KNOWLEDGE SPILLOVERS AND GROWTH IN THE DISAGGLOMERATION OF THE U.S. ADVERTISING AGENCY INDUSTRY*

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We investigate knowledge spillovers and externalities in the disagglomeration and growth of the advertising agency industry. A simple model of high demand, low wages, and externalities associated with clusters of related industries can explain the *dispersion of advertising agency employment across states*. Other factors affected the *industry growth rate within states*. Consistent with Porter (1990), growth increased with buyer cluster size. In accord with Jacobs (1969) and Porter (1990) but contrary to Marshall-Arrow-Romer, competition, but not specialization, enhanced growth. Diversity had no effect on growth. Despite improvements in telecommunications and transportation reducing effective distances, location still matters.

I. INTRODUCTION

Madison Avenue has moved. In 1948, 42 percent of all advertising agency employees in the United States worked in New York state. By 1997, the percentage had fallen by half. Over this 50-year period, the advertising agency business grew steadily but dispersed geographically, shifting away from its traditional base in a few eastern and mid-western states and spreading south and west across the continent. Local externalities did not "lock in" this industry to particular geographic locations.

What accounts for the disagglomeration of the United States advertising agency business that occurred over the last half of the twentieth century? Perhaps the simplest explanation may be that advertising agencies locate in areas of high demand and low wages. Other possible explanations may invoke externalities, either static or dynamic, or both. Recognition of the importance of static externalities dates back to Marshall (1920). More recently, dynamic externalities embodying knowledge spillovers have featured prominently in modern growth theories, including those of Romer, Porter and Jacobs, and have been investigated in studies of economic geography, such as those by Ellison, Glaeser and Henderson. Data on the growth of advertising agencies in different states enables us to test some of these theories.

To disentangle the effects of demand factors, static externalities, and dynamic externalities, we follow a two-step process. We begin by modeling the geographical dispersion of advertising agency employment across states. Any tendency for agencies to co-locate with related industries could be interpreted as reflecting the influence of either static or dynamic externalities. Whereas location may be affected by both static and dynamic externalities, growth is only affected by dynamic externalities. Accordingly, we

turn to a growth model in the spirit of that developed by Glaeser *et al.* (1992) to assess the influence of knowledge spillovers on the rate of growth in advertising agency employment within states. By means of this approach, we seek to reduce concerns about confounding the effects of different sources of externalities raised by Krugman (1991, p. 53) and Ellison and Glaeser (1997), among others.

This paper makes several contributions. We investigate the disagglomeration of an industry, test empirically Porter's (1990) theory that clusters of related industries foster growth, study the role of knowledge spillovers in growth within a single industry, and identify industry-specific sources of knowledge spillovers. By investigating a service industry, this work also partially redresses an imbalance in empirical research on growth and agglomeration, which has focused on manufacturing industries (Hanson 2000). Krugman (1991) has suggested that "[t]he most spectacular examples of localization in today's world are, in fact, services rather than manufacturing" (p. 66). Finally, this paper tests the temporal stability of knowledge spillovers and whether physical distance no longer matters because of modern advances in telecommunications and transportation.

Unlike most previous studies that have examined growth over a single extended time interval for a cross-section of industries and locations, we employ a longitudinal design for a single industry, pooling time series data for eight Census years between 1963 and 1997 for a panel of states. Studying a single industry, rather than a cross-section of industries, has three main advantages. First, a single industry study avoids problems of cross-industry heterogeneity. Second, it enables us to identify industry-specific institutional factors that may explain our empirical findings. Finally, our panel design permits assessment of the temporal stability of factors influencing changes in growth rates over

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an extended period of time, allowing us to examine the temporal stability of externalities. Glaeser *et al.* (1992) and Enright (1998) have questioned whether externalities are only important early in an industry's history, or alternatively, whether they remain permanent influences on growth.

Our results can be briefly summarized. We find that agencies locate in states where demand is high and wages are low, but we also find that agencies co-locate with clusters of related industries, namely buyers and suppliers. Consistent with conventional industry wisdom and Porter, we find that the rate of growth in advertising agency employment within states increases with the size of clusters of buyers of agency services. Evidence on the influence of suppliers of agency inputs on agency growth is inconclusive. Consistent with Jacob's (1969) and Porter's (1990) positions but contrary to those of Marshall-Arrow-Romer, our analysis reveals that growth is enhanced by competition but retarded by specialization. No effect of diversity on growth was detected. We find little evidence that the importance of externalities in the advertising agency business has changed over the last forty years. Our finding that clusters of related industries are an important source of externalities and knowledge spillovers for advertising agencies suggests that similar phenomena may hold in other service industries and perhaps in manufacturing industries as well.

The paper is organized as follows. Theories of growth and externalities are discussed in the next section, which also reviews the relevant empirical evidence. Section III explores the history and structure of the advertising agency industry and traces the shift in its geographical concentration over the last half of the twentieth century. Potential sources of externalities are discussed. Section IV describes our data and defines measures

of different sources of externalities and their hypothesized relations with the geographical dispersion of, and rate of growth in, advertising agency industry employment, respectively. Results are presented and discussed in Section V. We conclude in Section VI by considering the implications of our findings for the advertising agency industry and agglomeration theory.

II. THEORIES OF KNOWLEDGE SPILLOVERS AND OTHER EXTERNALITIES

A vast body of literature has addressed the influence of regional externalities on industry location and growth. Recent work distinguishes between *static* externalities, associated with cost efficiencies or pecuniary externalities, and *dynamic* externalities, related to knowledge spillovers. Static externalities can affect industry localization, but not growth (Glaeser *et al.* 1992, p. 1148).

Marshall (1920) in his *Principles of Economics* discussed various externalities that may affect geographic concentration of industries. Among the causes of industry localization, Marshall identified (1) specialized labor forces and the generation of new ideas, arising from face-to-face communications and human capital accumulation, (2) the availability of specialized inputs, (3) economies of mass production, and (4) the development of modern infrastructures. In Marshall's view, firms tend to co-locate with their buyers and suppliers, which creates positive pecuniary externalities arising from transportation, communication, and coordination efficiencies.

Consistent with Marshall's view, Ellison and Glaeser (1997) found evidence of co-agglomeration between manufacturing industries in the United States and their most important buyers and suppliers (p. 917). More recently, Ellison and Glaeser (1999) in-

vestigated the extent to which the geographic concentration of industries can be explained by natural advantages (static externalities), concluding that about one-fifth to one-half of the observed geographic concentration is due to static externalities, the remainder to industry-specific spillovers.

Dynamic externalities can also affect industry localization, but their more important effect is on innovation and growth. Location is crucial in understanding spillovers, as knowledge has been found to be geographically concentrated (Audretsch and Feldman, 1996) and bound to its location of origin (Jaffe *et al.* 1993). Although there is a broad consensus that location-specific knowledge spillovers matter, there is little agreement about exactly how location affects innovation and growth.

The debate about dynamic externalities has focussed on two competing theories: those of Marshall (1920)-Arrow (1962)-Romer (1986) (MAR) and Jacobs (1969). These alternative perspectives differ along two dimensions. The first pertains to the role of competition. The MAR framework holds that a local monopoly fosters growth and innovation, because it maximizes the ability of the firm to appropriate the rents from its innovations. Firms exposed to local competition are discouraged from innovating because they will be imitated without commensurate compensation.

Contrary to MAR, Jacobs maintains that competition fosters innovation and growth. Jacobs' perspective, shared by Porter (1990), argues that local competition provides both a strong incentive to innovate and an environment that fosters knowledge spillovers. The fear of falling behind puts pressure on firms to improve, because failure to do so will leave them at a serious competitive disadvantage. The presence of local competitors allows firms to monitor each other's actions closely, to imitate one another, and

to improve on their rivals' ideas. The Jacobs framework predicts that industries grow faster in locations with intense local competition, while the MAR framework argues just the opposite.

