Location and size distribution of entertainment and arts establishments

In Sweden
Abstract

This thesis analyzes the location and size distribution of arts and entertainment industries in Sweden as well as the size distribution of Swedish labor market regions. Several sectors of the arts and entertainment industry are investigated empirically by comparing their location and overall capacity to the size of their respective markets and testing their conformity with the rank-size rule. The analyzed establishments are opera houses, football stadiums, concert performances and movie theaters. The results are brought in context with transportation cost, market size, subsidies and optimal firm size. In conclusion, most arts and entertainment industries tend to locate close to urban agglomerations, their distributions in general follow the distribution of the population as determined by the labor market regions. Exceptions occur when the identified market differs significantly from the general population or when large amounts of subsidies distort the natural distribution.
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1 Introduction

The arts and entertainment industry consists of a large variety of industries and firms, providing a wide range of products and services to the consumer. Even though it covers an extensive field of businesses and establishments, the entertainment industry is particularly affected by certain economic characteristics such as the fixed-cost problem. Technological advances have lead to rapid changes in some parts of this industry while other areas have remained virtually unchanged for centuries. The arts and entertainment industry can be divided into two sectors, profit maximizing firms such as movie theatres, and non-profit organizations that rely largely on donations and subsidies, for example opera houses.

In Sweden there are 6 opera houses, showing around 20 different productions in one year. In comparison, in the year 2000 there were over 1100 movie theatres showing 223 new movies (Statens biografbyrå, 2002). What are the economic reasons behind this and what determines the supply of entertainment goods and services in general? What determines the location of arts and entertainment establishments and how do their location choices differ between the various fields?

This thesis will analyze the location and size distribution of arts and entertainment establishments in Sweden. It uses empirical data for profit driven and non-profit establishments, pointing out differences and similarities between them. The results are compared to the distribution of the population in Sweden and related to the rank-size rule and Zipf’s law. The analyzed sectors include opera houses and movie theatres, as well as the market for sports.

This study empirically finds that the distribution of the establishments and firms in general follows the patterns observed in the population distribution. This is in particular the case for performing arts that have a limited potential audience. Distortions to these patterns occur when subsidies are involved and when the targeted audience and consumer differ from the population in general.

1.1 Purpose of the study

This thesis will try to explain why arts and entertainment establishments locate where they do and what determines their size. It also analyzes the distribution and agglomeration of the general population in Sweden, relating market size and demand to the location of arts and entertainment institutions.

1.2 Outline of the thesis

Section 2 provides a background and a literature review of the field of geographical economics, with specific focus won the arts and entertainment industry. In section 3, different ways and measures of size distributions are presented while section 4 describes theories as of the optimal size of a firm. Section 5 analyzes the factors and reasons behind location choices while Section 6 evaluates the location and size distribution of selected arts and entertainment establishments in Sweden. Section 7 concludes the study.
2 Background

This thesis covers two main topics, the arts and entertainment industry specifically, as well as the location and size distribution of firms in general. While art and entertainment establishments show behavior similar to that of firms in other industries, they also have unique features that need to be interpreted according to their economic situation.

2.1 The economics of arts and entertainment

The importance of the art and entertainment industry has increased during the past years. It covers a wide range of products and services, from videogames to operas. Today, products such as Hollywood movies are translated and shown in virtually every country.

This increase can be attributed to several factors. In the past decades, many countries have made the transition from developing to industrialized nations, increasing the demand for entertainment and leisure activities. In the developed countries, average income has risen sharply and “in the long run the averages persons share of life that is devoted to work will probably decrease to less than nine per cent” (Andersson & Andersson, 2006, p. xii). An increase in disposable income and time is widely associated with an increase in consumption of art and entertainment. This increased demand emphasizes the importance of these industries for post-industrialized countries.

Creative industries have economic properties that influence the structure of the industry itself, as well as the individual establishments. Many creative products involve large fixed and sunk costs, a property that is especially important under the uncertain demand faced by many industries. Performing arts require a large input of labor and are therefore limited in benefitting from increases in productivity, especially those due to advances in technology. A production of Vivaldi requires the exact same inputs today as it did when it was first composed, described as the cost disease by Baumol and Oates (1972) in their study of theatre in renaissance London.

2.2 Location and size distribution

Economic activity is unevenly distributed across space. This applies to a global, national and local level. Certain industries agglomerate in specific areas, where they benefit from economies of scale and network effects. Transportation costs and market access are further determinants of a firms or industries location.

