

# Different Average Costs

As is discussed in *Using Inventory Cost Adjuster.pdf*, the average cost of an inventory item plays a major part in your business's profitability, as well as its value on the balance sheet. QuickBooks uses the current average cost to determine the COGS, or cost of goods sold, for a given sale.

Suppose you sell five items for \$100 when the average cost of that item is \$15. QuickBooks multiplies the average cost times the quantity sold to arrive at the COGS:  $5 \times \$15 = \$75$ , and your gross margin is  $\$100 - \$75 = \$25$ . Clearly, the lower the average cost, the greater the margin for a given amount of revenue.

Similarly, the value of inventory on your balance sheet is determined in part by the average item cost. One hundred items that have an average cost of \$15 each contribute \$1,500 to the current assets section of the balance sheet.

So the average cost of an item is a major factor in your company's profitability and worth. And if your company's revenue depends on the sale of inventory to any significant degree, it's important to understand, and perhaps manage, how that average cost is calculated.

## The QuickBooks Formula

QuickBooks uses an average cost formula, acceptable under GAAP, that is better described as "average cost of units on hand". On the date of any transaction QuickBooks calculates the current average cost of an inventory item as:

Average Cost = Asset Value / Quantity on Hand

An item's *Asset Value* is the total acquisition cost of that item less the total COGS, taking into account activities such as Inventory Adjustments that change the dollar value of an item's stock. The item's *Quantity on Hand* works the same way, but it is a count of the number of units on hand rather than a total of the dollars currently invested in the item.

One consequence of using this formula is that it makes Average Cost sensitive to the sales of an item – the formula uses on-hand values, which are the result of combining purchases with sales. This fact is often hidden in the numbers, because you don't usually see a change in an item's Average Cost until you buy more of it at a different unit cost.

For example, when you sell an item, both its Asset Value and the Quantity on Hand change – but its Average Cost doesn't, because the ratio of value to quantity remains the same.  $\$2.50 / 5$  units gives the same Average Cost, fifty cents, as  $\$2.00 / 4$  units. Even though there's no apparent change at this point, the sale has an effect on the Average Cost later on, when you buy more units at a different price.

Using the QuickBooks approach, it's not always easy to figure out why a current

Average Cost has the value it does. You have to track all the increases *and the decreases* to your holding in a given item – all the purchases, sales, adjustments to quantity, adjustments to valuation, and so on – or you won't arrive at the same figure that QuickBooks does.

## **Selling to Zero**

Another consequence of the QuickBooks approach shows up when you sell an item down to a zero quantity and then replenish your supply at a different cost. If you look again at the formula that QuickBooks uses:

$$\text{Average Cost} = \text{Asset Value} / \text{Quantity on Hand}$$

you see that when an item goes to zero units on hand its Average Cost is undefined – because you'd be dividing by zero – and that's why QuickBooks temporarily uses the preceding average cost. Then, when you replenish your supply, the new Average Cost is based exclusively on that new purchase. The history of prior purchases disappears from the Average Cost estimate, which is based only on the units you presently own. You may or may not regard that as desirable. Many users and accountants do not: for just one thing, this version of average cost is much more volatile when your suppliers are changing the prices they charge you. (GAAP takes no position on the issue of which version is preferable.)

## **Selling below Zero**

The situation gets worse if you sell more units than QuickBooks thinks you have on hand. See the later section, *Negative Quantity On Hand*, for more information on that issue, but – briefly – you cannot trust the financial results of any transaction involving an item as long as QuickBooks thinks you have fewer than zero units in stock.

The Inventory Cost Adjuster uses a different formula than QuickBooks does. For any given item on any given transaction date, it uses:

$$\text{Average Cost} = \text{Total Dollar Spent} / \text{Total Units Bought}$$

This formula is also acceptable to GAAP as a measure of Average Cost. There are several reasons that many users find it preferable to the approach that QuickBooks uses. Here are four of them:

1. It is the true average cost of all the items you have brought into inventory, not just the items you currently have in stock.
2. It is easier to verify because it is not affected by sales of the item.
3. It is not subject to fluctuations that are as extreme as the QuickBooks formula, because it uses information about *all* the purchases of the item that you have made.
4. The formula does not fix the problem induced by selling into a negative quantity on hand. That problem is not a function of how you calculate Average Cost, but is caused by QuickBooks' willingness to allow the user to

sell more units than are on hand. However, Inventory Cost Adjuster's version of average cost *mitigates* the problem at the point that a purchase returns you to a positive quantity on hand.

