable</u>	<u>Experience rate</u>	<u>Required allowance</u>
Not due	P 500,000	1%	P 5,000
1-30 days past due	300,000	3%	9,000
31-60 days past due	200,000	5%	10,000
61-90 days past due	100,000	8%	8,000
91-180 days past due	50,000	15%	7,500
181-365 days past due	30,000	35%	10,500
More than one year	20,000	50%	10,000
Total	<u>P 1,200,000</u>		<u>P 60,000</u>

The amount computed by aging of accounts receivable represents the required Allowance for Bad Debts at the end of the period. Thus, if the Allowance for Bad Debts has a beginning balance of P'10,000, the Bad Debts Expense is determined as follows:

$$\begin{aligned}
 ABD_{BEG} + BD_{CY} &= ABD_{END} && \text{(Equation 1)} \\
 P\ 10,000 + BD_{CY} &= P\ 60,000 \\
 BD_{CY} &= P\ 60,000 - P\ 10,000 \\
 BD_{CY} &= P\ 50,000
 \end{aligned}$$

2. Percent-of-receivables (statement of financial position) approach⁷

Using past experience, a company can estimate the percentage of its outstanding receivables that will become uncollectible, without identifying specific accounts. This procedure provides a reasonably accurate estimate of the receivable's realizable value. But, it does not fit the concept of matching cost and revenues. Rather, it simply reports receivables in the statement of financial position at cash realizable value.

Companies may apply this method using one composite rate that reflects an estimate of the uncollectible receivables.

Illustration 2

As of December 31, 2011, Sabrina Mae Company reported the balance of its Accounts Receivable at P'1,200,000.

⁷ Bases Used for Allowance Method, Accounts Receivable, Chapter 7 – Cash and Receivables, page 353-354, INTERMEDIATE ACCOUNTING Volume 1 IFRS Edition, Donald E. Kieso, Jerry J. Weygandt, Terry D. Warfield, Team for Success, John Wiley & Sons

Allowance for Bad Debts is estimated at 5% of Accounts Receivables.

Accounts Receivable	P	1,200,000
x Experience Rate		5%
Required Allowance	P	60,000

The amount computed using one composite rate represents the required Allowance for Bad Debts at the end of the period.

Hence, if the Allowance for Bad Debts has a beginning balance of P'10,000, the Bad Debts Expense is determined as follows:

$$\begin{aligned}
 ABD_{BEG} + BD_{CY} &= ABD_{END} && \text{(Equation 1)} \\
 P\ 10,000 + BD_{CY} &= P\ 60,000 \\
 BD_{CY} &= P\ 60,000 - P\ 10,000 \\
 BD_{CY} &= P\ 50,000
 \end{aligned}$$

3. Percentage-of-sales (income statement) approach⁸

In the percentage-of-sales approach, management estimates what percentage of credit sales will be uncollectible. This percentage is based on past experience and anticipated credit policy.

The company applies this percentage to either total credit sales or net credit sales of the current year.

Illustration 3

Assume that Sabrina Mae Company elected to use the percentage-of-sales basis. Based on past experience, it was projected that 1% of net credit sales will become uncollectible. Net credit sales for 2011 totaled P'10,000,000.

Net Credit Sales	P	10,000,000
x Experience Rate		1%
Bad Debts Expense	P	100,000

The amount of bad debt expense and the related credit to the allowance account are unaffected by any balance currently existing in the allowance account. Because the Bad Debt Expense estimate is related to a nominal account (Sales), any balance in the allowance is ignored. Therefore, the percentage-of-sales method achieves a proper matching of cost and revenues.

