Reserving Chapter 13 - Berquist-Sherman Method

Reading: Friedland, J.F., Estimating Unpaid Claims Using Basic Techniques, Casualty Actuarial Society, Third Version, July 2010. The Appendices are excluded.

Chapter 13: Berquist-Sherman Methods

> **Sample Wiki article:** This is a sample of one of our wiki articles made into a pdf. The subscriber version is on-line and interactive with on-line quizzes, interactive links, practice problems and more.

Contents

Study Tips

There are 2 versions of the Berquist-Sherman method:

> **reported method** - adjusts for changes in case reserve adequacy *(full method is frequently asked on exam)*
> **paid method** - adjusts for changes in settlement rate of claims *(full method is not frequently asked on exam)*

Both methods have time-consuming calculations but the reported method is easier and is asked more often. The paid method has one particular step *(the interpolation step)* that is very confusing and you are not often asked to do the calculations form start to finish. For the paid method you're more likely to be asked concept questions or to perform only a portion of the calculations.

There's also a short section at the beginning of the chapter on *Data Selection & Rearrangement*. The idea is you should first just try to select "good" data before going to the trouble of making complicated adjustments as in the Berquist-Sherman methods.

Estimated study time: 1 week *(not including subsequent review time)*

BattleTable

Based on past exams, the **main things** you need to know *(in rough order of importance)* are:

- **reported Berquist-Sherman method** - *calculate ultimate / unpaid / IBNR*
- **paid Berquist-Sherman method** - *calculate ultimate / unpaid / IBNR*

reference	part (a)	part (b)	part (c)	part (d)
E (2019.Fall #21)	**reported BS:** - calc unpaid			
E (2019.Spring #14)	**accuracy of paid devlpt**: - evaluate			
E (2019.Spring #22)	**reported BS:** - calc ultimate			
E (2018.Spring #21)	Excel Practice Problems			
E (2017.Fall #24)	**reported BS:** - calc IBNR	**alternate method**: - propose & justify		
E (2017.Spring #22)	**paid BS** - claim count adjustment			
E (2016.Fall #23)	**reported BS**, **BF** - calc unpaid			
E (2016.Spring #20)	**paid BS** - calc ultimate			
E (2016.Spring #21)	Friedland06.Diagnostics	**ultimate**: - suggest method		
E (2015.Fall #21)	**paid BS** - disposal rate	**paid BS** - distortion		
E (2015.Spring #22)	**impact**: - settlement rate change	**response**: - to settlement rate change	**related methods**: - rptd B-S, rptd devlpt	
E (2015.Spring #23)	**evaluate methods**: - paid & rptd devlpt	**adjustment to method**: - propose & justify		
E (2014.Fall #20)	**reported BS**, **paid BS** - calc ultimate			
E (2014.Spring #18)	**ultimate**: - select & apply 2 methods			
E (2013.Fall #6)	**reported BS:** - calc ultimate [1]			
E (2013.Fall #21)	**paid BS** - calc ultimate			
E (2013.Fall #23)	**operational change**: - explain	**investigating the change**: - questions for clms mgmt [2]	**diagnostics**: - to check results [3]	
E (2013.Spring #23)	**reported BS:** - adjust rptd triangle	**compare IBNR**: adjusted vs unadjusted		

[1] This question requires knowledge of pricing. You may need to come back to it later if you haven't covered the pricing material yet.
[2] See *Chapter 4 - Meetings* for potential questions.
[3] Review *Chapter 6 - Diagnostics* but note that valid answers can include diagnostics other than those specifically discussed in chapter 6. You may also find *Chapter 15 - Evaluating Methods* helpful.

Full BattleQuiz

In Plain English!

