Perspective

Examining Unintended Effects from Using The SG&A Intensity Ratio to Screen Wholesalers

BY A.E. RODRIGUEZ*

A critical element of a transfer pricing analysis is finding third-party comparables. When searching for wholesaler or distributor comparables, transfer pricing practitioners routinely use the SG&A (selling, general, and administrative outlays) intensity financial ratio, often in combination with other ratios, to screen firms from broader data collections, such as CompuStat or Disclosure.

Screening by using financial ratios reduces an analyst's search costs for finding potentially acceptable third-party companies. The practice is based on recognizing that companies performing comparable functions, undertaking comparable risks, and using intangibles of similar value generally have comparable returns.

The SG&A intensity ratio is obtained by dividing selling, general, and administrative outlays by net sales. The use and popularity of the ratio as a screen may be based on the underlying positive relationship between increases in levels of selling, administrative, and general expenses, and increased levels of sales. Presumably, additional functions or services provided by wholesalers incur higher SG&A expenditures and result in additional income.

But the positive relationship between the underlying variables in levels may not transfer into the relationship in ratios for several reasons. As a result, using the SG&A intensity ratio to screen wholesalers may have unintended effects. This article examines whether the ratio is being used improperly in transfer pricing analyses and whether practitioners should refrain from relying on the ratio as a screening device.

Distortions

Practitioners need to recognize that those using the SG&A intensity ratio may encounter some difficulties. First, normalizing the variables by net sales to obtain the required ratios may distort or sever the implicit positive relationship.

Second, the variable of interest in transfer pricing practice for determining returns to distribution services is operating income rather than gross profit. The latter variable is the typical profitability measure examined in the vast industrial organization literature addressing profitability.[1] Operating income reflects income generated by the firm after accounting for all operating expenses. Additional components of operating costs include research and development expenditures and depreciation charges. Both of these components may be exogenously determined.[2]

Return on Sales

The preferred ratio for transfer pricing considerations in the distribution industry is operating margin. Also known as return on sales (ROS), operating margin is defined as operating income divided by net sales. Increasing SG&A spending may increase sales, but it may increase returns to sales in varying proportions. Thus, the ultimate impact on a firm's operating margin from increasing SG&A intensity is not necessarily positive.

Economists Michael McDonald and Daniel Scales of Ernst & Young LLP, along with Fritz Scheuren of the Urban Institute, found no support for the use of the SG&A screening ratio.[3] McDonald, Scheuren, and Scales find that a positive relationship does not exist between return on sales (ROS) and the SG&A to sales ratio.[4]

The results obtained by the three economists are surprising to some extent.[5] Ex ante, as a matter of accounting algebra, the relationship between SG&A intensity and ROS appears to be negative.[6] This negative associa-

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[1] Compared with retail and manufacturing, there is significantly less written in industrial organization research about issues in the distribution sector. Industrial organization commentators have been concerned less with questions of importance to transfer pricing practitioners than with the interrelationship between industry structure, advertising, and price cost margins and related topics.

[2] As a general point, distributors are unlikely to carry significant amounts of research and developments expenditures; this may also be true of depreciation charges since wholesalers may not book significant amounts of depreciable capital.

[3] McDonald, Michael, Scheuren, Fritz, and Scales, Daniel, "SG&A Spending and Its Impact on Distributor Profitability," (8 *Transfer Pricing Report* 725, 12/22 /99).

[4] *Supra, note* 4, at 727.

[5] McDonald, Scales, and Scheuren reported empirical results that provide support for a negative association. Unfortunately, instead of a two-sided test, they ran a one-sided test of a positive relation against a null hypothesis of no relationship.

[6] Based on accounting identities: OI/Sales = 1 - COGS/Sales - SG&A/Sales, or, ROS = 1 - COGS/Sales - SG&A/Sales. Determining the influence of SGA&A intensity implies:

ROS/ (SG&A/Sales) = - (COGS/SALES)/ (SG&A/Sales) - 1. Thus: ROS/ (SG&A/Sales) < 0 if and only if (COGS/SALES) / (SG&A/Sales) > -1

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tion turns on whether the ratio of cost of goods sold, as a percent of net sales, remains constant. In distribution, a business characterized by markups over cost of goods sold, this is the norm rather than the exception.

