Spatial Divisions of Labor: How Key Worker Profiles Vary for the Same Industry in Different Regions

Ann Markusen
Project on Regional and Industrial Economics
Humphrey Institute of Public Affairs
University of Minnesota
markusen@umn.edu
http://www.hhh.umn.edu/projects/prie

and

Ann Gadwa
Mertris Arts
gadwa@metrisarts.com
http://www.metrisarts.com

September 2010

For inclusion in Phil McCann, Geoff Hewings, and Frank Giarattani, *Handbook of Economic Geography and Industry Studies,* Edward Elgar, forthcoming 2010. An earlier version of this paper was presented at the annual North American meetings of the Regional Science Association International, November 20-22, 2008. Our thanks to the National Science Foundation, Program in Geography and Regional Science, Grant No. 0136988, 2002-4, and the Public Policy Institute of California Fellowship, 2002, for support for the occupational analysis upon which this paper draws, to the Humphrey Institute of Public Affairs for research and staff assistance, and to the Sloan Foundation for a travel grant through the Industry Studies Association to present this work at the 2008 meetings. We would like to thank the members of the interdisciplinary Innovation Seminar at Korea University for the opportunity to present a preliminary version of these ideas and findings in October of 2008.

Abstract

The human capital component of regional economies plays a subsidiary role to physical capital in most analytical and policy work, reflected in the priority given to industry over occupational structure. We theorize that the occupational structures of industries vary across regions, that the formation of the regional labor force is semi-independent of firms' locations, and that firms follow workers as well as vice-versa. We explore the first of these hypotheses with two exercises on the occupational variation of industry structure across regions, one using employer-based data sources for all industries and occupations among a set of California metros, and one using worker-based data (Census PUMS) for cultural industries (e.g. advertising, media, performing arts, publishing) and cultural occupations (writer, musician, visual and performing artist) across a subset of US metros. The differential presence of artist-rich industries only partly explains the distribution of artists, both because industries' use of artistic labor varies among regions and because many artists choose locations on the basis of factors other than job offers from firms. Empirically, we investigate the extent to which artistic labor pools and cultural industries are co-located among the metros. Our findings suggest that regional policymakers cannot assume that the occupational structure and human capital requirements of their innovative industries will reflect national occupation-by-industry profiles. An effective cultural industry policy requires independent examination of a region's cultural workforce and the tailoring of policies appropriately. These inferences can be generalized to other occupational groups that are "in play" among regions, i.e. those that have relatively skewed distributions and high rates of inter-regional migration.

Since the 1950s, regional scientists have been interested in the industrial structure of regional economies and the location decision-making of firms and their establishments grouped as industries. In North America and elsewhere, as responsibility for economic development has devolved onto state/provincial and local governments, researchers and policymakers have developed analytical and decision-making tools to identify key industries and nurture, attract and retain firms within them. In this paper, we challenge the narrowness of this industrial focus by exploring the semi-autonomous role of regional labor force formation in regional economic development.

We first review how spatial division of labor theories, around for several decades, suggest that the occupational structure of an industry in core regions, where management and innovation reside, may differ substantially from the occupational structure of the same industry in other regions. We challenge the notion that only industry managers make important decisions about the location of productive activity, positing that workers also choose where to live and work in a calculus where firm or industry presence and job offers form only one of several decision criteria. Our basic contention is that an adequate understanding of the spatial differentiation of industries and their activities requires occupational as well as industrial intelligence.

Using occupations as a counterpart to industries, we investigate the extent to which industries in metropolitan regions share similar occupational profiles. We report the results of two exercises on the occupational variation of industry

employment across regions, one using employer-based data sources for all industries and occupations among a limited set of California metros, and one using worker-based data sources for the cultural industries and the occupation of artist for a subset of large US metros. While industries with routinized production processes often do possess occupational structures at the metro level similar to state and national patterns, this is not the case for the more innovative industries such as high tech, business services, and the information and creative sectors.

To explore the location calculus of workers as important agents in regional economy-building, we test several propositions about the inter-relationship between artists as a key occupational group and cultural industries across our metro set. We suggest that in occupations with high rates of self-employment, such as artists, factors other than employers' job offers or cultural industry presence may shape workers' location choices among metros.

Our findings have important implications for industry researchers and economic development policy. Regions aspiring to sectoral specializations must also understand the extent to which activities in their region fit into a larger regional and global division of labor. Analyses of occupational structures of existing and target industries can inform public investment choices. If the formation of distinctive economic sectors consists of semi-autonomous decision-making by workers and managers, an effective economic development strategy must take into account the location calculus of both sets of agents.

I. Theories of Industrial and Labor Force Formation at the Regional Level

No one ever “sees” a regional economy. Instead, we have mental maps based on conceptual categories that implicitly treat certain decision-makers as key to economic development (Markusen and Schrock, 2008b). The two most common typologies used to depict regional economies group jobs by industry and by occupation (Harrington, 1999). However, the industrial conception of a regional economy is older and much more heavily used, a geneology we have explored elsewhere (Barbour and Markusen, 2007).

The seminal case for using occupations in addition to industries in regional analysis was made by Thompson and Thompson (1985, 1987). They argued that important insights could be had by looking at what workers do (occupations, defined by skills) rather than simply what they make (industries, defined by product output). Few scholars picked up on the idea until the late 1990s, when several efforts made unique contributions independently. Florida (2002) argued that skilled workers are attracted to certain urban amenities and that their presence, in turn, drives high tech location. Feser (2003) argued that input-output relationships were not the only or most productive way to group related industries into clusters and used a skills-based data set to do so. In a subsequent paper (Renski et al, 2007), he and his colleagues showed that grouping industries by labor content rather than value chains produced very different configurations. Markusen (2004) articulated a series of causal hypotheses about why and how occupational structures are increasingly diverging across and within industries. In subsequent work, Markusen and Schrock (2006) showed that certain occupational groups are highly skewed

across US metropolitan regions and that such skewness has increased over two decades. Koo (2005) applied occupational analysis to regional economic structure, while Beyers (2007) explored an occupational approach to clustering producer services activities.

Very little work, however, has been devoted to understanding the intersection between industry and occupational approaches, either theoretically, as a way of understanding location decision-making, or empirically, by understanding how the two taxonomies vary in their sorting of regional economic activity. In this paper, we attempt both.