## An Example

Here's an example of what can happen. First, using the QuickBooks version of average cost:

Transaction Type	Date	Num	Qty	Cost	On Hand	Avg Cost	Asset Value
Item Receipt	12/15		10	\$1,000.00	10	\$100.00	\$ 1,000.00
Sales Receipt	12/16	3020	-5		5	\$100.00	\$ 500.00
Sales Receipt	12/17	3021	-15		-10	\$100.00	\$ (1,000.00)
Item Receipt	12/18		5	\$ 250.00	-5	\$100.00	\$ (500.00)
Sales Receipt	12/19	3022	-5		-10	\$100.00	\$ (1,000.00)
Item Receipt	12/20		20	\$2,000.00	10	\$100.00	\$ 1,000.00

The first two transactions are entirely normal: you buy 10 units for \$1,000.00, setting the initial Average Cost of \$100, and then sell 5 units at that Average Cost.

But then, on 12/17, you sell an additional 15 units. That's ten more than you had on hand, and you are now in negative territory. Notice that the Asset Value is correct: you have a negative 10 units, and at an Average Cost of \$100, the Asset Value is \$ (1,000.00). Nothing has happened so far to change the Average Cost.

Now, on 12/18, you buy 5 units for \$250.00. That's \$50 apiece and the Average Value should change, but it does not: you still see an Average Value of \$100 following that purchase. The quantity on hand is correct, but both the Average Cost and the Asset Value are wrong. This is because QuickBooks does not recalculate Average Cost when the quantity on hand is zero or below.

You haven't suffered financial damage yet, but you're about to. On 12/19 you sell 5 units, taking you from a negative 5 on hand to a negative 10 on hand. Since you still have a negative quantity on hand, QuickBooks doesn't yet recalculate the Average Cost. And because you sold 5 units on 12/19, QuickBooks assigns a COGS of \$500 to that sale.

But which physical units did you sell? You had -10 units on 12/17, and you can't physically sell units you don't have, so it can't have been those. No, on 12/19 you must have sold the 5 units you bought on 12/18. You bought them for \$250 – but QuickBooks thinks the COGS for the sale was \$500. You have just been cheated out of \$250 in gross margin on that sale.

Finally, on 12/20, your quantity on hand turns positive again as you buy an additional 20 units. And QuickBooks responds by recalculating the Average Cost, although you can't tell that it did, because that purchase is for \$100 per unit – the same as the existing Average Cost.

(We could have demonstrated that the Average Cost calculation kicks back in on 12/20 by arranging a purchase at a different unit cost, such as \$90, instead of \$100. We did it this way to demonstrate how what's really happening with QuickBooks Average Costs can be masked by the numbers.)

### Same Example, Different Formula

Now let's look at what happens when you use the Inventor Cost Adjuster utility:

Transaction Type	Date	Num	Qty	Cost	On Hand	Avg Cost	Asset Value
Item Receipt	12/15		10	\$1,000.00	10	\$100.00	\$ 1,000.00
Sales Receipt	12/16	3020	-5		5	\$100.00	\$ 500.00
Sales Receipt	12/17	3021	-15		-10	\$100.00	\$ (1,000.00)
Item Receipt	12/18		5	\$ 250.00	-5	\$100.00	\$ (500.00)
Sales Receipt	12/19	3022	-5		-10	\$100.00	\$ (1,000.00)
Item Receipt	12/20		20	\$2,000.00	10	\$100.00	\$ 1,000.00
Inventory Adjust	12/20	<b>COST-FIX</b>	0		10	\$ 92.86	\$ 928.57

By the time the Cost Adjuster is run – on 12/20 or subsequently – some damage has been done. QuickBooks has already calculated the COGS for the sale on 12/19 as \$500. However, on 12/20, the quantity on hand has once again turned positive and so QuickBooks starts calculating average cost again. As we've seen, though, QuickBooks just divides the Asset Value of \$1,000 by the quantity on hand of 10, to get an Average Cost of \$100.

But the Cost Adjuster kicks in as of 12/20. You can tell that it has made an adjustment from the **Num** value of **COST-FIX**, which identifies a record that's been added by the Cost Adjuster. Its effect is to draw the Average Cost down, so the *next* sale that is made will use the lower Average Cost, the COGS for that sale will be lower, and the damage done in the sale on 12/19 is not repeated in the next sale.

Notice how the Cost Adjuster arranges for an Average Cost of \$92.86 on 12/20. As explained above, the Cost Adjuster uses this formula for average cost:

$$\text{Average Cost} = \text{Total Dollar Spent} / \text{Total Units Bought}$$

There have been three purchases prior to 12/20:

Units Purchased	Dollars spent
10	\$1,000
5	\$250
20	\$2,000

So \$3,250 has been spent to acquire 35 units, and  $\$3,250 / 35$  is \$92.86, just as calculated by the Inventory Cost Adjuster.