Data Selection and Rearrangement

In *Chapter 6*, we discussed the effects of changes in case reserve strength and claim settlement rate on diagnostic triangles. In *Chapter 7*, we investigated how changes in case reserve strength affect the development method. Here are 2 facts, you absolutely must know:

- a change in case reserve strength affects **reported** data *(paid data is not affected)*
- a change in settlement rate affects **paid** data *(reported data is not affected)*

So, if I gave you a paid loss triangle and a reported loss triangle and told you there had been a change in case reserve strength, which triangle would you rather use to develop estimates of ultimates? It's easy: use the **paid** triangle because it is not affected by changes in case strength. The reported loss triangle could have distortions that cause the reported development method to either over or under-estimate the true ultimate.

But what if I told you there had been a change in the settlement rate of claims, then which triangle would you rather use? Again, it's easy: use the **reported** triangle because it is not affected by changes in settlement rate. In this situation, it's the paid triangle that's distorted so the paid development method is less likely to be accurate.

What we did above is called **data selection**. In other words, select data that's more likely to be free of distortions and try not to use data that you know may lead to inaccurate results.

Here are a few other examples...

situation	data selection
• change in definition of counts *(claim versus claimant)* • see *Chapter 11 - FS Method Key Assumptions* for a simple example	• use **exposures** in place of claim counts
• change in policy limits between policy years	• use **policy year data** in place of accident year data
• court decisions that correlate with report date • see *Chapter 11 - Disposal Rate Method* for an exam problem involving a court decision	• use **report year data** in place of accident year data
• significant growth or shrinkage causing a shift in average accident date	• use **accident quarters** in place of accident years
• change in mix of business • see *Chapter 7 - Scenario 6 (Change in Product Mix)* for an example of a change in mix	• **subdivide data** into more homogeneous groups

mini BattleQuiz 1

Berquist-Sherman Reported Method

Description of Method

Here's the first fact you have to memorize:

Purpose of Berquist-Sherman Reported Method: Adjust reported data for distortions caused by changes in case reserve adequacy *(case strength)*.

In practice, the first thing you should do in a reserve analysis is check for things like changes in case reserve adequacy. If there have not been changes, then you don't need the Berquist-Sherman reported adjustment. In the Pop Quiz at the top of this wiki article, we reviewed diagnostics for increases in case reserve adequacy:

→ **paid/reported loss**, **average reported loss**, **average case O/S loss**

Notice that the average paid loss *(also called paid severity)* is not listed – we learned in chapter 6 that a change in case strength does not affect paid data. But in **step 1b** further down, the overall severity trend is calculated from the average paid loss triangle. That might not seem right but here's the explanation:

- Without any change in case strength, there is still probably an underlying severity trend, often just due to inflation.
- This severity trend would show up in both the paid severity and outstanding severity triangles and would be roughly the same in each.
- Then if there is a change in case strength, the paid severity trend would not change but the outstanding severity trend would change
- The paid severity trend is the true trend but the outstanding severity trend is now distorted due to the change in case strength
- The Berquist-Sherman reported adjustment removes this distortion from the reported data

For example suppose both the paid and outstanding severity trends were 3% before any change in case strength. Then after the change in case strength, the paid severity trend is still 3%, but the outstanding severity trend is 5%. The Berquist-Sherman reported adjustment removes the 5% trend and restates or detrends the outstanding severity triangle back to a 3% trend.

Below is an exam problem that demonstrates the method. The solution in the examiner's report is very good because they write out all the intermediate steps. Note that this problem provides the severity trend of 5%. *(You don't have to estimate it yourself.)* Alice's solution has an extra step in case you're not given the severity trend and have to come up with it yourself.

E **(2019.Fall #21)**

Solution: 2019.Fall #21

For reference, here's the step-by-step procedure from Alice's solution:

- Normally you're given **CPL**, **CRL CPC**, **CRC**

(For a review of these abbreviations, see Chapter 11 - Disposal Rate Method.)