The second difference between these theories concerns the effects of specialization (the degree to which a location specializes in one industry) and diversity (the range of different industries in a location). The MAR framework maintains that most knowledge spillovers occur among firms in the same industry. Specialized locations with high levels of industry concentration should experience more innovation and faster growth. In contrast, Jacobs posits that the most important knowledge spillovers take place across different industries. Jacobs' theory predicts that industries will innovate more and grow faster in locations with greater diversity.

Empirical tests addressing this debate have produced conflicting results. Glaeser *et al.* (1992) and Feldman and Audretsch (1996) found that both competition and diversity fostered industry growth and innovation, while specialization discouraged them. These results conflict with those of Baptista and Swan (1998), who found that specialization had a positive effect on innovative output but that diversity had no significant effect. Harrison *et al.* (1996) and Henderson *et al.* (1995) reported positive effects for both diversity and specialization. Most studies were based on data for cross sections of industries, have relied on the city as the geographic unit of analysis, and have investigated manufacturing industries rather than services.

Porter's (1990) position on dynamic externalities lies between MAR and Jacobs. Porter argued that the most relevant knowledge spillovers occur among a set of related industries, which include buyer and supplier industries. While acknowledging that co-

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location with customers and sellers can result in cost efficiencies, he went on to posit that proximity to buyers and suppliers is also a source of knowledge spillovers. Proximity to buyers facilitates early perception of market needs and thereby encourages timely re-orientation of firms' innovative efforts. Co-location with suppliers also benefits the process of innovation. Closeness to suppliers provides ready access to new ideas and insights and permits rapid reactions and adaptation to the perceived buyers' needs because firms are able to source new components, services, and machinery more readily (Porter 1998).

Another issue raised in the literature is whether the role of externalities varies over time. Glaeser *et al.* (1992, p. 1134) suggested that there might be an industry life cycle in which externalities are only important in the early development stages. Similarly, Krugman (1991, p. 62) indicated that as an industry develops, it might become less dependent on pooled labor, specialized inputs, and knowledge spillovers. Enright (1998, p. 317) proposed that the externalities that foster the initial development of a location might not be the same that affect its subsequent growth. He did not, however, imply that the changes in the relevance of externalities might lead industries to change their original pattern of location.

III. The Advertising Agency Industry

The advertising agency industry presents an interesting setting for the study of agglomeration, externalities, and growth for several reasons. First, advertising agencies are essentially "idea" businesses (Backer 1993), and "creativity" in the craft of advertising is the elusive quality sought in the perpetual search for "breakthrough" advertising (O'Toole 1985, Schudson 1984). The advertising agency business possesses many char-

acteristics that Caves (2000) identified as differentiating creative industries from other sectors of the economy. Second, there are strong grounds, discussed below, for expecting that both pecuniary externalities and knowledge spillovers operate in this service industry. Third, although in its early history the advertising agency industry was highly concentrated in a handful of eastern and mid-western locations, over the past five decades the industry has dispersed geographically.

III.1. *Historical Trends*

The history of the United States advertising agency industry begins the twentieth century with five decades of agglomeration followed by five decades of increasing disagglomeration. This pattern contrasts with Kim's (1998) finding that the service sector was geographically dispersed throughout the second half of the twentieth century. Kim attributed the consistent low level of agglomeration to the lack of mobility of service sector output, but this does not apply to advertising agency outputs, which are most often intermediate goods communicated to national media. Detailed records pertaining to the initial agglomeration of the advertising agency industry are lacking, but data from eleven Censuses, conducted at regular intervals over the period 1948-1997, provide data for an econometric analysis of the advertising agency industry's disagglomeration.[1]

Advertising agencies advise clients on marketing strategy, create and produce advertising messages, and place them in communications media. This modern form of the "full service" agency emerged early in the twentieth century, the outcome of the rapid evolution of the original "advertising agent's" function from "space broker to advertisement creator to marketing advisor" (Pope 1983, p. 143).

By 1935, the first year the Census of Business collected data on the geographic distribution of the advertising agencies, the industry had undergone considerable agglomeration. Three states collectively accounted for 67.8 percent of total United States employment in advertising agencies. New York led with a 47.8 percent share of total agency employment, followed by Illinois with 11.5 percent, and Pennsylvania with 8.5 percent.

By the 1930s, New York city was recognized as the capital of the advertising business, and "Madison Avenue", like Detroit, Hollywood, and Wall Street, became the popular symbol for an entire industry. In *Madison Avenue U.S.A.*, published in 1958, Mayer noted that agencies located on Madison Avenue accounted for half of all national advertising expenditures. Within a few blocks of those agencies were the headquarters of the largest radio and television networks, several leading magazine publishers, and sales offices for numerous newspapers and local broadcast stations.

A distinct trend toward greater dispersion in the advertising agency business from 1948 onward is evident from changes in state shares of total United States employment in advertising agencies. Figure I identifies states where the share of total agency employment decreased from 1948 to 1997 and states where the share increased by at least one point. Table A1 in the Appendix presents the 1948 and 1997 employment shares for each state.

Of the 35 states for which data were available for both years[2], 27 had higher shares in 1997 than 1948, and 8 states had lower shares. Five of the six states with the largest shares in 1948 had lower shares in 1997. In 1948 the combined share of these five states was 73.6 percent, but by 1997 it had fallen to only 41.5 percent. The shares of New York, Illinois, and Pennsylvania each dropped by approximately half.

In contrast, California's share almost doubled, from 6.4 to 12.0. Texas' share grew from 1.3 to 5.6, and Florida's rose from 0.4 to 3.8. Georgia, Massachusetts, Minnesota, New Jersey, North Carolina, and Virginia were the only other states whose shares were one share or more points higher in 1997 than in 1948. Shares of 18 other states increased by lesser amounts (in absolute terms).

Over the latter half of the twentieth century, as Figure I shows, advertising agency employment shifted away from the corridor running from New York through Pennsylvania and Michigan to Illinois toward the west and south. Within the advertising business, this geographical shift was recognized as one of considerable significance (*cf.* Mayer 1991). Rothenberg (1994, p. 189), a long-time and well-informed observer, suggested that the growth of the agency business in the west and south revitalized creativity in the industry as a "more virulent, far less tradition-bound" mode of advertising emerged.

To quantify changes in agglomeration, we computed the index of geographical concentration developed by Ellison and Glaeser (1997) using data from the Census years in the 1948-97 period.[3] Figure II plots of the values of the index. Over these five decades, the index dropped from .149 in 1948 to .031 in 1997. Based on Ellison and Glaeser's (1997) guidelines for interpreting their index, this denotes a shift from a "highly concentrated industry" to a "not very concentrated" industry. Thus we again find compelling evidence of diminished geographical concentration over the past three decades.

Given the disagglomeration of advertising agencies, the question naturally arises: what other changes occurred in the advertising industry during this period? The level of overall advertising spending, while cyclical (Silk, Klein, and Berndt 1999), remained relatively unchanged over the 1948-97 period, as measured as a percentage of Gross Do-

mestic Product (GDP), varying between 1.7 and 2.3. Outlays for national advertising, which exhibit more cyclical variation than those for local advertising, ranged from 0.9 to 1.4 percent of GDP. The low and high for local advertising were 0.8 and 1.1 percent of GDP, respectively. We are aware of no evidence to suggest that the extent to which advertising services are vertically integrated has changed markedly over time. Data from studies conducted annually by the American Association of Advertising Agencies among its membership showed that over the 13 year period from 1975-87, independent agencies reported gaining 721 accounts which were previously in-house while losing 932 which shifted to in-house operations. No trend in the ratio of gains to losses was discernible in the annual time series (Silk 1989).

