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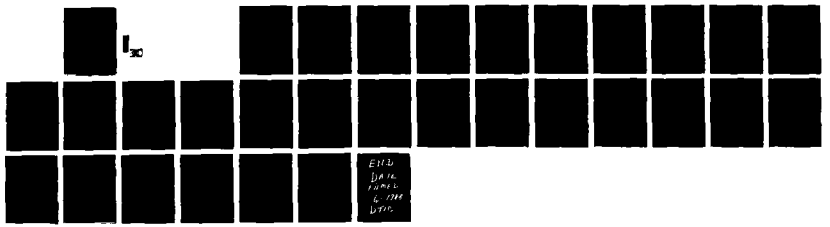

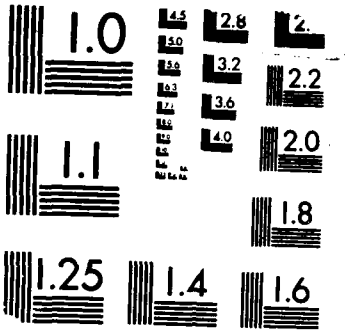

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Two methods for prioritizing secondary items for price reviews were examined. A sample of secondary items from a previous price scrub were ranked by their dollar value of demand and by their expected savings based on historical price scrub data. The dollar value of demand ranking was the preferred method due to the cost effectiveness of using only currently available data. The price scrub results by Federal Supply Classification (FSC) prioritizing were determined.

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SUMMARY

A review of prices found that the degree of overpricing differed significantly between items grouped by Federal Supply Classification (FSC) or nomenclature. The degree of overpricing was quantified as the percent reduction in the original price. For example, an overpriced factor equal to 0.10 for a particular FSC group indicates that the expected unit price reduction for an item in that FSC is ten percent. This study determined the outcome of conducting price scrubs on specific FSC groups with high percent overpriced factors versus low percent overpriced factors. The low percent overpriced factor groups produced higher total savings due to the dominance of the unit price and demand factors over the percent overpriced factor. The low percent overpriced factor groups had much higher demand items.

If items across all FSC groups are ranked together based on the expected savings, which is computed from each item's unit price, demand, and percent overpriced factor (based on its FSC group), most of the total expected savings occurs in the small percentage of the top ranked items. Ranking items by dollar value of demand, which eliminates the overpriced factor, produces slightly less effective results. On a cost effectiveness basis, the dollar value of demand ranking is preferred over the expected savings ranking.

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SECONDARY ITEM RANKING PROCEDURES FOR UNIT PRICE REVIEW

Chapter 1. INTRODUCTION

1.1. Background.

a. In 1984 the Army Materiel Command (AMC) conducted a price scrub of Army Stock Fund (ASF) and Procurement Appropriation-Secondary (PA-2) items in the Army Master Data File (AMDF). The price scrub was made on provisioning items and items having no procurement history data in the National Stock Number Master Data Record (NSNMDR) of the Commodity Command Standard System (CCSS). The major subordinate commands (MSC's) reviewed the prices of over 90,000 items. Price changes were recommended for about half of the items, of which 40 percent of the prices were off by at least 10 percent and 26 percent by as much as 50 percent. The large number of price changes created concern about the quality of prices entering the AMDF as well as about current prices.

b. The AMDF price is the Army's standard price used for budgeting and requisitioning functions. The importance of accurate pricing is magnified by the enormous amount of money expended annually on secondary items. The quantity of secondary items managed by AMC makes it very difficult to catch inaccurate prices before they enter the system.

c. The AMSAA conducted two previous studies on the subject of price screening procedures. The first study (Price Screening Methodology, Project 067, January 1986) determined the feasibility of developing pricing screens to flag unit prices that have a high probability of being invalid. Correlation and regression were used to predict price based on item parameters such as production leadtime, weight, and cube. The resulting correlations were extremely low and the price bands placed around the best fit regression surface were unable to segregate invalid prices from valid prices. A followup study (Unit Price Magnitude vs Accuracy Trends of Secondary Items, Project 076, January 1987) conducted an analysis of the relationship between price accuracy and price magnitude. Price acccuracy was quantified as the percentage change between the original and recommended price based on a price review. Price limits were selected which provided a high probability for flagging an overpriced item based on the underlying change in the concentration of overpriced items as price increased for a given group of items, such as Federal Supply Classification (FSC). The price magnitude accuracy trends alone were not able to optimally select a price limit. However, the degree of overpricing varied significantly between groups of items. This study was a followup effort.

1.2. Objective.

a. Determine if historical price accuracy data can effectively select categories of items for future price scrubs based on the predicted savings return.

b. Determine the level of influence the overpriced factor has on an item ranking procedure.

1.3. Limits and Scope.

This study pertains to the AMC cataloging and supply management functions. ASF and PA-2 prices from selected FSC were analyzed to satisfy the study objectives.

1.4. Assumptions.

a. Each price in the AMDF Price Scrub data was reviewed by the responsible major submordinate command (MSC) managing that item.

b. The recommended price changes represent fair and reasonable prices which are likely to be near the unit price of the next representative buy.

1.5. Terms of Reference.

a. Original price (OP) is the price which existed prior to the price scrub.

b. Scrubbed price (SP) is the price which the price scrub determined was the accurate price.

c. The overpriced factor (OPF) represents the percent reduction in the original price to the scrubbed price. This factor is derived as follows:

$$OPF = \frac{OP-SP}{OP}$$

d. The dollar value of demand is the product of the item unit price times the quantity demanded.

e. The expected savings is the amount of reduction in the dollar value of demand attributed to the OPF. Expected savings is a subset of dollar value of demand. It is the product of item unit price, quantity demanded, and the OPF.

1.6. Methodology.

a. Comparing FSC groups for the highest overpriced factor was accomplished by ranking each item in each group by its expected savings. These expected savings vs item rank distributions were then overlayed upon each other for a relative comparison of overpricing.

b. Individual and cumulative rankings by expected savings and dollar value of demand provided the basis for item prioritization.

c. Price accuracy for a given FSC group was expressed by the OPF. This permitted the price accuracy comparisons between groups of different price magnitudes.

1.7. Findings.

a. The degree of overpricing increases as the unit price increases for items within the same FSC group. This relationship inverses when the mean price and degree of overpricing are compared between different FSC groups. Groups with low unit priced items are more overpriced than high unit priced item groups.

b. Both the dollar value of demand and expected savings rankings captured most of the total savings in their top ranked items. The expected savings ranking captured 98.9 percent of the total savings in the top ten percentile of ranked items. In the dollar value of demand ranking, the top ten percentile accounted for 85 percent of the savings. Only 27 percent of the top 10 percentile items from each ranking were in common.

