SCALE AND SCOPE EFFECTS ON
ADVERTISING AGENCY COSTS

by

Alvin J. Silk and Ernst R. Berndt*

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Economies of scale are evident when a firm's average costs decline while its output expands, as when an advertising agency raises its gross income by serving more accounts and/or larger accounts. Economies of scope appear when cost savings can be realized by a single agency producing several products jointly, as compared to many agencies each producing them separately. How important are economies of scale and scope in advertising agency operations? In this paper cost models are formulated which represent how the principal component of agency costs, employment level, varies according to the mix of media and services an agency provides and the total volume of advertising it produces. These models are estimated and tested cross-sectionally utilizing data pertaining to the domestic operations of 401 US agencies for 1987.

The empirical evidence reported here indicates that both scale and particularly scope economies are highly significant in the operations of US advertising agencies. We find that of the 12,000 establishments comprising the industry in 1987, approximately 200-250 had domestic gross incomes of $3-4 million or more (or equivalently, billings of $20-27 million) and therefore had service mixes and operating levels sufficiently large to take full advantage of all available size-related efficiencies. Furthermore, the overall structure of the industry is one where these large, fully efficient firms created and produced more than half of all the national advertising utilized in the US during 1987. At the same time, vast numbers of very small agencies appear to operate with substantial cost disadvantages compared to large firms as a consequence of these scale and scope economies.

These findings carry important implications concerning possible future changes in the industry structure. It seems highly doubtful that scale economies could motivate further mergers among the largest 200-250 agencies. On the other hand, for small agencies, mergers and acquisitions might be attractive as means of mitigating their size-related cost disadvantages. Finally, our findings demonstrating the existence of scale and scope economies are consistent with the diminishing reliance on fixed rates of media commissions as the principal basis of agency compensation. They also cast strong doubts on size-related economies in operating costs as a viable explanation for the limited degree of vertical integration of agency services by large advertisers.

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I. INTRODUCTION

How important are economies of scale and scope in advertising agency operations? A typical agency serves a set of clients for whom it creates and places advertising messages in various communication media, and thus it should be treated as a multiproduct firm whose costs may be influenced by both the size and the composition of its service output. Economies of scale are evident when a firm's average (unit) costs decline while its output expands (as when an advertising agency raises its gross income by serving more accounts and/or larger accounts). Economies of scope appear when cost savings can be realized by a single agency producing several outputs jointly, as compared to many agencies each producing them separately.

The empirical magnitude of scope and scale economies critically affects several fundamental and inter-related issues relating to the organization of the advertising agency industry, including: (1) the magnitude of cost advantages associated with increasing agency size; (2) the breadth of the line of services agencies can efficiently deliver to clients; (3) the economic rationales underlying agency mergers and acquisitions; (4) the potential for vertical integration of agency services into client organizations; and (5) the viability of alternative agency-client compensation arrangements. Controversy surrounding these matters is scarcely new, and indeed, as is clear from the industry's history (Pope [1983]), these issues have played a central role in how the industry has evolved.

In recent years concern about agency scale and scope has once again arisen as conditions affecting the demand for agency services in the U.S. have undergone important changes. Growth in aggregate domestic advertising expenditures has slackened, especially in real terms (Coen [1990]). In several key sectors,
client merger and acquisitions have elevated concentration levels (Winski [1990]) and the shares of marketing budgets allocated to consumer and trade promotions have risen at the expense of expenditures on media advertising (Edel [1987]). Responding to these developments, the agency industry is presently in the midst of a re-structuring process and there is much speculation and debate about how the nature of agency operations and the industry's organization may ultimately be re-configured (Bernstein [1989], Economist [1990], Jones [1989], Mayer [1991], O'Toole [1990]).

What reasons are there for expecting that advertising agency operations might be subject to economies of scale and scope? The principal component of an agency's costs is payroll expense which averages about 65% of agency gross income (American Association of Advertising Agencies [1987], p. 13). Agencies typically employ some form of matrix organization (McNamara [1990]). While structured into departments corresponding to the core functions which a full service agency performs for its clients, an agency deploys its professional workers in account teams--each one consisting of a set of creative, media, research/planning and account executive personnel assigned to service a specific client (American Association of Advertising Agencies [1987]; Comanor, Kover and Smiley [1981]; Salz [1983]). Given these essential agency attributes of labor intensiveness and matrix organization operations, several phenomena can be identified involving specialization and imperfect divisibility of inputs that could give rise to scope and scale economies.

First, the division of labor occurring within agencies involves specialization with respect not only to function (e.g., creative, production, media buying, research, client contact) but also to type of output, differentiated on the basis of communication medium (e.g., broadcast, print, direct response, promotion, public relations). Further, an agency's costs of performing certain functions may vary by medium because media differ with
respect to "divisibility" and minimum transaction size (Porter [1976]). For example, the costs incurred by an agency in placing a given advertising expenditure with a single television network will be considerably less than those which would arise if the same amount were expended through a number of separate transactions undertaken to purchase local newspaper space or spot television time in several geographical markets (Poltrack [1983], pp. 79-81).

Second, Weilbacher [1990, pp. 125-133] has argued that the size and composition of an account team required to service a client tends to remain relatively fixed over a considerable range of variations in the size of an account, as measured by media billings. However, the minimum requirement for an account team varies for different type of account--e.g., the nature and level of media-related services required for an automotive account will be quite different from that applied to a proprietary medicine account.

Third, outside of the account teams, certain personnel and facilities associated with the performance of functions such as account supervision and research are often jointly utilized for various clients and media-related services. Still another component of shared input is agency overhead (e.g., office expense, accounting, new business solicitation, executive staff, etc.). Finally, other size-related economies might arise such as through serving several accounts within the same client firm, or by operating branch offices in several cities and/or countries.

If economies of scope and scale are available, then a number of implications occur concerning industry restructuring. For example, many of the mergers and takeovers which occurred in the past decade involved the largest firms in the industry and served not only to increase the scale of their operations, but also to expand the range of services they make available to clients (Business Week [1986], Millman [1988]). This raises questions about the magnitude of cost advantages that large agencies are able to realize as a result of both their
greater size (economies of scale) and their ability to engage in the joint
production of a broad as opposed to a more narrow line of services (economies of
scope). Given limited growth in aggregate advertising expenditures, whether
future concentration may occur will depend, in part, on the particular levels of
output at which economies of scale and scope are effectively exhausted.¹

The design of agency compensation arrangements, a major source of agency-
client discord throughout the industry's history (Haase [1934], Young [1933]) is
also affected by the presence of scale and scope economies. There is evidence
that, at least among very large advertisers, reliance on the longstanding
practice of setting agency compensation at 15% of a client's media expenditures
is eroding (Weilbacher [1989]). Weilbacher [1990] attributes this change to
client pressure for negotiated rates as a result of their recognizing a
"fundamental flaw" in the flat 15% commission, namely, the fallacious underlying
7] argues that scale economies are realized at the account level ("agency costs
tend to decline proportionately as the size of the advertising appropriations
for a brand or an advertising account grows") and predicts growing acceptance of
a sliding scale of media commission rates. Data pertaining to the costs
associated with servicing individual accounts are highly proprietary and to the
best of the authors' present knowledge, no empirical evidence of account-
specific scale economies has appeared in the public domain, although experienced
agency management are on record as acknowledging the phenomenon (McNamara [1990,
p. 82], Morgan [1990b]).