While no fundamental changes occurred in national and local advertising expenditure levels over the 1948-97 period, the allocation of that spending across economic sectors did shift substantially. An analysis of data from the Input-Ouput tables published by the Bureau of Economic Analysis for 1963-92 reveals that manufacturing accounted for a declining share of total purchases while the share accounted for by services grew substantially (King, Silk and Ketelhohn 2000, Table A4). Advertising technology also changed. Network and spot television emerged in the 1950s and cable television in the 1980s as important advertising media.

III. 2. *Industry Organization*

A highly diverse and unconcentrated size structure has long persisted in the advertising agency business (Silk and King 1998). The number of advertising agency establishments operating for an entire year reported by the Census grew from 3,279 in 1948 to 10,327 in 1997. Most of these establishments are small: the percentage with fewer than

20 employees was 88.3 in 1948 and 87.5 in 1997. During this entire period, the industry remained highly unconcentrated. The Herfindahl index for the employee size distributions of establishments was 0.00231 in 1948 and 0.00094 in 1997. (King, Silk and Ketelhohn (2000), Table A2).

In line with the industry's history of growth in the number of agencies, barriers to entry are few, and studies have shown that the minimum efficient size of agencies is small (Schmalensee, Silk, and Bojanek 1983; Silk and Berndt 1993). The Census reported that only about 1,500 firms and 2,200 establishments had 1987 gross incomes exceeding Silk and Berndt's (1993) estimate of $3-4 million as the minimum efficient agency size in that year. The overwhelming majority of agencies apparently operate below minimum efficient scale.

Agencies serve two distinct client segments. National advertisers, who market their goods and services on a national or broad regional basis, accounted for approximately 58 percent of total United States advertising expenditures throughout the period studied. The remainder came from local advertisers, primarily retailers, operating in smaller geographic markets. Demand for advertising is cyclical (Silk, Klein, and Berndt 1998), and competition among agencies for clients is intense. Studies conducted by the American Association of Advertising Agencies (various years) among its membership indicate that the rate of account turnover has risen over the past three decades and that the duration of agency-client relationships has become shorter.

The process of agency selection is typically one of an advertiser inviting several agencies to make "speculative" presentations, which require competing agencies to invest substantial amounts for which they receive only minimal compensation (Rothenberg

1994). A longstanding industry norm prohibiting agencies from serving competing accounts restricts specialization by agencies (Silk and Berndt 1994). In order to grow, agencies must continue to acquire an increasingly diverse set of accounts.

Absent strong externalities, these structural properties of ease of entry, small minimum efficient size, and cyclical demand from heterogeneous clients consisting of national and local advertisers operating in geographically dispersed markets would all seem conducive to industry mobility and disagglomeration.

III.3. *Sources of Externalities*

Externalities may be important in the advertising agency business for several reasons. First, the trade literature emphasizes co-location of agencies and their clients to minimize coordination costs (*cf*. Weilbacher 1990; Comanor, Kover, and Smiley 1981). Consistent with these observations, the overwhelming majority of advertising agencies are single unit (establishment) firms.[4] Part of the explanation for this pattern of localization lies in the protracted, iterative process involved in the development, production, and approval of advertising campaigns, which, as documented in several first-hand accounts, requires frequent face-to-face interactions among agency, client, and production personnel (Arlen 1979, Diamont 1970, Moeran 1996, Rothenberg 1994, Stabiner 1993). The advertising business fits Enright's (1998, p. 319) description of industries where "the geographical concentration of firms, suppliers, and buyers found in many regional clusters provide firms within the cluster with short feedback loops for ideas and innovations." Thus, we would expect that the local externalities discussed by Marshall (1920, Chapter X) are likely to be at work here.

Second, high rates of personnel turnover along with widespread intra- and inter-industry mobility are potential sources of information spillovers. Due to the cyclical nature of demand for advertising and the frequent movement of accounts, personnel frequently move back and forth among agencies, advertisers, and media organizations (Comanor, Kover, and Smiley 1981).

Third, professional associations and awards that recognize creative excellence in advertising constitute long-established institutional arrangements that serve as information networks and facilitate intra-industry spillovers (*cf.* Baur 1942, Danzig 1997). These organizations are commonplace in United States cities and regions, and the awards they bestow are prized as they enhance the reputations of artists, writer, directors, producers and technicians, and the agencies associated with the work showcased in the competitions (Helgesen 1994).

Finally, the practices of "borrowing" and "imitation" of creative ideas and styles is alleged to be widespread (*cf.* Bensman 1967; Cook 1999; Cracknell 1990). Ibarra (1993) has reported correlational evidence suggesting that extraorganizational contacts of agency personnel function as channels through which information about innovations is transmitted. She found that differential levels of participation in professional activities were associated with employees' involvement in the implementation of administrative and technical innovations within an advertising agency.

IV. METHODS

With this as background, we next investigate the dispersion of the advertising agency industry across the United States and the role of spillovers in its growth. The geo-

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graphic spread of advertising agencies over the past fifty years may have arisen for many different reasons. Among the possibilities are increased demand for agency services as populations grew in other parts of the country, growth in related buyer or supplier industries, and lower wages. We first develop a simple framework for investigating why advertising agencies located in some states rather than others. Static or pecuniary externalities, such as a favorable labor market or reduced coordination costs due to co-location with clients, offer one possible explanation. We then explore the role of knowledge spillovers in advertising agency growth using a second regression model.

To investigate whether externalities are important for growth, we calculate the growth rate of advertising agency employment in different states and examine which states grew faster. In pioneering work, Glaeser *et al.* (1992) looked for knowledge spillovers arising from competition, diversification, and specialization in a large cross-section of industries. To test the predictions of alternative theories of knowledge spillovers on industry growth, we extend this work in three ways. First, we add measures for buyer and supplier clusters to investigate the effects of potential spillovers from upstream and downstream industries. Second, we investigate a single service industry, rather than multiple, predominantly manufacturing industries. Third, we employ panel data for multiple periods rather than a single cross section.

IV.1. *Data*

The geographic unit of analysis for our observations is a state, rather than a city, which has been more typical in empirical analyses of agglomeration. There are several reasons for this choice. Although for certain purposes cities may be more meaningful economic units, states have the advantage of being all-inclusive. A state is a more appro-

priate unit here than a city since agencies serve local advertisers for whom the relevant

market area often extends beyond the city proper. Unlike cities, state boundaries have

remained unchanged over time, enabling us to obtain an extended time series of compa-

rable data. The use of state-level data allowed us to mitigate a common problem encoun-

tered in the regional science literature of using "highly disaggregated geographic units of

analysis and highly aggregated industry units" (Enright, 1993). This fundamental tradeoff

between the granularity of the geographic unit and the fineness of the industry level has

also been recognized by the Ellison and Glaeser (1997, p. 905), who similarly chose to

use state-level data. Relying on the state as the unit of analysis allowed us to study the

United States *in toto*, as opposed to studying dispersed pockets of population. Finally, we

were able to use United States aggregate figures to compute better estimates for undis-

closed information. Our analyses include a maximum of 51 "states," including the Dis-

trict of Columbia.

The data used in this paper derive mainly from the *Censuses of Business and

Services Industries* and *County Business Patterns*, which are produced by the Bureau of

Census. The Census years included 1948, 1954, 1958, 1963, 1967, 1972, 1977, 1982,

1987, 1992, and 1997. Our data set consists of time series observations for 8 years when

Censuses were conducted and a cross-section of states. Data required to calculate the

buyer and supplier cluster variables were available only after 1963, when the Input-

Output tables were first published by the U.S. Department of Commerce. Advertising

agency wages were deflated by the urban consumer price index (CPI-U 1982-84 = 100).