1.8. Conclusions.

a. Prioritizing FSC groups for price review is not a viable price screening procedure because of the inherent risk of missing high expected savings items belonging to low ranked groups. Ranking individual items independent of their group affiliation is more cost effective.

b. Unit price and demand are the dominant factors in predicting expected savings. Items from high unit priced FSC groups, which are generally more accurately priced, have greater expected savings.

c. A dollar value of demand ranking is preferred over a unit price ranking. A low unit priced item with large annual demand can lead to significant savings if a price reduction is warranted.

d. A dollar value of demand ranking produces comparable results to an expected savings ranking in terms of future savings. Most of the expected savings appears in the top ten percentile of the ranking.

1.9. Recommendation.

Price scrubs should concentrate on the high dollar value of demand items. Dollar value of demand is defined as the product of unit price times average monthly demand. Although optimum return would be produced by an expected savings ranking using historical price accuracy data, this would require extensive resources to develop and maintain the required data base. The dollar value of demand ranking is more cost effective. It utilizes currently available data and produces results comparable to the overpriced ranking procedure.

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Chapter 2. DATA COLLECTION

2.1. FSC Selection.

a. The 1984 AMDF Price Scrub data, received from the Catalog Data Activity (CDA), contained original price data on 91,721 Army Stock Fund (ASF) items. The nine FSC groups containing the most items reviewed by the US Army Armament, Munitions and Chemical Command (AMCCOM) are contained in Table 1. The item quantities pertain to AMCCOM only. The overpriced factors (OPF) were computed by dividing the sum of all the price reductions by the sum of all unit prices in the FSC sample. For example, the OPF for the 1824 items in the FSC 1005 sample set was computed to be 0.29. In other words, a given item in FSC 1005 is expected to be overpriced by at least 29 percent of its original price.

TABLE 1. AMCCOM Price Scrub Data

FSC		# ITEMS	MEAN UNIT PRICE ($)	OVERPRICED FACTOR
1005	Guns, through 30mm	1824	538	0.29
1010	Guns, over 30mm up to 75mm	1181	4612	0.52
1015	Guns, 75mm through 125mm	988	326	0.28
1025	Guns, over 150mm through 200mm	996	438	0.19
1240	Optical Sighting & Ranging Equipment	1389	2232	0.25
4931	Fire Control Maint & Repair Shop Specialized Equip	957	3895	0.13
5330	Packing & Gasket Materials	643	84	0.77
5340	Miscellaneous Hardware	563	168	0.68
5365	Rings, Shims & Spacers	736	81	0.72

b. FSCs 1010, 4931, and 5330 were selected for a followup data call. The selection was based on their uniquely different overpriced factors (0.52, 0.13, and 0.77, respectively).

2.2. AMCCOM Data Call.

a. A data call was issued to AMCCOM in October 1986 to collect data on active AMCCOM managed items in FSC groups 1010, 5330, and 4931. The following data was collected:

NSN
Nomenclature
Unit Price
Average Monthly Demand (AMD)

b. Table 2 contains the number of records received for each FSC group. The item totals were less than those in Table 1. The items in Table 1 included non-AMCCOM managed items, such as Defense Logistics Agency (DLA) and Defense Industrial Supply Center (DISC).

TABLE 2. AMCCOM Data Call

FSC	OVERPRICED FACTOR*	# ITEMS
5330, Packing & Gasket Materiels	0.77	531
1010, Guns, over 30mm up to 75mm	0.52	411
4931, Fire Control Maint & Repair Shop Specialized Equip	0.13	650
		1592

*Derived from AMDF Price Scrub Data

Chapter 3. DISCUSSION

3.1. Price Screening by Category.

a. For items grouped into categories such as Federal Supply Classification (FSC) or nomenclatures (e.g., Brackets or Adapters) the average relative price reduction resulting from price reviews varied significantly between groups.* This relative price reduction can be measured as the percentage reduction in unit price. For example, suppose a price review on a $15.00 item results in a fair and reasonable price determination of $12.00. This is a 20 percent price reduction or in other words a 20 percent overpriced factor. This overpriced factor (OPF) permits a relative comparison of the degree of overpricing of items or group of items over a wide range of prices.

b. The OPF and the median unit price for ten item categories (five FSC's and five nomenclature) were computed from the 1984 AMDF Price Scrub data (see Para 1.1.a). The data is shown in Table 3. The groups are separated into low unit price and high unit price groups. The low and high unit priced groups have an average median price of $9.39 and $356.94, respectively. They differ by a magnitude of 38. The low unit price groups have an average OPF 4.1 times greater than the high unit price categories; i.e., 0.41 to 0.10. The data in Table 3 shows that groups with low unit priced items are more overpriced on a relative basis than groups comprised of high unit priced items. On a per dollar basis, the expected savings is 4.1 times greater for low unit priced item groups.

TABLE 3. FSC and Nomenclature Group Data

GROUP	# ITEMS IN GROUP	MEDIAN UNIT PRICE ($)	OVERPRICED FACTOR
Low Unit Priced			
Bracket	1813	21.61	0.48
Plate	2475	5.15	0.30
Seal	905	6.23	0.16
FSC 5330, Packing & Gasket Matl	1827	4.96	0.52
FSC 5340, Misc Hardware	2298	12.22	0.55
FSC 5365, Rings, Shims, & Spacers	2224	6.16	0.46
High Unit Priced			
Adapter	1124	128.00	0.11
Circuitcard	4846	791.75	0.10
FSC 5999, Misc Elect & Electronic Components	1199	136.00	0.11
FSC 6625, Elect & Electronic Properties Measuring & Testing Instruments	1431	372.00	0.08

*AMSAA Technical Report No. 076, Unit Price Magnitude vs Accuracy Trends of Secondary Items, Edward F. Glavan, Jr., January 1987.

c. The findings above suggest that it would be more cost effective to develop a price screening methodology based on the premise that groups historically having high OPFs should be given high review priority. Although on a unit item basis, a small percentage reduction on a high unit price may be greater than a large percentage reduction on a low unit price, quantity must be taken into account to find the real benefit in terms of total dollars saved. In general, low unit priced items have higher demand quantities than high unit priced items. This could produce higher total dollar values of demand which in turn would lead to higher total savings. The savings that the Army would realize would be on the savings in the total dollar value of demand. The example below uses the averages in paragraph 3.1.b and shows how a low unit priced item can have a greater savings return than a high unit priced item.

EXAMPLE:	ITEM A (High Unit Price)	ITEM B (Low Unit Price)
Expected Savings per Item (Unit Pr x Sav/Dol)	$356.94 x .10 $35.69	$9.39 x .41 $3.85
Annual Demand Qty	500	20,000
Annual Expected Savings	$35.69 x 500 $17,845.00	$3.85 x 20,000 $77,000.00

3.2. FSC Prioritization by Overpriced Factor (OPF).

a. To determine whether the OPF for individual groups is a viable parameter for prioritizing groups for price review, three FSC groups were selected for analysis. The groups are listed in Table 2. Based on the OPF, a "group priority" price screen would select FSC 5330 as the group with the highest payback (i.e., savings) potential. An item in FSC 5330 has an OPF = 0.77 or an expected seventy-seven percent reduction in unit price. The expected monthly savings for each item in these FSC groups can be computed from the equation below:

$$\text{Expected Monthly Savings} = \text{Unit Price} \times \text{Avg Monthly Demand (AMD)} \times \text{OPF}\Big|_{\text{FSC}}$$

b. The Unit Price x AMD portion of the equation represents dollar value of monthly demand. In this case, the average monthly dollar value demanded. Factoring in the OPF yields the expected savings for a particular item in its respective FSC group.

c. The expected monthly savings was computed for each item in each group. The items were then ranked by their expected monthly savings from high to low within each group. Table 4 contains the expected monthly savings for selective ranked items in the three FSC groups. The expected savings of the top 300 ranked items in each group are graphically shown in Figure 1. The cumulative savings is shown in Figure 2.

