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Location and the Rank-size distribution of Arts and Entertainment

A study of US Metropolitan Regions

Master thesis within Economics

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Master's Thesis in Economics

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Abstract

This thesis describes and analyzes the location and size distribution of art and entertainment establishments and metropolitan regions in the United States. The included sectors are sound recording, motion picture and video, book and newspaper publishing as well as the live performing arts. Their size is analyzed by total employment and brought in context to their respective markets and the rank-size rule. The results are interpreted within the economic traits specific to the art and entertainment industry.

The results show that most analyzed sectors are over proportionally concentrated in one location, making it the center for these activities. In addition, the size distribution in all sectors except sound recording follows Zipfs law to a great extend. Explanations for this can be found in lock-in mechanisms over time and classic agglomeration advantages.

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1 Introduction

The art and entertainment industry is comprised of a large variety of firms and subsectors, offering a range of products and services to their customers. Some areas operate under the same conditions as more traditional sectors such as manufacturing, while others are fundamentally different. Specific economic traits, which are unique to products in the art and entertainment sector, ask the question to which extends the industry is open to agglomeration economies. This is particularly the case for the part of the industry that is dependent on subsidies and public support.

Some industry clusters in the United States are well known, Hollywood has become a synonym for movie production while Nashville boasts a large music scene with a variety of genres. What are the reasons behind these agglomerations and do they follow the general pattern observed in the distribution of the general population and other sectors? This is especially interesting for industries providing experience goods and sectors that depend heavily on public support through subsidies, such as the performing arts.

This study empirically finds that the distribution of establishments in the art and entertainment industry in general follows the rank-size rule. With few exceptions, the location of the industry agglomerations is identical with the largest metropolitan regions. In the case of the performing arts, a clear distinction in the location choices for profit and non-profit establishments exists.

1.1 Purpose of the study

This thesis will analyze the location and size distribution of entertainment and arts establishments in US metropolitan areas, giving possible explanations for their locations and what determines their size. It uses employment data obtained from the Census Bureau, both for profit-driven and non-profit establishments, pointing out cross-sector similarities and differences. The results are related to the overall size distribution of US metropolitan regions as well as Zipfs Law. The sectors included in this study are performing arts, movie production, publishing as well as sound recording. Selection of the subindustries was mainly based on the availability of current data on a regional level.

The rank-size distribution and Zipfs Law has attracted a large amount of research, however most studies focus on applying it as a way to describe agglomeration in general, with little focus on the arts and entertainment industry.

1.2 Outline of the thesis

Section 2 provides a brief literature review as well as background on the increased importance and recent growth of the art and entertainment industry. In section 3, different forms and sources of agglomeration economies are analyzed, with a specific focus on the art and entertainment sector. Section 4 introduces the rank-size distribution and contains the empirical part of the thesis with an analysis of US metropolitan regions and selected art and entertainment industries. Section 5 concludes the study.

2 Background

This thesis covers two main subjects, the location of economic activity in space together with the size distribution in general, as well as the art and entertainment industry specifically. Some of the economic attributes of the art and entertainment industry are unique and need to be interpreted accordingly.

The field of economics within art and entertainment is relatively new, with most of the studies conducted in the second half of the last century. First introduced by Baumol and Bowen (1966), the majority of the research has focused on the performing arts such as opera and theatre, as well as substitutes, for instance motion pictures. Overall economic analysis on art and entertainment has been carried out by several scholars such as Andersson and Andersson (2006), Pommerehne and Frey (1989) and Throsby and Withers (1979).

Empirical studies on the size distribution of city sizes have a long history, with most of the work concentrated on testing the rank-size rule as introduced by Zipf (1949). Other research has focused on defining accurate boundaries for cities and urban agglomerations. The rank-size distribution of US metropolitan regions has been analyzed for various periods in time, for instance by Krugman (1996), Dobkins and Ioannides (1998) and Gaibix(1999).

2.1 Separating art from entertainment

The art and entertainment industry consists of various sub-industries, providing cultural, entertainment and recreational interests by distributing, promoting and creating products, such as events or exhibits intended for public viewing as well as radio, television, films and theater. According to the 2007 NAICS classifications, art and entertainment establishments provide the artistic, creative and technical skills necessary for the creation of artistic products and performances. In addition, they operate facilities or provide services that enable patrons to participate in sports or recreational activities and pursue leisure-time interests.

This wide definition shows that art and entertainment often overlap and a clear distinction is difficult. Commonly, the two are used as synonyms, many entertainers for instance are referred to as artists and vice versa. Depending on the type of analysis, various attempts have been made to separate to two. A direct approach for example defines art as activities that require involvement and participation while the opposite is true for entertainment. As Scott (2005) puts it: “we do not go to entertainment, it comes to us”.

For most purposes and analysis, specific establishments and enterprises from both groups that share the same economic traits have been selected. Most live performing arts for example have a common production setting. The audience needs to be present at the venue in which the performance takes place, and the production itself is in principal identical for each performance (Heilbrun & Gray, 2001). In this sense, opera, ballet or symphony productions are similar in their economics while each provides a unique experience for the consumer. A classic orchestra on the other hand might have more

common ground with a record company distributing the same material from an artistic point of view, although their economic situation is fundamentally different.

However, what both art and entertainment have in common is that they provide and create experience goods and services. A good is an experience good if customers must consume it in order to be able to value it (Varian & Shapiro, 1999). This creates difficulties when making consumption choices, since important characteristics such as quality cannot be assessed beforehand. Experience goods are often intangible, they cannot be sampled or tasted before purchase. A book or feature film for instance cannot be judged before consumption and sampling, for example reading a selected page or watching a single scene does not allow for a rational decision. It is impossible to return inferior products after consuming them. In some cases, for instance an unsatisfactory movie experience, the purchase price is often refunded, which however does not compensate for the opportunity cost incurred.

2.2 Recent growth

Over the last decades, many countries completed the transition from developing to industrialized economies, increasing the demand for recreation and entertainment activities. Wolf (1999) names the US entertainment industry as the largest target of household spending, with 5.4%, and ahead of health care with 5.2%. Vogel (2007) estimates that the total annual spending on entertainment in America for the year 1999 exceeded 280 billion dollars, while worldwide spending was close to one trillion dollars. In 1997, consumers in the United States spend close to 10 billion dollars on admission to the live performing art (Heilbrun & Gray, 2001).

Vogel (2007) sees the entertainment industry as the major driving force in the post-industrial information and service economy. Andersson and Andersson (2006) point out that the total recreational and cultural expenditures in the United States in 1929 were only 7% of the level from 2000. This growth of the art and entertainment industry can be attributed to several factors.

First, the expansion in the industry is directly related to overall economic growth. Different studies estimate the average annual per capita GDP growth rates during the last century to be between two and three per cent for most industrialized market economies, meaning the per capita income roughly doubled every three decades. This increase in income has several effects on the consumption of art and entertainment.

The responsiveness of the demand for a certain good resulting from a change in income is measured by the goods elasticity. Several estimates of the income elasticity for art and entertainment products have shown them to be luxury, or superior goods with an elasticity larger than one. Examples include books and magazines ($\dot{\varepsilon} = 1.61$) (Andersson & Andersson, 2006) and theatre ($\dot{\varepsilon} = 1.47$) (Lévy-Garboua & Montmarquette, 1996). This means that an increase in income will lead to an over proportional increase in the demand for art, emphasizing the importance of these industries for modern-day economies. However, increased disposable income does not benefit all types of art and entertainment alike. Since the time available to each consumer is fixed, an increase in income also increases the value of every hour for the consumer. Activi-

ties that require a large amount of time, for example attending a live performance, become less attractive compared to less time intensive actions.

The increased recreation consumption is not only attributed to an increase in income, the share of disposable income devoted to leisure activities (such as the consumption of art and entertainment) has increased as well. According to empirical data analyzed by Andersson and Andersson, recreational expenditures have increase for a large number of developed economies and can be expected "to exceed 15 per cent of consumer expenditure by the year 2030" (Andersson & Andersson, 2006, p. 42).

As mentioned, the daily amount of hours available to each consumer is fixed. However, the amount of time devoted to work has significantly decreased, impacting the consumption of art and entertainment. In most of the developed economies, the number of annual working hours "has decreased to less than 1700 hours and in the long run the share of the averages person's life that is devoted to work will probably decrease to less than nine per cent" (Andersson & Andersson, 2006, p. xii). Research on time use shows that there has been an increase in overall leisure time in the U.S. in recent decades (Aguiar & Hurst, 2008), the historical development of hours of work per week for selected countries is shown in figure 1. Together with an increased vacation time, individuals today have a far larger opportunity to consume art and entertainment.

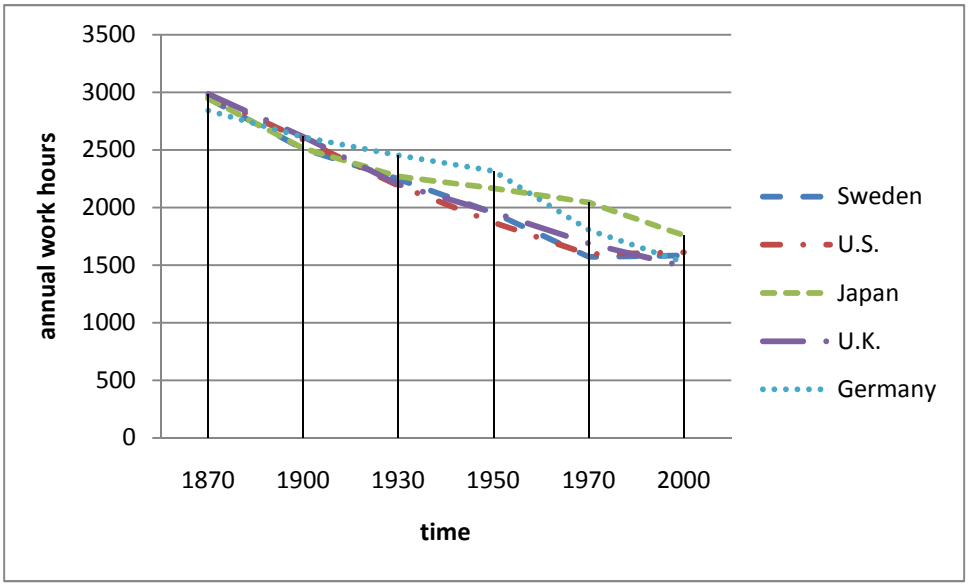

Figure 1: Historical development of annual work hours. Source: Based on data from Maddison (2006)

A direct consequence of increased per capita income is an increase in the life expectancy. Some forms of recreational activities require a minimum level of health in order to be accessible, such as events that require travel between the home and the venue. In cases where this is impossible, an increase in disposable income or leisure time will have no effect on the consumption of art and entertainment.
Analysis of demographic records has shown that life expectancy has significantly increased over the past generations. As a result, the average age of the population in developed countries has increased to over 40 years, which influences the demand for

recreation. The increase in an individual's lifespan together with a steady decline in time devoted to work leaves a large share of time available for recreational consumption, a main part of which is art and entertainment.