Step 1

Step 1a: calculate APL, ACOS *(APL = Average Paid Loss or Paid Severity, ACOS = Average Case Outstanding or Outstanding Severity)*

→ APL = CPL / CPC
→ ACOS = (CRL - CPL) / (CRC - CPC)

Step 1b: calculate and select severity trend using APL *(if severity trend is not given)*, check for evidence of change in case strength using ACOS

→ calculate APL trends down columns and make selections
→ calculate ACOS trends down columns and look for changes that might indicate a change in case strength

Step 2

Step 2a: restate ACOS by detrending backwards from latest diagonal
Step 2b: restate CRL as (restated ACOS) x (open counts) + (original CPL)

→ *note that open counts = CRC - CPC = (cumulative reported counts) - (cumulative paid counts)*

Step 3

- apply the development method to the restated CRL triangle

(Just apply the standard development to the restated triangle of cumulative reported losses. Easy! Theoretically, this restated CRL is now corrected for any changes in case strength. All AYs should be at the same level and the development method applied to this triangle shouldn't be distorted.)

Practice Problems

A couple of random practice problems where you have to select the severity trend yourself:

Practice: 2 problems on the Berquist-Sherman REPORTED method]

And the quiz with a selection of old exam problems:

mini BattleQuiz 2

Berquist-Sherman Paid Method

Description of Method

Here's the first fact you have to memorize:

Purpose of Berquist-Sherman Paid Method:	Adjust paid data for distortions caused by changes in claim settlement rate.

In practice, the first thing you should do in a reserve analysis is check for things like changes in the claim settlement rate. If there have not been changes, then you don't need the Berquist-Sherman paid adjustment. In the Pop Quiz at the top of this wiki article, we reviewed diagnostics for increases in settlement rate:

→ **paid/reported loss**, **paid/reported counts** or **average case O/S loss**

But there's another very useful diagnostic if you also know **UC** *(Ultimate counts)*, It's called the **CDR** *(Claims Disposal Rate)*.

CDR = CPC / UC

Recall CPC is Cumulative Paid Counts. And very often in exam problems on the BS Paid Method, you will be given ultimate counts. That's the case in the first BS Paid exam problem we're going to look at below. So if the ultimate counts for AY 2020 is 100, and at 12 months development you have 50 paid counts, then CDR_{12} = 50/100 = 0.5. If at 24 months the paid counts is 80 then CDR_{24} = 80/100 = 0.8, and so on.

This problem is an example of the full Berquist-Sherman paid method. Don't bother trying to figure out the solution in the examiner's report because Alice's solution is much clearer. It looks complicated but don't be alarmed. It's all quite easy except for the interpolation step, but don't worry if you don't completely understand the interpolation the first time through. We'll cover that in much more detail in the next section.

E **(2016.Spring #20)**

Solution: 2016.Spring #20

For reference, here's the step-by-step procedure from Alice's solution:

- Normally you're given **CPC**, **UC**, **CPL**

(For a review of these abbreviations, see Chapter 11 - Disposal Rate Method.)

Step 1

Step 1a: calculate CDR

→ This is to check for changes in claim settlement rate. Increases down columns generally indicate an increase in settlement rate.
→ Make CDR selections for each column. Do not select the average. Do select the most recent diagonal.

Step 1b: restate CPC using the CDR from step 1a

→ This is done by multiplying the **UC** for each AY by the vector of selected **CDRs**

Step 2

- restate CPL using either linear or exponential interpolation

(Many students find this step confusing. We'll discuss it in detail further down. Don't worry if you don't follow it the first time through.)

Step 3

- apply the development method to the restated CPL triangle

(Just apply the standard development to the restated triangle of cumulative paid losses. This should be easy for you! Theoretically, this restated CPL is now corrected for any changes in the claim settlement rate. All AYs should be at the same level and the development method applied to this triangle shouldn't be distorted.)

Interpolation Step in BS Paid Method

If you've read the Chapter 13 in the Friedland source text, you may have noticed that linear interpolation is not discussed. The source text only explains exponential interpolation, but here's an exam problem that specifically asks you to use linear interpolation. Don't do it now. I just wanted to point that out.

E **(2013.Fall #21)**

We're going to isolate and study the interpolation step of the Berquist-Sherman paid method in detail. Then when you attempt a full BS paid problem, it should go smoothly.