TABLE 4. Expected Monthly Savings by Item Rank

ITEM RANK	EXPECTED MONTHLY SAVINGS (1,000$)		
	FSC 4931 (OPF = .13)	FSC 1010 (OPF = .52)	FSC 5330 (OPF = .77)
1	1,854.3	774.9	159.0
25	100.0	59.3	5.9
50	60.3	27.4	3.0
75	33.9	12.9	1.4
100	21.6	4.7	0.9
125	16.6	2.6	0.5
150	11.6	1.4	0.3
175	9.0	0.7	0.2
200	6.6	0.5	0.1

d. The expected cumulative savings for the top one hundred ranked items in each FSC are $11.0, $8.6, and $0.7 million for FSC's 4931, 1010, and 5330, respectively. Our initial ranking of FSC groups based on the FSC's OPF is not supported by the data depicted in Figures 1 and 2. The FSC 4931, Fire Control Maintenance and Repair Shop Specialized Equip, has the highest expected savings even though its OPF is the smallest at 0.13. Inversely, FSC 5330, Packing and Gasket Materiels, which has the highest OPF at 0.77 has the least savings of the three FSC groups. This is the result of the dollar value of monthly demand portion of the expected savings equation dominating over the percent overpriced factor. Table 5 contains the factor averages of the top hundred ranked items in each FSC group. The average dollar value of monthly demand for an item in FSC 4931 is 1.5 times that of FSC 1010. The average dollar value for FSC 1010 is 52 times that of FSC 5330. The key driver of the three factors (i.e., unit price, AMD, OPF) is unit price. The overpriced factor imparts minimal influence because it can only take on values between zero and one. It can be concluded that the OPF is not a valid factor for ranking FSC groups for price reviews.

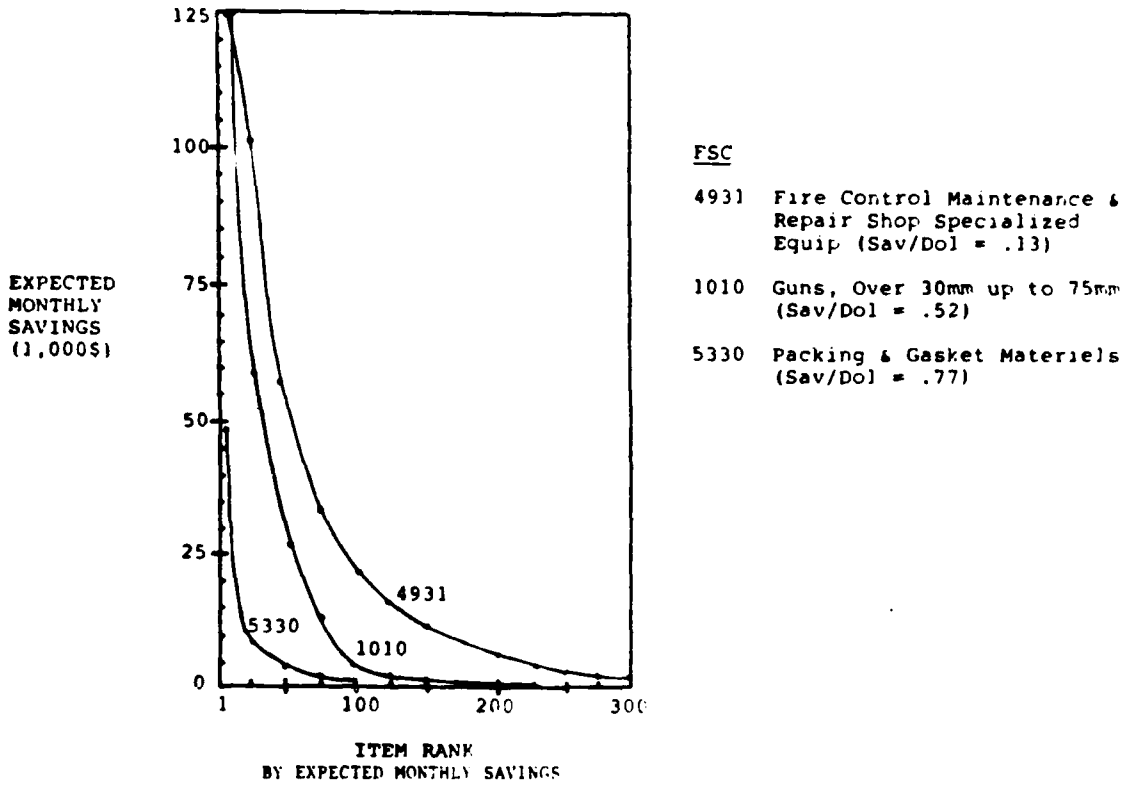


Figure 1. Item Ranking by Expected Monthly Savings

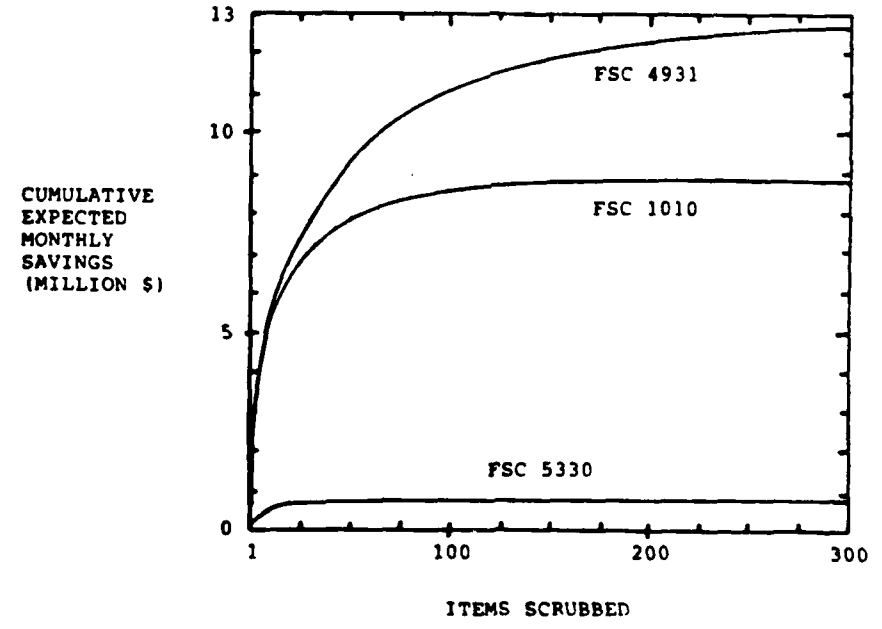


Figure 2. Expected Monthly Savings per Total Items Scrubbed

TABLE 5. Factor Averages for Top 100 Ranked Items

FSC	FACTOR AVERAGES			EXPECTED CUMULATIVE SAVINGS (Million $)	DOL VALUE OF DEMAND (UNIT PR x AMD) (Million $)
	UNIT PRICE	AMD	OPF		
4931, Fire Control Maint & Repair Shop Specialized Equip	14,898	263	0.24	11.0	3.9
1010, Guns, over 30mm up to 75mm	713	3,598	0.50	8.6	2.6
5330, Packing & Gasket Materiels	37	1,345	0.37	0.7	0.05