Many of the art and entertainment products require a certain level of knowledge or education. This can be general or specific knowledge, both of which can be seen as rational addiction or learning by consuming, where an increase in past consumption leads to an increase in current consumption. The consumer appreciates the production more if he had previous exposure to similar products. Both, learning by consuming and rational addiction, link future consumption to past consumption, they have different approaches when it comes to taste formation.

The high arts, including opera and classical music, are likely to be to a great deal consumed by individuals with a high level of formal education and to be consumed with decreasing frequency as the number of years of formal education decrease (DiMaggio, 1978). The level of education has been growing at high rates in most developed countries during the past century and continues to do so, resulting in an increased demand for art and entertainment.

The art and entertainment industry has also benefited from recent advances in technology, creating new products and opening new markets. For example, the way movies or music are distributed and consumed has changed significantly. In the early stages, movies could only be seen in theatres, while the only way to experience music was as part of a live audience. Technological change and major inventions have altered this, films became available at home via television broadcasting and home video systems while music experienced a similar development with audio recording and radio stations. In recent years, it has become possible to consume film and music at home in a quality similar to that provided at movie theatres or concerts. Feature films, previously limited to movie theatres, can now be distributed through a variety of platforms directly to the consumer at virtually no transaction cost, for instance through video-on-demand and streaming services. Other examples for this development include publishing with the increased importance of formats such as electronic books and online distribution.

The percentage of disposable income spend on movie tickets decreased by close to 80% after the introduction of television broadcasting in the late 1940's. Although new technologies have had dramatic effects on some sectors, studies suggest that these new ways of consuming have added additional demand instead of simply replacing the tradition methods of consumption, shown for instance for DVD sales and movie attendance (Barlow, 2005) or newspapers (Boczkowski, 2004).

2.3 Economics of art and entertainment

The art and entertainment industry has several attributes that distinguishes it from other sectors in the economy. These attributes have been described as "the bedrock properties" by Caves (2000).

These sectors are characterized by a multiplicative production function, in which every single input is vital and cannot be substituted. If only one of many inputs fails or does

not perform above a certain level, the entire output becomes commercially useless. A typical example is a concert performance that depends on input from every musician in order not to reduce quality.

The entertainment industry depends heavily on demand driven by popular consumption. However, the final demand is uncertain before the final product is brought in front of the consumer. Successful products seldom follow predictable patterns, rendering research and pre-testing largely ineffective. Caves (2000) calls this the “nobody knows” property. This suggests that the production of entertainment faces a high risk compared to other sectors. The danger of failure is increased by the fact that costs are usually sunk and cannot be retrieved after the production is complete. As a result, the entertainment industry is mainly driven by few big successes, absorbing the costs of many failed productions. According to Bettig (1996) an average of 10 out of the over 350 films released annually into theatres in the US are considered box office hits, while less than 30% manage to recoup their budget.

Many products require a large number and variety of skills. A cinema film involves, amongst others, actors, producers, musicians and technicians, all with a wide variety of specialized skills. A sufficiently large pool of talent in close geographic proximity is therefore required, however not within the same firm. As mentioned before, the required skills differ from each production, making it too expensive to integrate. Spatial proximity reduces recruiting costs, time and offers flexibility both for employers and employees.
As noted by Cave, creative products also differ in the quality level, as perceived by the consumer, as well as in the quality provided by the inputs. Out of the large number of actors for instance, only a selected few belong to the A-List category and are credited with the highest level of skill and quality provided.

3 Agglomeration economies and size measurements

As a general observation, economic activity tends to be clustered together in space (McCann, 2001). This can be in the form of industrial areas, cities or even on regional level. Examples for the entertainment industry include movie production in Los Angeles or the recording industry in Nashville.

Many variables and factors influence how economic activity is distributed across space. Certain industries and sectors are distributed fairly even while others agglomerate in areas where they benefit from network externalities and economies of scale.

Some theories, such as the neoclassical growth model, predict convergence, economic activity will eventually even out across space. Low income regions benefit from their higher marginal product of capital and higher growth rates and will eventually catch up with the higher income regions. This has been analyzed for regions in the United States for instance by Barro and Sala-i-Martin (1991) and Higgins et.al. (2006).

Others predict the distribution of economic to become gradually more geographically concentrated. Agglomeration advantages include information spillovers and a large qualified labor market. At the same time, disadvantages from agglomeration occur, such as higher factor prices, congestion cost and increased price competition. If agglomeration advantages outweigh the negative effects, economic activity will become increasingly concentrated. A series of papers by Ellison and Glaeser (1999), (1997) has analyzed the geographic concentration of industries in the United States, linking agglomerations to industry specific spillovers and natural regional cost advantages.

Agglomerations of firms and industries differ between sectors. Especially the difference between service and non-service sectors has attracted a considerable amount of research. In the United States, service industries have become increasingly concentrated, especially in cities, while non-service industries such as manufacturing have spread out (Glaeser & Kahn, 2001). Explanations for this include the diminished transportation cost, allowing sectors to agglomerate that previously had to spread out for accessibility. Others argue that technological change has allowed for manufacturing to relocate their production to less dense (and less expensive) areas (Carlino, 1985). Increasingly high land rents inside cities in general also contribute to the replacement of land intensive industries with industries from the service sector.

3.1 Sources of agglomeration economies

One explanation for these agglomerations is the existence of economies of scale within the clusters. Each firm achieves economies of scale through the existence of a large number of other firms within the same area. These location specific economies of scale are referred to as agglomeration economies and have first been described by Marshall (1920). He describes three sources for these economies of scale, information spillovers, the location of specialized inputs as well as the emergence of specialized labor markets.

When many firms of the same industry are located within close spatial proximity of each other, interaction between their employees often exists. This can be through formal contact in business meetings or in an informal way through common social interests and

events. In both cases, information is shared between the employees across firm level. This allows the individual firms to accumulate more information and get a better idea of the overall market environment. Firms located outside the cluster are cut off from this flow of information. Personal interaction is especially vital when the relationships between the individual establishments are only short-term, such as in the mostly project based film industry, where contracts are re-negotiated for every individual venture.

Many industries rely on specialist inputs which are often expensive to provide. In the case of firms clustering together in one area, these costs can be split up between the participation firms, resulting in lower prices for the individual business. The music and recording industry for example requires not only musicians, but sound technicians, legal advisors and talent managers.

The existence of many firms of the same industry within the same area creates a demand for labor with specific skills. People with these skills locate within the agglomerations. This enables firms to reduce their costs when it comes to recruiting employees, allowing them to quickly react to a change in market conditions. The costs of training new employees are also lower than in areas without a skilled local labor market. The movie and television industry for instance requires a large variety of trained actors of changing variety. Recruiting a cast for a new TV series will be much easier in the Los Angeles region compared to areas without an industry agglomeration.

3.2 Types of agglomeration economies

The mentioned sources of agglomeration economies describe the benefits that firms within the same industry achieve when clustering together. These benefits however, are not limited to industries but can occur across different sectors. In this case, agglomeration economies can be classified into internal returns to scale, localization economies and urbanization economies (Ohlin, 1933).

Internal economies of scale are achieved when a firm increases its output relative to its increase in size. In this case, the economies of scale are referring to a single point in space, although limited to a single establishment. Location specific internal returns to scale therefore occur when a firm concentrates its resources in one location instead of spreading them out over large geographies. According to the classification by Ohlin (1933) and Hoover (1948), these achievements are firm specific.

Economies of localization are referring to the advantages achieved when firms of the same industry cluster together in space. All three sources of agglomeration economies mentioned by Marshall (1920) contribute to this, the effects however are internal to a specific industry.

Urbanization economies of agglomeration occur across industries. Similar to the non-traded inputs mentioned by Marshall, urbanization economies describe the effects that clustering of industries has on the economy as a whole. For instance, firms require not only industry specific inputs but also services such as in accounting, administration or maintenance. Urbanization economies are internal within a city or region and external to industries.

3.3 Agglomeration in the creative industries

One solution to the mentioned problems that stem from the unique properties of the creative industry is clustering.

Based on Anderson and Andersson (2006), establishments in the art and entertainment industry are expected to have a higher degree of spatial concentration than other industries. This is due to "the high knowledge content and localized consumption of many art and entertainment products" (Andersson & Andersson, 2006, p. 14). Localized consumption is especially vital for the performing arts, which depend on a large market within close proximity. In other words, performing arts establishments will concentrate around large urban agglomerations to maximize their potential audience. Some parts of the creative industry depend on urban agglomerations to support the large number of part time employees. Many artists, actors and musicians rely on regular employment in other sectors, these jobs are mainly available and easier to find in larger cities.

Not all creative industries require a large local audience. Some, such as the sound recording industry, produce locally and distribute globally. Nevertheless, one can observe clustering in these sectors (Scott, 1999).

Besides the demand-side explanations for clustering, most creative industries, as mentioned before, rely on specialized inputs and services. Since these resources are industry specific, they will maximize their accessibility by co-locating, which adds to the importance of large metropolitan areas. In addition, many creative industries are project based and require a large number of different inputs provided by external firms or individual. The film industry for instance consists of a core group of production companies that outsource large parts of the creative work to freelance directors, actors and writers. The advantage of contracting for these services instead of integrating them lies in the flexibility to undertake a variety of different projects and the ability to select the best talent for each individual project. Storper and Christopherson (1987) refer to this as "flexible specialization", resources and skills can be shifted according to the current needs and requirements.

Flexible specialization requires contracts and agreements between the participating parties. As Scott points out, "clustering is especially prone to occur in cases where relations between firms cannot be planned over extended periods of time so that useful inter-firm contacts need to be constantly programmed and reprogrammed" (Scott, 2005, p. 7). Few productions have the same composition of talent, requiring frequent negotiating which is easier to carry out when all participants are located within close spatial proximity of each other. In line with Marshall's sources of agglomeration economies, geographical concentration lowers the transaction cost. The process of finding the right composition of inputs for each project is costly and requires a large network of contacts.

3.4 Market size and subsidies

The size of the industry is consequently decided by the size of its respective market. Market size is different for each industry and can vary greatly for the goods in question. For instance, the size of the market for a Hollywood movie is larger than the market for an opera production.