Numerous studies have analyzed the size distribution of cities and regions, the empirical research in this thesis is mainly based on the methods of Rosen and Resnick (1980) and their study of 44 countries as well as similar work by Brakman, Garretsen and van Marrewijk (2001). Swedish LA-regions and commuting behavior amongst municipalities are have been addressed by Johansson, Klaesson and Olsson (2002).
3 Size distributions

3.1 Size measurements of firms

Measuring the size of a firm is an important aspect in the field of microeconomic analysis and industrial organization. It is hard to find an optimal approach when establishing the size of firms, the most common difficulties lie in finding parameters that correspond to the purpose of the study. Each one, such as commonly used employment or sales measures, has its limitations. In reality, the choice of parameters is heavily influenced by the available data.

3.2 Measuring by input

Different firms use different inputs to produce goods and services. The amount of different inputs used allows for a measurement of the size of a firm or business.

3.2.1 Labor input

The most popular measurement is the number of employees per firm. It provides for a simple classification that can easily be assessed across industries and countries. The literature established different definitions for small, medium and large firms. In his study of the industry structure in Sweden, Johansson (1997) defines firms with 0-9 employees as micro-sized firms, 10-99 employees as small sized firms, 100-499 employees as medium sized firms and 500+ employees as large-sized firms. When studying on a national level for a smaller country such as Sweden, more intermediate size classes can be useful. Statistic Sweden (SCB) for example provides most data divided into 8 classes, 7 of which contain companies with less than 500 employees. This accounts for an additional advantage when using the number of employees, as this category of data is usually widely available. Especially for smaller firms, numbers on employment are easier to obtain than for example the number of sales per year, since depending on the legal structure of the firm they might not be required to publish any financial data. However, since the number of employees is recorded as a discrete variable, valuable information is lost. Smaller firms in particular and certain industries have a large percentage of part-time employees, which inflates their size considerably when measuring only by employment numbers. Burdett and Wright (1989) for example measure a firm’s size by the number of attached workers, which differ from the employees in the sense that employees can be temporarily laid off.

3.2.2 Capital input

Another way of looking at the size of a firm is the amount of capital. In this case, capital refers to the factors of production used to produce goods and services. Depending on the type of industry and type of firm, the use of capital varies greatly.
3.2.3 Use of intermediates

“Intermediate goods or producer goods are goods used as inputs in the production of other goods, such as partly finished goods. They are goods used in production of final goods” (Sullivan & Sheffrin, 2003, p. 301). The amount of intermediate goods utilized in production can be used to measure the size of a firm.

Certain branches of industries require a large amount of materials or other intermediate goods in their production while using very little labor and capital. In the energy sector for example, a hydropower plant can operate with only a few units of labor and a single installation of capital, while having an enormous throughput of water. On the other hand, solar power plants utilize large amounts of capital while employing little labor.

3.3 Measuring by output

A firms output can be measured in different ways, either real output (measuring the actual volume of production) or in terms of financial value, which again can be counted in a number of ways.

3.3.1 Total production

Total production refers to the total amount produced over a certain period of time. For a car manufacturer for example, this could be 100,000 cars during one month. Although this is relatively easy to measure, it allows for errors when comparing different firms, especially across industries. In very few cases do all the firms in the market produce exactly identical goods. The mentioned production of 100,000 medium-size cars cannot be compared to producing 100,000 trucks or 100,000 matches. Certain branches of industries have introduced standardized measurements that allow a direct comparison of the volume of production. In the oil producing sector, the standard size of measure is a barrel. Although the oil produced in various parts of the world differs in certain minor aspects, the total volume (measured in barrels) for each firm can be analyzed and compared. Another example is the freight industry. The total production, or amount transported, is measured in standard freight units which are defined by volume and weight. A shipment can by categorized using this unit of measure, large shipments can be compared to smaller ones and even to passengers travelling on commercial transport. The different firms can be compared by the amount they transport, measured in standard units.

3.3.2 Sales value

When measuring a firm’s size be the sales value of the output one can avoid most of the problems that occur. Basically, one measures the monetary market value of the output produced. This allows comparing completely different industries and firms producing different goods. Measuring the sales value is commonly used in accounting research. It is most powerful when determining the size of different companies within the same industry. The total value of sales of a certain type of products can be assessed and each firm’s share of the total gives a determinant of its size within the industry. When looking at a global level with different industries, the sales measurement is most commonly replaced by measuring revenues.
3.3.3 Value added
Measuring the value added during production refers to quantifying the value gained from the previous stage of production, the net sales revenue minus the costs of intermediate inputs. Measuring a firm's size by the total value added is especially important for companies that work with a large amount of intermediate goods. If we were only to measure the sales value, it would include the value added previous to the last firm's contribution and therefore distort the results. For example, a high end computer retailer assembles the final product from different parts, resulting in a high sales value but low value added. In general, measuring by value added is superior to measuring the value of the output, as the size of the firm corresponds to the value of its contribution. Studies by Eurostat have shown that when measuring value added per employee, results tend to be equally distributed amongst size-classes. This implies that results should be similar when measuring a firm's size in either one of these dimensions.