II. Does the Occupational Structure of an Industry vary across Regions?

If occupational structures of industries are invariant across regions, then researchers and policymakers need not conduct independent analyses by occupation to plan for firm expansions or relocations or to forecast future labor demand, though occupational intelligence would still be useful in understanding firm location preferences. There are good theoretical arguments that occupational composition will vary spatially, best articulated in the well-developed I analyses of the inter-regional division of labor and commodity chains ((Frobel et al, 1979; Massey, 1984; Markusen, 1985; Saxenian, 1994; Gereffi and Korzeniewicz, 1994). For many mature industries (steel, textiles, chemicals) at certain spatial scales (e.g. within the US), industries' structures of employment by occupation do not differ much across regions. But our research finds important variations in key industries.

In a study of eleven California metros in the 1990s, we found that occupational structures in information technology industries and business services varied markedly among the metros and from the national norm (Barbour and Markusen, 2007). In this exercise, we estimated what 1997 occupational employment by industry by metro would have been if industries' occupational structure mirrored that at the national level. We used the *Industry-Occupation Matrix* data from the State of California's Economic Development Department, available at the county level aggregated up to the metro level, and the Bureau of Labor Statistics' *National Historical Industry-Occupation Matrix Time Series (NTS), 1983-1998,* for 93 occupations and 181 industry categories. Overall, we found that using national occupation by industry averages closely predicted overall occupational employment, with only 5% of employment, or about 585,000 jobs, across the eleven metro set not accurately projected.

But for industries of great interest to economic developers, the high tech and innovative sectors, this method was a poor predictor of occupational structure. In the information technology and business services (the latter including computer and data processing), employment levels for many occupations were severely under-estimated (Table 1). In information technology sectors, more than one third of natural scientists were under-predicted in the San Francisco and Oakland metros, and more than one third of engineers were missed in San Jose.[i] The ranks of service and precision workers were over-estimated in this industry in the Bay Area region, often by quite large increments. In business services, engineering and computing workers were also

underestimated by a third or more, while service workers were over-estimated. In San Jose, actual totals of clerical and sales workers in business services were seriously over-estimated, while precision workers – people doing prototypes and advanced manufacturing – were under-estimated.

Metro differentials in innovative industries' occupational structures can also be viewed by comparing how certain occupations are over- or under-estimated in each region given national norms (Table 2). Across all industries in each metro, computer and IT professionals' ranks were under-estimated by 32%, 38% and 33% in San Francisco, San Jose and Oakland respectively, while they were over-estimated by 25% in Los Angeles. Over-estimates were nearly as large for selected engineers and natural scientists for the same three metros. These discrepancies often involved large numbers of jobs. These three occupations alone accounted for 29,000 under-estimated jobs in San Jose and 15,000 over-estimated high tech jobs in Los Angeles. For policymakers concerned with the quality of jobs associated with target industries and with the availability of existing workforce skills for newly recruited firms, these findings suggest that independent intelligence on the occupational structures of regional industries is highly desirable, especially in high tech and business service sectors.

III. Disaggregating: Do the Occupational Structures of Industries Still Vary Across Regions

A skeptic might argue that this lack of fit may be due to overly aggregated occupational groupings--that separating say civil engineers from electrical or

industrial or aeronautical engineers might result in better fits between industries and occupations. Can the finding of considerable spatial division of labor within the same industry in different regions be replicated with more detailed occupational groupings? In this section, we explore this question.

The exercise just described used employer-based data for three digit industries for large metros within one state. Differences in state level industry-by-occupational data sets makes it difficult to replicate this experiment at the national scale, where we might expect more variation. For a second exercise, we chose artists as a subset of cultural workers and four sub-disciplines--musicians, writers, visual and performing artists, investigating their distributions within a set of cultural industries nationally and how these vary among a set of large US metros. We use a strict definition of artists, not including related cultural workers such as designers and architects. Social scientists generally agree that artists are core cultural workers (e.g. Heilbrun, 1987; Wassall and Alper, 1985), and their rates of self-employment are much higher (Markusen and Schrock, 2006). In 2000, there were about 843,000 employed (including self-employed) artists in the US, accounting for about 0.6% of the workforce (Markusen, Wassall et al, 2008, Table 3).[ii]

A. Census Data and Metro Sets

For occupation, industry and metro analyses, we use Census of Population 2000 data drawn from the Public Use Micro-data Sample, a 5% sample that permits disaggregation by occupation and industry down to the

county level and below (see Markusen and Schrock, 2008a, for a user-friendly discussion of data quality and statistical reliability issues in using the PUMS data set for spatial analysis). The Census PUMS data set is under-explored for investigating industry and occupational employment patterns at various geographical scales.iii It records data on the basis of where people live rather than where they work (not a problem at a metro-scale analysis), and it includes self-employed workers who are not included in employer-based data sets.[iv] In addition to self-employed and miscoding problems, employment totals from the two sources will differ because employer-based sources count every job, so that moonlighting workers will be counted twice while Census totals include only the primary occupation of respondents.

We created a set of 22 metropolitan areas (PMSAs) to scrutinize. We first selected 18 of the 30 largest metro areas in the US. They include metros with high over-representation of artists (Los Angeles, New York, San Francisco, Seattle), others close to the national average (Chicago, Kansas City) and others with a low-representation of artists (Houston, Detroit, Cleveland, San Jose). We eliminated from the largest metro set several that are contiguous to larger primary MSAs (Baltimore, Nassau/Suffolk, Newark, Orange County, Riverside/San Bernardino) and several stand-alone metros with average or below artistic presence (Dallas, Phoenix, Pittsburgh, St. Louis, Tampa/St. Petersburg (Markusen and Schrock, 2006), and added several smaller metros with known outstanding pools of artists in one or more disciplines: Albuquerque, Austin, New Orleans, Santa Fe. For the correlation analysis below, we expanded

the set to 30 metros. Artistic concentrations, denoted by location quotients, for all 30 metros are arrayed in Table 3. In this section, we explore the extent to which these differentials appear to be explained by the presence of cultural industries in each region.