Client preferences for negotiated and cost-based compensation arrangements
are often coupled with demands for the "unbundling" of agency services
(Achenbaum [1990], Economist [1990]). Thus, the policy alternatives for a
client are to employ a full-service agency or to utilize some combination of
specialized in-house or outside agencies for particular functions such as
creative and media buying services. Similar demands arose in the adverse climate of the early 1970's (Loomis [1972]) and led full-service agencies to modify their strategies, by offering à la carte services and by emphasizing their creative product (Claggert [1988], Jones [1990]). Clearly, the extent to which agency operations are subject to scale and scope economies affects the feasibility of these organizational alternatives.

Despite the persistence of these institutional issues, there has been little economic analysis of the advertising agency industry since the Frey and Davis [1955] and Gamble [1959] studies, save surveys of industry practices by professional associations and trade publications.² The only econometric study addressing the question of agency scale and scope economies known to the present authors is that due to Schmalensee, Silk and Bojanek [1983] (hereafter referred to as SSB). They estimated nonlinear cost functions using 1977 data for a cross-section of 91 U.S. agencies. Extrapolating the sample estimates to the population, SSB concluded that over 200 US agencies were large enough to exhaust essentially all economies of scale.

In this paper we update and extend considerably the earlier work of SSB, who examined scale but ignored scope economies. In particular, we expand their analysis by deriving measures of scope economies, as well as the traditional scale economy calibrations, using a data base covering operations a decade later (1987) and for a much larger sample of U.S. agencies than that examined by SSB (401 vs. 91). We also overcome several of the econometric problems SSB encountered that prevented them from estimating and testing the full set of alternative nonlinear models they proposed. With our larger and updated data set, we demonstrate the empirical superiority of a model having both scale and scope economies relative to one having only scale economies. We also examine implications of our findings for issues concerning the organization of the advertising industry and policies relating to agency-client relations.
II. SPECIFICATION OF ALTERNATIVE COST FUNCTIONS

We begin with a theoretical overview of alternative specifications for cost functions, summarizing and extending the discussion given in SSB. Initially, let us suppose we are dealing with a single-product industry, whose average cost function is approximately L-shaped, with average cost approaching an asymptotic lower bound as a scale-related Z-variable approaches infinity. As SSB note, a reasonable specification for a cost function having such a shape is:

\[ U = \alpha + \beta e^{-\gamma Z}, \quad (1) \]

where \( U \) is a measure of average cost, \( Z \) is a scale-related variable, and \( \alpha, \beta \) and \( \gamma \) are (assumed positive) parameters. This function is illustrated in Figure 1 below, and as SSB observe, its shape is broadly consistent with the literature on economies of scale in many industries (Johnston [1960, Ch. 4]).

Given positive values of the parameters, equation (1) implies that \( U \) is an everywhere-decreasing function of \( Z \), so there is no finite \( Z \) at which scale economies are entirely exhausted. Note that as \( Z \to \infty, U \to \alpha \). We will say that scale economies are essentially exhausted for a firm of size \( Z^* \) if \( U(Z^*) = (1+\epsilon)\alpha \), where \( \epsilon \) is a small number. Solving for \( Z^* \), we obtain an indicator of minimum efficient scale as:
In this paper we set $\epsilon = .01$, so that a scale of $Z^*$ corresponds to costs one percent above the asymptotic minimum.

Another measure of the importance of scale economies is the cost penalty incurred by firms operating at inefficiently small scales. If a firm's scale is $kZ^*$, where $0 < k < 1$, its cost disadvantage relative to a firm of scale $Z^*$ is given by:

$$D^* = \frac{[U(kZ^*) - U(Z^*)]}{U(Z^*)} = \frac{[\epsilon^k(\beta/\alpha)^{1-k}]}{[1 + \epsilon]} - \epsilon$$

In this paper we set $k = 0.5$, in order to permit comparability with similar estimates for other industries. Illustrative values for $Z^*$ and $D^*$ are displayed in Figure 1.

Instead of producing but one product, now assume a firm produces $N$ services and that equation (1), with $j$ subscripts everywhere, refers to the unit cost of the $j^{th}$ service product where the unit cost term $U$ is now defined as total costs divided by gross income ($Y_i$). Multiplying by the revenue share $S_j$ and summing, we can obtain the basic equation for long-run costs as:

$$U = \sum_{j=1}^{N} \alpha_j S_j + \sum_{j=1}^{N} \beta_j S_j \exp(-\gamma_j Z_j).$$

Depending on the specification, $Z$ can take on alternative functions of all the output levels.

Following SSB, we specify the term in equation (4) involving $Z_j$ in two alternative ways. In the first specification, we have both scale and scope effects, while in the second model there are only scale economies.

In the "scope plus scale" (S&S) specification, the scale variable for each service product is simply the overall size of the $i^{th}$ agency, measured by gross
income \( Y_i \), where \( Y_i = \sum_j Y_{ij} \) and \( Y_{ij} \) is the \( i \)th firm's gross income from medium \( j \). In its most general version, the S&S specification is as follows:

\[
U_i = \sum_{j=1}^{N} \alpha_j S_{ij} + \sum_{j=1}^{N} \beta_j S_{ij} \exp(-\gamma_j Y_i) + u_i
\]  

(5)

where the \( u_i \) are assumed to be normal disturbance terms with all the usual desirable properties. Following SSB, one could of course constrain this most general specification by placing testable restrictions on the various \( \alpha_j \), \( \beta_j \) and \( \gamma_j \) parameters.