e. A price screening procedure based on the ranking of groups has the inherent risk of missing items with a high expected saving potential which belong to a low ranked group. A more effective price screen method would rank all items across all groups. If items are ranked based only on their demand value (unit price x quantity), a ranking may result similar to that shown in Figure 3. Items would be scrubbed starting with the item with the highest demand value (left column) and proceeding to the right. This item price scrub ranking is based on the premise that a unit price reduction in a high demand item would have a higher savings than a similar price reduction in a lower demand value item. However, the OPF can be a valuable parameter in a ranking procedure. The overpriced factors for the ranked items in Figure 3 are listed below each item's column. The expected savings, which is estimated by multiplying dollar value of demand by the OPF is represented by the double bar section. The item ranking would therefore change when expected savings is the primary criterion. It can be concluded that the OPF can have significant influence on the ranking or prioritization of items for a price review.

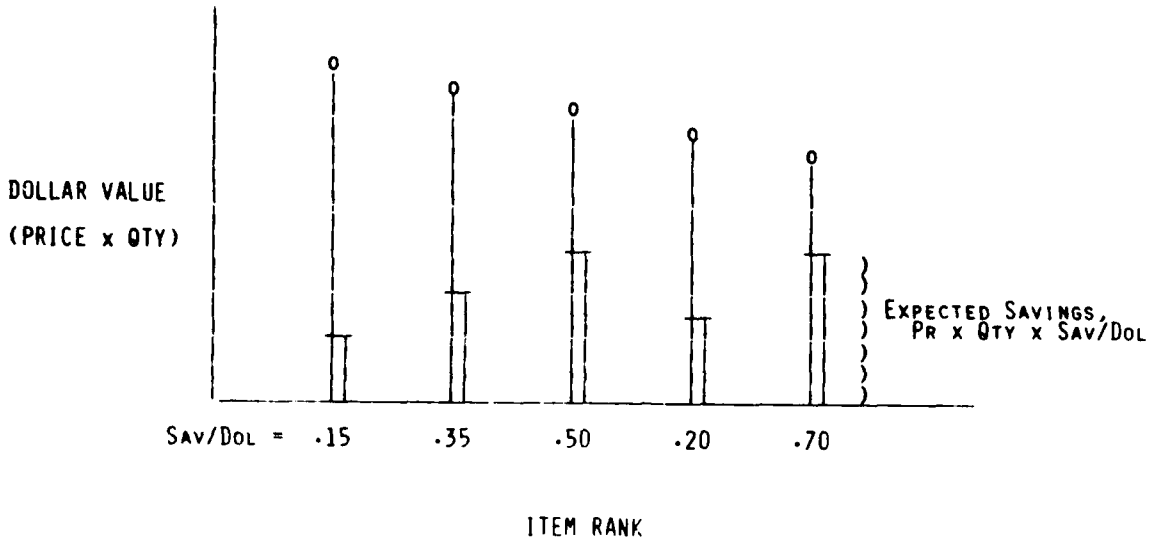


Figure 3. Influence of Overpriced Factor (OPF) on Dollar Value of Demand Item Ranking

3.3. Pareto Principle Applied to Expected Savings and Dollar Value of Demand Rankings.

a. Ranking items by expected savings inherently has a higher benefit versus cost return than a dollar value of demand ranking. Items historically having the greatest benefit in terms of likely price reduction would be ranked high. A ranking methodology using OPF data would require the development and updating of a data base for historical overpricing factors. The 1984 AMDF price scrub could serve as the initial source for developing the factors. Future price changes would be entered into the data base to update the FSC group price reductions data. This initiative would require the expenditure of resources to develop and maintain this data base. Also, further research and analysis must be done to ensure the data is accurate. However, if it can be shown that a dollar value of demand ranking methodology is as effective as an expected savings ranking, in terms of producing relatively the same amount of savings, then the task of building an OPF data base would not be necessary. The following investigates the relationship a dollar value of demand ranking has on the optimum savings return, which is assumed to be the expected savings ranking.

b. A ranking by dollar value of demand (UP x AMD) and expected savings (UP x AMD x OPF) of the combined items in the three FSC groups used earlier is shown in Figure 4.