Reports from the *Census of Business* or *Census of Service Industries* for SIC 7311 pro-

vided the time series data on advertising agency employment and establishment counts. Summary statistics are provided in Tables A2 and A3.

IV.2. *Model Specifications*

A. Location

To investigate the dispersion of advertising agencies across United States following World War II, we examine whether state advertising employment is correlated with overall state employment, state advertising agency wages, and state employment in related upstream and downstream industries. We measure the degree to which state i specialized in the advertising agency industry at time t by the ratio of advertising agency employment in the state to that in the nation. Similarly, the concentration in buyer and supplier clusters is measured by the ratio of their employment within the state to that in the United States. The relative advertising agency wage is captured by the ratio of state to national wages. Our model is similar to those of Dumais, Ellison and Glaeser (1997) and Kolko (1999).

Since the state share of national advertising agency employment lies between 0 and 1, we use a logistic regression model. We treat the state share of advertising agency employment as a function of the state share of population, employment in buyer and supplier industries, the relative wage, and initial conditions. We define the state share of advertising agency employment at time t as:

$$\alpha_{it} = \left(\frac{\text{Advertising agency employment in state } i}{\text{U.S. advertising agency employment}} \right)_t . \qquad (1.1)$$

then the regression model with state fixed effects, v_i, becomes:

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$$\ln\left(\frac{\alpha_{it}}{1-\alpha_{it}}\right) = \beta_0 + \beta_1 \ln\left(\frac{\text{Total state employment}}{\text{Total U.S. Employment}}\right)_t$$

$$+\beta_2 \ln\left(\frac{\text{State employment in buyer cluster}}{\text{U.S. employment in buyer cluster}}\right)_t$$

$$+\beta_3 \ln\left(\frac{\text{State employment in supplier cluster}}{\text{U.S. employment in supplier cluster}}\right)_t \quad (1.2)$$

$$+\beta_4 \ln\left(\frac{\text{State advertising agency wages}}{\text{U.S. advertising agency wages}}\right)_t + v_i + \varepsilon_{it}.$$

In this equation, logarithms of the shares of state and buyer cluster employment measure demand in that state. If firms locate in areas of high demand, we would expect the coefficients on these variables to be positive. The logarithm of the share of supplier cluster employment is a measure of the concentration of upstream industries in that state, while the logarithm of the relative wage reflects the attractiveness of the state labor market. If co-locating with suppliers provides advantages, the supplier coefficient would be positive, and if firms prefer low wages, the relative wage coefficient would be negative. Note that since the denominators of the share variables are fixed within each period, they are equivalent to indicator variables for each of the separate periods.

To determine membership in the buyer cluster, we first ranked industries by their share of purchases of the total intermediate use of advertising based on the Input-Output tables. The buyer cluster was then defined as the largest industries accounting for 70 percent of the total intermediate use of advertising. Similarly, the supplier cluster comprised the top five suppliers in each year of the total intermediate input to the advertising industry ranked by the percentage of their sales to the advertising industry (*see* King, Silk and Ketelhohn 2000, Appendix B for details).

This econometric specification captures the general equilibrium outcome of advertising agency location decisions. If buyers and suppliers of advertising agencies chose to locate near advertising agencies, the explanatory variables would be endogenous. The trade literature, however, clearly suggests that agencies' location decisions follow those of advertisers, rather than vice versa. The case of suppliers is less clear, but it seems likely that the location of some suppliers, such as radio and television stations, was influenced more by population concentration than the presence of many agencies. Other suppliers, such as commercial photography and printing, served many other industries in addition to advertising agencies. Data limitations precluded us from pursuing a structural analysis of this issue.

B. Growth

Although productivity growth would be a better measure than employment growth for assessing knowledge spillovers and other externalities, we do not observe output and thus cannot measure productivity. Growth in the advertising agency industry may arise for many different reasons, including knowledge spillovers within industry or across other industries. We next develop a framework for exploring how advertising agency employment growth is affected by measures of technological externalities, such as clusters, specialization, competition, and diversity, given by the various theories. Our framework builds on the theory developed in Glaeser *et al.* (1992), adding measures to test Porter's (1990) cluster hypothesis. We use this framework to describe the growth of advertising agencies in our data.

We first define the variables used to construct measures of growth, specialization, competition, diversity, and clusters that enable us to test competing theories for the role

of knowledge spillovers in growth. We employ measures of specialization, diversity, and competition proposed by Glaeser *et al.* (1992) and add two new measures for buyer and supplier clusters.

The growth of the advertising agency industry in state i at time t is:

$$Growth_{it} \equiv \frac{\text{Advertising agency employment in state } i \text{ at time } t}{\text{Advertising agency employment in state } i \text{ at time } t-1}. \tag{1.3}$$

Since the intervals between *Censuses* are not constant, all growth rates are annualized.

We measured the degree to which state i's employment at time t is specialized in the advertising agency business by the fraction of the state's employment that advertising agencies represent relative to the share of the advertising agency industry in national employment:

$$Specialization_{it} \equiv \frac{\left(\dfrac{\text{Advertising agency employment in state } i \text{ at time } t}{\text{Total employment in state } i \text{ at time } t} \right)}{\left(\dfrac{\text{Total U.S. advertising agency employment at time } t}{\text{Total U.S. employment at time } t} \right)}. \tag{1.4}$$

This variable measures how specialized a state is in the advertising agency industry compared to the situation where advertising agency employment is spread uniformly across the United States. This corrects for cases where state advertising agency employment is large only because the state employment is large.

For a measure of local competition among advertising agencies in state i at time t, we use the number of advertising agencies per worker in the state relative to the number of advertising agencies per worker in the United States:

$$Competition_{it} \equiv \frac{\left(\dfrac{\text{Number of advertising agencies in state } i \text{ at time } t}{\text{Advertising agency employment in state } i \text{ at time } t} \right)}{\left(\dfrac{\text{Number of advertising agencies in U.S. at time } t}{\text{Total U.S. advertising agency employment at time } t} \right)}. \tag{1.5}$$

The larger this ratio, the more firms relative to its size a state has. A ratio greater than one may be interpreted as evincing that the advertising agency industry is more competitive in the state than elsewhere in the United States. Alternatively, a value greater than one may mean that the firms in that state are simply smaller on average than those in the United States. Some further evidence bolsters the interpretation of this variable as measuring competition rather than small firm concentration. For four Census years, employment data were available that permitted computation of approximate Herfindahl indices for about 90 per cent of the states. From this, we constructed an alternative measure of competition, defined by the ratio of the state advertising agency Herfindahl to that for the United States as a whole. We found the ratio of state to national Herfindahl indices to be moderately positively correlated with the *Competition* variable defined by equation 1.5 for each of four years for which data were available.[5]

Given the abundance of advertising agencies operating below minimum efficient scale, one might have expected that consolidation would have occurred to eliminate inefficiencies. Perhaps surprisingly, for the majority of states over the past fifty years, the average number of employees per firm has remained virtually unchanged and below minimum efficient scale. The persistence of seemingly excessive numbers of small firms for half a century combined with evidence of intensely competitive practices within the industry further suggests that this variable should be interpreted as a measure of competition.

Our measure of the diversity of industries in state i at time t is the fraction of the state's employment represented by the five largest two-digit SIC code industries in the state:

$$Diversity_{it} \equiv \frac{\text{Employment in 5 largest 2-digit SIC code industries in state } i \text{ at time } t}{\text{Total employment in state } i \text{ at time } t}. \quad (1.6)$$

The lower this ratio, the more diverse the state is. The mean of this variable is 0.28 (Table A3), indicating that states are not well diversified.