Market size is also dependant on transportation cost. Some art and entertainment products have virtually no transportation cost, such as digitalized music. It can be purchased at identical costs regardless of the buyer's location. Others, such as the performing arts rely heavily on the consumer's accessibility as their productions cannot be transported at all. In this case, the transport cost is the patrons (opportunity) cost of travelling to the venue. As Andersson and Andersson (2006, p. 97) point out, "scale economies in performance production contribute to this dependence on accessibility".

The special situation of the performing arts allows dividing its market into the local market, the market of the corresponding commuting region and the market for commuters including tourists. By locating in or close to cities, performing arts establishments maximize the size of all three markets, since large cities naturally have an extensive local market and can easily be reached for commuters and tourists alike. Some regions have a small home market but benefit from a high demand through easy accessibility for wealthy tourists or a high seasonal demand during festivals and similar events.

Scale economies and accessibility are the main reason for performing arts establishments to locate in major cities. There are several unique circumstances shaping the cost structure. Assuming that the variable costs per production are constant, this means that the average total cost is declining with an increase in output, in this case a higher number of performances. Studies for theatre in Australia (Throsby & Withers, 1979) have shown average cost to decline with a large audience. Since average fixed costs are total fixed costs divided by quantity (performances), they decline rapidly in the beginning. For example, when increasing the number of performances from one to two, the average fixed costs are cut in half, since total fixed cost are spread out over twice as many performances as before. This effect diminishes when reaching a large number of performances and each marginal performance has little effect on the average total cost. The average variable cost and marginal cost are constant in view of the fact that each performance is "a repetition of the same production process as the previous one" (Heilbrun & Gray, 2001, p. 114). In traditional economics, average variable cost curves are U-shaped, due to the mentioned spreading of the fixed cost and diminishing marginal productivity.

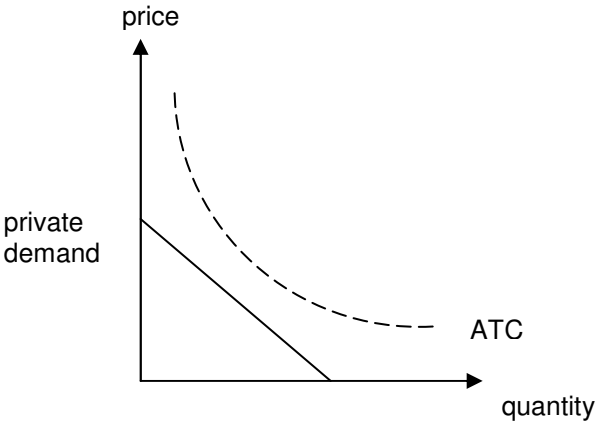

Figure 2: Average cost and demand

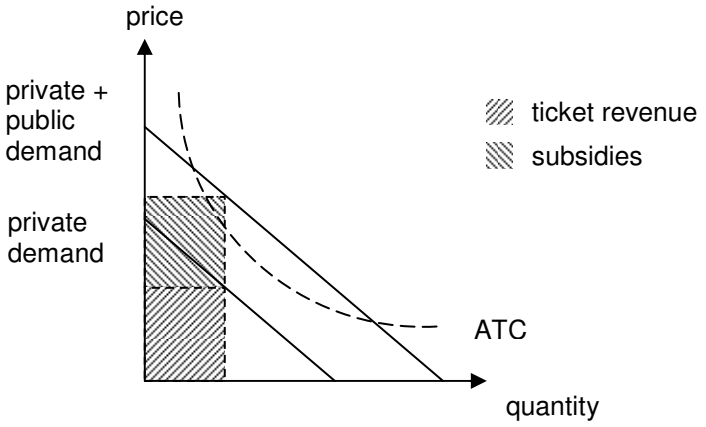

Figure 3: Effect of subsidies

The higher the fixed cost or the lower the variable revenue, the larger the market has to be in order to be able to support the establishments. If performing arts establishments were to locate outside large agglomerations, the market might not be enough to support even one, as shown in figure 2.

Most performing arts depend heavily on subsidies and private contributions. Opera for example is regarded as the most depending on government subsidies, although it's limited audience. Wanhill describes opera in the United Kingdom to receive "five times the amount of subsidies per attendance compared to other performing arts establishments while being attended by only 7% of the population". (Wanhill, 2008, p. 354).

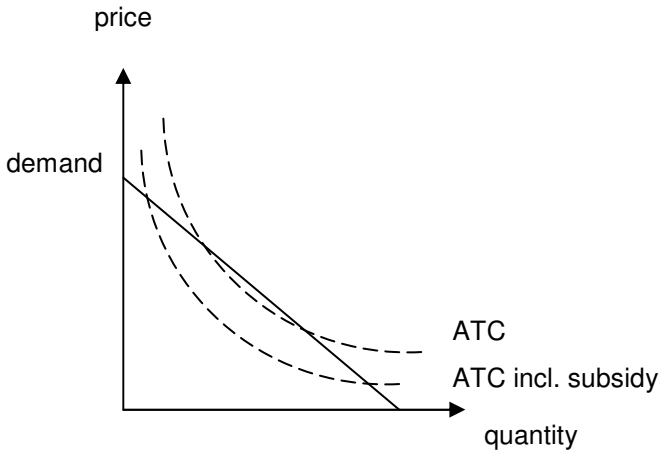

Figure 4: Effect of subsidies on ATC

Subsidies come in various forms and types. The most common case in the performing arts is directly subsidizing a given establishment, allowing it to charge prices well below what would otherwise be necessary. This causes a shift in demand, or in other words, the market size increases. This is depicted in figure 3. The demand curve shifts up, resulting in a new equilibrium. Subsidies and private offerings allow the establishment to lower prices by the amount of the subsidy and set them below the level of cost. It is also common that part of the subsidy is used to improve the quality of the production, resulting in higher costs. In this case, the influence of the subsidy on price is diminishes, since part of it is spend on the improvements in quality.

Another way of calculation subsidies from the supply side is as a function of the quantity produced which influences the ATC curve, as shown in figure 4. For each level of production, the subsidy would reduce the cost of production while leaving the demand unchanged. Unlike the demand influencing subsidy which leads to a reduction in prices, the quantity dependant subsidy will in fact influence the cost, covering any otherwise occurring deficits. This allows the establishment to increase the number of seats as well as the quality of the production.

3.5 Location of the creative industry

As mentioned, creative industries tend to cluster in space. The location of these agglomerations can be traced to the stated supply and demand explanations as well as to localized advantages. Performing arts venues for instance, such as opera houses or concert halls have a fixed location that "has lasted for many decades or even centuries" (Andersson & Andersson, 2006, p. 178). Other locations benefit from their climate or surroundings, several studies link the emergence of Hollywood as the major movie production cluster to its mild winters that allowed shooting year around, at a time when indoor scenes and artificial lighting were uncommon (Torrence, 1982). Some sectors in the creative industry are attracted to cities not only because of the larger demand for their work, but also because cities offer employment in other areas. This is especially important for industries with a high number of part time workers and independent artists. On the other hand, the elevated living costs in cities defy agglomeration for professions (for instance writers) that cannot take advantage of the large markets or creative advantages.

3.6 Industry size measurements

Measuring the size of an industry is an important aspect in the field of economic analysis. In most cases, the sum of the size of the individual establishments determines the extent of the industry as a whole. Usually, the parameters employed to determine a firm's size depend on the purpose of the study as well as the available data and industry specific factors. Each method has its advantages and limitations.

The size of an industry can be measured by the inputs used during production by the individual firms. The type of inputs differs from the firm and industry.

One of the most common input measures is the number of employees. It allows for a simple classification and is applicable across industries and countries. Usually, firms are divided into size classes according to their number of employees. The US Census, as well as the Bureau of Labor Statistics distinguishes between 7 different size classes, ranging from small firms with 0 to 4 employees to firms exceeding 500 employees. 6 out of the 7 size classes are for firms with less than 500 employees. One of the main advantages when measuring the labor input is the usually good availability of such data. Especially when analyzing smaller firms, employment information is easier to obtain compared to financial data.

However, since the number of employees is recorded as a discrete variable, it overestimates the size for firms with a lot of part time or seasonal employment. This can be avoided when measuring the number of attached workers (Burdett & Wright, 1989), which differ from regular employees in the way that they do not require full time employment. The arts and entertainment industry for instance has a higher percentage of part-time employment compared to other sectors. According to the US Bureau of Labor Statistics (2007), jobs in arts and entertainment are more likely to be part time than those in other industries. The average nonsupervisory employee worked 25.7 hours a week in 2004, as compared to an average of 33.7 hours for all other industries. Musical groups and artists were likely to work the fewest hours due to the large number of per-

formers competing for a limited number of engagements, which may require a great amount of travel.

Industry size is often measured by its total production, the amount produced over a certain period of time. In manufacturing or agriculture for instance, the output can be measured relatively easy. This could be a certain number of vehicles a month for a car producer or a quantity of meat produced on a farm.

In some cases firms produce identical goods, for example gasoline, so that output can either be directly compared between establishments or measured in standardized units that allow for comparison between firms and industries. In most cases however, the output produced differs in many aspects that make cross-industry assessments difficult. The mentioned production of cars per month cannot be compared to the number of trucks manufactured in the same amount of time.

Output measures are especially complicated in the art and entertainment industry, few direct measured exist to accurately quantify the production of creative goods. The main difficulty is what Caves (2000) calls horizontally differentiated products. Similar cultural products differ in quality, traits and styles, all of which are valued differently by the individual consumer. Two performances of the same composition by different orchestras may be seen as equal in quantity produced, the difference in quality however is what determines “the very essence of the arts” (Heilbrun & Gray, 2001, p. 108).

3.7 Output in the performing arts

Output for the performing arts has been defined in various ways, utilizing the quality supplied or quantity demanded. Ginsburgh and Throsby (2006) summarize four possible measurements. First, the total number of performances for each individual establishment. Second, the amount of individual performances. This differs from the number of total performances in the sense that performances of the same production are counted as one. Analyzing the number of total and individual productions is important when it comes to economies of scale. Long-run performances of the same work are usually less costly to produce compared to a high frequency of changing productions. The problem with these measures is that they do not reflect the actual demand. Performances in front of an empty audience do little good in terms of artistic experiences for the consumer, individual or overall.

These deficiencies are addressed when measuring the number of potential performance attendees or the number of actual attendees. The number of potential attendees (usually the venue capacity, e.g. number of available seats) gives a unit measure that allows accounting for the quantity supplied. However, since not all of the available seats are necessary occupied, the number of actual attendees gives a measure for the quantity demanded.

All this measures fail to address the issue of quality, which is widely regarded as one of the most important aspect of creative productions. According to Andersson and Andersson (2006), quality is regulated by inputs. It can be divided into objective and subjective quality, the first one being assessed by experts and professionals in the field, the

second one being the unique opinion of the individual consumer. A high level of objective quality often goes along with a corresponding objective quality impression.