We use the Census rather than employer-based data to chart artists' spatial and industrial distributions because self-employment levels among artists are very high, many times the national rate of 8% (Table 4). Employer surveys such as those relied upon in the California study do not include the self-employed. A comparison of employer-based with Census estimates of artists' employment confirms serious under-estimation of artists' ranks when using the former. The ranks of writers, for instance, are under-estimated more than six-fold for metros such as Los Angeles, Houston, Riverside/San Bernardino and Portland (Table 5). Even in cities where writers' formal employment rates are high—Minneapolis with its large educational publishing industry, Washington with its huge public sector and public interest organizations, and Kansas City with Hallmark Cards—writers' ranks are under-estimated by nearly 2 to 1 or more. These differentials are particularly remarkable since the Census asks only for primary occupation (and thus misses the 15% of the writers identified in the CPS as self-employed as a secondary occupation) while employer-based data sources will count a dual-job person twice.

B. Defining Cultural Industries

We defined a set of cultural industries at the national level, based both on qualitative knowledge and on cultural content as revealed by occupational concentrations. We ranked all 3-digit industries at the national level by the absolute numbers of artists that they employ and the shares of their workforce accounted for by artists. We chose to include those industries (N = 20) that employ more than 6000 artists, a set that accounts for 84% of the nation's employed artists (Table 6).[v] This cutoff ensures that we have enough artists in each industry at the national level to be confident of the estimates.

But industries are not equally sized. Huge numbers of artists in a large industry may not account for a very large share of that industry's employment. The industries in this set vary from those with very high shares of artists in their employment ranks, especially compared to the national norm of 0.65, to those with several that are below the national average: other recreation, restaurants, K-12 schools and computer systems design (Table 6). However, because some of these industries are significant employers of particular disciplines (restaurants for musicians, management, scientific consulting services for writers), we chose not to eliminate them in the first instance. We also looked at smaller industries to see if there were any with very large shares of artists in their workforce. However, since we did not find any additional industries where artists comprised more than 3% of employment, we chose to leave them out.

Our use of artistic occupations to identify cultural industries is analogous to the use of scientific and engineering occupations in defining high tech industries (Markusen, Glasmeier and Hall, 1986). It is interesting to compare this

method with other conceptual and impressionistic definitions (Hesmondhalgh, 2002; Power, 2002; Pratt, 1997; Pratt, 2004). Our set shares some core industries with other empirical accounts: performing arts, media, motion pictures and video, sound recording, advertising, publishing and printing. It also includes a number of industries that are not generally considered cultural: other professional, scientific and technical services; religious organizations; specialized design services; colleges and universities, and elementary/secondary schools; toys, amusements and sporting goods manufacture; drinking places and restaurants; management, scientific and technical consulting; civic, social and advocacy organizations; and computer systems and design. Our definition does not include peripheral cultural industries that are connected through inter-industry relationships, a common practice in cultural industry impact studies (DeNatale and Wassall, 2008; Beyers et al, 2004). Elsewhere, we debate the theoretical rationales and empirical problems posed by sectors such as religion, fashion, education, sports and even auto manufacture in defining cultural industries (Markusen, Wassall et al, 2008).

C. Does Cultural Industry Presence Explain Artist Distributions among Metros?

Spatial occupation by industry patterns can be studied either by mapping occupations in regions onto industries or by starting with cultural industries and exploring their occupational structures among regions. We previously investigated the metro distribution of artistic occupations among industries and found large differentials (Table 7). For instance, the motion picture/video industry

accounts for 20% of visual artists in Los Angeles compared with just 3% in the US as a whole, and the advertising industry accounts for three times as large a share of visual artists in Chicago as it does nationally. We can speculate that these patterns can be explained in large part by the differing incidence of cultural industries among regions.

In this current exercise, we use an industrial rather than occupational entry point, since our project is to compare the occupational composition of the same set of industries across all metros. For the set of broadly defined cultural industries, we computed the differential between the actual numbers and shares of artists in each metro compared with what they would have been if these shares mirrored the national shares for each industry, summing up for all cultural industries:

$$Si\ [(Eoir)-(Eoi/Ei)(Eir)]$$

where:
o: occupation (artist; or musician, etc)
r: region (metro)
i: cultural industry
E: employment

The largest under-estimates of artists occur for the huge, cultural industry-rich metros of New York and Los Angeles (Table 8). For each, about 14000 more artists are employed (and self-employed) in the cultural industries than would be predicted by assuming national shares for each industry. (As we demonstrate below, self-employed artists may state, or be assigned by a Census professional, an industry in which they work.) In contrast, artists' ranks are over-estimated by nearly 1500 or more in the metros of Detroit, Denver and Chicago.

Are these differentials large? For some metros, yes. For 9 of the 22 metros in the set, the over or under-estimation of artistic occupations from national industry shares exceeds 10%. Santa Fe's 30% artist under-count is the greatest in percentage terms, while Denver's over-count is close at 28%. For only six metros are the national share estimates less than 5%; Atlanta, Seattle, Portland, Washington DC, Minneapolis/St. Paul and Philadelphia. For these metros, artistic populations closely reflect the presence of cultural industries, although the direction of causation is not established.

Disaggregating by artistic discipline, the gap in actual versus estimated artists' shares by industry is even larger in many cases, revealing an important disciplinary spatial division of labor within cultural industries across space (Table 9). Visual artists in Santa Fe and Albuquerque's cultural industries are under-estimated by 49% and 38% respectively, underscoring the pre-eminence of these New Mexico metros as visual arts meccas, but over-estimated in Washington DC (30%) and Denver (35%). Performing artists in New York and Los Angeles' cultural industries are under-estimated by 43% and 32% respectively, while they are over-estimated by 43% in New Orleans and 88% in Santa Fe. Musicians' ranks are 29% under-estimated in Austin and Boston, but over-estimated in Albuquerque and Santa Fe by 30% and 82% respectively. Writers' presence in cultural industries is under-counted by 47% in Santa Fe using the national shares technique and over-estimated by more than 30% in Kansas City and Miami, and by 57% in New Orleans.

These are sizeable differences. Summing over the ten metros where they were under-estimated, more than 11000 writers would have been un-accounted for had their presence been estimated by national industry by occupation composition. Summing over the nine metros where performing artists were similarly underestimated, almost 23000 would be missing. In 13 of the metros, more than half the set, the numbers artists in at least one discipline would be under or over estimated by more than 25%. If, however, we disaggregated the industry set to look more closely at component industries, we might find a closer fit. We intend to do this in a further exercise, breaking out motion pictures, sound recording and several other industries. (Our work so far suggests that the various cultural industries do not cluster together in any systematic way across space.)