Suppose *further* that the beginning balance of Allowance for Bad Debts is at P'10,000. Hence, the ending balance of Allowance for Bad Debts will be computed as follows:

⁸ Bases Used for Allowance Method, Accounts Receivable, Chapter 7 – Cash and Receivables, page 353-354, INTERMEDIATE ACCOUNTING Volume 1 IFRS Edition, Donald E. Kieso, Jerry J. Weygandt, Terry D. Warfield, Team for Success, John Wiley & Sons

$$ABD_{BEG} + BD_{CY} = ABD_{END} \quad \text{(Equation 1)}$$

$$P\ 10,000 + P\ 100,000 - ABD_{END} = P\ 110,000 = ABD_{END}$$

The main argument against this method is that the Accounts Receivable may not be shown at estimated realizable value because the allowance for bad debts may prove excessive or inadequate.⁹

Thus, it becomes necessary that from time to time the accounts should be “aged” to ascertain the probable loss and as a consequence of which the rate applied on sales should be revised accordingly.¹⁰

Suppose now that Sabrina Mae Company conducted an aging of its accounts receivables totaling P’1,200,000. Based on the schedule of aged accounts receivables, the required allowance for bad debts of P’60,000 was computed. Kindly refer to Illustration 1 on page 2.

As a consequence, an adjustment will need to be taken up by the company to address the excess allowance for bad debts earlier computed.

Beginning Balance	P	10,000
Bad Debts Expense		100,000
Unadjusted Balance		110,000
Required Allowance		(60,000)
Excess Allowance	P	50,000

6. Main Results

Equivalence of methods of estimating Allowance for Bad Debts

As was made evident from Illustrations 1 through 3, it is possible to arrive at a reasonable amount in Allowance for Bad Debts regardless of the method employed by a business entity.

This is because the rate used to estimate Bad Debts Expense is based on past performance (experience) of the business entity with regard to its efficiency to collect from its portfolio of overdue accounts.

To prove that equivalence exists among the three (3) methods of estimating Allowance for Bad Debts, this research output will identify and establish the factors used:

⁹ Estimating doubtful accounts – aging, percentage of accounts receivable and percentage of sales, Chapter 6 – Accounts Receivable, page 283, FINANCIAL ACCOUNTING Volume One 2012 Edition, Conrado T. Valix, Jose F. Peralta and Christian Aris M. Valix

¹⁰ Estimating doubtful accounts – aging, percentage of accounts receivable and percentage of sales, Chapter 6 – Accounts Receivable, page 283, FINANCIAL ACCOUNTING Volume One 2012 Edition, Conrado T. Valix, Jose F. Peralta and Christian Aris M. Valix

a) To convert the *experience rates for each classification of aged receivables* (used in Aging the Accounts Receivable approach) into *one composite rate* applied on outstanding receivables (shown in Percent-of-Receivables approach), and

b) To derive the *composite rate* applied on outstanding receivables (shown in Percent-of-Receivables approach) from the *experience rate as a percentage of net credit sales* (used in Percentage-of-Sales approach)

Conversion of experience rates for each classification of aged receivables into a single composite rate applied on outstanding receivables (from Aging the Accounts Receivable approach to Percent-of-Receivables approach)

To methodically do this, we will *first* express by way of a mathematical equation the manner by which the Allowance for Bad Debts, Ending Balance (ABD_{END}) is computed. Using Aging the Accounts Receivable approach, we find that

$$ABD_{END} = (AR_{E1} \times ER_1) + (AR_{E2} \times ER_2) + (AR_{E3} \times ER_3) + (AR_{E4} \times ER_4) + (AR_{E5} \times ER_5) + (AR_{E6} \times ER_6) + (AR_{E7} \times ER_7)$$

(Equation 2)

Where,

ABD_{END}	Allowance for Bad Debts, Ending Balance
AR_{E1}	Outstanding Receivables Not Due
ER_1	Experience Rate applied to accounts Not Due
AR_{E2}	Outstanding Receivables 1-30 Days Past Due
ER_2	Experience Rate applied to accounts 1-30 Days Past Due
AR_{E3}	Outstanding Receivables 31-60 Days Past Due
ER_3	Experience Rate applied to accounts 31-60 Days Past Due
AR_{E4}	Outstanding Receivables 61-90 Days Past Due
ER_4	Experience Rate applied to accounts 61-90 Days Past Due
AR_{E5}	Outstanding Receivables 91-180 Days Past Due
ER_5	Experience Rate applied to accounts 91-180 Days Past Due
AR_{E6}	Outstanding Receivables 181-365 Days Past Due
ER_6	Experience Rate applied to accounts 181-365 Days Past Due
AR_{E7}	Outstanding Receivables More than One Year Past Due
ER_7	Experience Rate applied to accounts More than One Year Past Due