Throsby (1990) suggest criteria to judge quality in the performing arts over a number of performances. The criteria include the nature of the source material, technical factors such as the type of performance as well as the benefits to the audience, society as a whole and the art form itself. Based on these criteria, Throsby develops a model for quality judgments in the performing arts.

3.8 Deagglomeration forces

Referring back to the benefits that firms achieve through co-locating, agglomeration may also have negative effects. Examples include congestion costs, higher factor prices or shortage of resources and other inputs. In the case of the movie industry for instance, the shortage of studio space and suitable locations in New York City helped Hollywood to become the new center of movie production in the early 20th century.

In the case of the art and entertainment industry, certain factors enable parts of the industry to choose their location away from the major agglomerations. Recent advances in technology for example allow musicians to record their music at their homes and even collaborate with other artists in different locations.

The choice of location for the individual artists also effects the location and size distribution of the industry as a whole. Hollywood for instance has benefited from the favorable living conditions (such as the climate) of southern California, prompting many important individuals of the movie industry to locate within close proximity. In certain sectors, a small number of people or even individuals locating away from the industries centers are enough to create a presence in otherwise remote locations. The typical example of the actor moving away from the stress of the Hollywood requires agents and producers to shift their businesses with this individual as well.

4 Size distribution of Arts and Entertainment industries

4.1 Rank size distribution

When it comes to cities or agglomerations, the rank-size rule refers to a regularity in the size distribution. Their size can be estimated based on their overall rank, for example the n^{th} ranked city is approximately 1/*n* the size of the largest city. Auerbach (1913) first formulated this rule for the size distribution of city sizes:

$$ln(\beta) = ln(A) - \alpha * ln\,(x) \tag{1}$$

where β is the overall rank of the city, *A* the population of the largest city and *x* the population of a given city. When graphing the city sizes over their rank on a logarithmic scale, the distribution emerges as a straight line. For the special case that the slope equals -1 ($\alpha = 1 \text{ in equation } 1$), this is known as Zipfs Law, after George Zipf (1949), who's analysis attracted considerable interest.

4.2 Size distribution of US Metropolitan Areas

Rosen and Resnick (1980) observed that Zipf's Law holds more accurately the more careful city boundaries are defined. For the United States there are several formal definitions of city boundaries that can be used. The most common ones are the official city limits, urbanized areas as defined by the census and Metropolitan Statistical Areas (MSA). Using the official political city boundaries has the advantage that they usually remain fixed over a long period of time while census defined measures such as urban areas and MSAs are changed frequently. Urbanized areas are defined as "core census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500

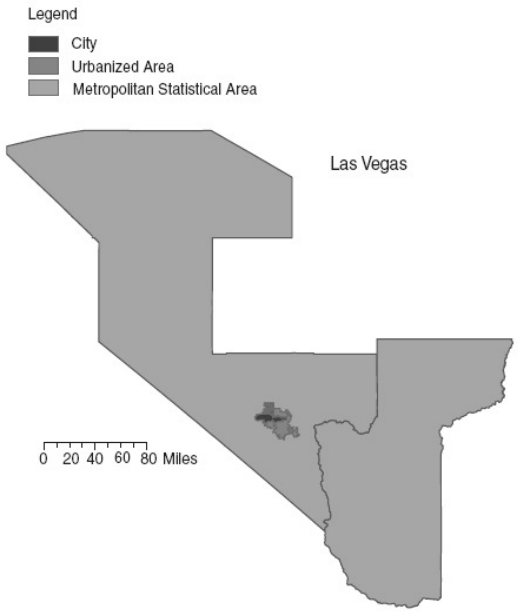

Figure 5: Different US regional boundaries

people per square mile". Using urbanized areas to define agglomerations is usually

more accurate compared to city boundaries which often depend on political and historical considerations.

However, most commonly used in economic research are Metropolitan Statistical Areas. Recent studies using MSA boundaries to define agglomerations by Gaibaix (1999) and Krugman (1996) have shown Zipfs Law to hold almost perfectly. US metropolitan statistical areas are defined by the U.S. Office of Management and Budget (OMB). The standards by which the MSAs are defined are updated every 10 years prior to each decennial census. The areas itself are refined annually based on census population estimates, most recently in 2008. A metropolitan statistical area centers around a core urban area with a population of at least 50.000 and includes the counties within the core area. In addition, it consists of adjacent counties with a high degree of social and economic integration, measured through commuting patterns. MSAs are named after their principal cities.

Although Metropolitan Statistical Areas are the most commonly used measure, this is not without potential problems. As Holmes and Sanghoon (2008) point out, since MSAs are made up of combined counties, they are highly dependent on county definitions which vary greatly in different regions. For example, the average county size in the western states is 34% larger than in the eastern states. Eeckhout (2004) shows that using MSAs in population analysis tends to truncate the number of available cities by excluding smaller agglomerations. Also, Metropolitan Statistical Areas cover large geographical areas. For instance, the New York-New Jersey metropolitan area includes urbanized areas that are over 150 miles apart. As a result, many rural areas are included into MSAs. Other criticism focuses on the constant changes in MSA definitions over time, which is not applicable to this analysis.

The most recent census population data is from 2000, in order to use more current information in line with the industry analysis, 3-year estimates (2006-2008) from the American Community Survey are used. The estimates are created from an annual sample of 3 million people and include the population age 15 and over. The total number of Metropolitan Statistical Areas in the 50 US States is 363, the smallest of which is Carson City, NV with a population close to 55.000. In 2008, 78% of the total population lived in Metropolitan Areas. Over the entire size of the distribution, the median Metropolitan Statistical Area has a population of 232.000.

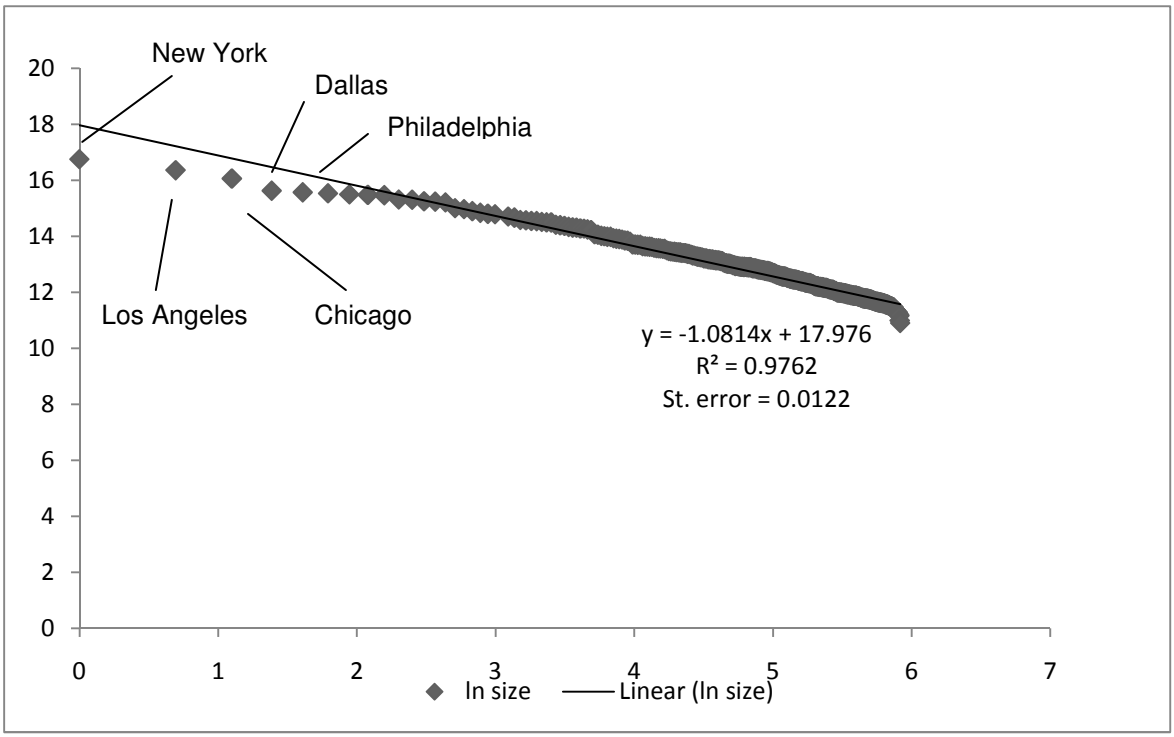

Figure 6: Size distribution of US Metropolitan Statistical Areas

The results follow the general pattern predicted by the rank-size rule. The overall Zipf exponent is 1.08, which is slightly off from Krugmans and Gaibaixs results. This can be attributed to the change in MSA definitions as well as to the circumstance that their analysis is limited to the 130 largest areas while this one includes all current metropolitan regions.

Rank	MSA	Population	N/n
1	New York-Northern New Jersey-Long Island, NY-NJ-PA	18,925,869	1.000
2	Los Angeles-Long Beach-Santa Ana, CA	12,818,132	1.476
3	Chicago-Naperville-Joliet, IL-IN-WI	9,502,094	1.992
4	Dallas-Fort Worth-Arlington, TX	6,150,828	3.077
5	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	5,822,368	3.251
6	Washington-Arlington-Alexandria, DC-VA-MD-WV	5,603,882	3.377
7	Boston-Cambridge-Quincy, MA-NH	5,403,075	3.503
8	Houston-Sugar Land-Baytown, TX	5,306,742	3.566
9	Atlanta-Sandy Springs-Marietta, GA	5,251,899	3.604
10	Miami-Fort Lauderdale-Pompano Beach, FL	4,494,144	4.211

Table 1: Ten largest MSAs

The 10 largest MSAs are shown in table 2. As one can see, the dominant areas are New York-Northern New Jersey and Los Angeles, being the only regions with a population well over 10 million. Taking New York-Northern New Jersey as a benchmark, the remaining regions in the top 10 are larger than what would be expected according to the rank-size distribution. Especially Los Angeles as a west coast counterpart to New York distorts the distribution. When looking at the overall distribution of all 363 MSAs, the plot shows that the biggest and smallest areas are too small to follow Zipfs Law perfectly.

The large number of smaller regions makes it difficult to visualize a rank-size relationship. Over 2/3rd of the Metropolitan Statistical Areas have a population smaller than 500.000, a clearer view emerges when the frequency distribution is analyzed. The metropolitan areas are arranged in a frequency table with equally spaced groups and ranked according to the number of observations in each group. The result is shown in Figure 6.