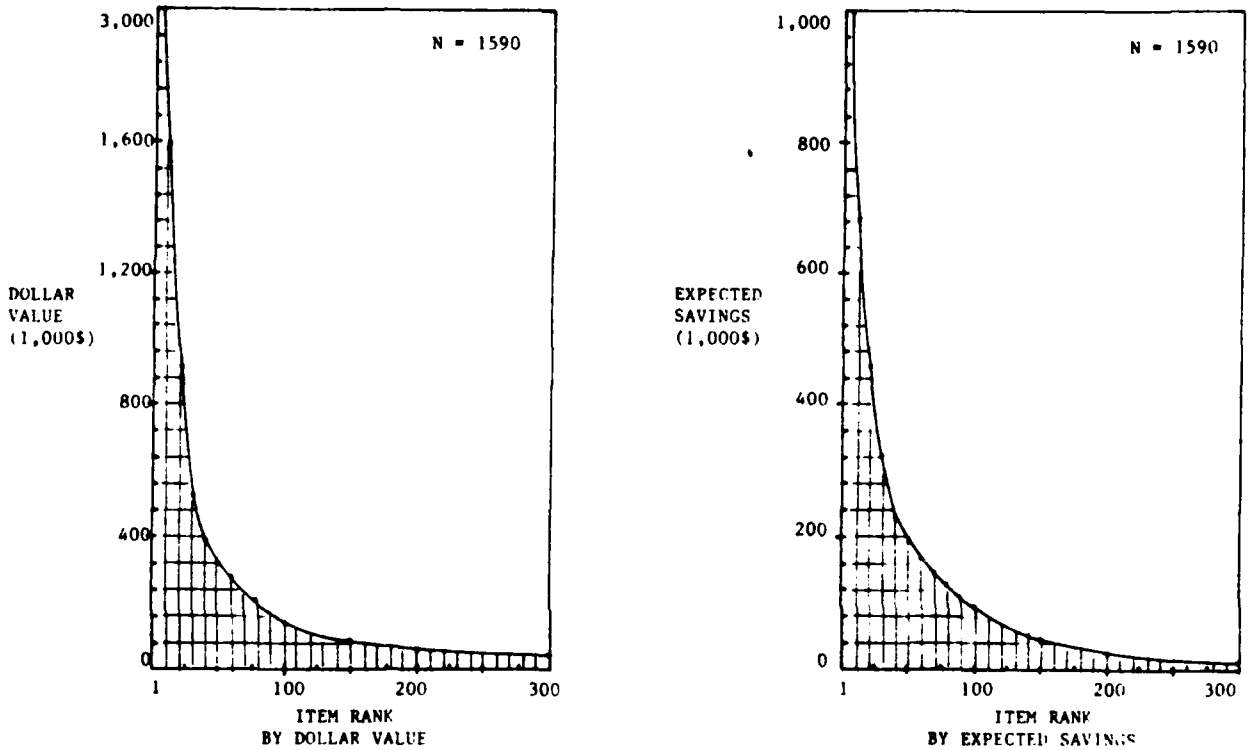
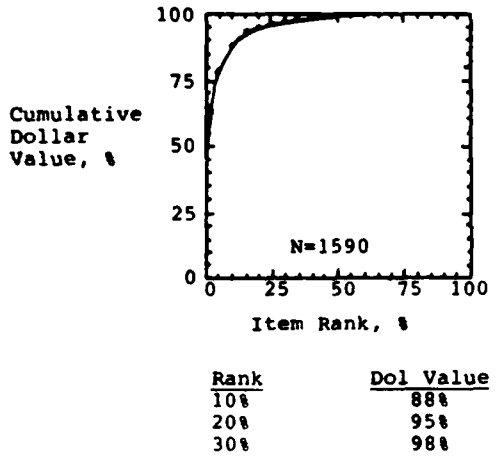
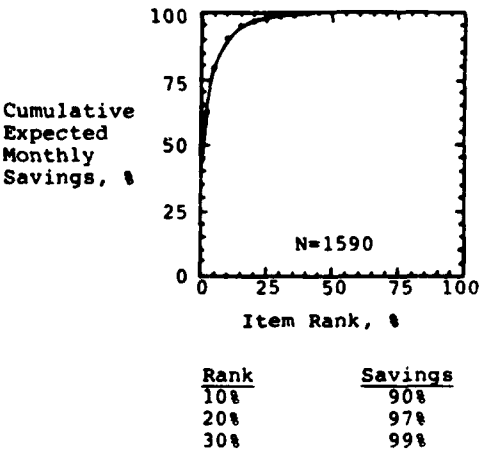


Figure 4. Dollar Value of Demand and Expected Savings Item Rankings, 3FSC Data

This analysis examines the rankings of the combined items since it was concluded in paragraph 3.2e that inclusive ranking of all items is a more effective screening procedure. This combined data will be referred to as the 3FSC data. A better way of comparing the curves in Figure 4 is by constructing the cumulative curves and utilizing a scale from 0 to 100. We can now discuss the parameters (expected savings, dollar value of demand, and rankings) in terms of percentages. See Figure 5.



Rank	Dol Value
10%	88%
20%	95%
30%	98%



Rank	Savings
10%	90%
20%	97%
30%	99%

Figure 5. Cumulative Dollar Value of Demand and Expected Savings, 3FSC Data

c. Intuitively, for the dollar value of demand ranking to be nearly as efficient, in terms of realized savings, a large number of top ranked items must be in common with the top ranked items of the expected savings ranking. Table 6, Col c & d, contains the breakdown of the number of common items for different top percentile rankings.

TABLE 6. Common Items in Dollar Value of Demand and Expected Savings Rankings

TOP PERCENTILE OF RANKINGS (a)	ITEM RANK LIMIT (b)	COMMON ITEMS	
		QUANTITY (c)	PERCENTAGE (d)
1	16	14	87.5
5	80	74	92.5
10	160	148	92.5
15	239	223	93.3
20	319	289	89.7
25	398	352	88.4
30	477	426	89.3
35	557	498	89.4
40	637	567	89.0
45	716	646	90.2
50	796	71	89.7

The quantity of common items in the top regions of the rankings are high. For example, in the top ten percentile of the dollar value of demand and expected savings ranking (i.e., items ranked from 1 thru 160), there were 148 common items. Therefore, 92.5 percent (148/160) of the items in the top 10 percentile were common. Figure 6 graphically depicts the data in Table 6 extended to the 100 percentile rank.

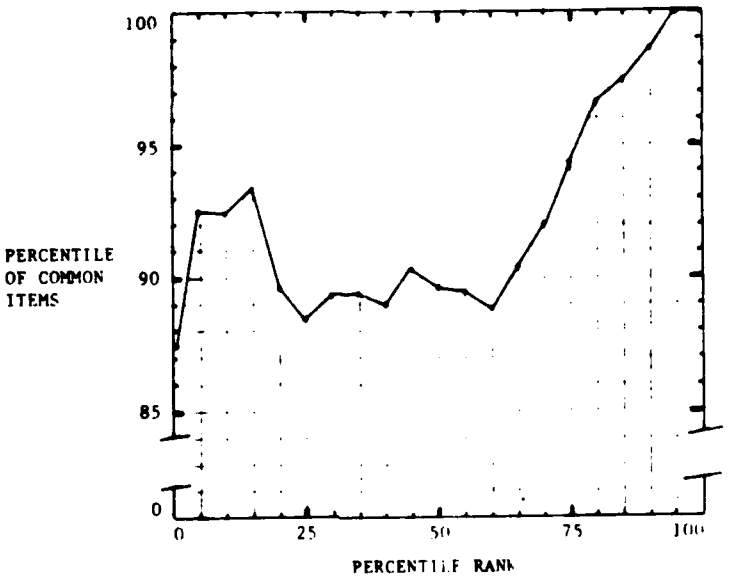


Figure 6. Percentage of Common Items vs Percentile Rank Relationship, 3FSC

d. The expected savings ranking is the preferred ranking, since it ranks the items beginning with greatest expected savings. A dollar value of demand ranking would produce different results. However, there is high similarity between the two rankings as was shown in Table 6 and Figure 6. Referring back to Figure 5, 89.9 percentage of the cumulative expected savings are in the top 10 percentile rank (items 1 thru 160). In the top 10 percentile of the dollar value of demand ranking, there are 148 items in common with the expected savings ranking. These 148 items captured 98.7 percent of the expected savings in the top 10 percentile expected savings ranking. Therefore, 148 items captured 88.8 percent (0.899 x 0.987) of the total expected savings to be realized if all of the items were reviewed. The proportion of the savings of the top X percentile of the expected savings rank captured by the common items is contained in Table 7, Col d. The percentage of the total expected savings captured by these common items is in Col e. This data is graphically shown in Figure 7. Based on the high percentage of the expected savings captured by the common items, a dollar value of demand ranking would be quite satisfactory.