To see why this S&S model incorporates both scope and scale economies, it is useful to extend the SSB discussion and consider the notion of returns to scope (which they did not consider), and to distinguish it from returns to scale. Briefly, what scope economies refer to is the cost savings to a firm from producing multiple services, rather than splitting the firm up into \( N \) smaller firms, each specializing in producing one and only one service output. More specifically, let \( C \) be total (not average) cost, and define total costs \( C_{\text{Split}} \) for the notional split-up multiservice firm as the sum of costs from producing each of the \( N \) services at \( N \) distinct single-service subsidiaries:

\[
C_{\text{Split}} = C(Y_1,0,\ldots,0) + C(0,Y_2,0,\ldots,0) + \cdots + C(0,\ldots,0,Y_N)
\]  

(6)

where the subscript on \( Y \) refers to the \( j \)th output. Total costs for the multiproduct firm jointly producing all \( N \) outputs is \( C_{\text{Joint}} = (Y_1,Y_2,\ldots,Y_N) \). Returns to scope (RSP) are then simply computed as the percent cost savings due to producing them jointly rather than separately, i.e.,

\[
\text{RSP} = \frac{C_{\text{Split}} - C_{\text{Joint}}}{C_{\text{Joint}}}.
\]  

(7)
Hence, when RSP are positive, \( C_{\text{Joint}} < C_{\text{Split}} \), and there are cost advantages to being a multiproduct firm, deriving perhaps from specialization and the joint utilization of shared inputs. When RSP are zero, no such cost advantages emerge, and if RSP were negative, the firm could reduce its costs by splitting up. The fact that it is rare for an agency to create and place advertising in a single medium suggests that RSP are available.\(^6\)

Consider, for example, the S&S specification in equation (5). Noting that \( S_{ij} = 1 \) for the firm producing only the jth output, that for such firms \( Y_i = Y_{ij} \), and setting the \( u_i = 0 \), for this model \( C_{\text{Split}} \) turns out to be:

\[
C_{\text{Split}} = \sum_{j=1}^{N} \alpha_j Y_{ij} + \sum_{j=1}^{N} \beta_j Y_{ij} \exp(-\gamma_j Y_{ij}).
\]  

(8)

On the other hand, noting that since \( S_{ij} = Y_{ij}/Y_i \Rightarrow Y_i S_{ij} = Y_{ij} \), it follows that for the specification in Eq. (5), \( C_{\text{Joint}} \) equals:

\[
C_{\text{Joint}} = \sum_{j=1}^{N} \alpha_j Y_{ij} + \sum_{j=1}^{N} \beta_j Y_{ij} \exp(-\gamma_j Y_i).
\]  

(9)

Note that the expression in the numerator of (7), \( C_{\text{Split}} - C_{\text{Joint}} \), will in general not depend on the \( \alpha \)'s, but will typically be non-zero because \( \exp(-\gamma_j Y_{ij}) \neq \exp(-\gamma_j Y_i) \).

In this S&S model with multiple service outputs, the traditional measure of returns to scale is ambiguous. To see this, recall that in the case of a single product firm, the traditional measure of returns to scale is the ratio of average cost (\( C/Y \)) to marginal cost (\( \partial C/\partial Y \)). In the multi-service case, however, the notion of average cost is not well-defined (by which service does one divide total costs?), and product mix could change with overall size (by how much does one change the various outputs?). To overcome this problem, in the multiservice context one can define a returns to scale notion as based on the
effects on total costs when all services are increased proportionately, i.e. holding service output mix constant. This concept is called ray-returns to scale (overall size expands on a linear ray in output space; see Bailey and Friedlaender [1982]). In our context, define ray returns to scale (RRS) as the ratio of average to marginal cost for \( Y_i \) where \( Y_i = \sum_j Y_{ij} \), holding service output mix fixed:

\[
RRS = \frac{C / Y_i}{\partial C / \partial Y_i} = \frac{S_{ij}}{S_{ij} - \bar{S}_{ij}}
\]

For the S&S model in Eq. (5), ray returns to scale turn out to be:

\[
RRS = \frac{\sum_j a_j S_{ij} + \sum_j \beta_j S_{ij} \exp(-\gamma_j Y_i)}{\sum_j a_j S_{ij} + \sum_j \beta_j S_{ij} \exp(-\gamma_j Y_i) - \sum_j \gamma_j \beta_j Y_{ij} \exp(-\gamma_j Y_i)}
\]

In contrast to the scope and scale specification of equation (5), one can specify a similar model, but having only scale and no scope economies. For example, one can follow SSB and specify a rather general "scale only" (S, in contrast to S&S for scale and scope) model as

\[
U_i = \sum_j a_j S_{ij} + \sum_j \beta_j S_{ij} \exp(-\gamma_j Y_i) + u_i
\]

Of course, differing testable restrictions can be placed on this S model, involving various combinations of the \( a_j, \beta_j \) and \( \gamma_j \) parameters. However, even in this most general S specification of equation (12), using the definition of returns to scope given in Eq. (7) above, it can easily be verified that the numerator in (7) is zero, i.e. RSP and scope economies are zero. Moreover, using the fact that \( Y_{ij} = S_{ij} Y_i \)
differ from unity. Hence in this S specification, while scope economies are absent, scale economies are permitted.

It is worth noting that the only difference between the S&S model (5) and the S specification (12) is in the exponential term, where the Z variable in (5) is \( Y_1 = \sum_j Y_{ij} \), while in the scale only Model (12) it is \( Y_{ij} \). Moreover, in our empirical implementation involving nine types of service outputs (defined in terms of alternative communication media), each model has 27 estimable parameters. As a result, the S model is not a testable special case of the S&S specification; however, following SSB, one can of course test various restrictions of parameters in (5), or in (12).

III. VARIABLE DEFINITIONS AND DATA BASE DESCRIPTION

Our empirical study utilizes data pertaining to the 1987 U.S. operations of a sample of 401 agencies compiled by Advertising Age [1988a]. The notation and variable definitions employed are as follows:

\[ Y \] = agency gross income for U.S. operations (10 millions of 1987 dollars).

\[ E \] = agency employment in U.S. operations (number of employees in 1987).

\[ U = E/(Y \cdot 10^3) \] or number of employees per $100,000 of 1987 gross income.

\[ S_j \] = share of an agency's billings volume derived from source or activity j, where \( j = 1, \ldots, 8 \) are alternative media and \( j=9 \) denotes billings and capitalized fees for all non-media specific services.

\[ Y_j = S_j \cdot Y \] = estimated gross income from source or activity j.

The unit of analysis throughout is an individual agency, which, when relevant, is denoted by the subscript, i. In line with industry practice and SSB's earlier work, and as further explained in Silk and Berndt [1991, Appendix A], we use "agency gross income" (Y) as our measure of agency output and "number of employees per hundred thousand dollars of gross income" (U) as a proxy for an agency's average cost.
Summary Sample Statistics

Summary sample statistics for selected variables presented in Tables 1 and 2. As can be seen from these tables, the sample of 401 agencies is a diverse one in terms of size and media mix. The median 1987 US gross income per agency is $3.23 million with a range from $380,000 to $284.7 million. Total billings volume ranged from $1.63 million to $1.96 billion, with a median of $23.25 million. In terms of employment, the median level was 43 with the smallest work force consisting of 10 employees while the largest had 3,723.