To capture the importance of buyer and supplier clusters, we define two additional indices in terms of the ratio of the shares of state employment in buyer and supplier clusters to their corresponding shares of national employment:

$$Buyer\,Cluster_{it} \equiv \frac{\left(\dfrac{\text{Employment in buyer cluster in state } i \text{ at time } t}{\text{Total employment in state } i \text{ at time } t}\right)}{\left(\dfrac{\text{Total U.S. employment in buyer cluster at time } t}{\text{Total U.S. employment at time } t}\right)} \quad (1.7)$$

and

$$Supplier\,Cluster_{it} \equiv \frac{\left(\dfrac{\text{Employment in supplier cluster in state } i \text{ at time } t}{\text{Total employment in state } i \text{ at time } t}\right)}{\left(\dfrac{\text{Total U.S. employment in supplier cluster at time } t}{\text{Total U.S. employment at time } t}\right)}. \quad (1.8)$$

Consider the following regression, in which we treat the growth in state advertising agency employment as a function of buyers, suppliers, competition, specialization, diversity, and initial conditions:

$$\begin{aligned}
\ln Growth_{it} = \alpha &+ \beta_1 BuyerCluster_{it-1} + \beta_2 SupplierCluster_{it-1} \\
&+ \beta_3 Competition_{it-1} + \beta_4 Specialization_{it-1} + \beta_5 Diversity_{it-1} \\
&+ \beta_6 \ln TotalEmployment_{it-1} + \beta_7 \ln AgencyEmployment_{it-1} \\
&+ \beta_8 \ln AgencyWage_{it-1} + v_i + \tau_t + \varepsilon_{it}.
\end{aligned} \quad (1.9)$$

In equation (1.9), the *Buyer* and *Supplier Cluster* variables measure the concentrations of related downstream and upstream industries in that state. According to Porter, both raise the rate of technological progress. *Competition* serves as a measure of the appropriability

of innovation, which MAR believe reduces, but Porter believes raises, technological progress. *Specialization* measures the concentration of the advertising agency industry within the state, which MAR hold increases the rate of technological progress. *Diversity* measures the variety of industry within the state, which, according to Jacobs, facilitates technological progress.

We include certain initial conditions as controls in the regression. These include the logarithms of total state employment growth, employment for the advertising agency in the state, and advertising agency wage in the state at the beginning of the period. Growth in total state employment serves as a proxy for statewide growth in demand. Although not strictly consistent with the assumption of a national labor market, wage controls account for firms moving to low-wage areas (or workers moving to high-wage areas) as some researchers have argued. Initial advertising agency employment may reduce employment growth because of either measurement error or "mean reversion," which, in the latter case, may be evidence against the MAR externalities. Unlike Glaeser *et al.* (1992), we do not include national employment changes in the advertising agency industry outside the state to correct for demand shifts because we found little correlation of that variable with in-state growth in advertising agency employment. Instead, we decompose the error term to include time, τ_t, and state fixed effects, v_i, to account, respectively, for shifts in aggregate demand across states and state-specific fixed effects across time.

V. RESULTS

We address first the issue of where advertising agencies locate. The results from the regression in equation (1.2) suggest that advertising agencies locate in populated areas with high concentrations in related industries and low wages. Table I presents the parameter estimates based on a regression with 323 state observations from 1963 to 1997, since buyer and supplier cluster variables are not available before 1963. Standard errors, corrected for heteroskedasticity and within state, first-order serial correlation, are given in parentheses below the corresponding parameter estimates.

The coefficient on the state share of total employment is positive and significant while the coefficient on the relative wage is negative and significant. The state fixed effects are highly significant ($\chi^2(49) = 4,606.0$, $p < 0.0001$). This is consistent with an argument that advertising agencies locate in areas with high demand and low wages. Both the buyer and supplier cluster shares are positive and significant, suggesting that advertising agencies locate in regions exhibiting positive pecuniary externalities, such as reduced communication, coordination, and transportation costs as Marshall (1920) originally suggested. These results are consistent with those of Kolko (1999), who found in his cross-sectional analysis of 18 business services that the county share of 1995 service industry employment was positively related to the presence of customers and suppliers.

To assess the temporal stability of the regression model, we looked for changes in the coefficient estimates between the first and second halves of our sample. The first half comprised Census years 1963, 1967, 1972, and 1977; the second contained 1982, 1987, 1992, and 1997. We created an indicator variable for these two periods ($\delta = 0$ in 1963-1977, $\delta = 1$ in 1982-1997) and interacted it with each of the explanatory variables. Any

coefficient changes between the two periods would then appear as a statistically significant coefficient on the interaction terms.

With the exception of the state total employment share, none of the interaction terms were significant in the regression. The coefficient for the state total employment share interaction term was negative and significant, suggesting that over time the state total employment share had become less strongly correlated with the state share of national advertising agency employment. Thus, we find little evidence that declining telecommunication and transportation costs or indeed other factors have reduced the importance of externalities over time to the location of advertising agency employment.

Next, we consider the role of externalities in fostering growth in advertising agency employment. Table II contains parameter estimates for the state-advertising agency employment growth regression, equation (1.9), based on a first-differences estimation with indicator variables for each period except the first. Observations from different periods were pooled resulting in 316 observations for regressions without cluster variables and 245 observations for regressions with cluster variables since the cluster measures could not be constructed before 1963. Five observations appeared to be typographical errors and were eliminated from the data set as outliers. Observations were also excluded because of missing and undisclosed data, particularly among smaller states.

The first column in Table II gives the results for a regression model that includes our five spillover measures (buyer and supplier clusters, competition, specialization, and diversity) but without controls for advertising agency employment, advertising agency wage, or time period. Although each of the coefficient estimates is significant at the 5% level, comparison with the results in column 7 shows that controlling for state employ-

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ment growth is important and that the other controls are significant and affect some parameter estimates. Columns 2 through 6 show the results of adding each spillover measure separately while controlling for other effects. The standard errors of the regressions are corrected for heteroskedasticity and within state, first-order serial correlation. They are reported in parentheses below the corresponding coefficient estimate.

The results of the full model are presented column 7. The buyer cluster variable is positive and significant at the 10 percent level. Controlling for growth in total state employment, columns 5 and 6, reduces the magnitude of the coefficient by half. The supplier cluster coefficient is positive but not significant, except for the model in column 1, which does not include the control variables. These results accord with the argument by Porter (1990) that clusters of local buyers and suppliers create knowledge spillovers that foster growth even after accounting for pecuniary externalities, such as reduced transportation and communication costs, identified by Marshall (1920).

Co-location with concentrations of buyers appears to be more important for advertising agency growth than co-location with suppliers. We can evaluate the quantitative effect of the buyer cluster on growth. Increasing the measure of the buyer cluster by one standard deviation (0.12) raises the annualized employment growth rate of advertising agencies by 0.6 percent or 12 percent of a standard deviation.

Competition is positive and significant in the full model (column 7) and consistent across the other specifications with controls. This implies that advertising agency employment grows faster in states in which advertising agencies are smaller than the average size of advertising agencies of United States. If we assume that spreading the same employment over more firms increases competition among firms, this result contravenes

the MAR prediction that competition reduces growth because of the appropriability of innovations, but it supports the theories of Jacobs (1969) and Porter (1990) that competition increases the rate of technological progress by forcing faster innovation.

Changes in the level of the competition measure have substantial effects on employment growth. An increase of one standard deviation in the competition measure (0.59) increases annualized advertising agency employment growth by 2.1 percent, representing 42 percent of the standard deviation. Another interpretation of this finding is that smaller firms grow faster. Davis, Haltiwanger and Schuh (1996, p. 60), however, find that smaller firms do not, in aggregate, grow faster after taking into consideration their larger rates of job destruction. In addition, Silk and King (1998) found that the size distribution of advertising agencies for the entire United States is remarkably stable over time.