Booking SG&A Expenses

Another reason impeding the association from transferring may be a result of how SG&A expenses are booked. The effect on sales from selling expenses incurred by some wholesalers are indistinct from those of advertising expenditures in their effects on sales. Advertising affects not only costs but shifts the demand curve as well.[7] The classification criteria for booking expenses as advertising, selling, or as a component of cost of goods sold is often blurred and imprecise. Costs that should be considered overhead may be booked as a variable cost. The CompuStat SG&A data is not disaggregated and therefore it was not possible to examine the effects of each the individual component within SG&A. Although additional functions or services offered by a distributor to its customers are likely to result in additional selling expenditures, not all selling expenditures support functions. Rather, they are designed to increase sales in the same manner as advertising. For example, data-laden chemical or medical product brochures handed out to customers could be correctly considered as reflecting expenses incurred in providing valuable information services to the customer. But they could also be correctly considered selling expenses designed to enhance sales.

Doubts also arise about the transferability of the positive association between the SG&A spending and sales onto SGA intensity and ROS because the exact outcome of increased SG&A expenditures on operating income may depend on various other factors. Market and product characteristics may have a bearing on the particular results, such as:

- sensitivity of sales spending to selling expenditures;
- rate of amortization of the SG&A stock of goodwill;
- rival behavior; and
- ease of entry.

Since these variables may differ across markets and products, the exact relationship is ultimately an empirical matter.

Scope and Results

The author conducted a test of the relationship between SG&A intensity and operating profitability controlling for various market and firm characteristics using wholesale distribution industry level financial data aggregated at the four-digit Standard Industrial Classification (SIC) code level.

Results suggest no support for the hypothesis that SG&A intensity is unrelated to operating margins for wholesalers as a group. In fact, SG&A intensity is negatively related to operating profitability for the industry examined as a whole. This result implies that the SG&A intensity ratio is being used inappropriately in transfer pricing practice.

The negative association between SG&A intensity and operating profitability returns a set of companies from the broader database universe that are more likely to have median operating profitability higher than the universe median. The routine transfer pricing practice of using inter-quartile ranges for removing the influence of data outliers and strengthening the robustness of the comparables set may correct the initial bias imputed by using the SG&A intensity screen.

Transfer pricing analysts typically sift through web sites, Securities and Exchange Commission 10-Ks Forms and other financial documents belonging to those firms within the comparables set to ensure functional and risk comparability. This examination, albeit subjective, may also provide additional control. However, if not carefully conducted, these additional adjustments may not entirely avoid compromising a transfer pricing study. A final group of comparables characterized by higher operating profitability is more likely to justify a tested party's higher returns to distribution services. Unless more careful matching of functions and risks can be ensured, transfer pricing practitioners should refrain from relying on the SG&A intensity as a screening device.

Empirical Considerations

As discussed above, the literature examining the association between SG&A and (gross) profitability does not necessarily imply that similar concerns apply to the relationship between SG&A and ROS. This section discusses these considerations.

Endogeneity

The literature relating levels of advertising expenditures and gross margins indicates that advertising is endogenously determined by sales.[8] Controlling for simultaneity, empirical results reveal a positive relationship between advertising and sales. Thus, one must wonder whether a similar simultaneity applies between the ratios. In transfer pricing practice, this endogeneity may not apply. The various factors discussed above—the normalization by net sales of the variables in levels, the influence of exogenous factors such as depreciation and R&D—are likely to sever the positive association in levels from the association in ratios. As a result, return on sales may not be determined simultaneously with SG&A intensity.

The condition that the ratio of COGS (Cost of Goods Sold) to Sales is likely to remain constant is a very plausible one in the distribution industry. The two other cases, where the association is positive and where the association is equal to zero, are theoretically possible. However, they turn on conditions that are atypical in the industry.

[7] Dorfman, Robert, and Steiner, Peter O., "Optimal Advertising and Optimal Quality, *American Economic Review*, Vol. 44 (1954) 826.