Table 1
Summary Statistics for Agency Output and Cost Variables
(n = 401 Agencies)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Upper Limit</th>
<th>Lower Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Income ($10 Million)</td>
<td>1.351</td>
<td>0.323</td>
<td>28.470</td>
<td>0.038</td>
</tr>
<tr>
<td>Employment</td>
<td>151.365</td>
<td>43</td>
<td>3723</td>
<td>10</td>
</tr>
<tr>
<td>Employees/Gross Income</td>
<td>1.443</td>
<td>1.377</td>
<td>3.196</td>
<td>0.339</td>
</tr>
<tr>
<td>(Employees/$100,000 GI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume ($10 Million)</td>
<td>9.427</td>
<td>2.325</td>
<td>196.243</td>
<td>0.163</td>
</tr>
<tr>
<td>Media Billings</td>
<td>6.990</td>
<td>1.289</td>
<td>167.900</td>
<td>0.011</td>
</tr>
<tr>
<td>Non-Media Billings</td>
<td>2.437</td>
<td>0.821</td>
<td>50.520</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Clearly, the distributions of these variables are highly skewed, reflecting the level of concentration in the agency industry. The 1987 Census of Service Industries reports that for the 12,335 advertising agencies (establishments) operating in that year, their total gross income (receipts) was $10.213 billion (U.S.Bureau of the Census [1989], Table 1a). The corresponding figure for the present sample of 401 agencies was $5.417 billion or 53.04% of the industry total, which includes both national and local advertising.
Collectively, the billings volume of these 401 agencies amounted to $37.8 billion which represents 62.35% of the total amount of $60.6 billion expended on national advertising in the U.S. during 1987 (Coen [1988]). While large agencies are overrepresented, the sample does contain a broad distribution of agencies of different sizes producing advertising for a wide variety of media.

Table 2
Summary Statistics for Media Shares, 1987
(n = 401 Agencies)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Medium</th>
<th>Percent Share of Agency Volume</th>
<th>Share of Sample's Total Billing Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>TVL</td>
<td>Network Television</td>
<td>7.46%</td>
<td>0.21%</td>
</tr>
<tr>
<td></td>
<td>Major</td>
<td>(6.87%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td></td>
<td>Cable</td>
<td>(0.59%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td>TVH</td>
<td>Spot Television</td>
<td>12.44%</td>
<td>7.48%</td>
</tr>
<tr>
<td>MGL</td>
<td>General Magazines</td>
<td>9.40%</td>
<td>6.60%</td>
</tr>
<tr>
<td>PTH</td>
<td>Specialty Print</td>
<td>5.81%</td>
<td>1.69%</td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td>(3.53%)</td>
<td>(0.36%)</td>
</tr>
<tr>
<td></td>
<td>Farm</td>
<td>(0.44%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
<td>(1.43%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td></td>
<td>Supplements</td>
<td>(0.40%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td>NPH</td>
<td>Newspapers</td>
<td>8.95%</td>
<td>5.88%</td>
</tr>
<tr>
<td>DRH</td>
<td>Direct Response</td>
<td>4.64%</td>
<td>0.91%</td>
</tr>
<tr>
<td>RDH</td>
<td>Radio</td>
<td>5.99%</td>
<td>4.63%</td>
</tr>
<tr>
<td>OTH</td>
<td>Other</td>
<td>2.38%</td>
<td>1.04%</td>
</tr>
<tr>
<td></td>
<td>Outdoor</td>
<td>(1.17%)</td>
<td>(0.52%)</td>
</tr>
<tr>
<td></td>
<td>Point of Sale</td>
<td>(0.84%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td></td>
<td>Special Events</td>
<td>(0.24%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td></td>
<td>Transit</td>
<td>(0.13%)</td>
<td>(0.00%)</td>
</tr>
<tr>
<td>XMB</td>
<td>Non-Media Services</td>
<td>42.94%</td>
<td>42.13%</td>
</tr>
</tbody>
</table>

The principal services which agencies supply to their clients are those associated with the planning of campaigns and the creation, production, and
placement of advertising messages in different media vehicles. As shown by SSB [1983], variations in media mix are a major source of interagency cost differentials. To measure the composition of an agency's output, we use the share of its billings volume emanating from each of the nine categories listed in Table 2, eight of which relate to different media while the ninth covers "non-media services." Three of the nine categories shown in Table 2 are composite ones: "Network Television," "Specialty Print," and "Other". These categories were formed by combining data for a few related types of media for which only a minority of agencies reported any output, as is indicated by the data shown in Table 2.

The last share category listed in Table 2, "Non-Media Services" is a heterogeneous one. The data available for each agency included its "volume of total billings" which is the sum of billings in different media categories plus "capitalized billings." The latter includes billings to clients for materials and services purchased from outside sources and marked up (usually at 17.65%) plus "capitalized fees" which are calculated by multiplying fee income times 6.67—a practice favored in the industry as a means of treating income from fees as the equivalent of the traditional 15% commission earned on media billings (Garnder [1976], Advertising Age [1988a], p. 4). Hence, the share term for "non-media services" shown in Table 2 is the proportion of "total billings volume" accounted for by "capitalized billings."

Non-media share of billings volume encompasses a broad spectrum of services, the composition of which may vary widely among agencies according to the mix of functions performed and method of compensation. Included here are ad production and specialized services or projects such as marketing research, new product development, public relations, and sales promotion. This category may also contain, in some instances, other functions for which an agency is
compensated by fees rather than media commissions, such as creative and media planning services.

Consistent with SSB's [1983] earlier results, we also found evidence of some weak cross-sectional relationships between agency size and media mix. Share of billings for each of the categories shown in Table 2 was regressed on the natural logarithm of gross income and for five of the nine categories, statistically significant relations were found to exist (see Appendix Table A-1 in Silk and Berndt [1991]). The results indicated that, on average, the larger the agency, the larger the share of its billings in network television, spot television, and general magazines, but the smaller its share for direct response and "non-media services."

Two measurement issues deserve to be noted here. First, use of "number of employees per hundred thousand dollars of gross income" as a proxy for an agency's average cost assumes the absence of systematic cross-sectional wage differentials. Summary data published from surveys of agency compensation levels shown average compensation per employee increasing with agency billings size (Cole and Sizing [1988]). However, this effect may be explained at least partially by the tendency for large agencies to be located in large, high wage/living cost metropolitan areas. Also, reported payroll expenses for incorporated agencies may be higher as a result of firms seeking to avoid double taxation of dividends. To the extent that average compensation per employee does increase with agency size, then we may overestimate the importance of scale economies by taking employees as a proxy for cost.

A second possible source of measurement error is our treatment of the share of an agency's billings volume in each media/service category as an unbiased measure of the share of the agency's gross income attributable to that category of output. This assumption is strictly valid only if the ratio of gross income to billings is a constant for all categories of output within each
agency (but not necessarily fixed across all agencies). As discussed in Silk and Berndt [1991, Appendix A], while there is some limited indirect evidence suggesting that departures from this assumption may arise, two reasons may be cited for doubting that such effects are likely to be highly systematic. First, the standard commission rate granted agencies varies little across media (4A's [1987], p. 12). Second, clients tend to prefer equal margins across media in order to remove an incentive for the agency to favor one medium over another (McNamara [1990], pp. 140-141).