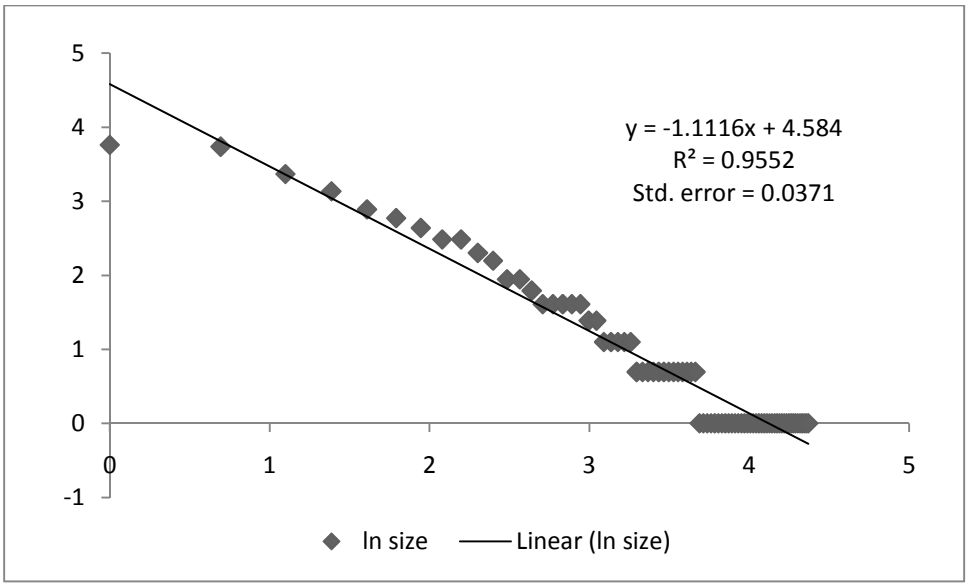

Figure 7: Frequency distribution of US Metropolitan Statistical Areas

The frequency increases with the rank of the group. Again, a certain group of MSAs distorts the distribution, in this case the largest regions with only one or two items in each classification.

4.3 Size distributions of arts and entertainment industries

In order to analyze the size distribution of sectors with the arts and entertainment industries, the number of total employees aggregated per MSA is used. The information is drawn from the 2007 Economic Census, missing or incomplete observations are replaced with data from the 2007 County Business Pattern, published by the Department of Labor Statistics. Samples for MSAs with available data from both sources show almost identical results.

Four sectors within the industry are selected based on data availability. The selected industries are newspaper and book publishing (NAICS 5111), motion picture production and video (NAICS 5121), sound recording (NAICS 5122), and performing arts (NAICS 7111). The data covers 71 to 263 US metropolitan areas and accounts for 78% to 95% of national industry employment. The missing data is mainly owed to the publishing guidelines which express small observations in size classes instead of numbers. Although the actual numbers are recorded in the national employment, MSA-level data is only available per size class. However, this is almost exclusively the case for the smallest size class with 0-19 employees, in these cases, in order not to distort the rank-size distribution, MSAs within this size class are exempt in the analysis.

NACIS	Industry	MSA coverage	Employee coverage
5111	Publishing	263	86,69%
5121	Motion picture	235	91,79%
5122	Music production	66	70,55%
7111	Performing arts	230	95,62%

Table 2: Data availability

4.4 Book and newspaper publishing

This industry group comprises of establishments primarily engaged in publishing newspapers, magazines, other periodicals and books. Unfortunately, usable data for a large number of metropolitan areas is only available up to the 4-digit NAICS level so aggregating somewhat different sub-sectors such as magazines and books is necessary. Published work is characterized by the intellectual creativity required in their development and are usually protected by copyright. Publishers distribute or arrange for the distribution of these works in one or more formats, such as print and/or electronic form. Establishments in this industry may print, reproduce, or offer direct access to the works themselves or may arrange with others to carry out such functions.

The data covers 263 metropolitan areas and close to 87% the national industry employment. For the analysis, the 115 largest MSAs are used, which account for 85% of the observations. The remaining 148 metropolitan areas are all in the two smallest size classes and are therefore excluded.

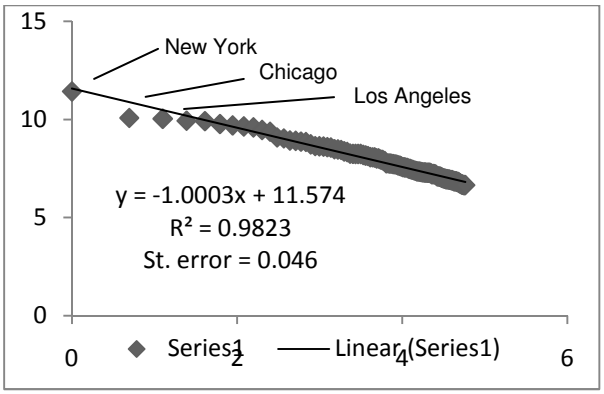

Figure 8: Size distribution of the publishing industry

As the plot shows, the publishing industry follows the predicted distribution. The Zipf exponent has a value of 1.0003 with a R^2 of 0.9823. The largest agglomeration is, as can be expected by the population distribution, in the metropolitan area of New York and New Jersey. Minneapolis-St. Paul is ranked 5th although it is only 16th when it comes to population. What stands out is the dominance of the New York area. It is almost four times the size of the second largest metropolitan area Chicago. When looking at the overall distribution, this results in the 2nd to 5th ranked metropolitan areas being too small, this effect diminishes through the ranks towards the smaller areas.

One explanation for the close correlation between the population distribution and the allocation of the publishing industry is the importance of local news and information. Few newspapers have a national audience, the majorities of the papers are targeted at a local audience and contain mostly regional information such as sport results, family announcements or local advertising.

4.5 Motion picture and video

The motion picture and video industry is composed of firms and establishments primarily engaged in the production and/or distribution of motion pictures, videos and television programs. Excluded in this analysis is NAICS 51213, motion picture and video exhibition, which is comprised of movie theatres and drive-in theatres.

235 metropolitan areas are included in this analysis, accounting for 92% of the total industry employment. Again, the smallest size classes are excluded.

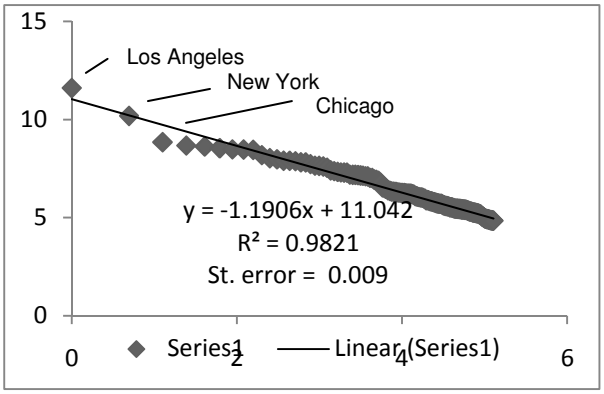

Figure 9: Size distribution movie production

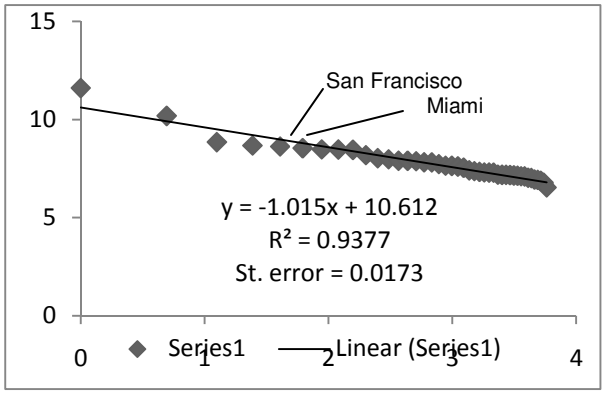

Figure 10: Size distribution 50 largest MSAs

Not surprisingly, the Los Angeles metropolitan area, which includes Hollywood, is by far the largest and four times the size of second ranked New York-New Jersey. Over one third of the total industry employment is concentrated in the Los Angeles area, together with New York-New Jersey they account for 45%. No other metropolitan area even comes close to this size, with Los Angeles being over 18 times the size of 3rd and 4th ranked Chicago and San Francisco. Explanations for this include historic developments or natural regional advantages such as the climate. Over time, Hollywood became the center of the US and worldwide movie industry, attracting the largest and most successful cinema producers.

The extreme industry concentration in one metropolitan area distorts the rank-size distribution. The overall Zipf exponent for the analyzed areas is 1.19 and therefore larger than expected. In addition to the main agglomeration in Los Angeles, the remainder of the industry is scattered over a large number of areas without significant size.

A better Zipf fit emerges when the analysis is limited to the 50 largest metropolitan areas. The excluded 185 areas together account for less than 10% of the total industry employees, and together are less than 1/3 the size of the Los Angeles region. The Zipf exponent for the 50 largest metropolitan areas is 1.015. The general pattern is similar to the one observed when analyzing all areas, the difference here is that the very small regions at the end of the distribution no longer disturb the overall distribution.

4.6 Performing arts

This industry group comprises establishments primarily engaged in producing live presentations, dancers, musical groups and artists and other performing artists. Excluded are establishments that have their main focus on promoting and organizing such performances as well as independent artists.

For the performing arts, the Economic Census differentiates between regular establishments and establishments that are exempt from the federal income tax. In order to be exempt from the federal income tax in the United States, the establishment must fulfill requirements set by the Internal Revenue Service, which in most cases for the perform-

ing arts equals private or public supported non-profit organizations. Examples are most opera companies, public theatre or orchestras.

MSA	Percentage Non-Profit Establishments	Percentage Non-Profit Employees
United States	44.57%	57.91%
New York-Northern New Jersey-Long Island, NY-NJ-PA	32.96%	50.28%
Los Angeles-Long Beach-Santa Ana, CA	12.90%	41.90%
Orlando-Kissimmee, FL	14.89%	4.58%
San Francisco-Oakland-Fremont, CA	62.95%	63.47%
Washington-Arlington-Alexandria, DC-VA-MD-WV	56.39%	56.26%
Las Vegas-Paradise, NV	5.79%	13.50%

Table 3: Percentage of non-profit establishments

In the United States, almost 58% of all industry employees are part of a non-profit establishment. However, this number varies significantly between different metropolitan areas. Table 4 lists selected regions and their share of non-profit establishments and employees as a percentage of the areas total. The MSAs are all part of the ten largest national areas by industry employment. As one can see, the percentage of non-profit employment for these regions is lower than the national average, with the exception of San-Francisco-Oakland-Fremont. Unfortunately, the Economic Census does not provide detailed employment data for the smallest regions.

