

Running head: AVAILABLE MARGIN ALLOCATION

Available margin allocation for use in pricing and revenue
recognition

Dennis Wilson, PhD.

Tom Jackson

Abstract

This paper deals with the challenge of determining a final transaction price as experienced by many companies in the technology industry. It specifically deals with the scenario of determining the final transaction prices for products that have been bundled and sold after the application of a general discount to be applied to the bundle of products. The issues resulting from this scenario have been found to impact order management, finance, strategic pricing, and asset valuation. The efficiency of the proposed available margin model, if integrated into a pricing application, may also contribute to overhead cost reductions.

Available margin allocation for use in pricing and revenue
recognition

Problem

Technology companies have a number of challenges when it comes to pricing and revenue recognition. One element contributing to this phenomenon is the number of different types of products sold along with the prevalence of multi-element contracts. Some of the revenue types common in the technology industry include service revenues, license revenues, right-to-use revenues, maintenance revenues, hardware revenues, and software revenues. All of these revenue types need to be recognized pursuant to FASB and SEC regulations and guidance. From an operational perspective, the determination of revenues and fair value can impact order management, financial management, sales and marketing, and asset valuation.

"Under GAAP, the fair value of an asset is the amount at which that asset could be bought or sold in a current transaction between willing parties, other than in a liquidation scenario. On the other side of the balance sheet, the fair value of a liability is the amount at which that liability could be incurred or settled in a current transaction between willing parties, other than in liquidation" (Value Based Management.net,

2006). This indicates that a primary determinant of fair value is the acquisition price (the price at which ownership is transferred) (FASB 157, 2006). Historically speaking, the selling price for the vendor has been the cost for the customer, and this continues to be one of the primary means of determining asset valuation (Vendor Specific Objective Evidence (VSOE))(SOP 97-2). The requirements for fair value are further specified in SAB-104 where it states that VSOE fair value must be established for each element of the transaction. This is a pivotal aspect of the challenge facing the technology industry because business transactions in this industry are prone to "bundling" where various types of products are packaged together and then a single price is applied to the bundle of products. As indicated by Sondhi (2006), some of the products within the bundle may be sold separately, while some are not (Sondhi, A.C., 2006, p. 3). In addition, some of the products (services and software) may have pricing and revenue recognition requirements that are different from other products in the bundle such as hardware. This means that the purchaser does not have clear visibility to the fair value of the products (assets) in the bundle, which makes it difficult for the customer to value the assets, and at the same time it makes it difficult for the vendor to recognize the revenue.

According to FASB 157, "a fair value measurement should be determined based on the assumptions that market participants would use in pricing the asset or liability" (FASB, 2006). Therefore, the objective of a fair value measurement is to determine the price that would be received to sell the asset or paid to transfer the liability at the measurement date (an exit price) (FASB 157, 2006). This focus on price emphasizes the need to have a fair, consistent, and traceable method of setting the price on a product. Under current accounting guidelines, it is advantageous to both the buyer and seller if the seller is consistent in the method used to price the goods or services, and if the variability in the results of the pricing methodology for the market is minimized. A consistent pricing policy and methodology has a better chance of resulting in a consistent transaction price, which is going to be conducive to establishing fair value and revenue recognition. This position is supported by Sondhi (2006) who recommends keeping, comprehensive records of the price at which items are sold. He further recommends creating a database of the transactions, which can be used to develop and sustain evidence of VSOE. This database can also reduce or even eliminate hassles with respect to the timing and the amount of revenue you can recognize.

However, it remains that this grand plan for price tracking is compromised by the strong tendency within the technology industry for bundling products and then applying a single general discount to the bundle. This practice results in obscuring the transaction price for the individual products. It also results in the challenge of equitably and consistently distributing the general discount across all the products included in the bundle, such that the individual products will continue to have a transaction price that remains consistent with the transaction price when the products are sold separately.

For compliance purposes, companies need a method that can be repeated and have consistent results each time. In this context, a method that can be programmed, as part of a pricing application, would seem to be preferable; the logic of the method could be audited (fits with internal controls) and the results could be assured to be consistent.

Historically, there has not been the same interest or emphasis on tracking transaction prices for individual products. For as much as the practice existed, there are a few methods that might be theoretically employed, but under today's scrutiny, these methods can be found wanting as methods in support of determining fair value. Some such methods would be

prorating (weighted average) based on product list price,
prorating (weighted average) based on product cost, prorating
(weighted average) based on Extended List Price.