Example A: Linear Interpolation

Suppose you're given 2 points on the real plane:

- $(x_0, y_0) = (10,500)$
- $(x_1, y_1) = (20,600)$

Question 1: Use linear interpolation to find the y-value corresponding to x = 16.

Answer:

- y = [(16 - 10) / (20 - 10)] * (600 - 500) + 500 = 560

Actually, the formula makes it harder to see what's going on. Because the numbers are so simple, you can easily see that x = 16 is 60% of the way between 10 and 20. *(That's the quantity inside the square brackets.)* Then the corresponding y-value must also be 60% of the way between 500 and 600 which is obviously 560.

Of course, if the numbers aren't so simple you might not be able to do the calculation in your head. Suppose you're now given:

- $(x_0, y_0) = (21.2, 378.6)$
- $(x_1, y_1) = (64.7, 982.0)$

Question 2: Use linear interpolation to find the y-value corresponding to x = 31.2.

Answer:

- y = [(31.2 - 21.2) / (64.7 - 21.2)] * (982.0 - 378.6) + 378.6 = 517.3

You can write out the formula as shown below, but I don't think this is the most helpful way to think about it:

- $y = [(x - x_0) / (x_1 - x_0)] * (y_1 - y_0) + y_0$

Think about it like this instead:

linear interpolation: y = [proportional distance of x from x_0] * $(y_1 - y_0) + y_0$

In terms of high school algebra, you're basically just fitting a linear equation $y = mx + b$ to the given points and then using that equation to get the *new y-value* corresponding to the *given x-value*. But you don't actually have to find *m* and *b*. That would take too long. If you understand how interpolation works intuitively, you can do it much quicker.

Example B: Linear Interpolation Applied to Paid Data

Instead of *x-values* and *y-values* we're now going to use *paid counts* and *paid losses* which is what you have in the Berquist-Sherman paid method. Suppose you're given the following data for AY 2020.

data type	12-months	24-months	36-months	48-months
CPC	10	20	25	28
CPL	500	600	640	670

Remember the first step of the BS paid method is to calculate CDR *(Claims Disposal Rate)* then use it to restate CPC *(Cumulative Paid Counts)*. Let's suppose you did that and found the restated CPC values to be:

data type	12-months	age 24-months	age 36-months	age 48-months
restated CPC	15	18	24	28
restated CPL	?	?	?	?

The **interpolation step** is finding the corresponding restated CPL-values in the above table. Let's do them one by one:

12-months:

→ since restated CPC_{12} = 15 is within the 12-24 interval of the original CPC-values, we do the interpolation using original CPC and CPL values as follows:

- $(x_0, y_0) = (CPC_{12}, CPL_{12}) = (10, 500)$
- $(x_1, y_1) = (CPC_{24}, CPL_{24}) = (20, 600)$

→ restated CPL_{12} = [(15 - 10) / (20 - 10)] * (600 - 500) + 500 = 550

24-months:

→ since restated CPC_{24} = 18 is **still** within the 12-24 interval of the original CPC-values, we do the interpolation using the same original CPC and CPL values as before:

- $(CPC_{12}, CPL_{12}) = (10, 500)$
- $(CPC_{24}, CPL_{24}) = (20, 600)$

→ restated CPL_{24} = [(18 - 10) / (20 - 10)] * (600 - 500) + 500 = 580

36-months:

→ since restated CPC_{36} = 24 is within the 24-36 interval of the original CPC-values, we do the interpolation using original CPC and CPL values as follows:

- $(CPC_{24}, CPL_{24}) = (20, 600)$
- $(CPC_{36}, CPL_{36}) = (25, 640)$

→ restated CPL_{36} = [(24 - 20) / (25 - 20)] * (640 - 600) + 600 = 632

48-months:

→ if we assume the 48-month value is the lastest diagonal then the restated CPC and CPL values are the same as the orignal values and no calculation is necessary
→ restated CPL_{48} = original CPL_{48} = 670