IV. RESULTS

We now discuss empirical findings, summarizing results from various specifications, the model selection procedure employed, minimum efficient scale, cost penalties, and estimated scope and scale economies. Detailed results are presented in Appendix B of Silk and Berndt [1991].

Choice of Preferred Specification

We have estimated parameters in both the S&S equation (5), and the S model (12), as well as various special cases of these two models outlined in SSB. Specifically, we assumed that the \( u_i \) stochastic disturbance term is independently and identically normally distributed with mean zero and covariance matrix \( \Omega \). With this specification, maximum likelihood estimation is numerically equivalent to nonlinear least squares. To carry out estimation for our alternative models, therefore, we employed the nonlinear least squares algorithms in the Time Series Processor (TSP) statistical software, Version 4.1C, using an AT&T 6386 microcomputer. We now summarize the procedure by which we reached a preferred specification; a more detailed discussion is given in Silk and Berndt [1991].

We first estimated various versions of the scale and scope Model (5) and the scale only Model (12). Then, using a likelihood ratio testing criterion for nested hypotheses that involved selecting the most parsimonious parameterization consistent with the data, we settled on one preferred scale and scope model, and
one scale only model. Finally, using a variety of non-nested model selection procedures (from empirical plausibility to more formal procedures such as goodness of fit, a Bayesian criterion,\(^9\) and the likelihood dominance approach\(^10\)), we were able to reject the scale-only model in favor of the scale and scope model. Parameter estimates for the preferred S&S model are given in Table 3. In the remainder of this paper we will present results for only this preferred version of the S&S Model. Note that the \(\alpha_i\) parameter (asymptotic unit cost) varies for certain media categories, but the other two parameters (\(\beta, \gamma\)) do not.

Table 3

<table>
<thead>
<tr>
<th>Parameter*</th>
<th>Estimate</th>
<th>Parameter*</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\alpha_{TVL} = \alpha_{TVH})</td>
<td>0.7438 (13.573)</td>
<td>(\beta_{TVL} = \beta_{TVH})</td>
<td>1.9535 (6.397)</td>
</tr>
<tr>
<td>(\alpha_{MGL} = \alpha_{PTH})</td>
<td>1.3159 (10.034)</td>
<td>(\beta_{RDH} = \beta_{MGL})</td>
<td>(\beta_{NPH} = \beta_{PTH})</td>
</tr>
<tr>
<td>(\alpha_{NPH} = \alpha_{DRH})</td>
<td>2.1667 (8.441)</td>
<td>(\beta_{DRH} = \beta_{OTH})</td>
<td>(\beta_{XMB})</td>
</tr>
<tr>
<td>(\alpha_{RDH} = \alpha_{OTH})</td>
<td>1.5745 (30.447)</td>
<td>(\gamma_{TVL} = \gamma_{TVH})</td>
<td>14.524 (6.079)</td>
</tr>
<tr>
<td>(\alpha_{XMB})</td>
<td>(\gamma_{RDH} = \gamma_{MGL})</td>
<td>(\gamma_{NPH} = \gamma_{PTH})</td>
<td>(\gamma_{DRH} = \gamma_{OTH})</td>
</tr>
<tr>
<td>(\gamma_{XMB})</td>
<td>(\ln L) = 167.776</td>
<td>(R^2(\text{Adj})) = 0.4718</td>
<td>(\text{SER} = 0.3705)</td>
</tr>
</tbody>
</table>

*See Table 2 for definitions of subscript abbreviations.

Minimum Efficient Size

We begin with a discussion of minimum efficient size. In column (1) of Table 4 we present estimates of \(Z^*\), minimum efficient size (MES) for the
preferred S&S model, measured in millions of 1987 dollars of gross income. These quantities have been calculated for each media category using Eq. (2), along with parameter estimates shown in Table 3.

Table 4

Maximum Likelihood Estimates of Minimum Efficient Agency Size ($Z^*$) in $ Millions of Income (1987), and Average Cost Penalty Incurred at Half Efficient Scale ($D^*$), in Percentage Points for Preferred Scope & Scale Model 5 (Asymptotic Standard Errors in Parentheses)

<table>
<thead>
<tr>
<th>Media Category</th>
<th>MES Agency Income (1987)</th>
<th>% Sample GI &gt; MES</th>
<th>Implied Medium Income*</th>
<th>Average Cost Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Television</td>
<td>3.836 (0.539)</td>
<td>45.39%</td>
<td>.28613</td>
<td>15.06% (1.35)</td>
</tr>
<tr>
<td>Spot Television</td>
<td>3.836 (0.539)</td>
<td>45.39%</td>
<td>.47714</td>
<td>15.06% (1.35)</td>
</tr>
<tr>
<td>General Magazines</td>
<td>3.836 (0.539)</td>
<td>45.39%</td>
<td>.36054</td>
<td>15.06% (1.35)</td>
</tr>
<tr>
<td>Specialty Print</td>
<td>3.836 (0.539)</td>
<td>45.39%</td>
<td>.22285</td>
<td>15.06% (1.35)</td>
</tr>
<tr>
<td>Newspapers</td>
<td>3.443 (0.488)</td>
<td>48.38%</td>
<td>.30813</td>
<td>11.07% (1.12)</td>
</tr>
<tr>
<td>Direct Response</td>
<td>3.443 (0.488)</td>
<td>48.38%</td>
<td>.15974</td>
<td>11.07% (1.12)</td>
</tr>
<tr>
<td>Radio</td>
<td>3.099 (0.440)</td>
<td>52.12%</td>
<td>.18565</td>
<td>8.41% (0.86)</td>
</tr>
<tr>
<td>Other</td>
<td>3.099 (0.440)</td>
<td>52.12%</td>
<td>.07377</td>
<td>8.41% (0.86)</td>
</tr>
<tr>
<td>Non-Media Services</td>
<td>3.319 (0.462)</td>
<td>49.38%</td>
<td>1.42528</td>
<td>10.04% (0.87)</td>
</tr>
</tbody>
</table>

*aMES agency income multiplied by mean media share shown in Table 2.
First we comment on the precision of these estimated MES for our preferred S&S Model. Although the various entries in Column (1) of Table 4 appear rather similar in magnitude, in fact these media-specific MES are estimated quite precisely, and most MES estimates are statistically different from one another. Interestingly, it turns out that the media for which MES is largest (particularly network television (TVL), spot television (TVH) and general magazines (MGL)) are also those media whose share of agency revenue were found to increase most strongly with agency size (see Appendix Table A-1 of Silk and Berndt [1991]). Hence, in the S&S model, media mix interacts with agency size.