Some aspects of pricing for the technological industry that should also be considered and incorporated into a robust model for distributing general discounts in order to establish a final transaction price are as follows:

- The impact of Administrative costs (costs not included in sales) should be considered in the model
- The bundle of products may contain some products on which the price can be adjusted, along with some products, that for various reasons (contractual—such as a most favored nation clause in a sales contract) the price cannot be adjusted.
- Provision for a single product or a small number of products to be priced below cost, as promotional items or loss leaders. This type of consideration should be specific to the product, so that management can assure that the below cost pricing has been specifically intended as part of the strategic pricing scenario.

Weighted Average based on List Price

The weighted average based on list price is achieved by first selecting the subset of products that can have their list price adjusted. The list price for these products is summed, and then the list price for each product is then divided by the sum of the list price for the subset of products, thus determining a factor that is the proportion of the total represented by each product in the subset. The value of the general discount is then multiplied by the proportional factor for each product, and the result is deducted from the extended list price (quantity * list price) for each of the products in the subset.

Where:

LP_i = the list price for discountable product i

GD = the value of the general discount

n = the number of discountable products in the subset

TP_i = the transaction price determined for discountable product i

$$TP_i = \frac{(Q_i * LP_i) - \left(GD * \frac{LP_i}{\sum_{i=1}^n LP_i} \right)}{Q_i}$$

Equation 1

Figure 1, shows the calculations for a weighted average based on list price. As can be seen, only those products that have been deemed discountable are included in the price adjustment calculations. It can also be seen that this method drives the transaction price for some products to be negative. These would be unintended negative transaction prices, which is totally unacceptable. This means that additional manual effort and discretionary reallocations would be required in order to further adjust and eliminate the unintended negative transaction prices. Only with further discretionary adjustments after the transaction can a final transaction price be obtained that might appear to be reasonable.

A weighted average distribution based on list price presents an unacceptable model for determining a final transaction price.

Figure 1, Weighted Average based on List Price

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2		Weighted Average based on Price											
3		Extraordinary Discount		0.23									
4		Administrative Charge		0.15									
5													
6	Item ID	Discountable	Unit List Price	Unit Cost	Qty	Extended Price @ List	Extended Cost	Discountable Unit List Price	Wt Avg base on Unit Price	Allocated Discount	Net Price	Margin	Transaction Price
7	ID003	n	71627.32	71442.56	1	71627.32	71442.56	-	0.0%	-	71627.32	184.76	71627.32
8	ID004	n	73,069.71	64,198.45	2	146,139.42	128,396.89	-	0.0%	-	146,139.42	17,742.53	73,069.71
9	ID005	n	38,753.17	33,372.14	10	387,531.74	333,721.43	-	0.0%	-	387,531.74	53,800.31	38,753.17
10	ID007	n	65,969.17	63,142.79	5	329,845.84	316,713.94	-	0.0%	-	329,845.84	14,131.91	65,969.17
11	ID010	n	97,776.46	93,695.52	7	684,435.21	655,868.62	-	0.0%	-	684,435.21	28,566.60	97,776.46
12	ID016	n	88,350.03	80,938.42	8	706,800.27	647,507.35	-	0.0%	-	706,800.27	59,292.92	88,350.03
13	ID001	y	6,814.28	2,284.96	7	47,699.94	15,994.73	6,814.28	1.9%	17,889.47	30,330.47	14,335.74	4,332.92
14	ID002	y	24,330.57	14,093.11	6	145,983.40	8,454.67	24,330.57	6.7%	62,018.17	83,965.23	75,510.56	13,994.21
15	ID006	y	16,051.81	15,000.00	2	32,103.62	30,000.00	16,051.81	4.4%	40,315.77	(8,812.15)	(38,812.15)	(4,406.07)
16	ID008	y	4,333.39	-	2	8,666.77	-	4,333.39	1.2%	10,045.72	(2,378.95)	(2,378.95)	(1,189.47)
17	ID009	y	79,307.26	21,017.89	8	634,458.12	168,143.15	79,307.26	21.8%	202,152.76	432,305.36	284,162.20	54,038.17
18	ID011	y	83,736.40	25,756.16	8	669,891.23	206,049.27	83,736.40	23.0%	213,442.55	456,448.68	250,399.40	57,056.08
19	ID012	y	96,352.72	1,446.15	1	96,352.72	1,446.15	96,352.72	26.4%	245,601.31	(149,248.59)	(150,694.74)	(149,248.59)
20	ID013	y	1,201.54	-	2	2,403.08	-	1,201.54	0.3%	3,062.70	(659.62)	(659.62)	(329.81)
21	ID014	y	21,455.01	7,338.48	2	42,910.01	14,676.96	21,455.01	5.9%	54,688.41	(11,778.40)	(26,455.36)	(5,889.20)
22	ID015	y	30,736.91	11,985.88	1	30,736.91	11,985.88	30,736.91	8.4%	78,947.82	(47,610.91)	(99,596.79)	(47,610.91)
23			799,865.75	493,028.50		4,037,585.60	2,609,401.59	364,319.89	100.0%	928,644.69	3,108,940.91	499,539.32	
24													
25				Discount		928,644.69							
26				Net Price		3,108,940.91							
27													
28						Administrative Charge							
29						466,341.14							
30													
31											Profit/(Loss)		
32											33,198.19		