TABLE 7. Savings Captured by Common Items, 3FSC Data

TOP PERCENTILE OF RANKING (a)	ITEM RANK LIMIT (b)	PCT OF TOTAL EXPECTED SAVINGS* (c)	PCT OF (c) CAPTURED BY COMMON ITEMS (d)	PCT OF TOTAL EXPECTED SAVINGS CAPTURED BY COMMON ITEMS (e)=(c)x(d)
1	16	49.3	95.4	47.0
5	80	79.0	98.2	77.6
10	160	89.9	98.7	88.7
15	239	94.9	99.2	94.1
20	319	97.3	99.1	96.4
25	398	98.5	99.3	97.8
30	477	99.2	99.6	98.8
35	557	99.5	99.7	99.2
40	637	99.7	99.8	99.5
45	716	99.8	99.9	99.7
50	796	99.9	99.9	99.8

*From Figure 5

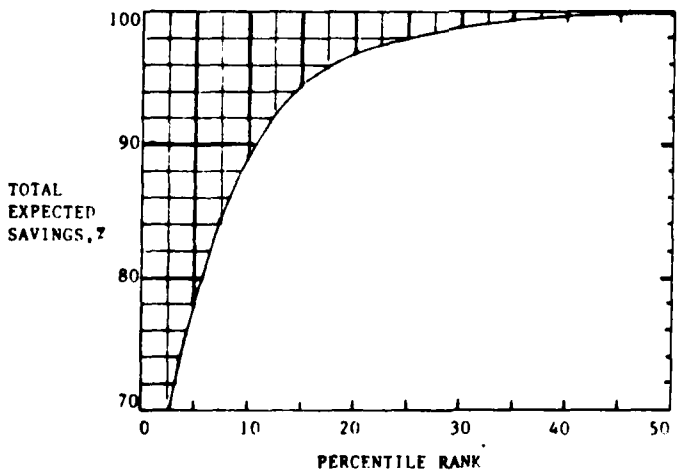


Figure 7. Total Expected Savings Captured by Common Items, 3FSC Data

e. The total savings resulting from a dollar value of demand ranking would be the sum of the savings captured by the common items (as shown in Figure 7) and the additional savings captured by the remaining items not in common with the expected savings ranking. It is concluded that the return from a dollar value of demand ranking is substantially high to warrant a dollar value of demand ranking procedure over an expected savings ranking procedure.

3.4. Evaluation of Dollar Value Ranking Procedure.

a. To verify the findings of paragraph 3.3, a sample scrub could be conducted on a portion of the "3FSC" items (N=1590) to compare actual savings to our expected savings. However, price scrub exercises are very resource intensive. An alternative is to use the data from a previous price scrub exercise, prioritize the items using both ranking procedures and compare the results. The data from the 1984 AMDF Price Scrub was used for this comparison. The data consist of the original unit price and the new price resulting from the scrub. A sample of 5844 items was randomly selected for this analysis.

b. Average monthly demand (AMD) data, required to project the savings return, was not available with the price scrub data. The AMD can be estimated from the AMD vs Price relationship of the 3FSC data. This relationship is shown in Figure 8.

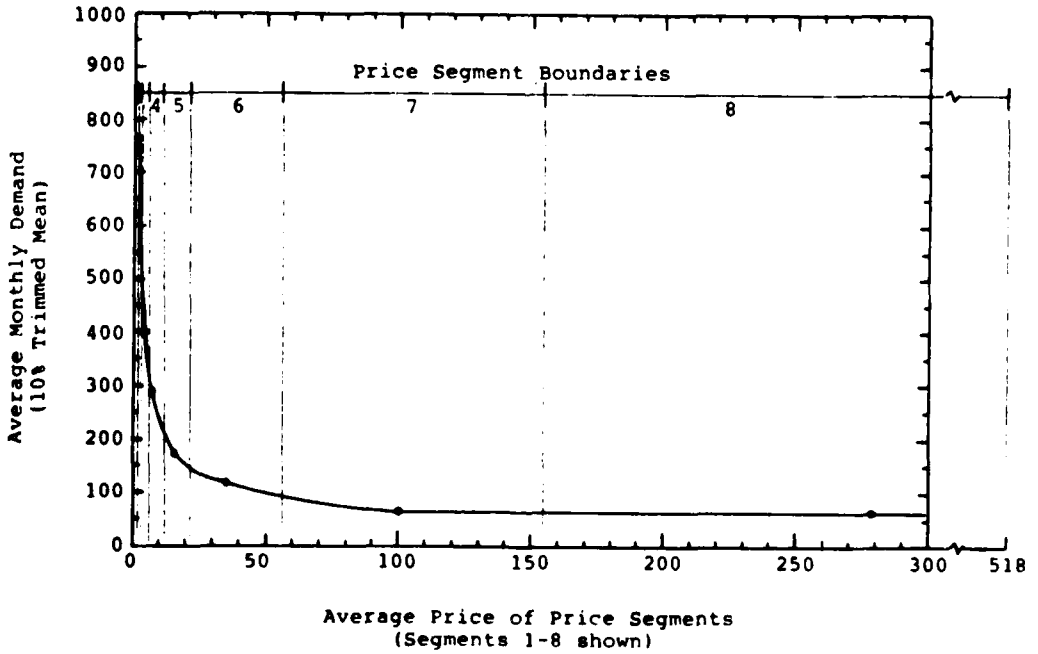


Figure 8. AMD vs Unit Price Relationship

The range of unit prices was divided into ten segments of 1590 items each. Price segment data and the ten percent trimmed mean* of the AMD for each price segment is contained in Table 8. The ten percent trimmed mean was used to represent the expected AMD value for a price segment because: (1) it is a more robust location estimation than the mean and median, and (2) high variability is common in demand data. We can assume the relationship in Figure 8 is representative of all secondary items and, therefore, also for our sample of N=5844.

TABLE 8. AMD and Price Segment Data, 3FSC Data

PRICE SEGMENT	PRICE RANGE ($)	MEAN PRICE ($)	AMD (10% TRIMMED MEAN)
1	Less than 0.74	0.37	764
2	0.74 - 2.07	1.24	615
3	2.08 - 4.75	3.28	419
4	4.76 - 10.25	7.24	281
5	10.26 - 21.39	14.91	160
6	21.40 - 56.99	35.16	119
7	57.00 - 154.99	100.04	72
8	155.00 - 517.99	279.26	68
9	518.00 - 1417.99	903.43	48
10	Greater than 1417.99	11,966.28	36