Next, we incorporate Equation 2 to Equation 1

$$ABD_{BEG} + BD_{CY} = ABD_{END} \quad \text{(Equation 1)}$$

As a result, we arrive at

$$(AR_{E1} \times ER_1) + (AR_{E2} \times ER_2) + (AR_{E3} \times ER_3) + (AR_{E4} \times ER_4) + (AR_{E5} \times ER_5) + (AR_{E6} \times ER_6) + (AR_{E7} \times ER_7) = ABD_{BEG} + BD_{CY} \quad \text{(Equation 3)}$$

Since ABD_{END} (from Equation 2) is equal to the required Allowance for Bad Debts applying the Aging the Accounts Receivable approach, we can readily assume that Equation 3 will require further adjustment for excessive Allowance for Bad Debts such that

$$ABD_{BEG} = ADJ_{EXCESS} \quad \text{(Assumption 1)}$$

Where,

ABD_{BEG}	Allowance for Bad Debts, Beginning Balance
ADJ_{EXCESS}	Adjustment for Excessive Allowance for Bad Debts

Thus, we expand Equation 3 such that

$$(AR_{E1} \times ER_1) + (AR_{E2} \times ER_2) + (AR_{E3} \times ER_3) + (AR_{E4} \times ER_4) + (AR_{E5} \times ER_5) + (AR_{E6} \times ER_6) + (AR_{E7} \times ER_7) = ABD_{BEG} + BD_{CY} - ADJ_{EXCESS} \quad \text{(Equation 4)}$$

Going by Percent-of-Receivables approach, we find that

$$ABD_{END} = (AR_E \times ER) \quad \text{(Equation 5)}$$

Where,

ABD_{END}	Allowance for Bad Debts, Ending Balance
AR_E	Outstanding Receivables
ER	Experience Rate applied to Outstanding Receivables

Next, we incorporate Equation 5 to Equation 1

$$ABD_{BEG} + BD_{CY} = ABD_{END} \quad \text{(Equation 1)}$$

As a result, we arrive at

$$(AR_E \times ER) = ABD_{BEG} + BD_{CY} \quad \text{(Equation 6)}$$

Given that ABD_{END} (from Equation 5) should equal the required Allowance for Bad Debts when implementing the Percent-of-Receivables approach, it can already be expected that Equation 6 will result to an excessive Allowance for Bad Debts, Ending Balance. This is due to the inclusion of the Allowance for Bad Debts, Beginning Balance in Equation 6. Thus, there is need to adjust Equation 6 as follows

$$ABD_{BEG} = ADJ_{EXCESS} \quad \text{(Assumption 1)}$$

Thus, we expand Equation 6 such that

$$(AR_E \times ER) = ABD_{BEG} + BD_{CY} - ADJ_{EXCESS} \quad \text{(Equation 7)}$$

Because Sabrina Mae Company (or any other business entity for that matter) maintains a **single set** of books of account, we can conclude from Equations 4 and 7 that

$$AR_E = AR_{E1} + AR_{E2} + AR_{E3} + AR_{E4} + AR_{E5} + AR_{E6} + AR_{E7} \quad \text{(Equation 8)}$$

Re-writing Equation 8 in terms of percentages (%) of outstanding receivables, we derive

$$1 = Wt_1 + Wt_2 + Wt_3 + Wt_4 + Wt_5 + Wt_6 + Wt_7 \quad \text{(Equation 9)}$$

Where,

Wt_1	Ratio of Outstanding Receivables Not Due to Total Outstanding Receivables
Wt_2	Ratio of Outstanding Receivables 1-30 Days Past Due to Total Outstanding Receivables
Wt_3	Ratio of Outstanding Receivables 31-60 Days Past Due to Total Outstanding Receivables
Wt_4	Ratio of Outstanding Receivables 61-90 Days Past Due to Total Outstanding Receivables
Wt_5	Ratio of Outstanding Receivables 91-180 Days Past Due to Total Outstanding Receivables
Wt_6	Ratio of Outstanding Receivables 181-365 Days Past Due to Total Outstanding Receivables
Wt_7	Ratio of Outstanding Receivables More than One Year Past Due to Total Outstanding Receivables