Weighted Average based on Cost

As with the weighted average based on list price, the weighted average based on cost is achieved by first selecting the subset of products that can have their list price adjusted. The unit cost for these products is then summed, and the unit cost for each product in the subset is then divided by the sum of the unit cost for the subset of products, thus determining a factor that is the proportion of the unit cost for each product in the subset. The value of the general discount is then multiplied by the factor for each product, and the result is deducted from the extended list price (quantity * list price) for each of the products in the subset.

Where:

LP_i = the list price for discountable product i

Q_i = the quantity of discountable product i

C_i = the cost for discountable product I

n = the number of products included in the subset

GD = the value of the general discount

TP_i = the transaction price determined for discountable product i

$$TP_i = \frac{(Q_i * LP_i) - \left(GD * \frac{C_i}{\sum_{i=1}^n C_i} \right)}{Q_i}$$

Equation 2

Figure 2, shows the calculations for a weighted average based on unit cost. Again, only those products that have been deemed discountable are included in the price adjustment calculations. As with the example for the weighted average based on list price, it can be seen that this method also drives the transaction price for some products to be negative. This method also has the further deficiency of not adjusting the price on products that have no cost (like software products).

The cost for software development is typically treated as part of the research and development expense, thus the typical situation is that software products have zero cost. When using a weighted average method based on cost, products with zero cost result in a zero adjustment to the price. Thus we see that the weighted average based on cost method also requires additional manual effort and discretionary reallocations after the transaction in order to further adjust the transaction prices, and to arrive at a transaction price that might appear to be reasonable.

A weighted average distribution based on cost is an unacceptable model for determining a final transaction price.

Weighted Average based on Extended List Price

The weighted average based on extended list price is achieved by again first selecting the products that can have their list price adjusted. The extended list for this subset of products is then summed, and then the extended list price for each product in the subset is divided by the sum of the extended list price for the subset, thus determining a factor that is the proportion of the extended list price for each product in the subset. The value of the general discount is then multiplied by the factor for each product, and the result is deducted from the extended list price (quantity * extended list price) for each of the products in the subset.

Where:

ELP_i = the extended list price for discountable product i

Q_i = the quantity of discountable product I

n = the number of products included in the subset

GD = the value of the general discount

TP_i = the transaction price determined for discountable product i

$$TP_i = \frac{\left(ELP_i - GD * \left(\frac{ELP_i}{\sum_{i=1}^n ELP_i} \right) \right)}{Q_i}$$

Equation 3

Figure 3, shows the calculations for a Weighted Average based on Extended List Price. Again, only those products that have been deemed discountable are included in the price adjustment calculations. It can be seen that this method will also drive a negative transaction price, but to an extent that is significantly less than the Weighted Average based on List Price method or the Weighted Average based on Cost method. To the extent that this method will also drive a negative transaction price, it requires some manual intervention and further discretionary reallocations in order to arrive at final transaction prices that would appear reasonable. This method is in common use, but due to the discretionary element and the inherent lack of consistency, this method does not meet the goals of comparability, reliability, and repeatability suggested by Leech (Leech, 2003) as key criteria for assurance and audit methods.