Column 7 in Table II shows that advertising agency employment grows more slowly in states where it is more heavily concentrated than it is in United States as a whole. Glaeser *et al.* (1992) find this effect is statistically significant but small. We also find a statistically significant effect, but one that is quantitatively large for advertising agencies. If we increase the measure of specialization by one standard deviation (0.54), annualized advertising agency employment growth falls 8.5 percent, which is 170 percent of the standard deviation. This result contradicts the prediction of MAR. We find that geographic specialization reduces employment growth in the advertising agency industry.

Finally, we find no effect of diversity (lack of diversity is measured by the share of state employment comprised by the five largest industries) on advertising agency growth. Although the coefficient estimate is negative and significant in the model without

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controls, column 1, the estimate is not significant in the specifications of columns 6 and 7, and it changes sign. Contrary to what might be expected from Jacobs (1969), we fail to find positive evidence in favor of the importance of knowledge spillovers from outside the advertising agency industry. Our results for advertising agencies also differ from those of Glaeser *et al.* (1992), who found that having a greater variety of local industries helped growth.

A major difference between our results of those of Glaeser *et al.* (1992) is that we are able to control for growth in total state employment. Thus, the effects we find are in addition to those caused by overall state employment growth. A comparison of columns 6 and 7 in Table II shows that adding state employment growth to the regression more than halves the buyer cluster and diversity coefficients, increases the effect of specialization, but does not have a large effect on the competition variable.

The other control variables generally have the expected signs. Growth in total state employment leads to growth in state advertising employment. A large initial employment in the advertising agency industry in the state leads to slower growth in advertising agency employment. The period indicator variables are jointly significant in each specification and have both positive and negative signs. The advertising agency wage is positively and significantly correlated with growth in advertising agency employment.

As a check on the robustness of these results, we also estimated the full model using the bootstrap method (Efron and Tibshirani 1993) and by omitting the two states with the largest changes in advertising agency employment, New York and Illinois. In both cases, we obtained qualitatively similar results, which did not appear to be significantly affected by outliers or driven by changes occurring in the largest states.

To determine whether modern telecommunication and transportation have eliminated the need for geographical proximity for delivering services and benefiting from knowledge spillovers, we tested the temporal stability of the coefficient estimates for the growth regression. As for the location regression, we divided the sample into two periods, 1963-1977 and 1982-1997, created a period indicator variable ($\delta = 0$ in 1963-1977, $\delta = 1$ in 1982-1997), and multiplied each of the explanatory variables by the indicator variable to create interaction terms.

We found no statistically significant differences between the coefficient estimates in the two periods with exception of those for the supplier cluster and the advertising agency employment. The coefficient estimate for the supplier cluster was not significant in the first period, even at the 10 percent level, but the interaction term was positive and significant, indicating that supplier clusters became more important for growth during the second half of the sample. Similarly, the positive and significant interaction term for the advertising agency employment reduced, but did not eliminate, the negative effect of advertising agency employment on growth in the second half of the sample period. Contrary to Kolko (1999), we found little evidence that changes in technology – computer, telecommunication, transportation, or otherwise – over the last 30 years have eradicated distance and eliminated the need for co-location to facilitate delivery of services and intellectual spillovers.

VI. CONCLUSION

We have investigated the disagglomeration and growth of the advertising agency industry over the last half of the twentieth century. As far as we are aware, this study is

the first: (a) to explore the forces of *dis*agglomeration, (b) to investigate issues of location and knowledge spillovers in the context of a single industry, and in particular, a business service industry; and (c) to conduct an econometric test of Porter's theory of clusters of buyers and sellers as sources of dynamic externalities.

Estimating state advertising agency industry growth as a function of initial conditions in the state has two main advantages: 1) initial conditions are predetermined and may reasonably be assumed to be uncorrelated with future shocks, and 2) time-invariant state characteristics, which affect the distribution of industry growth in the cross section but not over time, may be controlled. One disadvantage is that one cannot determine whether the regression results reflect steady-state growth or the transition to steady state. Two considerations may mitigate this concern. First, we find little evidence that the coefficient estimates changed between the first and second halves of the sample period. Second, since advertising agencies have few fixed assets and are highly labor intensive, the five-year interval between Census years may be sufficient for employment to equilibrate. Nevertheless, this uncertainty should be borne in mind when interpreting the parameter estimates.

Our results suggest several conclusions. Since the geographic concentration of the advertising agency industry changed dramatically over the study period, exogenous resources do not appear to be the exclusive factor determining location; the acquired characteristics of regions also factor in attracting advertising agencies to particular locations. We found that the share of national advertising agency employment within states was correlated with state population, employment in buyer and supplier clusters, and wages. Thus, a simple model of high demand, low wages, and externalities associated with the

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presence of clusters of related industries, like those emphasized long ago by Marshall (1920), appears to account for the dispersion of advertising agencies throughout the United States. Although this may explain the decline of Madison Avenue and the rise of new advertising agencies in the south and west, other factors appear to have influenced the growth rate of advertising agency employment.

We found that advertising agency employment growth could not be explained simply by overall employment growth within a state. Instead, after accounting for total employment growth in a state, growth in state advertising agency employment appeared to increase with the local concentration of buyers and with competition among advertising agencies. That buyer clusters increased advertising agency employment growth rates supports Porter (1990). The buyer cluster effect dominated that of the supplier cluster, suggesting that knowledge spillovers from clients may be more important than those from media and other sources of inputs used in advertising campaigns. Buyer clusters were more important for advertising agency growth than either knowledge spillovers from unrelated industries or from within the industry itself.

VI.1 *Organization of the Advertising Agency Industry*

Our results enhance understanding of the advertising agency industry by demonstrating the role that demand and externalities have played in the disagglomeration of this industry. The effect of knowledge spillovers on the rate of advertising agency industry growth has not been previously appreciated. The principal sources of knowledge spillovers that influenced growth, namely the size of the clusters of local buyers and the level of competition among local agencies, correspond to the dominant institutional features of this industry which observers have long emphasized.

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Vertical relations are characterized by an asymmetrical distribution of power: agencies are typically beholding to their clients. Although asymmetric, agency-client relations involve processes that facilitate knowledge spillovers, agencies and clients rely heavily on face-to-face interactions in planning and developing campaigns, and a high level of mobility between agencies and clients characterizes careers in marketing. Horizontally, competition among agencies for clients is fierce, fuelled by an institutional mobility barrier that prohibits an agency from serving competing accounts. Several well-known industry practices reveal the importance of competition in fostering knowledge spillovers: client reliance on "shootouts" among several agencies in awarding accounts, the emphasis on creativity in developing campaigns, the widespread borrowing and imitation of ideas and techniques, and the existence of professional associations and contests which serve as information networks.

VI.2 *Agglomeration Theory*

Our finding that competition fosters growth supports Jacobs (1969) and Porter (1990) but cannot be reconciled with Marshall-Arrow-Romer theories. While specialization, measured by advertising agency share of employment in a state relative to the national share, retards advertising agency employment growth, diversity, a measure of the variety of industries within the state, does not affect employment growth. The result that specialization inhibits growth contradicts the MAR theory. We found no direct evidence to support Jacobs' (1969) view that diversity encourages growth through knowledge spillovers from unrelated industries.

Unlike Glaeser *et al.* (1992), we did not find evidence that important knowledge spillovers occur between rather than within industries, but this may be the result of in-

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dustry-specific factors. The industry norm that agencies do not serve competing accounts may ensure that advertising agencies are already diversified across industries. Alternatively, spillovers from non-related industries may be minimal after accounting for those arising from buyer and supplier clusters, both of which are quite heterogeneous.