These patterns reflect overall artistic specializations across metros (Table 3). Our results suggest that cultural industries alone, even with residual "independent, performing arts and sports" category included, do not explain the full extent of these differentials. For instance, cultural industries in Minneapolis/St. Paul employ writers at 7% below the national norm for the cultural industries present. Yet writers are heavily over-represented in the Twin Cities. Thus their ranks include many artists working for other industries in the region.

We conducted sensitivity analysis on the choice of cultural industries by eliminating the large industries in our set with below-national-average shares of artists: restaurants and other food services, computer systems design and

related services, and elementary and secondary schools. We found almost no difference in over- and under-estimates of artists' presence by doing so. This suggests that a more restricted set of cultural industries can reasonably be used as a proxy for the presence of artist-employing industries in regions.

We also eliminated the industry category "independent artists, performing arts, spectator sport and related" from the exercise. This "industry" accounts for 31% of all artists working in the 20 cultural industries nationally, so its exclusion might be expected to influence the size of over and under-estimates. If this industry group reflects the same compositional variation as other industries, then the numbers should simply moderate. We found this to be the case for many of the metros. Eliminating this industry resulted in national norm-generated estimates of metro artists closer to actual Census estimates, often substantially, though in some metros, an under-estimate became an overestimate or vice-versa (Table 10). Under-estimates fell most in absolute terms for New York, Los Angeles and San Francisco/Oakland, but their unaccounted-for artists remained high (all more than 10%). Over-estimates shrank most for Detroit and Chicago. For two metros, however, Washington DC and Seattle, norm-generated over-estimates were larger than when the independent/performing arts industry was included. This reveals that self-employed and performing artists are over-represented in those two cities and help compensate for the lower incidence in the other cultural industries. Overall, the elimination of this large industry moderated absolute and relative mis-estimates, but they still range from 16% under-estimation in the case of Los Angeles and 23% over-estimation in the case

of Denver. Thus our finding, that artists' employment by industry varies substantially among metros, stands without the "independent/performing arts" industry.

From this exercise, we conclude that the industry encompassing self-employed artists and performing artists is best treated as a separate phenomenon, chiefly due to its inclusion of self-employed artists who do not identify as associated with any industry. Using a set of cultural industries that excludes this potpourri "industry" will not change overall findings a great deal, especially in a multi-variate analysis of the determinants of artist location by metro areas. It is regrettable that performing arts establishments are included in this same industry. However, since the Census also records the self-employment status of respondents, we can use this to estimate the size of this those working for the performing arts and treat the rest as truly independent.

D. Self-Employment Status and Industry Orientation

Being self-employed does not mean that members of an occupation are not oriented toward a particular industry. From work on the film (Scott, 2005) and performing arts sectors (Beyers and GMA, 1999), we know that many artists regularly work on contract, a relationship typical of the project organization of work in some cultural industries. Relying on interview data, the Beyers study found that only 14% of people working in Seattle dance, theater and music establishments are full time employees, another 39% are part-timers, and 47% are not counted as employees at all, but work on a contractual or student

internship basis. Scott's work reveals the project-based relationships in the motion picture and television industries of Los Angeles. So we cannot assume that artists' presence in a region is unrelated to the presence of cultural industries solely on the basis of their being self-employed. On the other hand, many artists may be attracted to a cultural industry-rich locale simply to enjoy the cultural offerings or for reasons unrelated to culture, such as environmental and recreational opportunities.

Is it possible to explore the extent to which self-employed people are oriented towards particular industries? The Census offers us an opportunity to probe this, because it asks people to identify whether they are self-employed, as opposed to work for a for profit, non-profit, public or household employer, and it also asks them to identify the industry in which they work. Many self-employed artists report or are assigned an industry affiliation, as we show for selected metros in Table 11. In Kansas City, for instance, many self-employed artists are attached to the "other professional, scientific" industry (largely photographers), and to the printing and publishing industry, reflecting the presence of Hallmark Cards. More artists working in K-12 in this metro are identified as self-employed than on salary. Similarly, in the Los Angeles metro, high shares of artists associated with the specialized design industry are self-employed. Seattle's independent/performing arts "industry" includes higher shares of self-employed artists than in either Kansas City or Los Angeles, evidence supporting the Beyers interview data. This evidence underscores the failure of employer-based data

sources to capture large numbers of people working off-salary in cultural industries.

These data permit us to unpack the independent/performing arts/sports industry and distinguish people who are self-employed from those that are employed. So for instance, in Kansas City, 530 artists reported being self-employed and unaffiliated with any other industry (though they could be affiliated with the performing arts), with 425 of these reporting wage and salary employment, presumably in the performing arts and not sports. We have thus confirmed that many self-employed artists are working chiefly in one industry and are captured this way by the Census in ways that are not possible with other data bases.

IV. Regional Development Implications

If the occupational composition of key industries is relatively similar across regions, then the case for parallel investigation of occupational formation and industry location is not strong. If however, as we have shown in two different exercises, the spatial division of labor within innovative industries varies across space, both regional analysis and economic development policy should take this into account.

In terms of regional research, this means investigating the relative size and significance of various occupations in the region (and vis-à-vis other regions), including how these occupations serve otherwise disparate industries.

If, as we have yet to demonstrate, the behavior of those who create human capital (workers themselves, their households, and training institutions) is semi-autonomous from decisions made by industry managers, then their location calculus should be taken into account. There is circumstantial evidence that artists as a particular case are semi-autonomous. They exhibit relatively high rates of migration among states and regions, and although this is also the case with other high tech occupations, artists' self-employment rates are at least three times higher than the latter, supporting the hypothesis of relative independence from particular job offers (Table 12).

Since economic development tools are often designed to incentivize behavior, a more effective regional development strategy would allocate resources across a larger portfolio of investments, including inducements to firms to locate, expand and retain jobs, but also those that shape human capital formation and skilled labor recruitment and retention.