Bonus Question 1: what if restated CPC_{36} = 26 *(instead of 24)*

→ if restated CPC_{36} = 26 then you have to use a different interval **and this is the part that confuses people**. You have to notice that 26 is in the original 36-48 CPC-interval and then use the original CPC and CPL values corresponding to that interval:

- $(CPC_{36}, CPL_{36}) = (25, 640)$
- $(CPC_{48}, CPL_{48}) = (28, 670)$

→ restaed CPL_{36} = [(26 - 25) / (28 - 25)] * (670 - 640) + 640 = 650

Bonus Question 2: what if restated CPC_{12} = 9 *(instead of 15)*

→ if restated CPC_{12} = 9 then you have a **choice**. You **could** use the same interval as we did for interpolating the paid value of 15 and you would get:

- CPL_{12} = [(9 - 10) / (20 - 10)] * (600-500) + 500 = 490

→ **Or**, use the origin (0,0) as your other interpolation point as follows, which I think makes more sense because if CPC = 0 then CPL = 0 also. *(Note you may get a different answer but the source text doesn't specify a method so either should be acceptable.)*

- $(CPC_0, CPL_0) = (0, 0)$
- $(CPC_{12}, CPL_{12}) = (10, 500)$

→ restated CPL_{12} = [(9 - 0) / (10 - 0)] * (500 - 0) + 0 = <u>450</u>

Now you can attempt **(2013.Fall #21)**. The examiner's report performs their linear interpolation using **selected disposal rates** without explicitly calculating the restated paid counts. This is potentially quicker than my method but it's easier to make a mistake. You can decide for yourself how you'd rather do it but the more steps you write out, the more partial credit you'll get if your final answer isn't exactly right.

Alice's solution below shows both linear and exponential interpolation even though the official problem asked only for linear interpolation. *(If you're asked to perform exponential interpolation on the exam, you should always be given the parameters for the exponential regression.)*

E **(2013.Fall #21)**
Solution: 2013.Fall #21

And here's the solution to **(2016.Spring #16)** using both linear and exponential interpolation. *(The question asked only for exponential interpolation.)*

E **(2016.Spring #20)**
Solution: 2016.Spring #16

Example C: Exponential Interpolation

Let's revisit the first problem from *Example A: Linear Interpolation* but this time we're going to use exponential intepolation. Suppose you're given 2 points on the real plane:

- (x_0, y_0) = (10,500)
- (x_1, y_1) = (20,600)

Suppose you're also given the regression parameters $a = 417$ and $b = 0.01840$ for the exponential regression $y = ae^{bx}$.

Question 1: Use <u>exponential</u> interpolation to find the y-value corresponding to x = 16.

Answer: All you have to do is substitute x = 16.

- $y = 417 * e^{(0.01840 * 16)}$ = <u>559.7</u>

This is very close to the answer of 560 you get with linear interpolation. Exponential interpolation in a Berquist-Sherman problem is generally easier than linear interpolation because you will be given the exponential regression parameters.

Let's now do a problem that's closer to what you'll have to do on the exam using *paid counts* and *paid losses*. We did this exact problem earlier using linear interpolation but here you are also given the exponential regression parameters for each successive pair of (count, loss) values.

data type	12-months	24-months	36-months	48-months
CPC	10	20	25	28
CPL	500	600	640	670

AY	0-12		12-24		24-36		36-48	
	a	b	a	b	a	b	a	b
2020	*use 12-24 values*	*use 12-24 values*	417	0.01840	463	0.01299	437	0.1539

The regression parameters for each interval are based on these pairs of given values:

12-24: uses (10, 500) & (20, 600)
24-36: uses (20, 600) & (25, 640)
36-48: uses (25, 640) & (28, 670)

Remember the first step of the BS paid method is to calculate CDR *(Claims Disposal Rate)* then use it to restate CPC *(Cumulative Paid Counts)*. Let's suppose you did that and found the restated CPC values to be:

data type	12-months	age 24-months	age 36-months	age 48-months
restated CPC	15	18	24	28
restated CPL	?	?	?	?