Because this researcher claims equivalence between Equations 4 and 7, we set

$$AR_E \times ER = (AR_{E1} \times ER_1) + (AR_{E2} \times ER_2) + (AR_{E3} \times ER_3) + (AR_{E4} \times ER_4) + (AR_{E5} \times ER_5) + (AR_{E6} \times ER_6) + (AR_{E7} \times ER_7) \quad \text{(Equation 10)}$$

Substituting the percentages (%) of outstanding receivables from Equation 9 to Equation 10, we arrive at

$$1 \times ER = (Wt_1 \times ER_1) + (Wt_2 \times ER_2) + (Wt_3 \times ER_3) + (Wt_4 \times ER_4) + (Wt_5 \times ER_5) + (Wt_6 \times ER_6) + (Wt_7 \times ER_7) \quad \text{Or} \\ ER = (Wt_1 \times ER_1) + (Wt_2 \times ER_2) + (Wt_3 \times ER_3) + (Wt_4 \times ER_4) + (Wt_5 \times ER_5) + (Wt_6 \times ER_6) + (Wt_7 \times ER_7) \quad \text{(Equation 11)}$$

Table 2. Inputting the data supplied from Illustration 1 on page 2 into Equation 11, we will be able to derive the **composite rate of 5.0%** used in Illustration 2 on page 3.

		(a)	(b)	
	Accounts Receivable	% to Total	Experience rate	(a x b)
Not due	P 500,000	41.67%	1.00%	0.42%
1-30 days past due	300,000	25.00%	3.00%	0.75%
31-60 days past due	200,000	16.67%	5.00%	0.83%
61-90 days past due	100,000	8.33%	8.00%	0.67%
91-180 days past due	50,000	4.17%	15.00%	0.63%
181-365 days past due	30,000	2.50%	35.00%	0.88%
More than one year	20,000	1.67%	50.00%	0.83%
Total	P 1,200,000	100.00%		5.00%

Derivation of one composite rate applied on outstanding receivables from the experience rate as a percentage of net credit sales (from *Percent-of-Receivables approach to Percentage-of-Sales approach*)

Recall the mathematical expression to derive the Allowance for Bad Debts using the Percent-of-Receivables approach which is

$$ABD_{END} = (AR_E \times ER) \tag{Equation 5}$$

Such that

$$(AR_E \times ER) = ABD_{BEG} + BD_{CY} - ADJ_{EXCESS} \tag{Equation 7}$$

Next up, we provide the equation to determine the Allowance for Bad Debts using the Percentage-of-Sales approach which is

$$ABD_{END} = ABD_{BEG} + (CS_{Net} \times ER_{CSNET}) \pm ADJ \tag{Equation 12}$$

Where,

ABD_{END}	Allowance for Bad Debts, Ending Balance
ABD_{BEG}	Allowance for Bad Debts, Beginning Balance
CS_{Net}	Net Credit Sales
ER_{CSNET}	Experience Rate based on Net Credit Sales
ADJ	Adjustment for Excessive or Inadequate Allowance for Bad Debts

At this point, we will establish equivalence among *experience rates* used in Equations 4, 7 and 12 which are as follows:

- Aging the accounts receivable (statement of financial position) approach

$$ER_n = \sum_1^n \frac{BD_{Hn} + AR_{Hn}}{AR_{Hn}} \tag{Equation 13}$$

Where,

ER_n	Experience Rate applied to accounts in Category n
BD_{Hn}	Total Historical Bad Debts experience from accounts in Category n
AR_{Hn}	Total Historical Outstanding Receivables from accounts in Category n

Category n represents each and all account classifications in terms of the length of the period they are past due.