3.4 Performance measures
A firm's performance is usually referring to its position and success in the market and is often assessed through financial measurements. A lot of establishments in the arts and entertainment industry perform on a non-profit basis, their goal is not to maximize profits but rather attendance as well as maintaining a certain quality. The following measures therefore mostly apply to profit oriented sectors within the industry, such as movie theatres.

3.4.1 Measuring by profits
A company's profits are an alternative option to determine its size. This holds especially for larger and publicly traded firms that are required to make data openly available. Since the total net profit is an absolute number, it allows for comparisons between companies in different sectors and countries. Still, a direct evaluation of these values proves to be difficult. Almost every country or even state has different rules and laws on taxation, ranging from a high percentage to no taxation at all. In addition, the possibilities of deductions and write-offs can alter the final net profit depending on the location of the business. A company's profit becomes more significant when put in relation to a physical measure of size, for instance the number of employees. A small financial institution with only a few employees might post billions in profit while a car manufacturer with a large workforce loses money. To avoid the mentioned accounting problems, one can either analyze the pre-tax net profit or the total revenue. Especially the revenue provides for a quick guide to the size of a firm. For example, it is virtually impossible for a large firm to have a small turnover as measured by revenues or total value added. The annually Fortune 500 list is created by ranking the world's largest corporations according to their revenues.

3.4.2 Dividends and the value of the firm
The capital value ($CV$) is the expected dividend flow ($D$), discounted to the current value. The capital value at time 0 is therefore solely determined by the dividends. The dividends on the other hand are completely determined by the profits and the optimal sav-
ings rate within the firm. For publicly traded firms, the stock price is a measure that includes expected dividend flow and the expected profits. For these reasons, when data on the capital value is available, it should be used instead of other performance measures, as capital value includes future expectations of the dividend flow \((g_D)\).

\[
CV_0 = \int_0^\infty D(t) e^{-rt} dt \approx \frac{D_0}{r - g_D} \tag{1}
\]

The next worth of a firm can not only be expressed in terms of price of its outstanding shares but also in the value of its assets. An asset is defined as “everything of value that is owned by a person or company” (Sullivan & Sheffrin, 2003, p. 259). Assets can be divided into two classes, tangible and intangible assets. This difference proves to be important, as financial institutions for example have a large share of intangible assets while traditional companies tend to have a large share of tangible assets. In line with the possible fluctuations when measuring a company’s size by the value of its stock mentioned earlier, the value of intangible assets can change at the same pace. One example for this is the current financial crisis which forced many banks to re-evaluate their assets.
4 What determines the number of firms

Various factors determine the number of firms competing in a single market. The number of firms can range from only a single firm in a true monopoly, such as phone companies in certain countries, to numerous competitors supplying identical products. Firms accommodate the demand that exists in the market. Their number therefore depends on the size of the market itself and the individuals firm’s size.

\[
Total \ number \ of \ firms = \frac{\text{size of the market for the good in question}}{\text{optimal size of the firm}} \tag{2}
\]

4.1 Size of the market

Virtually all theories conclude that the number of firms is related to the size of the respective market. Firms tend to stay in business for as long as they make non-negative profits, new firms enter the market as long as a positive profit is to be made. The question therefore is how many firms a particular market can support. Larger markets can sustain more firms than smaller markets, ceteris paribus.

Markets can be distinguished from one another “by the size and number of suppliers and by whether the goods sold are homogenous or differentiated” (Heilbrun & Gray, 2001, p. 116). The arts and entertainment industry can in most cases be described as being monopolistically competitive, due to the lack of truly homogeneous products. Opera productions for instance differ in various aspects, even when based on identical work. Outside the performing arts, the market structure can in some cases have characteristics of an oligopoly, with few large firms dominating the market. However, in most cases the typical pricing strategies of oligopolies do not apply. In the case of operas, the establishments operate on a non-profit basis, where as cinemas commonly have their prices predetermined by the movies producers.