Available Margin Allocation

Figure 3, Weighted Average based on Extended List Price

	A	B	C	D	E	F	G	H	I	J	K	L	M
1													
2		Weighted Average based on Revenue											
3		Extraordinary Discount											
4		Administrative Charge											
5													
6	Item ID	Discountable	Unit List Price	Unit Cost	Qty	Extended Price @ List	Extended Cost	Discountable Revenue	Vt Avg base on Price	Allocated Discount	Net Price	Margin	Transaction Price
7	ID003	n	71627.32	71442.56	1	71627.32	71442.56	-	0.0%	-	71627.32	184.76	71627.32
8	ID004	n	73,069.71	64,198.45	2	146,139.42	128,396.89	-	0.0%	-	146,139.42	17,742.53	73,069.71
9	ID005	n	38,753.17	33,372.14	10	387,531.74	333,721.43	-	0.0%	-	387,531.74	53,810.31	38,753.17
10	ID007	n	65,969.17	63,142.79	5	329,845.84	315,713.94	-	0.0%	-	329,845.84	14,131.91	65,969.17
11	ID010	n	97,776.46	93,695.52	7	684,435.21	655,668.62	-	0.0%	-	684,435.21	28,666.60	97,776.46
12	ID016	n	88,350.03	80,938.42	8	706,800.27	647,507.35	-	0.0%	-	706,800.27	59,292.92	88,350.03
13	ID001	y	6,814.28	2,284.96	7	47,699.94	15,894.73	-	2.8%	25,888.01	21,813.92	5,819.20	3,116.27
14	ID002	y	24,330.57	14,093.11	6	145,983.40	8,454.67	-	8.5%	79,222.91	66,760.49	58,306.81	11,26.75
15	ID006	y	16,051.81	15,000.00	2	32,103.62	30,000.00	-	1.9%	17,422.13	14,681.49	(15,318.51)	7,340.74
16	ID008	y	4,333.39	-	2	8,666.77	-	8,666.77	0.5%	4,703.32	3,963.45	3,963.45	1,981.72
17	ID009	y	79,307.26	21,017.89	8	634,458.12	168,143.15	634,458.12	37.1%	344,310.52	290,147.59	122,004.44	36,268.45
18	ID011	y	83,736.40	25,756.16	8	669,891.23	206,049.27	669,891.23	39.1%	363,539.52	306,351.71	100,302.44	38,293.96
19	ID012	y	96,362.72	1,446.15	1	96,362.72	1,446.15	96,362.72	5.5%	52,289.12	44,063.60	42,617.46	44,063.60
20	ID013	y	1,201.54	-	2	2,403.08	-	2,403.08	0.1%	1,304.11	1,098.97	1,098.97	549.48
21	ID014	y	214,550.1	7,338.48	2	42,910.01	14,678.96	42,910.01	2.5%	23,286.59	19,623.42	4,946.46	9,811.71
22	ID015	y	30,736.91	11,985.88	1	30,736.91	11,985.88	30,736.91	1.8%	16,680.44	14,066.47	2,070.59	14,066.47
23			799,865.75	493,028.50	Rev at List	4,037,585.60	2,609,401.59	1,711,205.79	100.0%	928,644.69	3,108,940.91	499,539.32	
24													
25													
26				Discount		928,644.69							
27				Net Price		3,108,940.91							
28													
29				Administrative Charge		466,341.14							
30													
31				Profit(Loss)		33,198.19							

Weighted Average based Available Margin

The weighted average based on available margin method again starts with selecting the products that may have their list price adjusted. A calculation is then made to determine which of these products has sufficient margin to which a portion of the available discount may be allocated. In terms of this method, this would be a margin amount that is greater than the minimum margin (cost plus minimum margin factor) that has been stipulated for the product. Thus, the Extended List Price minus the sum of the Cost plus Minimum Margin equals Available Margin.

Where:

ELP_i = the extended list price for discountable product i

Q_i = the quantity of discountable product i

C_i = cost for discountable product i

Fm_i = minimum margin factor for product i

AM_i = available margin for product i

n = the number of products included in the subset

For $i = 1$ to n

$$AM_i = ELP_i - ((1 + Fm_i) * C_i)$$

Equation 4

The subset of products is then refined to include only those products that have a positive available margin amount thus creating a revised subset of products, $\text{subset}(r)$.

The available margin for $\text{subset}(r)$ is then summed, and then the available margin for each product is divided by the sum of the available margin for $\text{subset}(r)$, thus determining a weighted average factor based on the determination of available margin. The general discount is then multiplied by the weighted average available margin factor and the resultant amount is subtracted from the Extended List Price for each of the products in $\text{subset}(r)$.

Where:

ELP_i = the extended list price for discountable product i

AM_i = the Available Margin for discountable product i

n = the number of products included in $\text{subset}(r)$

GD = the value of the general discount

TP_i = the transaction price determined for discountable product i

$$TP_i = \frac{ELP_i - \left(GD * \left(\frac{AM_i}{\sum_{i=1}^n AM_i} \right) \right)}{Q_i}$$

Equation 5

Figure 4, shows the calculations for a Weighted Average based on Available Margin. In this instance, none of the transaction prices are driven negative by the calculations. In the event of a product or some products being used as loss leaders this model still work because, these negative margin products are not included in the calculation, and there specific determination is recorded as part of a specific strategic pricing initiative. An additional strength of the model is that discretionary decisions involved in the model are made a priori, which reduces the concern around unwarranted and substantiated price manipulations based information determined after the transaction.