[8] Berndt, Ernst R., Chapter 8, *The Practice of Econometrics: Classic and Contemporary*, (Reading, Mass: Addison-Wesley, 1991) titled, "Causality and Simultaneity Between Advertising and Sales," offers a veritable tour de force on theoretical and empirical issues underlying the relationship between advertising and sales. More recently, see Jung, C. and Seldon, B.J., "The macroeconomic relationship between advertising and consumption," *Southern Economic Journal* 61, January 1995, 577-87.

Stock Effects

Advertising by wholesalers is infrequently directed at the general public. Customers are generally reached via telephone, in-person marketing, or by specialized advertising. Follow-up orders are either vendor-initiated or client-initiated, generally based on previous sales, and typically reflect the existence of strong ties between sellers and buyers. In fact, transactions are often conducted between wholesalers and clients that have long-standing business relationships and enjoy valuable goodwill.[9]

Clearly, to the extent that current period sales depend on prior period SG&A spending, such as advertising or promotions, SG&A's stock properties may be a factor and must be analyzed in any empirical test.[10] However, there are two considerations that suggest that the lagged influence of SG&A may not be empirically detectable. First, research on the decay of SG&A stock suggests that any potential stock effects disappear within one year.[11] The data used here is yearly data and may be too aggregated to provide any detail on any stock effects of SG&A. The second caveat is that transfer pricing interest lies not on the stock effects of SG&A, but rather, on the stock effects of SG&A intensity, at any rate.

Competition

Competitive conditions affect the relationship between sales and advertising. Entry and exit, especially when using time series data, may affect pricing dynamics as well as the relationship between sales and advertising. Entry may be associated with either an increase or a decrease in price elasticity. The correct prior can only be anticipated from a close understanding of competitive conditions in each market. Failure to control for entry may result in either a positive or negative association between price elasticity and advertising.

Any empirical study should capture the varying competitive conditions across the different markets. Fixed-effects controls may distinguish cross-sectional variations in competitive conditions as well as other product-specific effects relevant to each of the products or markets within the broader SIC code. Without the fixed effects model, any product/market specificity is likely to influence the estimated parameters of the model.

However, once again, the fact that the variables of interest here are normalized and differ from those typically cast in empirical industrial organization studies may negate any influence of a competition proxy in an empirical formulation.

Extent of the Market: SIC Codes

By keeping an empirical analysis at the four-digit SIC code level, one automatically examines a vast array of substantially different product markets. Although transfer pricing practice typically focuses on functions and risks, reported within the four-digit data will be instances of markets characterized by significant brand competition, generics, different institutional arrangements, and different patterns of market entry and exit, across varying market concentrations and price elasticities of demand.[12] Aggregation across four-digits may mask any meaningful information one can draw about price dynamics and advertising. A correct examination of the relationship between advertising and sales would require closer attention to individual market factors.

The results provided here examining whether the SG&A intensity screen can be reliably used are valuable despite the level of aggregation, because transfer pricing practice typically operates at the four-digit SIC code level, at least at the outset of a study. It is possible that a more disaggregated accounting of the various influences in our model will determine a more accurate relationship between intensity and profitability. But examining firms at a more disaggregated level is costly and time consuming and defeats the purpose of screening.

Omitted Variables

In addition to lagged values of SG&A intensity, the advertising expenses undertaken by *manufacturers* may be an important explanatory variable in several markets. Especially in the case of branded products, manufacturers often share in advertising programs with their distributors. To the extent manufacturers' advertising expense variables are expected to be negatively correlated with SG&A intensity, the estimated ordinary least squared coefficient of SG&A intensity picks up the effect of this upstream expense variable.[13] A strong enough negative effect may outweigh the "true" effect of SG&A intensity on the operating margin and the regression model may estimate a negative coefficient as a result of the omitted variable.

Advertising and increased selling expenses may communicate the availability of new products. In doing so, it may facilitate the introduction of new products. Increased profits from sales of new products in turn increase the returns to R&D. Empirical results suggest that R&D intensity is positively correlated with advertising intensity.[14] Thus, as a general point, failure to include R&D in an econometric specification may bias the results. But R&D is less significant a factor in wholesale distribution. Thus, its absence from our specification is of no significant concern.