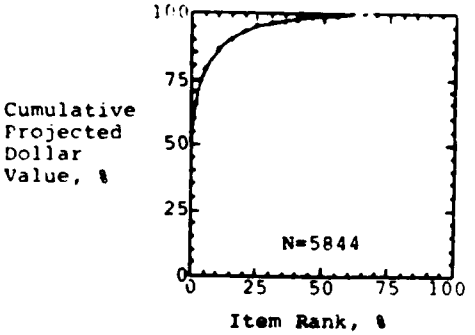
c. For our sample of 5844 items, the change in price (i.e., the savings per unit item) is known and the AMD can be easily projected. Therefore, we can project the actual savings per month of each item. It will be called the projected savings. The equation to compute projected savings is below. The price reduction per unit factor replaces the OPF used in the expected savings equations earlier. The OPF provided a measure of the expected price reduction.

$$\text{Projected Savings} = \text{Original Unit Price} \times \text{Projected AMD} \times \text{Price Reduction Per Unit}$$

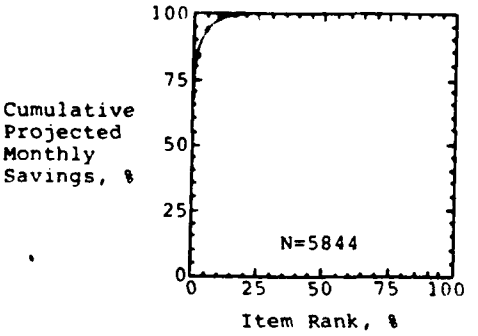
d. Ranking the 5844 items by dollar value of demand and by the projected actual savings produces the cumulative dollar value and savings curves in Figure 9. The ranking in both figures are expressed on a cumulative percentage

*A ten percent trimmed mean omits the largest ten percent and the smallest ten percent of the acceptable values and computes the mean using the remaining observations (the central 80 percent).

basis where 100 percent represents the 5844th item. This allows comparisons to be made to the rankings of the 3FSC data in Figure 5. Similar to Figure 5, the Pareto Principle applies here.



Rank	Dol Value
10%	86%
20%	93%
30%	96%



Rank	Savings
10%	99%
20%	100%
30%	100%

Figure 9. Cumulative Projected Dollar Value of Demand and Savings, N=5844 Data

e. The number of common items in the top regions of each ranking is not as high as was seen for the 3FSC data. In the top ten percentile of each ranking, only 27.0 percent of the items were common compared to 92.5 percent for the 3FSC data. A breakdown of the common items is contained in Table 9. The data is graphically depicted in Figure 10 and extended to the 100 percentile rank. The low percentage of common items in the upper rank regions is attributed to only 1,068 of the items (18.3 percent) in the sample having any price reduction. The number of items with savings over the entire dollar value of demand ranking is contained in Col d of Table 11.

f. An examination of the projected savings captured by these common items still produces impressive results. For the top ten percentile rank, the 158 common items captured 85.9 percent (Table 10, Col d) of the savings projected in the top ten percent of the projected "actual" savings ranking. The percentage of total projected savings captured by these common items, Col e, is graphically shown in Figure 11.

TABLE 9. Common Items in Dollar Value of Demand and Projected Savings Rankings

TOP PERCENTILE OF RANKING (a)	ITEM RANK LIMIT (b)	COMMON ITEMS	
		QUANTITY (c)	PERCENTAGE (d)
1	59	15	25.4
5	293	82	28.0
10	585	158	27.0
15	877	239	27.3
20	1169	333	28.5
25	1462	457	31.3
30	1754	599	34.2
35	2046	749	36.6
40	2338	942	40.3
45	2630	1154	43.9
50	2923	1502	51.4

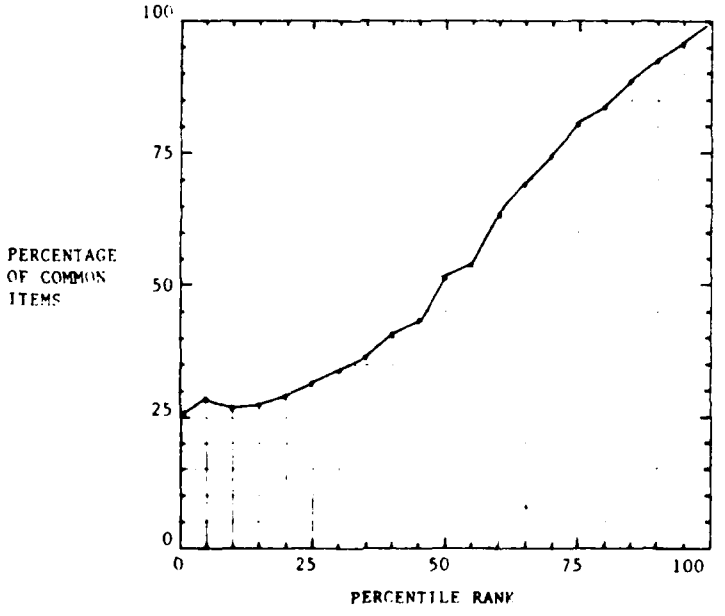


Figure 10. Percentage of Common Items vs Percentile Rank Relationship, N=5844 Data

TABLE 10. Projected Savings Captured by Common Items, N=5844 Data

TOP PERCENTILE OF RANKING (a)	ITEM RANK LIMIT (b)	PCT OF TOTAL EXPECTED SAVINGS* (c)	PCT OF (c) CAPTURED BY COMMON ITEMS (d)	PCT OF TOTAL PROJECTED SAVINGS CAPTURED BY COMMON ITEMS (e)=(c)x(d)
1	59	74.3	63.2	47.0
5	293	94.3	81.5	76.9
10	585	98.9	85.9	85.0
15	877	99.9	90.2	90.1
20	1169	100.0	93.4	93.4
25	1462	100.0	95.5	95.5
30	1754	100.0	96.8	96.8
35	2046	100.0	97.9	97.9
40	2338	100.0	98.5	98.5
45	2630	100.0	98.9	98.9
50	2923	100.0	99.2	99.2

* From Figure 9

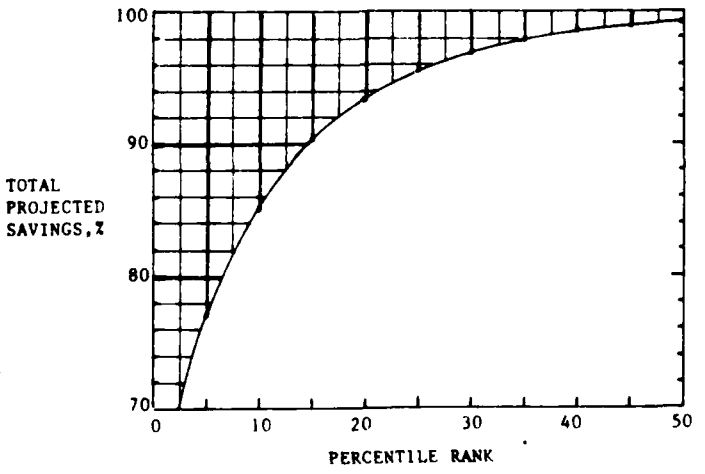


Figure 11. Total Projected Savings Captured by Common Items, N=5844 Data

g. It was shown above that the Pareto Principle applies and that the dollar value of demand ranking can capture a high percentage of the expected savings. The following analysis concentrates on the projected "actual" savings over the different regions of the dollar value ranking. The 5844 items were divided into ten equal-sized regions by descending price. See Table 11. The first region (top ten percentile) contained 86.2 percent (Col c) of the total dollar value of all 5844 items. One in every three items in this top region had a price reduction (Col e). The annual savings from these 193 items (col d) is $42.9 million (Col f). The data in Columns c, e, and g are depicted in Figure 12. The dollar value of demand and savings figures drop over dramatically below the top ten percentile region. Compare the similarity between parts a and c of Figure 12. The bulk of the savings is concentrated in the top dollar value of demand items.