Figure 5 shows that the contribution to total revenue using this model remains fairly consistent across the products. This is supportive of achieving the goal of a pricing model that produces results that are comparable, reliable, and repeatable.

This model has the added advantage of being able to be programmed (incorporate) into a pricing application.

Figure 5, Evaluation of Revenue Contribution

	A	B	C	D	E	F	G
1							
2							
3	Item ID	Discountable	Evaluation Dollars before	Evaluation Dollars After	% of Revenue Before	% of Revenue After	Change in % of Revenue
4	ID003	n					
5	ID004	n					
6	ID005	n					
7	ID007	n					
8	ID010	n					
9	ID016	n					
10	ID001	y	47,699.94	24,798.34	2.8%	3.2%	-0.4%
11	ID002	y	145,983.40	39,500.62	8.5%	5.0%	3.5%
12	ID006	y	32,103.62	32,103.62	1.9%	4.1%	-2.2%
13	ID008	y	8,666.77	1,894.00	0.5%	0.2%	0.3%
14	ID009	y	634,458.12	289,759.16	37.1%	37.0%	0.0%
15	ID011	y	669,891.23	331,568.18	39.1%	42.4%	-3.2%
16	ID012	y	96,352.72	22,356.11	5.6%	2.9%	2.8%
17	ID013	y	2,403.08	525.16	0.1%	0.1%	0.1%
18	ID014	y	42,910.01	22,567.31	2.5%	2.9%	-0.4%
19	ID015	y	30,736.91	17,488.62	1.8%	2.2%	-0.4%
20							
21			\$ 1,711,205.79	\$ 782,561.11			
22							

Although the examples provided are constructed of fictitious products for demonstration purposes only, the potential of the model has already been verified. This model has been programmed into a pricing application used by a company in the technology industry. The company has product portfolios that number in the 10s of thousands and that extending across several different types of technologies and product types. This model has been used to determine a final transaction price on deals spanning thousands of products. It has been shown to be able to reduce the time required perform calculations from 3 days (using a spreadsheet) down to a matter of a few seconds (integrated into

the pricing application). This has the end result of improving accuracy, consistency, and efficiency along with the opportunity to reassign available hours to other work, thus having the additional advantage or potentially contributing to a significant reduction in overhead cost. The model has also been shown to have applicability in support of order management, finance, strategic pricing, asset valuation, and analysis.

In addition, during the implementation, the model was extending to handle multiple general discounts expanding the formula as follows:

Where:

AR_{ji} = the available revenue for Discount j and discountable product i

AM_i = the Available Margin for discountable product i

n = the number of products included in subset(r)

m = The number of General Discounts to be applied

GD_j = the value of the general discount j

TP_{ji} = the transaction price determined for general discount j and discountable product i

$$TP_{ji} = \frac{AR_{ji} - \left(GD_j * \left(\frac{AM_i}{\sum_{i=1}^n AM_i} \right) \right)}{Q_i}$$

Equation 5

The results of the expanded model after repeated calculations has been shown to be very robust, providing consistent, comparable, repeatable, and reliable results.

References

- Financial Accounting Standards Board (FASB). (2008, September). *Statement of Financial Accounting Standards No. 157, Fair Value Measurements (FASB 157)*. Retrieved October 29, 2008, from <http://www.fasb.org/>
- Leech, T. J. (April 2003). *Sarbanes-Oxley Sections 302 & 404. A White Paper Proposing Practical, Cost Effective Compliance Strategies*. Retrieved October 13, 2008, from www.carddecisions.com
- Sarbanes-Oxley. (2002). *Sarbanes-Oxley Act of 2002*. Retrieved October 18, 2008, from <http://www.sarbanes-oxley.com/>
- Sondhi, T. C. (2006). *CURRENT ISSUES IN VSOE ACCOUNTING, A Technical Brief*. Retrieved October 26, 2008, from RevenueRecognition.com Web Site: http://www.acsondhi.com/issues/docs/SOP_97-2_Current_Issues_in_VSOE.pdf
- Value Based Management.net*. Retrieved October 29, 2008, from Value Based Management.net Web Site: http://www.valuebasedmanagement.net/faq_what_is_value_based_management.html