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[9] Bureau of the Census, *Establishment and Firm Size, 1997 Economic Census, Wholesale Trade* (September 2000).

[10] This understanding goes back to Nerlove, Marc and Arrow, Kenneth J., "Optimal Advertising Policy under Dynamic Conditions," 29 *Economica* 129 (1962).

[11] Berndt, *supra*, footnote 9, at 392.

[12] This problem has been noted in other studies. See, Pittman R.W., and Werden, G.J., "The Divergence of SIC Industries from Antitrust Markets Indications from Justice Department Merger Cases," *Economics Letters*, Volume 33, Issue 3, (July 1990) pp. 283-286; Guenther, David A., and Rosman, Andrew J., "Differences between COMPUSTAT and CRSP SIC Codes and Related Effects on Research," *Journal of Accounting and Economics*, Vol. 18, Issue 1 (July 1994) pp. 115-128.

[13] This line of reasoning implicitly assumes that the combined amount of marketing expenses by manufacturers and wholesalers is fixed, and only the composition changes. This is a plausible assumption across various industries. Thus, if the distributor's share of the marketing campaign decreases, the manufacturer's share increases. As a result of increased advertising, sales presumably will increase, resulting in a decreasing wholesaler SG&A intensity ratio.

[14] Hula, David G., "Advertising, New Product Profit Expectations, and the Firm's R&D Investment Decisions," *Applied Economics*, Vol. 20 (January 1988); Leffler, Keith B., "Persuasion or Information? The Economics of Prescription Drug Advertising," *Journal of Law & Economics*, Vol. 24 (April 1981).

Buyer and seller market power are also likely influences on wholesaler margins. Buyers of wholesaler's services are retail outlets, for the most part, which vary in size and purchasing power across the panel. Similarly, manufacturers may be able to squeeze wholesaler margins depending on the relative market power of the two parties. The price equilibrium is unclear because a firm's ability to exercise market power will be limited by bargaining power from the opposing side of the market. Again, a specification that fails to control for market power may bias the results.

Specification, Data, Empirical Results

To establish a basis of comparison, a model is established, based on one proposed by McDonald, Scales, and Scheuren.

$$Return\ on\ Sales_{it} = \beta_0 + \beta_1(SG\&A/Sales)_{it} + \beta_2(Assets/Sales)_{it} + \beta_3(Ln(Assets))_{it} + \beta_T \Sigma Years_t + \Lambda_i + \mu_{it}$$

The variable of interest is SG&A intensity, represented by SG&A/Sales. As discussed above, the coefficient of SG&A intensity should be negative. The variable *Ln(Assets)*, is the logarithm of reported assets. In the specification, this variable controls for firm size. Because larger firms are more likely to be profitable, *Ln(Assets)* is anticipated to have a positive coefficient.[15] The variable *Assets/Sales* is obtained by dividing a firm's reported assets in a given year by its net sales. This variable reflects a firm's efficiency and should capture the higher returns generated by more efficient firms. The anticipated coefficient on this variable is negative, since it is the inverse of efficiency or turnover.

There are two important differences from the McDonald, Scales, and Scheuren specification; this alternative specification provides more generality. To reflect the fact that the population of wholesalers may have different distributions in different time periods, we allow the intercept to differ over the years. To accomplish this, the author included dummy variables for all but the first year, 1984, which is chosen as the base year. This set of binary variables is represented above by *Years*.

The variable Λ_i captures the influence of all unobserved time-invariant factors that affect return on sales. In addition, μ_{it} represents the combined influence of all unobserved effects that change over time and affect profitability.

To remove the effect of time-constant unobserved attributes discussed, the same variables also are estimated after first differencing all the independent variables.[16]

$$\Delta Return\ on\ Sales = \alpha_0 + \alpha_1 \Delta SG\&A/Sales + \alpha_2 \Delta Assets/Sales + \alpha_3 Ln(Assets) + \alpha_4 \Delta Y1997 + \ldots + \alpha_{17} \Delta Y1986$$

Other variables are also tested. A variable to control for concentration and the intensity of competition in the various markets was included. In the model this variable is represented by *N*. It is obtained by counting the number of competitors reported within each four-digit SIC code. It is likely that more competitors will result in reduced operating profitability. One anticipates that the coefficient on *N* will be negative.