The **interpolation step** is finding the corresponding restated CPL-values in the above table. Let's do them one by one:

12-months:

→ since restated CPC_{12} = 15 is within the 12-24 interval of the <u>original</u> CPC-values, we use the *a* and *b* for the 12-24 range:
→ restated CPL_{12} = $417 * e^{(0.01840 * 15)}$ = <u>549.5</u>

24-months:

→ since restated CPC_{24} = 18 is **still** within the 12-24 interval of the original CPC-values, we use the *a* and *b* for the 12-24 range as before:
→ restated CPL_{24} = $417 * e^{(0.01840 * 18)}$ = 580.7

36-months:

→ since restated CPC_{36} = 24 is within the 24-36 interval of the original CPC-values, we use the *a* and *b* for the 24-36 range:
→ restated CPL_{36} = $463 * e^{(0.01299 * 24)}$ = 632.4

48-months:

→ if we assume the 48-month value is the lastest diagonal then the restated CPC and CPL values are the same as the orignal values and no calculation is necessary
→ restated CPL_{48} = original CPL_{48} = 670

Bonus Question 1: what if restated CPC_{36} = 26 *(instead of 24)*

→ if restated CPC_{36} = 26 then you have to use a different interval **and this is the part that confuses people**. You have to notice that 26 is in the original 36-48 CPC-interval and then use the *a* and *b* for the 36-48 range:
→ restated CPL_{36} = $437 * e^{(0.01539 * 26)}$ = 652.0

Bonus Question 2: what if restated CPC_{12} = 9 *(instead of 15)*

→ if restated CPC_{12} = 9 then unlike with linear interpolation you have a **no choice**. You **must** use the **12-24** parameters. You cannot perform a regression on the **0-12** interval because an exponential curve curve cannot pass through the origin and there is no other logical left endpoint for the **0-12** interval.

- CPL_{12} = $417 * e^{(0.01840 * 9)}$ = 492.1

Practice Problems

Here are 2 problems that deal only with the interpolation step of the Berquist-Sherman paid method. If you're confident with interpolation, you can skip these.

Practice: 2 problems on Berquist-Sherman Interpolation

And here are 2 full practice problems on the Berquist-Sherman paid method:

Practice: 2 problems on the Berquist-Sherman PAID method

And finally, here's the quiz with old exam problems:

mini BattleQuiz 3

BS Methods Combined

Sometimes you have a situation where there's been both a change in claim settlement rate and and change in case reserve adequacy. In this case you might want to apply both Berquist-Sherman methods to your data. Recall that for the BS Reported Method, you'd typically be given:

- **CPL**, **CRL**, **CPC**, **CRC**

For the BS Paid Method, you'd have:

- **CPC**, **UC**, **CPL**

So the only extra piece of information you need for the paid method is **UC**. Putting this all together, your starting point for applying both Berquist-Sherman methods is these 5 items:

Data Needed for Both BS Methods: CPL, CRL, CPC, CRC, UC

You must do the BS paid adjustment first to obtain:

- restated CPC, restated CPL

Then feed these into the BS reported adjustment. That means you use the following data as your starting point for the BS reported adjustment:

- **restated CPL**, **CRL**, **restated CPC**, **CRC**

Here's an exam problem where you have to do this. It looks harder than it really is. You just need to keep your work organized. They help you out by giving you the interpolated values for the BS paid method so you don't have to stop and calculate them yourself.