Table 1. Share of Occupational Employment Unexplained by Industry Structure in Information Technology and Business Services, California Metropolitan Areas, 1997

	San Francisco	San Jose	Oakland	Los Angeles	Orange	San Diego
Information Technology Industries, Excluding Computer and Data Processing Services						
Managerial/Professional Workers	10	21	15	12	5	8
Computer/IT Professionals	-11	21	1	11	-6	17
Selected Engineers	4	36	19	3	7	-3
Natural Scientists	48	12	35	7	19	6
Sales and related workers	3	-8	27	-22	24	-47
Clerical and administrative support	-18	-4	-2	8	11	-13
Service workers	-45	-43	-29	9	-24	-36
Precision workers	-21	-29	-8	-8	8	-16
Manual workers	-25	-34	-41	-25	-20	-1
Total Employment	35,532	214,907	50,089	153,605	87,690	74,513
Business Services (includes Computer and Data Processing Services)						
Managerial/Professional Workers	35	38	28	-8	2	17
Computer/IT Professionals	39	57	40	-51	1	9
Selected Engineers	43	61	34	-167	-35	52
Natural Scientists	-30	-89	55	-32	-8	14
Sales and related workers	7	-44	-18	16	-33	-19
Clerical and administrative support	-3	-33	-14	-6	20	4
Service workers	-42	-56	-48	6	-5	-5
Precision workers	-118	28	-45	1	0	-18
Manual workers	-68	-15	14	1	-30	-28
Total Employment	111,411	128,230	93,027	353,245	123,314	90,357

Source: Barbour and Markusen, 2007. Data from California Employment Development Department, *Industry-Occupation Matrix,* and Bureau of Labor Statistics, *National Historical Industry-Occupation Matrix Time Series, 1983-1998*

Table 2. High-Tech-Related Occupations in Six California Metropolitan Areas, 1997

	San Francisco	San Jose	Oakland	Los Angeles	Orange	San Diego
Computer/IT Professionals						
Location Quotient	2.0	3.3	1.7	0.9	1.3	1.3
Employment Share Unexplained by Industı	32%	38%	33%	-25%	2%	11%
# Jobs Unexplained by Industry	8,961	18,348	8,448	-13,433	572	2,277
Selected Engineers						
Location Quotient	1.2	4.6	1.7	0.9	1.5	1.7
Employment Share Unexplained by Industı	10%	37%	28%	-6%	10%	21%
# Jobs Unexplained by Industry	623	9,888	2,755	-1,383	1,104	2,274
Natural Scientists						
Location Quotient	1.8	1.7	1.9	0.8	0.9	1.8
Employment Share Unexplained by Industı	33%	18%	37%	-12%	-4%	3%
# Jobs Unexplained by Industry	1,504	756	1,872	-1,023	-125	142

Source: Barbour and Markusen, 2007. Data from California Employment Development Department, Industry-Occupation Matrix, and Bureau of Labor Statistics, National Historical Industry-Occupation Matrix Time Series, 1983-1998

Table 3. Location Quotients for Employed and Self-Employed Artists by Metro Area, 200

	All Artists	Visual artists	Performing artists	Musicians, composers	Writers
Los Angeles	2.98	2.13	5.47	2.15	2.73
Santa Fe	2.92	4.27	0.83	1.16	4.20
New York City/Bergen	2.58	2.01	3.73	2.03	3.00
Nashville	1.97	1.14	1.63	5.16	1.01
San Francisco/Oakland	1.86	1.83	1.86	1.23	2.52
Seattle	1.37	1.52	1.16	1.17	1.50
Washington, DC	1.36	0.97	1.54	1.02	2.31
Austin	1.30	1.19	0.89	1.48	1.87
Boston	1.30	1.03	1.24	1.25	2.01
Albuquerque	1.24	1.64	0.96	0.87	1.08
San Diego	1.23	1.34	0.95	1.37	1.16
Minneapolis/St. Paul	1.19	1.11	1.13	1.28	1.33
Las Vegas	1.16	0.83	1.94	1.51	0.60
Miami	1.15	1.02	1.49	1.40	0.80
Portland, OR	1.12	1.02	1.12	0.95	1.51
Atlanta	1.10	1.11	1.06	1.24	0.98
Chicago	1.06	1.14	0.84	0.92	1.28
Dallas	1.00	1.10	1.08	0.95	0.74
UNITED STATES	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
Philadelphia	0.98	1.03	0.91	0.97	0.95
Phoenix	0.96	1.10	0.70	1.04	0.88
Kansas City	0.94	1.22	0.59	0.84	0.82
Tampa	0.92	0.91	0.84	1.19	0.75
Denver	0.91	0.81	1.09	0.87	0.98
New Orleans	0.91	0.95	0.69	1.43	0.57
San Jose	0.86	0.95	0.75	0.67	0.95
Cleveland/Akron	0.83	0.84	0.64	1.04	0.80
Pittsburgh	0.77	0.73	0.63	1.00	0.79
Detroit	0.76	0.83	0.62	0.81	0.73
Houston	0.76	0.75	0.65	1.00	0.67
St. Louis	0.74	0.82	0.52	0.87	0.68

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 4. Self employment trends, artistic occupations, 2002

Occupational Title	Total Employment	Self-employed	% Self-employed	Primary job	Secondary job
Visual artists	307,254	155,159	50%	129,109	26,050
Performing artists	176,463	42,724	24%	38,174	4,550
Musicians	215,425	83,121	39%	56,770	26,351
Writers	138,980	94,377	68%	80,509	13,868
Total, arts occupations	838,122	375,381	45%	304,562	70,819
Designers	531,921	168,806	32%	132,827	35,979
Architects	136,378	29,678	22%	23,809	5,869
Total, all occupations	144,013,600	11,451,600	8%	9,926,000	1,525,600

Source: Markusen and Schrock, 2006. Data from Bureau of Labor Statistics, National Industry-Occupation Employment Matrix. http://www.bls.gov/emp/empoils.htm