Recall that with the S&S model, the scale or size variable is total agency gross income. Hence, the MES estimates shown in Table 4 represent the levels of total gross income required for an agency to operate with a unit cost 1% above the estimated asymptotic minimum ($\alpha_j^*$) for some medium j, assuming the agency's entire output was concentrated in that medium. To view these MES estimates of total agency gross income from the perspective of a "typical" agency operating as a multiproduct firm, we computed the "Implied Medium Income" by multiplying each estimate of MES total agency gross income by the corresponding mean share of billings volume reported in Table 2. The values of these implied medium incomes are shown in Column (3) of Table 4.

The median gross income for the entire sample of 401 agencies is $3.233 million, and as may be seen from Table 4, that value falls within two standard errors of the MES point estimate for each of the nine media categories. The latter range from $3.099 million for each of radio and the "other" category to $3.836 million for each of network TV, spot TV, general magazines, and special print. Note that the difference in MES estimates between media categories are in all cases within two standard errors of one another -- i.e., twice the value of the asymptotic standard errors which vary from $0.44 to $0.539 million, resulting in a 95% confidence region of $0.88 to $1.078 million.
In line with the observation that the MES estimates lie close to the sample's median gross income, when these MES point estimates are located within the distribution of the entire sample's gross incomes, we find that at least 45% of the agencies had gross incomes which exceeded the MES estimates for the various media categories (see Column (2) of Table 4). Thus, our preferred S&S model indicates that slightly less than half of the sample (or, 180-210 agencies) are of sufficient size to operate at minimum efficient scale. Furthermore, the share of the entire sample's billings accounted for by agencies with gross incomes greater than the upper and lower values of the MES estimates are 92.56% (for MES = $3.836 million) and 94.26% (for MES = $3.099 million). In light of the fact noted earlier that the total billings of this sample of 401 agencies represents more than 60% of total US national advertising expenditures in 1987, we conclude that the majority of all national advertising is produced by agencies operating at minimum efficient scale, i.e. a representative transaction is most likely to emanate from an efficient firm.

**Cost Penalties**

The preceding results indicated that a substantial fraction of agencies operate at less than minimum efficient scale, and therefore it becomes important to ask what magnitude of cost disadvantage results from this condition. Accordingly, using Eq. (3) and parameter estimates from Table 3, we have calculated the cost penalty borne by an agency operating at an output level equal to half that required to achieve minimum efficient scale. Estimates of the average cost penalties are presented in column (4) of Table 4, along with asymptotic standard errors. In general, these penalties are of a considerable magnitude in absolute terms, and larger than similar estimates for several manufacturing industries reported in the literature (Scherer [1980], pp. 96-97).

The penalties for operations at less than MES are highest for network and spot television, general magazines, and special print. The first three of this
latter set of media are those for which larger agencies tend to have higher shares. Thus it would appear that small agencies can face a substantial cost disadvantage relative to large agencies in producing and placing advertising for network and spot television and general magazines. As noted earlier, smaller agencies tend to have higher shares in direct response and non-media services, and while the cost penalties for these categories are somewhat lower than those associated with the major media, they are still of sufficient size to represent a serious cost disadvantage for the multitude of very small agencies operating in this industry.

Returns to Scope

The possible cost advantages accruing to an agency with a broad media mix as compared to a narrow one may be evaluated by estimating returns to scope. This quantity represents the percentage cost saving realized from the joint production of some mix of agency services over the cost of producing the elements of that mix separately, as defined above in Eqs. (7)-(9). We have calculated estimates of these savings using parameter values from Table 3, and find that scope economies are substantial. The median cost saving from joint production is 26.43% (mean: 29.53%), with a range from essentially zero to 86.45%. Moreover, the distribution is highly skewed in the direction of large cost savings.

To explore how these scope economies vary with agency size, we constructed a scatter diagram (see Figure 2) where cost savings percentages are plotted against agency gross income. Clearly, a marked tendency exists for the cost savings percentage to decline as agency gross income increases. Scope economies appear to be virtually exhausted for the handful of very large agencies with gross incomes of $100 million or more. However, among the smallest agencies (e.g., those with gross incomes of $2 million or less and hence below half minimum efficient scale), there is a very large amount of variation in the cost savings percentage that is unrelated to size. Thus, although scope economies are
exhausted for the very largest firms, we also find strong evidence that scope economies are of considerable consequence to small firms, for their costs are particularly sensitive to the mix of media services provided.

**Ray Returns to Scale**

Earlier in Section II we noted that for multiproduct firms the concept of returns to scale is inherently ambiguous. One possible measure of size-related economies, however, is the notion of ray returns to scale (RRS), defined in (10).
Essentially, RRS is the ratio of average cost to marginal cost for agency total gross income, holding fixed the service mix, i.e., $S_{ij} = \bar{S}_{ij}$. Using Eq. (11) and the parameter estimates from Table 3 for our preferred scale and scope model, we have computed agency-specific RRS. A number of findings are worth noting.

First, the mean value of RRS is 1.182, but the median is less, being only 1.065. This reflects a rather skewed distribution, with 192 of our 401 agencies (47.9%) having RRS in the region of 1.00 to 1.05. Indeed, 77 of these 192 agencies display RRS that are virtually constant, being in the range of $1.000 < \text{RRS} < 1.001$. Second, since RRS can be envisaged as the ratio of average to marginal cost, the large number of RRS near one suggests again that a very substantial number of advertising agencies in our sample are sufficiently large to have exhausted virtually all available scale economies. Third and finally, although many agencies are efficient, a considerable number are small and as a consequence, they have been unable to exploit potential scale economies; 47 of our 401 agencies (11.72%), for example, display RRS of greater than 1.50 (the largest value is 1.873), and for these agencies the ratio of average to incremental cost is significant. Of the 401 agencies, 71 (17.71%) have RRS in the range of 1.25 to 1.50, while 91 (22.69%) fall in the $1.05 < \text{RRS} < 1.25$ range.14

V. DISCUSSION

Comparing the Effects of Changes in Scale and Scope

Our findings indicate that both scale and particularly scope economies play a major role in determining agency costs. As a means of illustrating their separate and joint impacts, we computed the average cost for a "representative small agency" using our preferred S&S model and compared this average cost with that of a "representative large agency". A "small agency" was defined as having a gross income level and media/service mix equal to the mean of the 50 agencies whose gross incomes ranked from 300 to 350 in the total sample of 401 agencies,
while a "large agency" was specified in equivalent terms with reference to the largest 50 agencies in the sample. Their profiles are shown below in Table 5, along with estimates of their respective average costs.