The Sample and the Data

The variables used in the regression have been introduced in general form. To maintain consistency, the author selected the identical data set used by McDonald, Scales, and Scheuren drawn from the same source and relying on their specifications. Specifically, the author draws a sample of distributor financial data from CompuStat, a financial database of publicly traded U.S. companies. The data set encompassed the years 1984 through 1997. The data set contained only "wholesale distributors," defined as companies whose primary industry classification was SIC Codes 5000 through 5199.[17] The resulting set included over 2000 companies.

The wholesale sector comprises establishments engaged in wholesale merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. There are three main types of wholesalers represented in the data:

- those that sell goods on their own account;
- those that sell goods manufactured by a parent company in the United States, and
- those that arrange sales and purchases for others for a commission or fee.

Empirical Results

Table 1 presents the result of the two specifications discussed over the full panel set. The first column, labeled independent variable, describes the variables included in the specification for the first regression results. The variables included in the second specification are the first differences of the same set of variables in column 1.

Estimates were obtained by using a weighted least squares procedure to account for variances that may change over time.[18] No direct test for endogenity was possible.[19]

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[15] Van Dalen, Jan, and Thurik, Roy, "A Model of Pricing Behavior: An Econometric Case Study" *Journal of Economic Behavior and Organization*, Vol. 36, No. 2 (August 1998) 175-194.

[16] The year and sub-sector subscripts have been dropped.

[17] The empirical tests were performed across two different data sets. One set covered a cross-section across a 14-year period and the other was a single year cross-section.

[18] The weighted least squares regression is obtained by first dividing the weight series by its mean, then multiplying all of the data for each observation by the scaled weight series. The scaling of the weight series is a normalization that has no effect on the parameter results, but makes the weighted residuals more comparable to the unweighted residuals. Estimation is then completed by running a regression using the weighted dependent and independent variables to minimize the sum-of-squared residuals.

[19] Granger causality tests (2-lags) for a number of subsectors rejected the hypothesis that SG&A intensity does not Granger-cause ROS. By contrast, all failed to reject the hypothesis that ROS does not Granger-cause SG&A intensity.

Table 1

Regression Result for Return on Sales as Dependent Variable Panel of Distributors for the Year 1982-1997

Independent Variable	Parameter Estimates (Generalized Least Squares)	t-values	Parameter Estimates (Generalized Least Squares) First-Differences	t-values
Constant	0.300	54.289	0.0006	0.4276
SG&A Intensity	−1.007	−262.173	−1.0541	−197.0041
Assets/Sales	−0.016	−30.743	−0.0070	−6.2865
Log (Assets)	0.0014	2.655	0.0005	0.9074
D1997	−0.012828	−2.316	−0.0200	−1.0246
D1996	−0.010059	−1.775	−0.0196	−1.0909
D1995	−0.014941	−2.588	−0.0183	−1.1195
D1994	−0.021223	−3.617	−0.0175	−1.1808
D1993	−0.017638	−2.938	−0.0176	−1.3257
D1992	−0.016076	−2.54	−0.0144	−1.2354
D1991	−0.016373	−2.50	−0.0126	−1.2476
D1990	−0.014275	−2.17	−0.0124	−1.4504
D1989	−0.006122	−0.924	−0.0070	−1.0051
D1988	0.000749	0.112	−0.0034	−0.6294
D1987	−0.002508	−0.372	−0.0027	−0.7194
D1986	−0.002079	−0.307	−0.0020	−0.9352
D1985	−0.004008	−0.589		
Included Observations	14		13	
Total Panel Observations	2614		2282	
R-Squared	0.9765		0.9478	

The first equation was specified with common effects across all sub-sectors. The results are reported above in column 2 in Table 1. Subsequently, the same model was estimated allowing a time-constant intercept to vary across each four-digit SIC segment. The fixed-effects variable captures any secular trend in the industry that would cause SG&A intensity to change over the period examined. Parameter estimates did not vary with the fixed effects model. The identical strong negative association between SG&A intensity and ROS remains.[20]

The results from the first-difference estimator are also estimated assuming common effects.