- Percent-of-receivables (statement of financial position) approach

$$ER = \frac{BD_H + AR_H}{AR_H} \tag{Equation 14}$$

Where,

ER	Experience Rate applied to Outstanding Receivables
BD_H	Total Historical Bad Debts experience
AR_H	Total Historical Outstanding Receivables

- Percentage-of-sales (income statement) approach

$$ER_{CS} = \frac{BD_H + CS_{HNET}}{CS_{HNET}} \tag{Equation 15}$$

Where,

ER_{CS}	Experience Rate applied to Net Credit Sales
BD_H	Total Historical Bad Debts experience
CS_{HNET}	Total Historical Net Credit Sales

Recall how we established equivalence between Aging the accounts receivable approach and Percent-of-receivables approach via

$$ER = (Wt_1 \times ER_1) + (Wt_2 \times ER_2) + (Wt_3 \times ER_3) + (Wt_4 \times ER_4) + (Wt_5 \times ER_5) + (Wt_6 \times ER_6) + (Wt_7 \times ER_7) \tag{Equation 11}$$

Similarly, we can apply the *same logic* with Equations 13 and 14 such that

$$\sum_1^n \{(BD_{Hn} + AR_{Hn}) \times (Wt_n)\} = BD_H + AR_H \tag{Equation 16}$$

Where,

$$\sum_1^n (BD_{Hn} \times Wt_n) = BD_H$$

And

$$\sum_1^n (AR_{Hn} \times Wt_n) = AR_H$$

This section will next establish equivalence between Equations 14 and 15 such that

$$\left(\frac{BD_H}{AR_H}\right) = \left(\frac{BD_H}{CS_{HNET}}\right) \quad \text{(Equation 17)}$$

Because Equations 14 and 15 share the same numerator (BD_H) and their denominators (AR_H and CS_{HNET}) are related, we can therefore derive two (2) conversion factors (x_1 and x_2) as follows

(1) Assign x_1 to the left side of Equation 17

$$\begin{aligned} \left(\frac{BD_H}{AR_H}\right) x_1 &= \left(\frac{BD_H}{CS_{HNET}}\right) \\ x_1 &= \left(\frac{BD_H}{CS_{HNET}}\right) + \left(\frac{BD_H}{AR_H}\right) \\ x_1 &= \left(\frac{BD_H}{CS_{HNET}}\right) \times \left(\frac{AR_H}{BD_H}\right) \\ x_1 &= \left(\frac{AR_H}{CS_{HNET}}\right) \end{aligned}$$

x_1 is used to convert experience rates from Percent of receivables approach to Percentage-of-sales approach.

x_1 is the ratio of total historical outstanding receivables to total historical net credit sales.

From Illustrations 2 and 3, we then use the 5% experience rate on outstanding accounts receivable, and 1% experience rate on net credit sales to derive x_1 .

Thus,

$$\begin{aligned} \left(\frac{BD_H}{AR_H}\right) x_1 &= \left(\frac{BD_H}{CS_{HNET}}\right) \\ (5\%)(x_1) &= 1\% \\ x_1 &= 1\% + 5\% \\ x_1 &= 20\% \end{aligned}$$

(2) Assign x_2 to the left side of Equation 17

$$\begin{aligned} \left(\frac{BD_H}{CS_{HNET}}\right) x_2 &= \left(\frac{BD_H}{AR_H}\right) \\ x_2 &= \left(\frac{BD_H}{AR_H}\right) + \left(\frac{BD_H}{CS_{HNET}}\right) \\ x_2 &= \left(\frac{BD_H}{AR_H}\right) \times \left(\frac{CS_{HNET}}{BD_H}\right) \end{aligned}$$

$$x_2 = \left(\frac{CS_{HNET}}{AR_H}\right)$$

x_2 is used to convert experience rates from Percentage-of-sales approach to Percent of receivables approach.

x_2 is the ratio of total historical net credit sales to total historical outstanding receivables.

From Illustrations 2 and 3, we then use the 5% experience rate on outstanding accounts receivable, and 1% experience rate on net credit sales to derive x_2 .

Thus,

$$\begin{aligned} \left(\frac{BD_H}{CS_{HNET}}\right) x_2 &= \left(\frac{BD_H}{AR_H}\right) \\ (1\%)(x_2) &= 5\% \\ x_2 &= 5\% + 1\% \\ x_2 &= 500\% \end{aligned}$$

Lastly, we derive $\pm ADJ$ from Equation 12 using percentage-of-receivables approach and percentage-of-sales approach to describe the variables.

$$ABD_{END} = ABD_{BEG} + (CS_{Net} \times ER_{CSNET}) \pm ADJ \quad \text{(Equation 12)}$$

$$\pm ADJ = (ABD_{BEG} - ABD_{END}) + (CS_{Net} \times ER_{CSNET}) \quad \text{(Equation 18)}$$

To simplify Equation 18, we may re-write as

$$\pm ADJ = \Delta ABD + (CS_{Net} \times ER_{CSNET}) \quad \text{(Equation 19)}$$

Where, the variable (ΔABD) represents the change in the balance of Allowance for Bad Debts.