(E) **(2014.Fall #20)**

Alice's BS Combined Hint: Do the paid adjustment first. Do the reported adjustment second. *Simple!* :-)

BS Method Concepts

Memorize the answers to these next 2 items:

Question: identify advantages of the Berquist-Sherman methods

B-S Paid method:

- corrects for changes in claim settlement rate so the *Key Assumption* of the development method holds

B-S Reported method:

- corrects for changes in case reserve adequacy so the *Key Assumption* of the development method holds

Question: identify disadvantages of the Berquist-Sherman methods

B-S Paid method:

- assumes changes in settlement rate apply to all claims uniformly *(paid losses are proportional to closed counts)*

(won't be true if small claims settle faster and large claims settle more slowly)

B-S Reported method:

- very sensitive to the selected trend

Here's a great exam problem that tests whether you really understand what the Berquist-Sherman methods are doing and/or not doing. You're told that an insurer began prioritizing small claims so that small claims are now being settled faster. You're then asked to explain why neither the paid nor reported development method will work. *(See discussion below.)*

(E) **(2015.Spring #23)**

Part (a.i), explaining why paid development won't work is easy:

- an increase in settlement rate violates the *Key Assumption* of the development method, that future loss development is similar to development in prior years

Part (a.ii), explaining why reported development won't work is a little trickier and you should read the 3 sample answers in the examiner's report which I've paraphrased below. Note that for sample answer 2, the conclusion is that reported development will work:

1. if small claims are prioritized then large claims may be given less attention and will develop differently than in the past *(so the Key Assumption of the development method is violated)*
2. if case reserves for small claims are accurate then settling them more quickly has no effect on reported losses *(you may have to think about that for a minute – if case reserves were deficient/redundant, then as soon as a claim is paid and closed for the higher/lower amount the reported loss would immediately get bumped up/down to reflect that **but** if the case reserves were correct the reported losses would not require adjustment and the reported development method would work)*
3. if case reserves for small claims are deficient/redundant then reported losses would be distorted as explained in the previous bullet point

Part (b) of this problem goes deeper and many candidates did not answer correctly. When we talk in general about an increase in settlement rate, we're usually assuming the settlement rate increases **for all claims**. In other words, both small claims and large claims are settled faster. What often happens however is that **only small claims** are settled faster. This is the situation in this exam problem and this has a couple of knock-on effects:

- paid severity will **decrease** at earlier development periods
- outstanding severity will **increase** at later development periods

If only small claims are settled faster then the Berquist-Sherman adjustments **will not work**. The paid BS adjustment won't work because the key assumption is violated:

Key Assumption (Paid Berquist-Sherman): Paid losses are proportional to closed counts

- paid losses will be smaller relative to closed counts at early development periods *(because small claims are settled faster)*
- future paid losses will be larger relative to closed counts at later development periods *(because large claims are all that's left)*

In other words, the proportionality is destroyed by settling some but not all claims faster. Fortunately there's an alternate strategy that's more likely to work:

Alternate Strategy: Separate small claims and large claims into different triangles and analyze each individually

That's what you had to notice to get credit in part (b) of this exam problem. You can then apply the paid B-S adjustment separately to the small claims data and the large claims data because the key assumption is more likely to hold for each individually.

An interesting side note is that the reported Berquist-Sherman adjust will not work either. If you're not careful, you might interpret the increase in outstanding severity as increase in case reserve strength. We learned in *Chapter 6 - Changes in Case Reserve Adequacy* that an increase in case reserve strength will cause and increase in outstanding severity, but the reverse is not true. An increase in outstanding severity could have other causes and if it isn't due to an increase in case reserve strength, then the reported Berquist-Sherman adjustment won't work. *(The reported B-S adjustment is specifically to correct for changes in case strength.)*

Extra Exam Problems

Full BattleQuiz

POP QUIZ ANSWERS

- To detect changes in case reserve adequacy the best 3 diagnostics to look at are:

  → **paid/reported loss**, **average reported loss**, **average case O/S loss**

- To detect changes in claim settlement rate the best 3 diagnostics to look at are:

  → **paid/reported loss**, **paid/reported counts** or **average case O/S loss**

- **BONUS:** For an increase in case reserve adequacy and an increase in claim settlement rate, **green font** indicates an increase down columns in the diagnostic triangles and **red font** indicates a decrease.

<html>Go back</html>