The history of the advertising agency industry shows that "lock-in" did not prevent geographical diffusion of this mature industry. There is no evidence for within industry knowledge spillovers or other dynamic externalities arising from specialization. The advertising agency industry has been growing away from locations with high advertising agency concentrations. This provides some support for the suggestions of Krugman (1991), Glaeser *et al.* (1992), Enright (1998), and Henderson (1999) that the role of knowledge spillovers and other externalities may vary as an industry develops. Mature industries may be less subject to "lock-in" than nascent ones.

Our result that specialization retards growth, a finding that has arisen in other studies (*cf.* Glaeser *et al.* 1992), however, remains puzzling. Collinearity does not appear to be a viable explanation based on results obtained for alternative specifications of the growth model, which show that the coefficient for specialization remains consistently negative when other explanatory variables are excluded from the estimation equation (Table II).

Some have argued that during the last half century, advances in telecommunications and transportation have dramatically reduced effective distances, reducing the importance of location for the delivery of services and the operation of intellectual spillovers (*e.g.*, Kolko 1999). To test these hypotheses, we looked for changes in the effects of demand, wages, buyer and supplier clusters, specialization, diversity, and competition

on advertising agency location and growth. We found little evidence that distance no longer matters and that co-location no longer benefits advertising agency growth. Nor did we find direct evidence that the sources of externalities in the advertising agency industry have changed over the last four decades.

APPENDIX
TABLE A1
Shares of Advertising Agency Employment by State, 1948 and 1997

State	1948 Share	1997 Share	Difference
Alabama	0.19	0.76	0.57
Alaska	NA	0.1	NA
Arizona	0.1	0.8	0.7
Arkansas	0.08	0.42	0.34
California	6.43	11.96	5.53
Colorado	NA	0.82	NA
Connecticut	0.68	1.34	0.66
Delaware	NA	0.27	NA
District of Columbia	0.49	0.25	-0.24
Florida	0.41	3.78	3.37
Georgia	0.49	2.19	1.7
Hawaii	0.11	0.34	0.23
Idaho	0.05	0.14	0.09
Illinois	15.02	7.82	-7.4
Indiana	0.61	0.98	0.37
Iowa	0.46	0.71	0.25
Kansas	0.07	0.54	0.44
Kentucky	NA	0.89	NA
Louisiana	0.38	0.62	0.24
Maine	NA	0.23	NA
Maryland	1.07	1.49	0.42
Massachusetts	2.23	3.2	0.97
Michigan	5.29	4.92	-0.37
Minnesota	1.47	2.68	1.21
Mississippi	NA	0.22	NA
Missouri	2.79	2.12	-0.67
Montana	NA	0.11	NA
Nebraska	NA	0.51	NA
Nevada	NA	0.52	NA
New Hampshire	NA	0.19	NA
New Jersey	1.03	3.27	2.24
New Mexico	NA	0.21	NA
New York	42.02	22.14	-19.88
North Carolina	0.18	1.66	1.48
North Dakota	0.02	0.12	0.1
Ohio	4.8	3.36	-0.44
Oklahoma	NA	0.52	NA
Oregon	0.46	1.18	0.72
Pennsylvania	6.49	3.39	-3.1
Rhode Island	0.41	0.24	-0.17
South Carolina	NA	0.63	NA
South Dakota	NA	0.12	NA
Tennessee	0.45	1.23	0.78
Texas	1.34	5.64	4.3
Utah	0.15	0.67	0.52
Vermont	NA	0.12	NA
Virginia	0.3	1.59	1.29
Washington	0.83	1.17	0.34
West Virginia	0.08	0.15	0.07
Wisconsin	1.42	1.78	0.36
Wyoming	NA	0.03	NA

TABLE A2
Summary Statistics for
Variables in Location Regression, Eq. (1.2)
(Number of Observations = 323)

	ln (α/1-α)	ln (Supplier Cluster Share)	ln (Buyer Cluster Share)	ln (Relative State Advertising Agency Wage)	ln (State Total Employment Share)
Mean	-4.9299	-4.4469	-4.3328	-0.2227	-4.3350
Std. Dev	1.4753	1.0974	1.0001	0.1930	1.0140
Min	-8.8094	-6.9753	-6.3871	-1.1754	-6.5485
Max	-0.3674	-1.6201	-2.0328	0.2925	-2.1372

TABLE A3
Summary Statistics for
Variables in Growth Regression, Eq. (1.9)
(Number of Observations = 305)

	ln (Ad Agency Empl. Growth)	Diversity	Specialization	Competition	Supplier Cluster	Buyer Cluster	ln (Ad Agency Employ.)	ln (Ad Agency Wages)	ln (State Growth)
Mean	0.0385	0.2776	0.6781	1.6292	0.9438	1.0090	6.6184	0.0279	-2.7382
Std Dev	0.0480	0.0641	0.5370	0.5936	0.3544	0.1204	1.4002	0.0170	0.5754
Min	-0.1417	0.1411	0.1002	0.4460	0.3502	0.6941	3.1355	-0.0287	-4.0486
Max	0.2068	0.5880	3.8482	4.1136	4.5542	1.7347	10.4957	0.0725	-1.2688

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NOTES

[1] Information found in historical works provides a basis for sketching the beginnings of the industry. In his history of the N.W. Ayer agency over the period 1869-1949, Hower (1949) documented that in the early 1900s, the three largest agencies in the United States were located in New York (J. Walter Thompson), Philadelphia (N.W. Ayer), and Chicago (Lord & Thomas, the forerunner of Foote, Cone & Belding). Hower (1949, p. 550) estimated that in 1905, the media billings of each was in the vicinity of $4 million, which combined would represent about 1.5 percent of the $775 million that Coen (1999) estimated was expended in the United States on advertising in that year. Pope (1983, p. 175) has noted that large agencies began to establish branch offices in major cities in the early 1900s.

[2] States missing data in 1948 were Alaska, Colorado, Delaware, Kentucky, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, Oklahoma, South Carolina, South Dakota, Vermont, and Wyoming.

[3] Data on the size distribution of advertising agencies (SIC 7311) available for Census years between 1948 and 1997 were used to compute the surrogate (MINL) for the Herfindahl index recommended by Schmalensee (1977). Prior to 1997 advertising agencies were identified by the Census as SIC 7311 and subsequently as NAICS 54181. Following Ellison and Glaeser (1997), we use total employment as the measure of the size of states. See King, Silk and Ketelhohn (2000) for further details on the Herfindahl and Ellison and Gleaser indices reported here.

[4] Census data show that the proportion of agencies operating more than one unit rose from about 3 percent in the period 1967-77 to 6 percent in 1982 and since then has de-

clined, falling to 3 percent in 1997. The mean number of units (establishments) per mul-

tiunit firm dropped from 3.6 in 1967 to 2 in 1982 but subsequently has risen slowly,

reaching 3 in 1997 (see King, Silk and Ketelhohn 2000, Table A3 for details). Data re-

ported in *Advertising Age* for 1987, 1992, and 1997 reveal that New York, Illinois, and

California were the only states where virtually all the ten largest agencies maintained

branch offices.

[5] For the Herfindahl indices, we used the MINL approximation for the Herfindahl index

recommended by Schmalensee (1977). The simple correlations between the two meas-

ures were: .331 (n = 44), .321 (n=46), .331 (n=49), and .356 (n=49) for 1977, 1982, 1987,

and 1992, respectively.