Both sets are consistent in showing that distributors with higher SG&A intensity generally have lower return on sales; both estimates are statistically significant. The coefficients on the year dummy variables show a sharp drop on post-1990 industry return on sales relative to profitability in the base year 1984.[21] It is not clear why this occurs.

Several other control variables were tested. No discernible effects were found when concentration was taken into consideration. Similarly, no effect was found when including a one-period lagged value of the dependent variable.

In addition, cross-section estimates were estimated for the years 1986 and 1996 with no noticeable difference in the results. Both cross-section equations confirm the strong negative relationship between SG&A intensity and ROS.

Conclusion

The use of SG&A intensity as a filter to select comparables is based on an assumed positive relationship between SG&A intensity and operating profitability. Empirical results cannot confirm this hypothesis, nor can they reject the hypothesis of no relationship. In fact, the results suggest an inverse relationship between SG&A intensity and firm operating profitability. The results are obtained from a linear specification between profitability represented by return on sales and SG&A intensity, controlling for firm size, asset intensity, fixed effects, and annual dummies. Other variables and specifications were also tried, but the main result remains invariant. The model is tested with a panel of SIC data drawn from CompuStat encompassing the years 1984 to 1997 for firms encompassing SIC 5000-5199. In addition, cross-section estimates for two years, 1997 and 1986, confirm the negative relationship between the variables of interest.

The hypothesis that SG&A intensity is unrelated to operating margins for wholesalers as a group is rejected. The article's results indicate that SG&A intensity is negatively related to operating profitability for some industries. This implies not only that the SG&A intensity ratio is not a useful screening ratio to identify a reduced set of comparable wholesalers but that it may be imputing counterintuitive results. Paradoxically, the negative association between SG&A intensity and operating profitability is likely to return a set of companies

[20] The fixed-effects estimator results are not reported here but are available upon request.

[21] As a group, the year dummies are jointly significant; the Wald test F-statistic is F = 12.4.

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with median operating profitability higher than the universe median.

The use of interquartile ranges and other mechanisms for removing the influence of data outliers and the subjective examination of individual companies selected as comparables improves the likelihood of ultimately selecting an acceptable set of comparables. However, these adjustments may not entirely neutralize the imputed bias and ultimately compromise reported results or recommendations. A group of comparables characterized by higher operating profitability is more likely to justify a tested party's higher returns to distribution services. Unless more careful matching of functions and risks can be guaranteed, transfer pricing practitioners should refrain relying on the SG&A intensity as a screening ratio.

Appendix I

Table 2

Sample Statistics Common Pool

Statistic	OM	SGA/SALES	ASSETS/SALES	LOG (ASSETS)
Mean	-0.098466	0.316964	1.506006	4.376217
Median	0.031898	0.164228	0.507083	4.398060
Maximum	3.116379	92.00000	447.4355	11.31837
Minimum	-93.00000	-0.478448	-1.892241	-3.863233
Std. Deviation	2.052536	2.011784	13.61233	2.044643
Observations	2614	2614	2614	2614
Cross-Section	310	310	310	310

Table 3

Sample Medians Cross-Section Specific for Pool

Year	OM	SGA/Sales	Assets/Sales	Log (Assets)
1984	0.041886	0.174582	0.543873	4.509364
1985	0.032184	0.185526	0.57204	4.398589
1986	0.03487	0.177754	0.537204	4.135742
1987	0.034476	0.181224	0.563926	4.367623
1988	0.036102	0.169145	0.536888	4.379015
1989	0.034065	0.174242	0.551246	4.39398
1990	0.028005	0.171717	0.505105	4.331759
1991	0.024152	0.169035	0.481265	4.320816
1992	0.029619	0.153249	0.468095	4.214836
1993	0.03206	0.158222	0.46722	4.346057
1994	0.033968	0.15776	0.483518	4.458941
1995	0.030044	0.154674	0.471163	4.348597
1996	0.031324	0.152556	0.501255	4.396583
1997	0.030637	0.157475	0.513582	4.535842