To expound on the variable (ΔABD), let us substitute Equation 5 to Equation 18

$$\pm ADJ = (AR_{BEG} \times ER_{BEG}) - (AR_{END} \times ER_{END}) + (CS_{Net} \times ER_{CSNET})$$

The above equation is similar to

$$\begin{aligned} \pm ADJ &= (AR_{BEG} \times ER_{BEG}) - ((AR_{BEG} + \Delta AR) \times (ER_{BEG} + \Delta ER)) \\ &\quad + (CS_{Net} \times ER_{CSNET}) \end{aligned}$$

Expanding the expression

“($(AR_{BEG} + \Delta AR) \times (ER_{BEG} + \Delta ER)$)”, we find that

$$\begin{aligned} \pm ADJ &= (AR_{BEG} \times ER_{BEG}) - ((AR_{BEG} \times ER_{BEG}) + (AR_{BEG} \times \Delta ER) \\ &\quad + (\Delta AR \times ER_{BEG}) + (\Delta AR \times \Delta ER)) + (CS_{Net} \times ER_{CSNET}) \end{aligned}$$

$$\pm ADJ = (AR_{BEG} \times ER_{BEG}) - (AR_{BEG} \times ER_{BEG}) - (AR_{BEG} \times \Delta ER) - (\Delta AR \times ER_{BEG}) - (\Delta AR \times \Delta ER) + (CS_{Net} \times ER_{CSNET})$$

$$\pm ADJ = -(AR_{BEG} \times \Delta ER) - (\Delta AR \times ER_{BEG}) - (\Delta AR \times \Delta ER) + (CS_{Net} \times ER_{CSNET})$$

(Equation 20)

Where,

AR_{BEG}	Outstanding Receivables, Beginning Balance
ER_{BEG}	Experience Rate applied to Outstanding Receivables, Beginning Balance
ΔAR	Change in the balance of Outstanding Receivables
ΔER	Change in Experience Rates

Inputting data from Illustrations 2 and 3, we then compute for the variable $\pm ADJ$

(1) Using Equation 18,

$$\pm ADJ = (ABD_{BEG} - ABD_{END}) + (CS_{Net} \times ER_{CSNET})$$

$$\pm ADJ = (P10,000 - P60,000) + (P100,000)$$

$$\pm ADJ = P50,000$$

Note that $\pm ADJ$ of P50, 000 is equal to the Excess Allowance computed in Illustration 3.

(2) Using Equation 20 and assuming further that ARBEG is P'1,000,000 and that the experience rate on ARBEG or ERBEG is 1%.

$$\pm ADJ = -(AR_{BEG} \times \Delta ER) - (\Delta AR \times ER_{BEG}) - (\Delta AR \times \Delta ER) + (CS_{Net} \times ER_{CSNET})$$

$$\pm ADJ = -(P1,000,000 \times 4\%) - (P200,000 \times 1\%) - (P200,000 \times 4\%) + (P100,000)$$

$$\pm ADJ = -(P40,000) - (P2,000) - (P8,000) + (P100,000)$$

$$\pm ADJ = P50,000$$

Note that $\pm ADJ$ of P50, 000 is equal to the Excess Allowance computed in Illustration 3.

7. Concluding Remarks

To summarize, the three different approaches will ultimately yield the same estimate of bad debts given that the business entity utilizes experience rates obtained from its historical account of receivables doubtful of collection.

More importantly, the article also showed that there exists ways to convert experience rates to and from the three different approaches. That is from Aging the Receivables approach to Percent-of-receivables approach to Percentage-of-sales approach and vice-versa. As a result, business entities may not necessarily need to gather historical data to

determine its experience rates using the other approaches it has yet to apply.

Having the flexibility to convert experience rates or to use all three methods of estimating bad debts also allows the business entity to simplify its procedures when forecasting collections from credit sales – which is a critical component when analyzing cash flows.

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