Table 5. Writers' employment estimates, Worker vs. Employer Sources, 2000

Metropolitan Area	% Self-Employed	Census/OES	Employment Census	Employment OES
Los Angeles, CA	57	6.1	12970	2110
Houston, TX	57	7.3	1524	210
Portland, OR-WA	57	7.5	1647	220
Riverside-San Bernardino, CA	56	7.3	951	130
San Francisco-Oakland, CA	55	5.8	6260	1075
New York, NY-NJ	54	3.8	16443	4350
Miami, FL	52	2.6	906	350
Denver, CO	51	3.1	1235	400
Orange County, CA	51	5.8	1498	260
Phoenix, AZ	51	5.6	1520	270
Philadelphia, PA-NJ	51	5.0	2687	540
Seattle, WA	50	4.2	2208	530
Chicago, IL	49	4.2	5893	1410
Nassau-Suffolk, NY	47	5.8	1341	230
St. Louis, MO-IL	47	3.4	1022	300
Atlanta, GA	47	2.0	2389	1180
San Diego, CA	47	6.3	1763	280
Tampa-St. Petersburg, FL	46	3.8	996	260
Detroit, MI	43	2.6	1792	690
Pittsburgh, PA	42	4.3	988	230
Boston, MA-NH	42	3.8	4207	1120
San Jose, CA	40	2.6	972	370
Newark, NJ	39	4.0	1425	360
Minneapolis-St. Paul, MN	36	1.8	2494	1360
Dallas, TX	35	3.1	1489	480
Washington, DC-MD-VA-WV	35	2.3	6877	3000
Cleveland, OH	34	2.1	948	460
Baltimore, MD	30	1.7	1361	810
Kansas City, MO-KS	22	2.7	847	310
United States	**47**	**3.8**	**158116**	**41410**

Sources: Markusen and Schrock, 2006. Data from Census 2000 5% PUMS dataset, Integrated Public Use Microdata Sample, Minnesota Population Center, University of Minnesota; US Bureau of Labor Statistics, Occupational Employment Statistics.

Table 6. Distribution of Artists by Discipline in Cutural Industries, United States, 2000

Industry	Total	Visual artists	Performing artists	Musicians and composers	Writers	Artists as % Industry
Independent artists, performing arts, spectator sports	259066	92256	40005	69998	56807	45.3
Other professional, scientific and technical services	64536	63383	395	44	714	22.8
Radio and television broadcasting and cable	61263	7152	49230	1172	3709	10.4
Motion pictures and video industries	55403	8987	40364	1255	4797	17.9
Religious organizations	55362	595	797	53037	933	5.6
Advertising and related services	36048	18523	4284	155	13086	6.6
Publishing, except newspapers and software	23545	9192	865	223	13265	5.6
Specialized design services	22785	21843	369	0	573	8.4
Newspaper publishers	21240	11588	103	76	9473	4.2
Colleges and universities, including junior colleges	20268	4785	7230	2421	5832	0.7
Toys, amusement, and sporting goods manufacturing	12685	12404	169	0	112	9.4
Drinking places, alcoholic beverages	11284	56	8258	2970	0	5.1
Other amusement, gambling, and recreation industries	9846	2249	4984	2120	493	0.7
Printing and related support activities	8547	8034	148	80	285	1.0
Sound recording industries	7700	540	2305	4571	284	20.0
Management, scientific and technical consulting services	7170	1841	605	90	4634	0.7
Restaurants and other food services	7111	432	935	5215	529	0.1
Civic, social, advocacy, grantmaking organizations	6992	473	1327	817	4375	1.1
Elementary and secondary schools	6571	940	1516	2389	1726	0.1
Computer systems design and related services	6147	3046	988	78	2035	0.5
Artists, All Industries	837862	340561	185413	155593	156295	0.6

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 7. Employed artists, top industries, Los Angeles, Chicago, Boston Metro, US, 200

	% of occupational employment			
	Boston	Chicago	Los Angeles	US
Visual artists				
Independent artists, performing arts, spectator sports	25.5	17.9	24.0	27.1
Other professional, scientific and technical services	20.1	19.1	13.9	19.6
Specialized design services	11.7	7.3	6.1	6.0
Advertising services	4.9	16.0	4.2	5.1
Newspaper publishers	4.5			3.9
Motion pictures and video industries			19.6	2.7
Management, scientific, technical consulting services		3.0		0.4
Performing artists				
Radio and television broadcasting and cable	41.5	19.1	15.6	27.5
Independent artists, performing arts, spectator sports	14.5	24.2	22.5	21.3
Motion pictures and video industries	11.4	20.4	48.7	20.0
Colleges and universities, including junior colleges	6.2			4.6
Advertising services	5.2	9.6	1.3	3.2
Employment services			3.5	0.7
Computer systems design services		2.7		0.4
Musicians and composers				
Independent artists, performing arts, spectator sports	51.2	46.5	64.9	46.8
Religious organizations	28.7	31.9	9.8	32.5
Restaurants and other food services	3.0	4.4	3.8	3.2
Sound recording industries		2.9	7.2	2.7
Elementary and secondary schools	2.6	2.3		1.6
Colleges and universities, including junior colleges	3.4			0.9
Motion pictures and video industries			2.7	0.9
Writers and authors				
Independent artists, performing arts, spectator sports	23.6	30.9	45.3	35.8
Advertising services	12.1	15.5	4.1	9.5
Publishing, except newspapers and software	14.0	11.1	6.1	7.9
Newspaper publishers		3.5		7.5
Colleges and universities, including junior colleges	6.8			3.6
Motion pictures and video industries			20.0	3.1
Radio and television broadcasting and cable			6.6	3.0
Management, scientific, technical consulting services	8.6			2.3
Civic, social, advocacy organizations, grantmaking		4.2		1.9

Source: Markusen, Wassall, DeNatale and Cohen, 2008, using 2000 Census data from Ruggles et al.(2004) Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 8. Artist by Industry Deviations from National Norms, Selected US Metros, 2000

Metro	All artists	Differential/ Total Employment (%)
New York City/Bergen	14155	18.7
Los Angeles	13927	18.3
San Francisco/Oakland	3675	14.9
Boston	1948	13.3
Austin	460	8.8
Albuquerque	444	16.8
Santa Fe	417	29.9
Atlanta	40	0.3
Seattle	-66	-0.6
Washington, DC	-73	0.0
Portland, OR	-165	-2.5
New Orleans	-222	-7.0
Minneapolis/St. Paul	-283	-2.4
Miami	-363	-5.4
Kansas City	-388	-7.5
San Jose	-446	-9.5
Cleveland/Akron	-570	-7.6
Philadelphia	-690	-4.6
Houston	-872	-9.4
Chicago	-1475	-5.6
Denver	-1723	-28.0
Detroit	-1768	-17.7

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 9. Artistic Discipline Counts by Industry, Deviation from National Norms, Selected US Metros, 2000