The lowest percentage of non-profit establishments is in the Orlando-Kissimmee metropolitan area while the lowest percentage of non-profit employment is found in the Las Vegas-Paradise region. Both areas have a non-profit percentage in both categories that is below 15% and a fraction of the national averages. On the other hand, although they are in the top share of regions by total industry employment (Las Vegas is ranked 10th while Orlando is ranked 4th), they are ranked lower when it comes to population with Las Vegas being ranked 31st and Orlando 28th. One explanation for this is the role of the outside market for these two metropolitan areas. Las Vegas, which refers to itself as

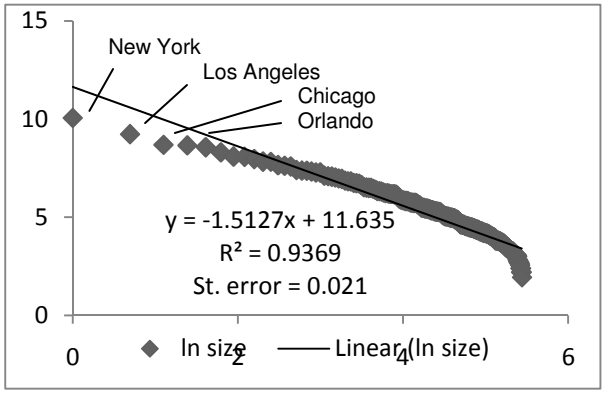

Figure 11: Size distribution for performing arts

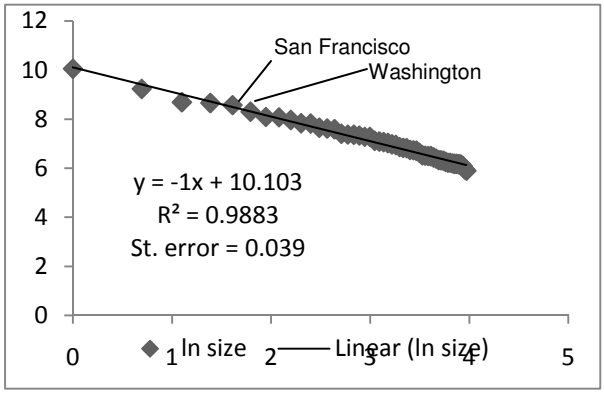

Figure 12: Performing arts 60 largest MSAs

“The Entertainment Capital of the World”, is a popular tourist destination with casinos and live performances being the major attractions. As expected, few of these establishments operate on a non-profit basis.
The same can be said about the Orlando-Kissimmee metropolitan region, which is well known for its theme parks such as Disney World or the Universal Studios Florida.

For the rank-size distribution, 231 metropolitan areas were analyzed, covering over 95% of total national employment. Regions with 19 employees or less had to be excluded due to a lack of observations. The results are shown in Figure 10.

As the plot shows, the smallest and largest regions are somewhat too small to fit Zipfs Law. Especially the large number of regions with very few employees distort the distribution. The overall Zipf exponent is 1.52 with an R^2 of 0.937. The three largest metropolitan areas are identical with the three largest areas by population, however only one (Washington-Arlington-Alexandria) of the remaining ten largest areas by industry employees are present when measuring by population. Noticeable industry agglomerations are present in, as mentioned before, Orlando-Kissimmee and Las Vegas-Paradise, as well as in the Nashville-Davidson metropolitan area which is ranked 9th by industry employees and 38th by population.

A better Zipf fit emerges when the analysis is limited to the 60 largest metropolitan areas, covering 86% of the total number of employees. The result, as shown in Figure 8 is a perfect rank-size distribution with a Zipf exponent of 1.00.

There are certain forces that are result in the agglomeration of the performing arts that are somewhat different from other economic sectors. When it comes to commercial success, the size of the market (or audience) is vital. Large cities and metropolitan areas provide access to a large and diverse number of potential consumers. In other words, it is almost impossible to separate production and consumption.

However, the concentration in a few selected locations has possible explanations outside classic economic reasons such as agglomeration benefits or the accessibility of the audience. There is also what can be referred to as the premiere effect. Major plays for example are expected to premiere on Broadway, the same way many entertainers strive to have their own show in Las Vegas. Even the best play or performance will have a very limited audience and exposure if is taking place in a remote location. Broadway plays receive national attention through the presence of critics and press. Successful performances attract the top talent in each discipline, leading to more successful productions. All these factors create a temporal interdependence, certain locations are locked in over time.

4.7 Sound recording

The sound recording industry primarily produces and distributes musical recordings. Additional fields include publishing of records as well as providing recording and related services.

The dataset for the sound recording industry (NAICS 5122) is the smallest in this paper, with 71 Metropolitan Statistical Areas covering 78% of the overall employment. This is due mainly to the industry concentration in a few selected geographies and the resulting problems of data suppression for the smallest MSAs.

The three largest agglomerations are in Los Angeles, New York and Nashville, accounting for over 70% of the total observations. The metropolitan area of Nashville is ranked 3rd in the number of industry employees, while ranked 38th in population. Florida and Jackson (2007) attribute the importance of Nashville as a center for music production to the frequent technological advances in the industry. Large agglomerations lack the flexibility to adopt new styles and genres, giving way to smaller areas with a higher ability to respond to innovations. As such, Nashville "has a vibrant creative community, a well-educated music industry workforce, and the ability to attract top creative talent from all over the world." (Scott, 1999)

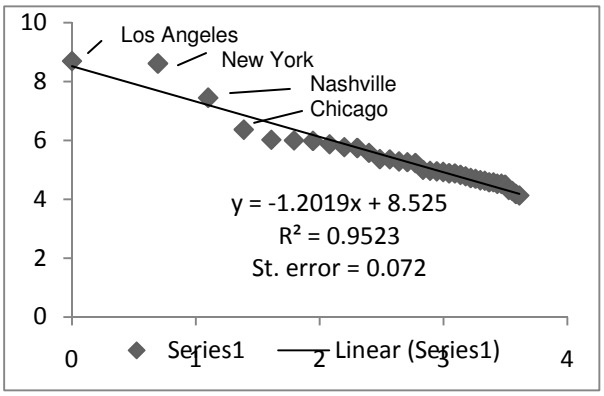

Figure 13: Size distribution sound recording industry

As shown in Figure 10, the size distribution of the Metropolitan Statistical Areas does not follow Zipfs Law very well. When analyzing the overall distribution, the fore mentioned three largest regions are larger than they should be according to Zipf. Especially the two largest MSAs, which are almost equal in size, distort the distribution. Once the top three regions are accounted for, the slope flattens out with a number of metropolitan areas sharing the remainder of the employees.

The same arguments made for the emergence of clusters in the performing arts hold for the sound recording industry. Successful artists are drawn to centers where they maximize their exposure. For some genres, being a success in Nashville is the equivalent of directing a Broadway play.

5 Conclusions

This thesis has analyzed the location and size distribution of art and entertainment establishments in the United States. As a general observation, the location of these establishments is correlated to the market size, as measured by population. With the exception of the recording industry and the special case of Nashville, the three largest metropolitan regions New York, Los Angeles and Chicago are also home of the largest industry agglomerations. When it comes to the rank-size distribution, all analyzed sectors are over proportionally concentrated in the top share of metropolitan areas. This leaves a large number of smaller MSA's without significant industry employment and a Zipf exponent larger than one. A better Zipf fit emerges when excluding these smaller metropolitan areas.

While most industry agglomerations can be explained through the size of the metropolitan areas themselves, certain activity is highly concentrated in specific centers. Almost 40% of national employment in the movie industry is located in the Los Angeles metropolitan area and together with New York they account for 26% of all performing arts activity, well above their share of the total population. This can be interpreted as an effect resulting from classic agglomeration benefits. Especially the movie industry is highly dependent on specialized and diverse inputs that are unavailable in most parts of the country. Other clusters, such as for-profit performing arts in the Orlando and Las Vegas region, rely heavily on the tourist market and depend less on local demand. Few establishments in this sector could exist without the demand effects generated by collocating with similar establishments.

As mentioned earlier, the rank-size distribution is directly influenced by the definition of urban agglomerations. The boundaries for metropolitan regions as defined by the Census are merely compositions of political areas and often a less than perfect fit for economic analysis. Further research based on other classification, for instance based on commuting patterns, could provide further insight especially for sectors such as the performing arts. In addition, other measures to capture the economic size of a region, for example per capita income could be employed.

While the concentration of the film industry in few selected locations can be explained by agglomeration effects, the same does not necessarily hold for music production. The position of Nashville with its large number of musicians can only be in part attributed to the need for a professional recording infrastructure and most likely heavily influenced by other variables, especially in the light of recent technological advances that allow the production of music to take place virtually everywhere in the world.

What stands out in most analyzed sectors is a spatial lock-in phenomenon, regions become clusters for certain sectors, influencing the entire distribution. This becomes especially prominent for the observed outliers, for instance the Los Angeles region in movie production or Nashville for sound recording. The clustering of industries leads to a selective migration of people affiliated or connected to the respective sectors, which in return attracts critics, further emphasizing the clusters importance. Certain advantages

can only be attained in the main industry centers, leading to a time-dependant strengthening of the whole industry structure.