As indicated there, the combined effects of scale and scope components results in a 35% cost disadvantage for the "small" agency relative to its larger counterpart. It is revealing to separate the effects of scale and scope components in this comparison using our preferred S&S model. On the one hand, were the small agency able to adjust its outputs so as to achieve the same media/service mix as that of the large agency, but maintain its small scale, then its estimated average cost index would fall to a level of 81.5. Thus, this change in output mix without any accompanying change in scale would result in an

<table>
<thead>
<tr>
<th>Table 5</th>
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<tbody>
<tr>
<td>Average Costs of Representative &quot;Small&quot; and &quot;Large&quot; Agencies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gross Income (Millions)</th>
<th>Small</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.33</td>
<td>$79.98</td>
<td></td>
</tr>
</tbody>
</table>

| Media/Service Mix (Shares): |
| --- | --- | --- |
| Non-Media | 60% | 22% |
| TV & Magazines | 20% | 59% |
| Newspaper & Direct Response | 12% | 11% |
| Radio & Other Local | 8% | 8% |

| Estimated Average Cost |
| (Employees per $100k Gross Income) | 1.72 | 1.11 |
| Estimated Standard Error | (0.037) | (0.028) |
| Index of Average Cost (1.72 = 100) | 100 | 64.9 |

estimated 18.5% reduction in the small agency's average cost. Alternatively, if the small agency retained its present media/service mix but grew in size to the point of having the same gross income as the large agency, its average cost index
would fall to 83.4 -- a level slightly above that expected with the aforementioned shift in mix but absent any change in output level. It can therefore be seen that changes in either output level or mix may have equivalent impacts on agency costs, and thus it becomes important to consider the joint effects of scale and scope economies on costs in comparisons of agency performance or alternative growth strategies. Of course, cost is only one dimension of competitive strategy and agencies often seek to differentiate their services on the basis of such factors as location and reputation for creativity.

Implications for Industry Organization and Agency-Client Relations

The findings reported here carry implications for a number of issues raised in the Introduction concerning the organization of the advertising agency industry and policies relating to agency-client relations.

1. Agency Mergers and Acquisitions and Service Mix Policy

Our results clearly indicate that economies of scale and scope offer substantial incentives for mergers and acquisitions among smaller agencies. The recent slackening in aggregate demand for advertising and rising uncertainty about the industry's growth prospects may hasten consolidation among smaller agencies seeking to reduce the cost disadvantage they bear when operating at less than minimum efficient scale (Lafayette and Levin [1990]).

The circumstances of large agencies are, of course, quite different. On the one hand, it appears unlikely that any benefits due to scale economies are to be realized by mergers among the largest 200 or so agencies, since they have already achieved minimum efficient scale. Our estimates also indicate that the available scope economies have been exhausted by the very largest agencies. In light of this, it is interesting to note that in recent years a number of large agencies have changed their service mix policies and sought to offer clients a broader and more integrated set of marketing communications services (O'Toole [1990]). McNamara [1990, p. 102] identifies several acquisitions which occurred
over the past decade where major agencies acquired smaller ones specializing in direct marketing, public relations, and sales promotion services.

Within the industry, opinions are divided about client demand for integrated marketing communications services and the prospects that agencies will be able to realize further economies through pursuit of such a policy (Lander [1991]; McNamara [1990]; Rothenberg [1990]). Unfortunately, in this study we were unable to trace economies of scope which may be associated with specific forms of these non-traditional services due to the composite nature of our "non-media services" category. However, given access to more disaggregated data, this matter could be addressed using the models and methods employed here.

2. Agency Compensation

Our evidence of economies of scale is consistent with the trend away from reliance by large advertisers on fixed commission rates as the basic method of compensating their agencies. Surveys conducted by the Association of National Advertisers among its member companies show that utilization of the traditional 15% commission on media expenditures has declined steadily over the past few years (Weilbacher [1989]), and the presence of scale economies is a fundamental argument clients have frequently brought forward in negotiating alternative compensation arrangements (Achenbaum [1990]).

If all the scale economies captured in our cost model held at the level of individual accounts or clients, then our estimates imply that, on average, larger accounts would be less costly to service than smaller ones, up to billings of $20-26.7 million. However, since our estimates are based on data from a cross section of agencies rather than individual accounts, such an inference should be considered as suggestive, and one that invites additional investigation with more micro level data. It is interesting to note that in its most recent survey of agency compensation practices, the Association of National Advertisers found that about two-thirds of large advertisers report that they review financial
information relating to the profitability of their accounts to the agency (Weilbacher [1989, p. 22]).

Closely related to issues concerning the level and/or method of agency compensation is the question of whether the industry is likely to experience any widespread movement toward "unbundling" the package of services encompassed by the traditional agency "full service" policy and covered by a fixed rate of commission on media expenditures (e.g., 15%). While "a la carte" creative and media services have been available from either specialized or regular agencies for many years (Loomis [1972]), reliance on a full service agency has remained the prevalent practice (Bloede [1983]). However, it has been suggested that client interest in unbundling of agency services is growing (Achenbaum [1990]). For example, recently a number of large advertisers have consolidated the buying of certain media for all of their products in a single agency or specialized service but left the assignments for performing the remaining functions for each of the individual products with separate agencies (Mandese [1991]; Rigg [1990]).

These developments raise important questions about the extent to which costs associated with the performance of specific functions (e.g., campaign planning, copy development, media planning and buying, etc.) may be subject to size-related economies. Understanding such phenomena would contribute to assessing the viability of alternative policies for bundling and pricing agency services. Here again, access to the micro level data is essential in order to permit analysis of the behavior of costs incurred at the level of specific functions.

3. Vertical Integration of Agency Operations by Advertisers

It has sometimes been suggested that size-related economies serve to restrict the vertical integration of agency services by large advertisers (see Silk [1989] for a review). However, our findings cast strong doubts on such an explanation for the low incidence of in-house agencies. The estimates of minimum
efficient agency size obtained from our preferred scope and scale model are in the $3-4 million range, which implies that advertisers with billings of $20-26.7 million could operate fully efficient house agencies. Although each of the largest 200 national advertisers in the U.S. had expenditures which exceed these levels in 1987, less than 5% of them operated in-house agencies (Advertising Age [1989b,c]).

Limitations and Directions for Further Research

The structure and behavior of advertising agency costs are clearly subjects deserving future attention. Since this study is based on cross-sectional data, it would be of interest to obtain data on agency costs over time, thereby facilitating an assessment of parameter stability and potential dynamic effects, using pooled cross-section and time series data. Further, access to more detailed and disaggregated cost data could facilitate investigation of several issues left unresolved here, and would also permit analysis of additional questions of importance which have not yet been addressed in this study. Cost measures which go beyond the proxy for payroll expenses generally relied upon in discussion of agency economics would certainly be welcome. It would also be desirable to decompose "non-media services" into more specific components. Examination of costs at a more micro level could cast considerable light on the economic implications of unbundling agency services and on the efficiencies which may be associated with recent agency efforts to offer broader and more integrated services to clients. As Weilbacher [1990] has suggested, an understanding of account level cost behavior could contribute much to addressing contemporary questions and concerns about the viability of alternative agency compensation plans.