Metro	Visual	%	Performing	%	Musicians	%	Writers	%
New York City/Bergen	-212	-1	10389	43	661	6	3317	20
Los Angeles	243	1	9850	32	619	6	3215	25
Boston	-529	-11	552	18	751	29	1174	28
San Francisco/Oakland	1164	12	974	18	-64	-2	1600	26
Washington, DC	-1860	-30	495	9.2	227	7.5	1065	16
Miami	-363	-15	203	11	69	4	-271	-31
Albuquerque	532	37	16	4	-103	-30	0	0
Austin	-30	-2	-163	-21	319	29	333	24
Denver	-772	-35	-384	-24	-254	-23	-312	-25
Cleveland/Akron	-99	-3	-353	-28	93	5	-210	-12
Kansas City	263	10	-260	-36	-134	-16	-257	-30
Detroit	-807	-18	-651	-36	-65	-3	-245	-14
New Orleans	34	3	-228	-43	180	20	-208	-57
Santa Fe	404	49	-78	-88	-85	-82	176	47

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 10. Without Independent Artists/Performing Arts Selected Metros, 2000

Metro Employment Deviation from National Industry Average (#)	All artists	w/o Indep	Differential/ Total Employment	w/o Indep
Los Angeles	13927	11897	0.18	0.16
New York City/Bergen	14155	10272	0.19	0.14
San Francisco/Oakland	3675	2715	0.15	0.11
Boston	1948	1439	0.13	0.10
Albuquerque	444	273	0.17	0.10
Cleveland/Akron	-570	242	-0.08	0.03
Miami	-363	146	-0.05	0.02
Santa Fe	417	141	0.30	0.10
Kansas City	-388	109	-0.08	0.02
Portland, OR	-165	48	-0.03	0.01
Austin	460	-39	0.09	-0.01
New Orleans	-222	-155	-0.07	-0.05
Minneapolis/St. Paul	-283	-191	-0.02	-0.02
Houston	-872	-225	-0.09	-0.02
Atlanta	40	-247	0.00	-0.02
San Jose	-446	-433	-0.10	-0.09
Seattle	-66	-519	-0.01	-0.05
Washington, DC	-73	-593	0.00	-0.03
Philadelphia	-690	-607	-0.05	-0.04
Chicago	-1475	-701	-0.06	-0.03
Detroit	-1768	-743	-0.18	-0.07
Denver	-1723	-1388	-0.28	-0.23

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 11. Artists by selected industry, metro: Shares self-employed

		Wage, Salary	Self-Employed	% Self Employed
Kansas City, MO-KS	TOTAL	3823	1338	26
Independent artists, performing arts, spectator sports		425	530	55
Other professional, scientific, technical services		298	168	36
Radio and television broadcasting and cable		369	45	11
Printing and related support activities		372	44	11
Publishing, except newspapers and software		309	22	7
Elementary and secondary schools		18	22	55
Religious organizations		516	0	0
Los Angeles-Long Beach, CA	TOTAL	46031	30059	40
Independent artists, performing arts, spectator sports		8587	16132	65
Motion pictures and video industries		16265	5945	27
Other professional, scientific and technical services		1335	1790	57
Advertising and related services		1235	623	34
Specialized design services		626	1008	62
Publishing, except newspapers and software		761	642	46
Sound recording industries		745	482	39
Seattle-Everett, WA	TOTAL	6240	4601	42
Independent artists, performing arts, spectator sports		1021	2990	75
Other professional, scientific and technical services		335	331	50
Specialized design services		76	208	73
Motion pictures and video industries		250	122	33
Publishing, except newspapers and software		151	110	42
Sound recording industries		64	96	60
Management, scientific, technical consulting services		35	69	66

Source: Authors' computations from 2000 Census of Population data from Ruggles et al.(2004), Integrated Public Use Microdata Series: Version 3.0 Minneapolis: Minnesota Population Center, University of Minnesota.

Table 12. Occupational Self-employment, Localization and Regional Migration, 1995-2000

Occupational group (SOC Major)	% moving across: States	Divisions	% Self-Employment	Localization Coefficient
Life, Physical, and Social Science	17.8	13.5	8.7	17.3
Computer and Mathematical	16.3	11.8	5.0	16.2
Arts, Design, Entertainment, Sports, Media	15.4	11.5	24.9	13.2
Architecture and Engineering	13.6	10.0	5.9	12.6
Community and Social Services	12.0	8.5	2.0	6.9
Business and Financial Operations	11.8	8.5	11.4	5.7
Management	11.5	8.4	17.9	4.9
Healthcare Practitioners and Technical	11.2	8.3	9.2	6.7
Legal	10.9	7.7	26.4	11.9
Food Preparation and Serving	10.7	7.9	2.4	5.6
Education, Training, and Library	10.2	7.5	2.4	4.4
Sales and Related	10.1	7.2	13.3	2.9
Personal Care and Service	9.4	6.9	29.8	5.5
Installation, Maintenance, and Repair	9.3	6.9	9.6	6.0
Office and Administrative Support	8.8	6.4	2.7	2.1
Protective Service	8.6	6.5	0.8	10.1
Healthcare Support	7.9	5.7	4.8	11.5
Transportation and Material Moving	7.9	5.8	6.1	6.1
Construction and Extraction	7.8	5.7	19.8	7.7
Building and Grounds Cleaning, Maintenance	6.8	5.0	14.5	6.7
Production	6.6	4.8	4.1	13.0
Farming, Fishing, and Forestry	6.5	4.4	7.4	24.6
Total, all occupations	**9.9**	**7.3**	**9.4**	**6.6**

Source: Authors' calculations. Data from Census 2000 5% PUMS dataset, Integrated Public Use Microdata Sample, Minnesota Population Center, University of Minnesota. Data include the self-employed. Percentages are total in labor force, domestic migration on Census Divisions (9): New England, Mid-Atlantic, E North Central, W North Central, South Atlantic, E South Central, W South Central, Mountain, Pacific

References

Barbour, Elisa and Ann Markusen. 2007. “Regional Occupational and Industrial Structure: Does the One Imply the Other?” *International Regional Science Review,* Vol. 30, No. 1: 1-19.

Beyers, William, and GMA Research Corporation. 1999. *An Economic Impact Study of Arts and Cultural Organizations in King County: 1997.* Bellevue, WA: GMA Research Corporation.