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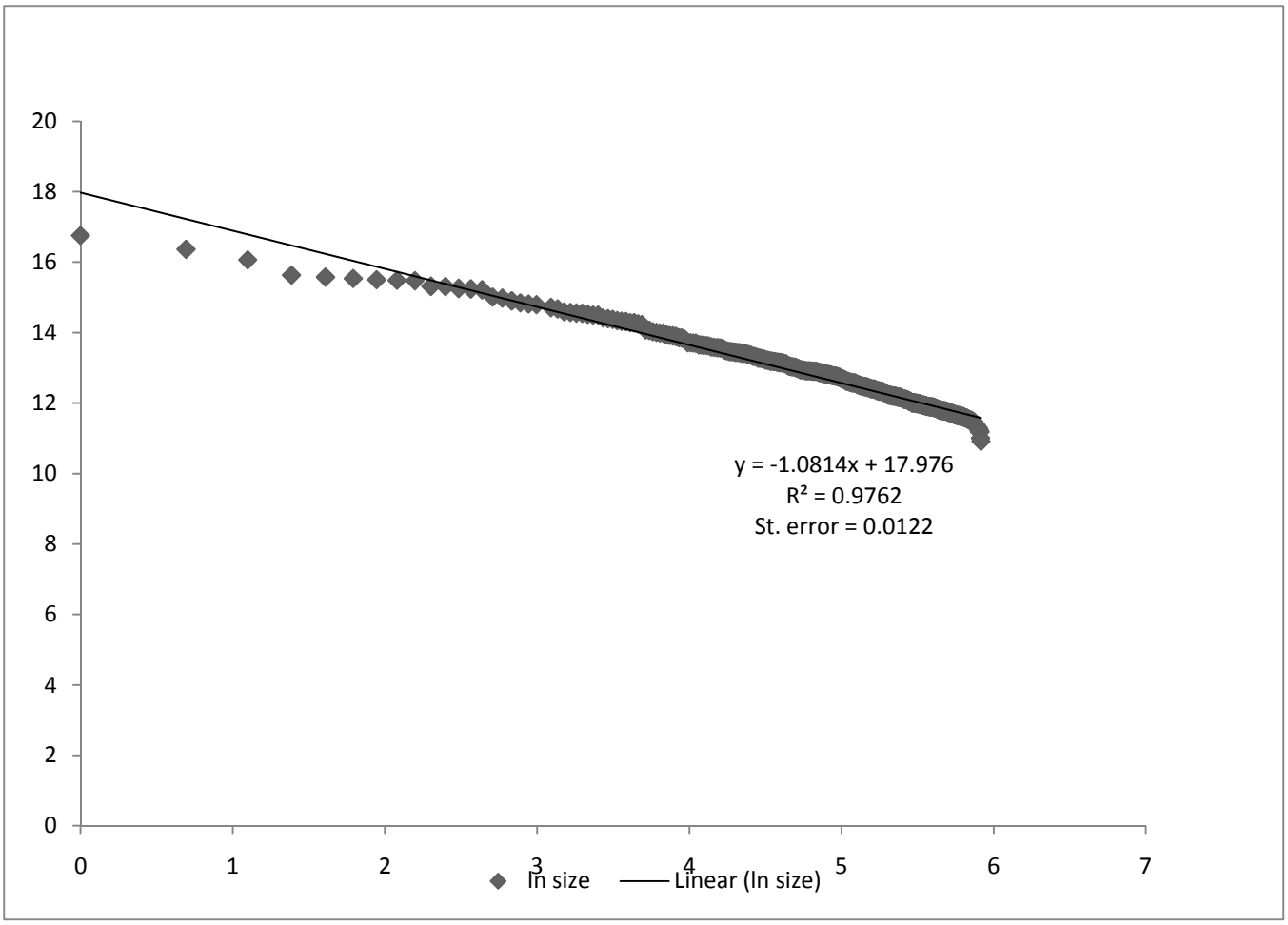
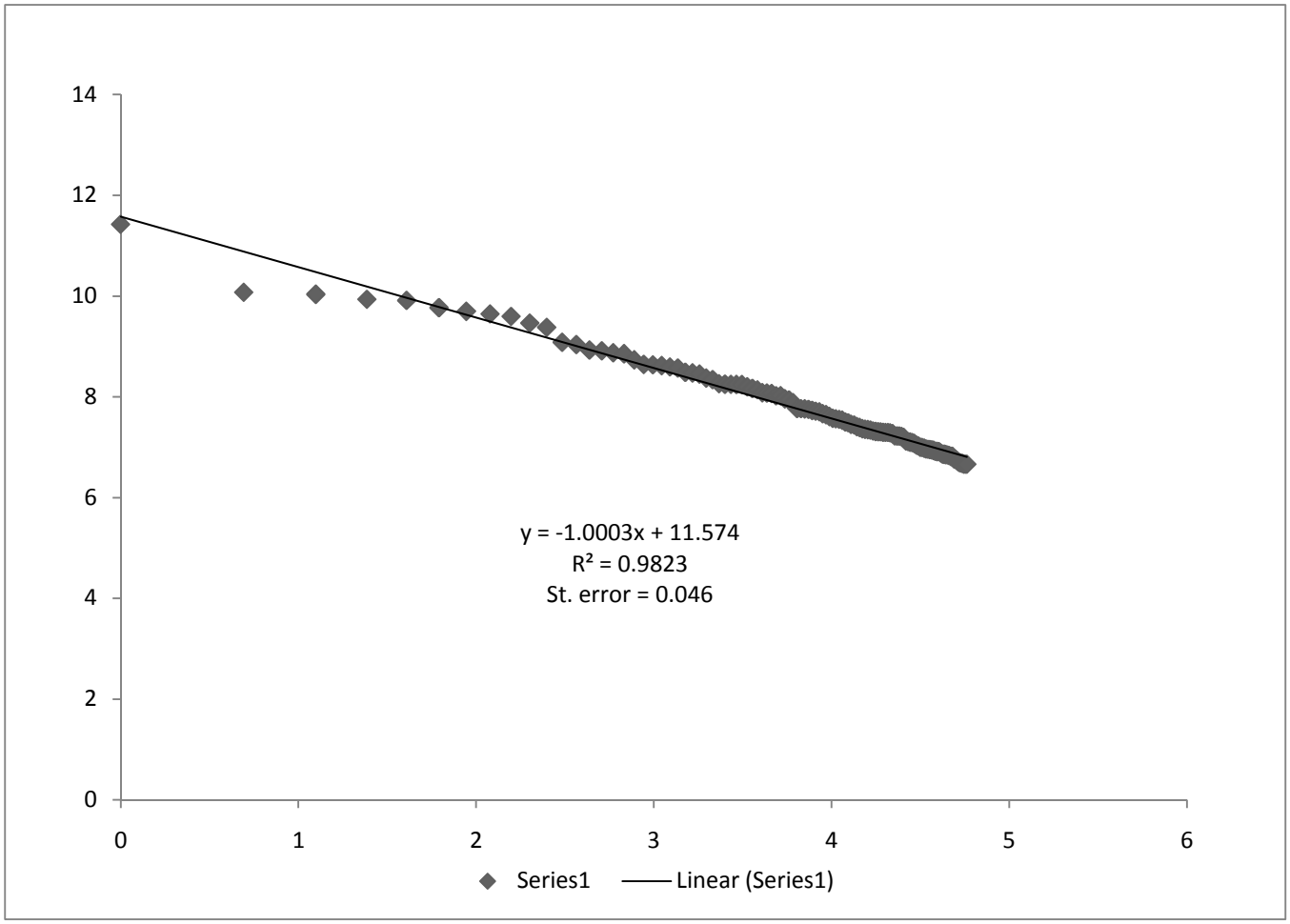
7 Appendix