TABLE I

Logit Model of State Share of Total United States
Advertising Agency Employment, 1963-97*

Dependent Variable: $\ln(\alpha/1-\alpha)$, $\alpha \equiv$ Share of National Advertising Agency Employment in the State i at Time t	
ln (State Total Employment Share)	0.767
	(0.142)
ln (Buyer Cluster Share)	0.451
	(0.134)
ln (Supplier Cluster Share)	0.201
	(0.037)
ln (Relative State Advertising Agency Wage)	-0.434
	(0.024)
Constant	0.541
	(0.282)
State Indicator Variables**	Yes
Log Likelihood	161.9
No. of Observations	323

 * Standard errors, corrected for heteroskedasticity and within state, first-order serial correlation, are in parentheses.
 ** The state indicator variables are jointly significant.

TABLE II

State Advertising Agency Employment Growth, 1963-1997
First Difference Regressions*

Dependent Variable	$(1/T)$ ln (Employment at t/Employment at t-1) in the State-Advertising Agency Industry						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Buyer Cluster in state at t-1	0.127 (0.040)				0.056 (0.027)	0.124 (0.029)	0.046 (0.025)
Supplier Cluster in state at t-1	0.019 (0.010)				0.000 (0.007)	0.007 (0.008)	0.008 (0.007)
Competition in state at t-1	0.065 (0.010)			0.018 (0.006)		0.027 (0.008)	0.034 (0.007)
Specialization in state at t-1	-0.232 (0.038)		-0.179 (0.024)			-0.010 (0.027)	-0.152 (0.028)
Diversity in state at t-1	-0.151 (0.044)	-0.090 (0.044)				0.054 (0.039)	0.023 (0.035)
ln (State Total Employment Growth at t-1)		0.630 (0.078)	0.885 (0.079)	0.627 (0.079)	0.850 (0.082)		1.073 (0.071)
ln (Advertising Agency Employment in state at t-1)		-0.162 (0.009)	-0.090 (0.013)	-0.141 (0.011)	-0.187 (0.010)	-0.184 (0.017)	-0.087 (0.015)
ln (Advertising Agency Wage in state at t-1)		0.104 (0.014)	0.098 (0.014)	0.101 (0.014)	0.078 (0.015)	0.050 (0.017)	0.086 (0.013)
Constant	0.009 (0.002)	0.061 (0.005)	0.059 (0.004)	0.019 (0.009)	0.067 (0.005)	0.070 (0.005)	0.057 (0.004)
Period Indicators**		Yes	Yes	Yes	Yes	Yes	Yes
Log Likelihood	453.85	654.49	669.19	655.75	543.67	524.75	562.78
No. of Observations	245	245	316	316	316	245	245

* Standard errors, corrected for heteroskedasticity and within state, first-order serial correlation, are in parentheses.

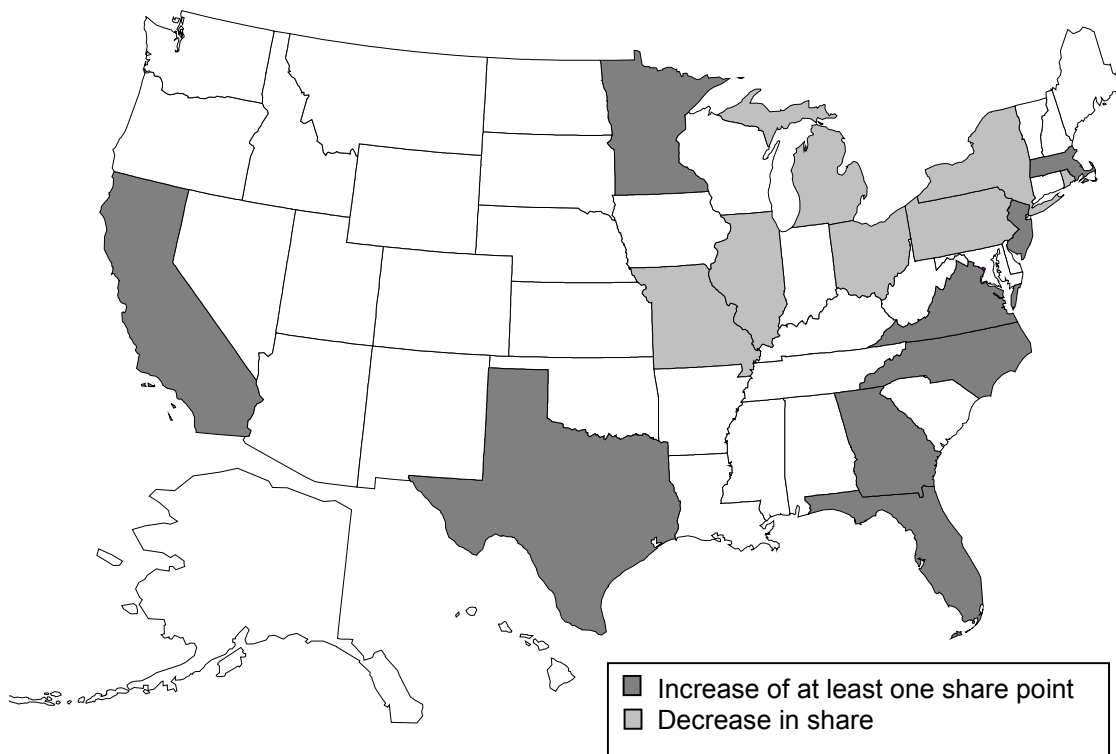**The period indicator variables were jointly significant in each specification.

FIGURE I
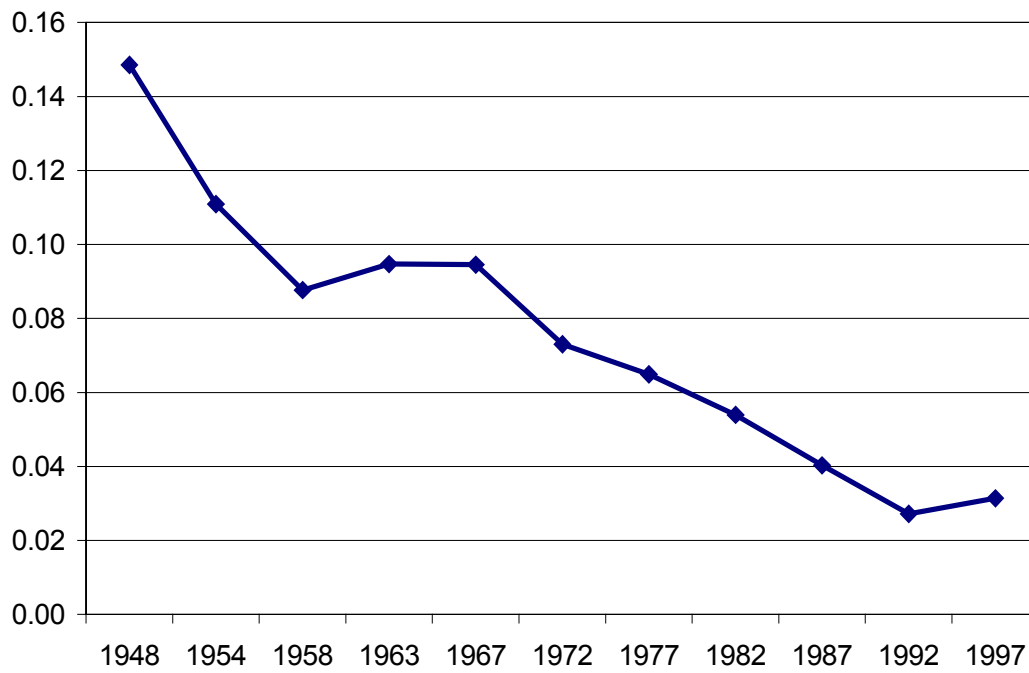Changes in State Ad Agency Employment Shares, 1948-1997

FIGURE II
Ellison and Glaeser (1997) Gamma Index of
Geographical Concentration of Advertising Agencies