Beyers, William, Anne Bonds, Andrew Wenzl and Paul Sommers. 2004. “The Economic Impact of Seattle’s Music Industry.” Seattle: City of Seattle, Office of Economic Development.

Beyers, William. 2007. “Occupational Structure in Industries in the United States: Defining Clusters and the Regional Distribution of Selected Clusters.” Working Paper, Department of Geography, University of Washington, Seattle, December.

DeNatale, Doug and Greg Wassall. 2007. *The Creative Economy: A New Definition.* Boston: New England Foundation for the Arts.

Feser, Edward. 2003. “What Regions Do rather than Make: A Proposed Set of Knowledge-Based Occupation Clusters.” *Urban Studies,* Vol. 40, No. 10: 1937-58.

Florida, Richard. 2002. *The Rise of the Creative Class.* New York: Basic Books.

Frobel, Folker, Jurgen Heinrichs and Otto Kreye. 1979. *The New International Division of Labor.* Cambridge: Cambridge University Press.

Gereffi, Gary and Miguel Korzeniewicz, eds. 1994*. Commodity Chains and Global Capitalism.* Westport, CN: Greenwood Press.

Harrington, James W. 1999. “Categories as Constraints: Geographic Research on Services.” Working Paper, Department of Geography, University of Washington.

Heilbrun, James. 1987. “Growth and Geographic Distribution of the Arts in the U.S.” In Douglas Shaw, William Hendon and C. Richard Waits, eds., *Artists and Cultural Consumers.* Akron, Ohio: Association for Cultural Economics: 24-35.

Hesmondhalgh, David. 2002. *The Cultural Industries.* London: Sage.

Koo, Jun. 2005. “How to Analyze the Regional Economy With Occupation Data. *Economic Development Quarterly*.” Vol.19, No. 4: 356-372.

Markusen, Ann and Greg Schrock. 2006. “The Artistic Dividend: Urban Artistic Specialization and Economic Development Implications.” *Urban Studies,* Volume 43, No. 10: 1661-1686.

Markusen, Ann and Greg Schrock. 2008a. *Leveraging Investments in Creativity* (LINC) *Artist Data User Guide.* Minneapolis, MN: Project on Regional and Industrial Economics, April.

Markusen, Ann and Greg Schrock. 2008b. *The Distinctive City.* MS under revise and resubmit, Cornell University Press.

Markusen, Ann, Greg Wassall, Doug DeNatale and Randy Cohen. 2008. "Defining the Creative Economy: Industry and Occupational Approaches." *Economic Development Quarterly,* Vol. 22, No. 1: 24-45.

Markusen, Ann, Peter Hall, and Amy Glasmeier. 1986. *High Tech America: The What, How, Where and Why of the Sunrise Industries.* Boston and London: Allen & Unwin.

Markusen, Ann. 1985. *Profit Cycles, Oligopoly and Regional Development.* Cambridge, MA: MIT Press.

Massey, Doreen. 1984. *Spatial Divisions of Labor: Social Structures and the Geography of Production.* New York: Methuen.

Power, Dominic. 2002. "'Cultural industries' in Sweden: An assessment of their place in the Swedish economy." *Economic Geography,* Vol. 78, No. 2: 103-127.

Pratt, Andy. 1997. "The Cultural Industries Production System: A case Study of Employment Change in Britain, 1984-91." *Environmental and Planning A,* Vol 29: 1953-1974.

Pratt, Andy. 2004. "Mapping the cultural industries: regionalization; the example of South East England." In Dominic Power and Allen Scott (Eds) *Cultural Industries and the Production of Culture.* New York: Routledge: 19-36.

Renski, H, J. Koo and E. Feser. 2007. "Differences in Labor versus Value Chain Industry Clusters: An Empirical Investigation," *Growth and Change*, Vol. 38, No. 3, 364-395

Renski, Henry, Jun Koo and Feser, Edward. 2007. "Differences in Labor versus Value Chain Industry Clusters: An Empirical Investigation," *Growth and Change*, Vol. 38, No. 3, 364-395.

Saxenian, Annalee, 1994. *Regional Advantage: Culture and Competition in Silicon Valley and Route 128,* Cambridge: Harvard University Press, 1994.

Scott, Allen. 2005. *On Hollywood: The Place, The Industry.* Princeton: Princeton University Press.

Thompson, Wilbur and Philip Thompson. 1985. "From Industries to Occupations: Rethinking Local Economic Development." *Economic Development Commentary,* Volume 9: 12-18.

Thompson, Wilbur and Philip Thompson. 1987. "National Industries and Local Occupational Strengths: The Cross-hairs of Targeting." *Urban Studies*, Vol. 24: 547-560.

Wassall, Gregory and Neil Alper. 1985. “Occupational Characteristics of Artists: A Statistical Analysis.” *Journal of Cultural Economics*, Vol. 9, No. 1: 13-34.

---

[i] “Selected engineers” include chemical engineers, civil engineers, electrical and electronics engineers, and mechanical engineers. This group comprises the vast majority of engineers. Due to data limitations, aeronautical and astronautical engineers, industrial engineers, metallurgists, mining, and petroleum engineers are excluded. “Computer/information technology professionals” include computer engineers, systems analysts, database administrators, computer support specialists, computer programmers, computer programmer aides, programmers, (numerical, tool, and process control) and all other computer scientists. “Natural scientists” include agricultural and food scientists, biological scientists, conservation scientists and foresters, medical scientists, all other life scientists, geologists, geophysicists, and oceanographers, physicists and astronomers, chemists, atmospheric scientists, and all other physical scientists.

[ii] Related cultural workers not included account for another 1.2%, or 1.5 million, employed and self-employed workers in the US. Among designers, the largest subgroups are industrial and graphic designers.

[iii] Unlike employer-based industry and occupational data used for most state and federal employment analysis, these data are based on individuals’ responses to the special long form of the US Census. Responses are allocated mechanically and by trained government employees to SOC occupational and NAICS industry categories.

[iv] Although the BLS estimates self-employment at higher levels of spatial aggregation from the Current Population Survey, the CPS is too small to permit metro-specific adjustments.

[v]Our cut-off was chosen on the basis of a careful look at the activities of those industries below and above the line. The three 3-digit industries that employ 5000 to 6000 artists, for instance, are miscellaneous retail stores; sporting goods, camera, hobby and toy stores; and other information services. These industries seem unlikely to be on artists’ radar screen as significant employers.