7.1 Figures

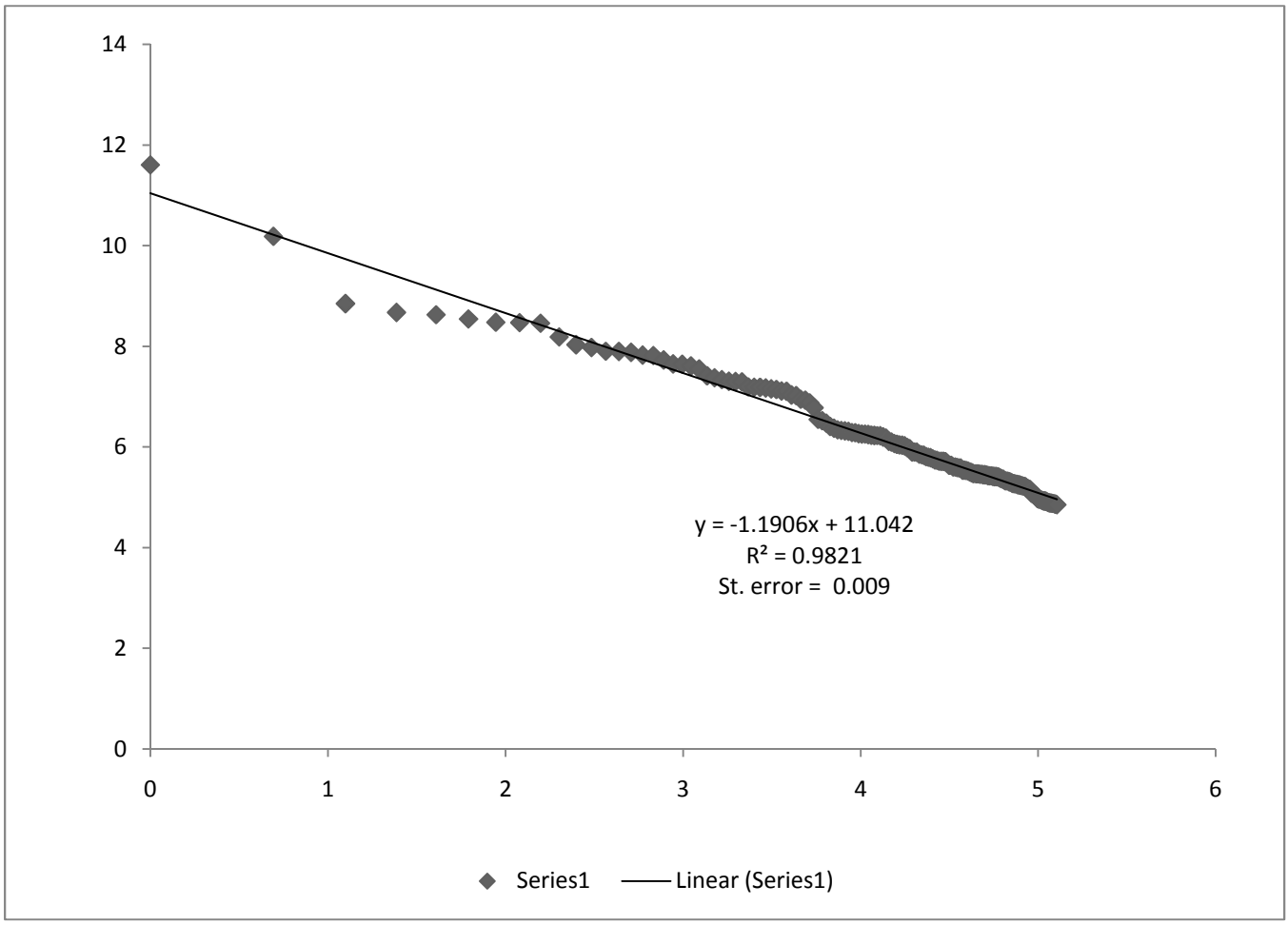
7.1.1 US Metropolitan Statistical Areas



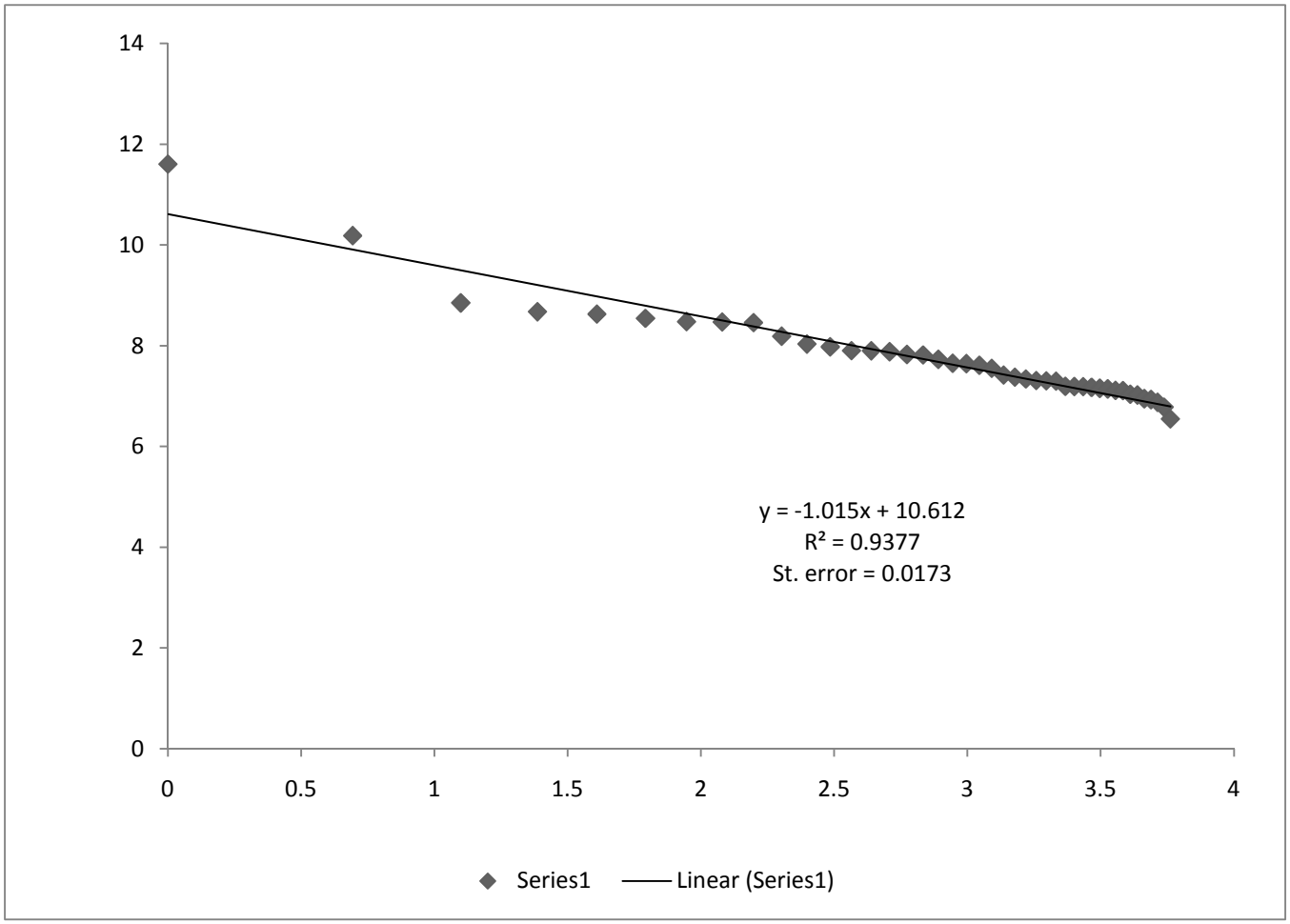
7.1.2 Publishing Industry



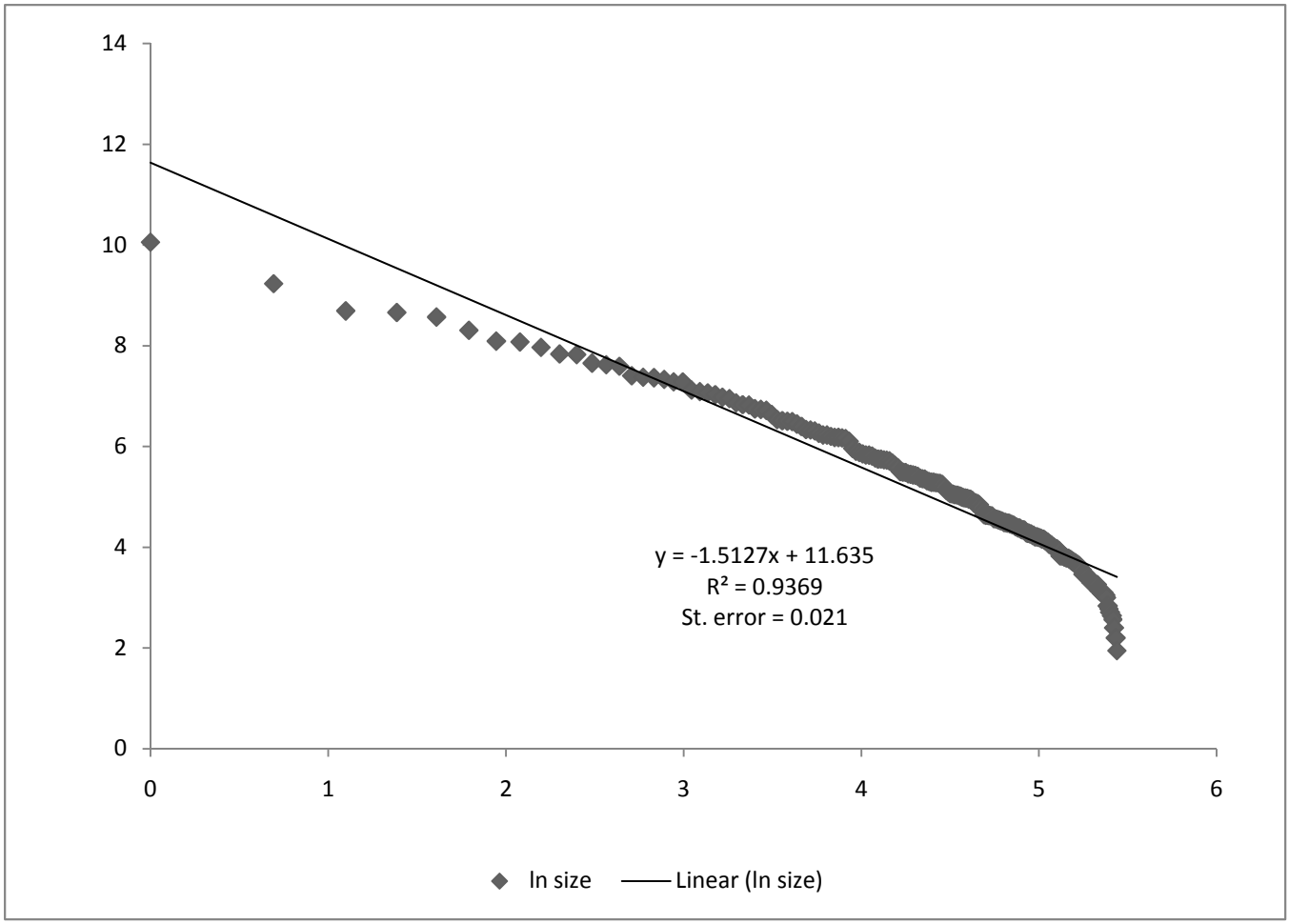
7.1.3 Movie Production



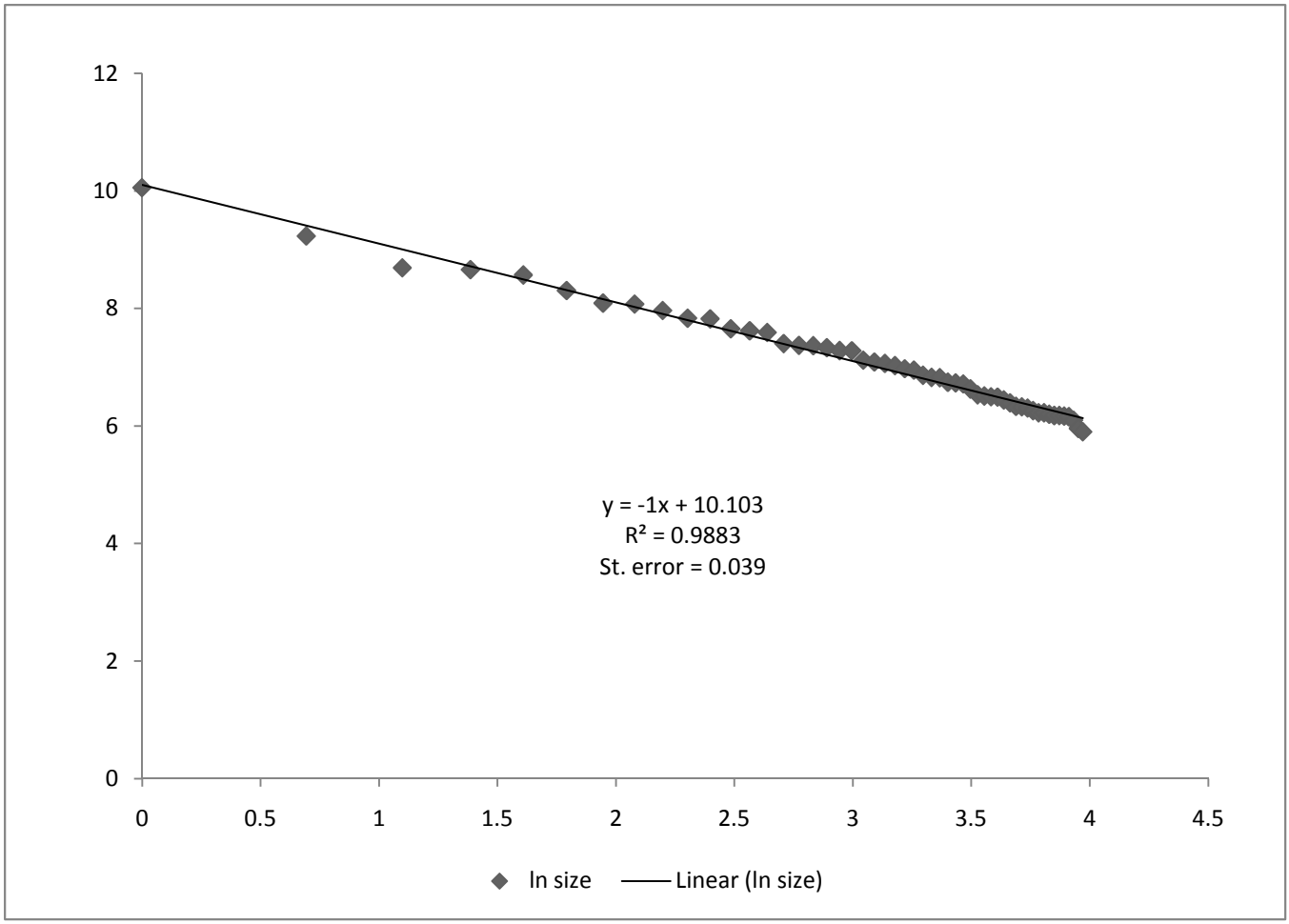
7.1.4 Movie Production Top 50



7.1.5 Performing Arts



7.1.6 Performing Arts Top 60



7.1.7 Sound Recording