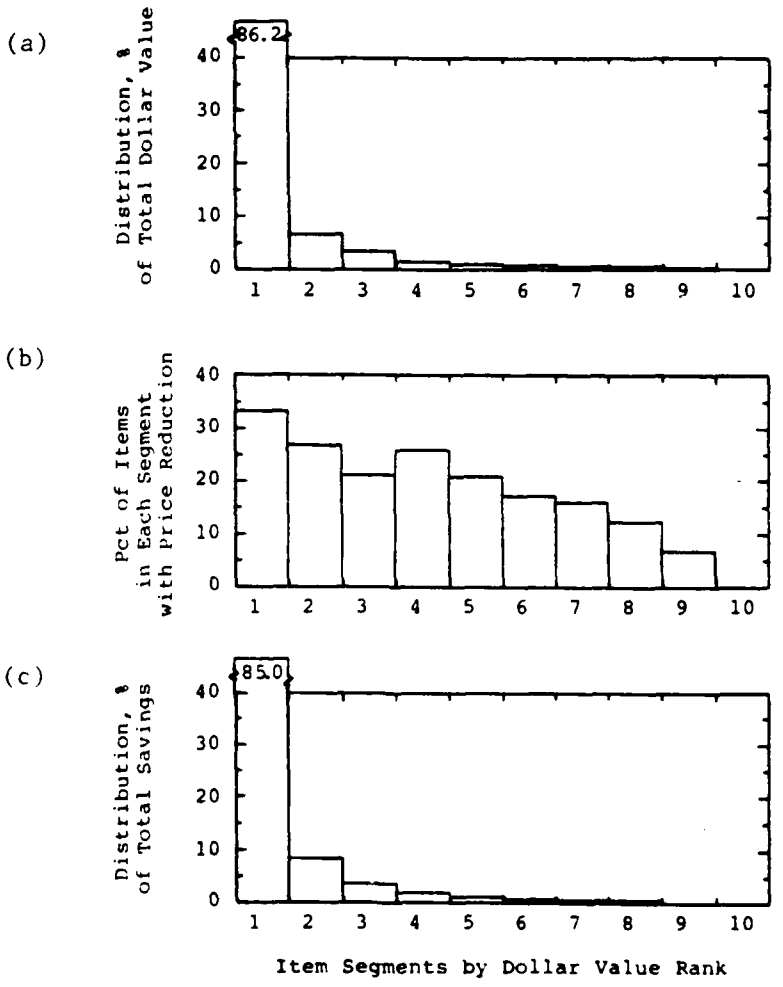


Figure 12. Price Reduction and Savings Distributions Over Dollar Vallue of Demand Regions, N=5844 Data

h. The ten percentile region captured 85.0 percent (Table 11, Col g) of the total projected "actual" savings of all the possible savings in the N=5844 sample. The 193 items with price reductions in this region is 3.3 percent of the total sample. It was shown in Tables 9 and 10 that the 158 common items from both ranking procedures also accounts for 85.0 percent of the projected "actual" savings. These 158 common items make up 2.7 percent of the total sample. This discrepancy is due to rounding error. The 158 common items captured 84.96 percent of the total savings while the 193 items (158 common + 35 uncommon) with price reduction captured 85.02 percent.

TABLE 11. Projected Savings by Dollar Value Region, N=5844 Data

DOLLAR VALUE REGION (a)	TOTAL DOLLAR VALUE FOR REGION (1,000s) (b)	PCT OF TOTAL DOL VALUE OF DEMAND (c)	# ITEMS w/PRICE REDUCTION (d)	PCT OF ITEMS w/PRICE REDUCTION (e)	TOTAL SAVINGS IN REGION (1,000$) (f)	REL FREQ OF TOTAL SAVINGS (g)
1	373,447	.862	193	.330	42,862	.850
2	28,856	.067	162	.277	4,202	.083
3	14,784	.034	127	.217	1,733	.034
4	6,924	.016	149	.255	880	.017
5	3,596	.008	125	.214	345	.007
6	2,271	.005	102	.175	203	.004
7	1,487	.003	94	.161	109	.002
8	990	.002	74	.126	65	.001
9	540	.001	42	.072	15	.000
10	154	.0004	0	.000	0	.000
SUM:	433,049	1.000	1068		50,414	1.000

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Chapter 4. FINDINGS

Within an FSC group, prices become more overpriced; i.e., the overpriced factor increases, as unit price increases. An inverse relationship occurs between FSC groups of different price magnitudes. That is, groups with high unit priced items have lower overpriced factors than low unit priced item groups.

Ranking items by overpriced factor or by dollar value of demand shows that most of the savings or dollar value of demand are in a "critical few." The top 10 percent ranked items captured 98.9 percent of the savings. This finding follows the Pareto Principle. The dollar value ranking captured 85 percent of the expected savings in the top 10 percent ranked items. This occurred even though only 27 percent of the items in the top regions of each ranking were in common.

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Chapter 5. CONCLUSIONS

Prioritizing or ranking groups of items (such as by FSC) for price review is not a viable price screening procedure. Items with high potential savings belonging to low ranked groups would be passed over in the ranking process for lower potential savings items. Higher cost effective results are obtained by ranking individual items independent of their classification or category.

Unit price and demand are the dominant factors in predicting expected savings. Although high unit priced FSC groups are generally more accurately priced (i.e., have small UPF) than low unit priced FSC groups, their expected total savings are much greater.

When ranking items for price review, a dollar value of demand ranking is preferred over a unit price ranking. This eliminates the possibility of overlooking low unit priced items with a large demand that potentially could lead to significant savings if a price reduction is warranted.

A dollar value of demand ranking produces comparable results to an expected savings ranking in terms of future savings. Most of the expected savings can be isolated by flagging for review the top ten percentile of items based on dollar value of demand.

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Chapter 6. RECOMMENDATION

Price scrubs should concentrate on the high dollar value of demand items regardless of item category. Dollar value of demand is the product of unit price times average monthly demand. Both parameters are in the Commodity Command Standard System (CCSS) and it would require minimal effort to produce a list (i.e., a ranking) of the top dollar value of demand items managed by AMC. Optimum return would be produced by an expected savings ranking based on using historical price accuracy data. But this would require extensive time and resources to develop and maintain the required data base. A dollar value of demand ranking is more cost effective, since it produces only a slightly less return and uses existing CCSS data elements.

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