The availability of cross-sectional data at the level of individual accounts or clients (rather than entire agencies) would support development of more complex structural models to investigate how the greater efficiency or
larger agencies may be related to the size and media/service mix of the clients they serve. Large agencies tend to derive larger shares of their incomes from media and services with lower asymptotic costs than do smaller agencies. In particular, three of the four media categories with the lowest asymptotic unit costs and highest cost penalties (network and spot television, and general magazines) are those for which the cross-sectional associations between media share and total agency gross income are positive (see Silk and Berndt [1991], Appendix Table A-1). Although we lack the disaggregated data necessary to investigate this matter in detail, informed industry opinion suggests that these size-related differences in agencies' media mixes are associated with size-related differences in clientele served. Clients with large budgets are those most likely to expend substantial amounts on national campaigns in television and magazines and for various reasons, they also tend to favor large agencies over small ones. SSB ([1983, pp. 471-473] present some earlier evidence consistent with this line of argument.

VI. CONCLUSIONS

This paper reported results from an econometric study of the influence of scale and scope economies on advertising agency costs. Data pertaining to the domestic operations of 401 agencies for 1987 were used to estimate and test alternative models representing how the principal component of agency costs, employment level, varies according to the mix of media and services an agency offers and the total volume of advertising it produces. Empirical evidence derived from a series of model selection tests indicated that a model capturing both scale and scope economies dominated one that included only scale economies. Using the parameter estimates for this preferred model, we then investigated a number of specific measures of the importance of scale and scope economies in determining agency costs.
Overall, the empirical evidence reported here strongly indicates that both scale and scope economies are highly significant in the operations of U.S. advertising agencies. Our results indicate that there is considerable variation across media in the magnitudes of asymptotic unit costs, and that larger agencies tend to obtain larger shares of their billings from major national media with the lowest unit costs. Of the several thousand establishments comprising the industry in 1987, approximately 200-250 had domestic gross incomes of $3-4 million or more (or equivalently, billings of $20-27 million) and therefore had service mixes and operating levels sufficiently large to take full advantage of all available size-related efficiencies. Furthermore, the overall structure of the industry is one where these large, fully efficient firms created and produced more than half of all the national advertising utilized in the US during 1987. It is well known that agencies compete fiercely with one another in bidding for accounts, and these findings indicate that the majority of the industry's output is produced by efficient agency operations.

These findings carry important implications concerning possible future changes in the industry structure. First, it seems highly doubtful that scale economies could motivate further mergers among the largest 200-250 U.S. agencies; moreover, potential scale economies are unlikely to provide incentives for cross-national mergers in an increasingly globalized economy. On the other hand, for small agencies, mergers and acquisitions might be attractive as means of mitigating their size-related cost disadvantages. Secondly, our findings demonstrating the existence of scale and scope economies are consistent with the diminishing reliance on fixed rates of media commissions as the principal basis of agency compensation in the U.S. Finally, they also cast strong doubts on size-related economies in operating costs as a viable explanation for the limited degree of vertical integration of agency services by large advertisers (Silk [1989]).
The present body of findings advances understanding of agency cost behavior beyond that reported in the only previous econometric study of agency costs (SSB [1983]) by establishing that scope economies are a critical determinant of agency costs. With our additional measures of scope economies and ray returns to scale, and the advantage of a larger cross-sectional sample, a clearer and more balanced picture of multi-product agency cost behavior has been obtained than was heretofore available.
Of course, agency mergers and acquisitions may be motivated by other considerations. For example, an agency may desire to expand its operations so as to be able to serve multinational clients or to otherwise grow in the face of constraints imposed by policies of existing clients that prohibit or restrict it from serving competing clients.

The exceptions are Leffler and Sauer [1984], Palda [1988], and Simon [1970, Chapter 6].

We contemplated using "flexible" functional forms such as the well-known translog function (see Berndt [1991], Chapter 9), but found them to be impractical since in our sample, for many agencies a number of outputs take on zero values. With zero values, one cannot employ logarithmic forms such as the translog, and use of other polynomial transformations is also problematical.

See, for example, F. M. Scherer [1980, pp. 96-97].

A useful discussion of scope economies and references to literature is given in Bailey and Friedlaender [1982].

For a discussion of the nature of market equilibrium when economies of scope are present, see B. Curtis Eaton and S. Q. Lemche [1991].

For a more detailed description of the variables and the agency sample, see Silk and Berndt [1991, Appendix A].

As a practical matter, we estimated the most restrictive models first, and then used parameter estimates from these converged models as starting values for the more general models. Although we cannot be absolutely certain that we have found the global minimum sums of squared residuals for each of these models, we have obtained the same converged values for each model using several different starting values. The only model for which we experienced substantial convergence difficulties was Model 12.5.

See Zellner and Plosser [1975], and the empirical implementation by Berndt, Darrough and Diewert [1977].

For details on this approach, see Pollak and Wales [1991].

In particular, referring to 3.836 as $MES_1$, 3.443 as $MES_2$, 3.099 as $MES_3$ and 3.319 as $MES_4$, we find that differences between all pairs are statistically significant ($MES_1 = MES_2$, $t = 3.589$; $MES_1 = MES_3$, $t = 4.751$; $MES_1 = MES_4$, $t = 5.275$; $MES_2 = MES_3$, $t = 2.576$; $MES_3 = MES_4$, $t = 2.394$), except that between $MES_2$ and $MES_4$, where the t-statistic on the no-difference null hypothesis is 1.716. Incidentally, the computation for the estimated variance of the difference between two MES in these nonlinear models involves a first order (linear) approximation, and therefore takes into account any correlation among the estimated coefficients. For further discussion of the ANALYZ command we used to construct these t-tests, see the TSP Reference Manual (Bronwyn H. Hall et al. [1986]).

For our preferred S&S model, it can be shown that for some media category $j$, the expression (2) for the gross income of an agency operating at minimum
efficient scale becomes: \( Z^* = -(1/\gamma) \ln (0.01a_j S_j / \beta) \). The estimates of MES shown in Table 4 have been calculated by setting \( S_j = 1 \) in the above expression. That is, the MES estimates assume that an agency's total output is concentrated in a single medium.

\(^{13}\)For a discussion of industry structure implications of economies of scope in a somewhat different context, see Chiang and Friedlaender [1985].

\(^{14}\)We have also computed RRS using parameter values from our preferred S Model 12. Unlike the case for our preferred S&S model, however, with our S model values of RRS are extremely volatile. Although mean and median values of RRS are 1.555 and 1.020, respectively, for the S model the standard deviation of RRS is 12.700, almost sixty times larger than the 0.214 value for the S&S model; the estimated RRS for the S model range from -153.571 to 123.546.
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