The size of the market is especially important when large fixed costs are involved. Firms need to cover their fixed costs with variable profits, smaller markets might only have enough demand to support one firm, if any. The higher the fixed costs or the lower the variable profits, the larger the market needs to be to support a firm. The existence of fixed cost implies that the average total cost of production decreases if more units are produced.
Figure 1 depicts a situation in which the market is too small to support even a single firm. The average cost curve is always above the demand curve, which implies that the cost of producing a unit is always above what consumers in the market are willing to pay. It also shows that the per unit cost decreases as production increases.

In some industries this effect is countered by subsidies, firms are being compensated to operate in what would otherwise be unprofitable markets. This is especially true for the entertainment industry and necessary institutions such as schools and health care providers.

In addition, competition usually reduces profits, the market size has to increase over proportionally to the increase in number of firms. A market that can support two firms has to be more than double the size of a market supporting only one firm.

The size of the market itself can be measured in various ways. Most common and accurate are demand-side measures such as annual industry output, which can be calculated in monetary or physical units. When both market size and the individual firm size is measured in output it allows calculating the respective shares of the market.

4.2 Optimal size of the firm

The optimal size of a firm is directly related to growth of demand. Rajan and Zingales (2001) find that close to 70% of overall growth in industries is due to the growth of existing firms, which leads to the question which parameters determine the optimal size of a firm.

The definition of actual optimal size of a firm has been diverse, one example is “where the ratio between profit and capital invested in the firm is maximized” (Varian, 2006). As mentioned earlier, both of these parameters are difficult to measure accurately. Various studies emphasize factors that point to the most favorable size for a given enterprise. In their study of companies across 15 European countries, Rajan, Zingales and Kumar
(1999), find that on average, firms facing larger markets are larger. Industries that re-
quire a lot of physical capital or research tend to have fewer, larger firms. The same
goes for utility companies, possibly due to their monopoly position in some cases. Effi-
cient judicial systems promote larger firms, as they serve as protectors for physical and
intellectual capital.

Firms profit from internal economies of scale, their per unit cost decreases as their out-
put (and firm size) increases. This is attributed to fixed cost being spread out over more
units, as well as to other benefits such as increased bargaining power when purchasing
production inputs or being able to afford better equipment. The optimal size of a firm is
reached when the production is at a level that minimizes average total cost. Equation 3
can be used to show that this is directly related to the market demand (size of the mar-
ket) and the total number of firms.

\[
\text{optimal size of the firm} = \frac{\text{size of the market for the good in question}}{\text{total number of firms}}
\]  

(3)

A growth in demand results in an increase in the total number of firms.
5 Distribution of the location of firms in space

In almost every country, economic activity is unevenly distributed across space. Firms and businesses tend to concentrate in a few selected areas. The modern analysis of this behavior is based on “the economics of agglomeration, a term which refers to the decline in average cost as more production occurs within a specified geographical area” (Anas, Arnot, & Small, 1998, p. 13). This refers to external economies of scale. However, there are other parameters that influence the location of firms and businesses.

Firms make their decisions on where to locate based on profit maximization. Their potential profit is influenced by their location in a number of ways. In some cases, locating close to the market is a necessity, for example when the goods and services cannot be transported. Generally speaking, profits will be higher if the transportation costs are lower. Some firms and industries also benefit from being located within close proximity to each other, while others benefit from locating in a large urban area.

5.1 Market access

Market access is the ability of firms or individuals to take part in a market place, either as seller or buyer. The access can be limited or denied through barriers that need to be overcome before being able to participate.

In geographical economics, market access can refer to the distance between producers and consumers, employers and employees etc. The distance can either be measured in time or actual geographical distance. This is an important factor, as availability becomes only valuable together with accessibility. The attractiveness of jobs for example decreases with an increased time to commute. Firms therefore tend to locate close to their potential markets, depending on transportation cost.

![Willingness to commute to other municipalities](image)

*Figure 2: Willingness to commute to other municipalities*

*Source: Johansson et al. (2002) p.11*
Market access is strongly influenced by transaction cost, namely transportation cost. A common measure of market access is using travel time or distance as a cost measure and utilizing distinguished individual markets. The market for arts and entertainment for example can be divided into the local market, the market of the corresponding commuting region and the commuting market including tourists.

5.2 Transport cost

Transportation costs can be divided into two groups, the costs that occur when transporting raw inputs or intermediaries to the production facility (procurement cost) and the cost of transporting the final output to the market (distribution cost). A firm for which transportation costs are the prevailing factor when selecting a location is called a transfer-oriented firm, it chooses the location that minimizes the total transport costs.

The location of the inputs and the market location are often different from each other, the firm then has to decide if to locate closer to its customers or its inputs. A firm with high procurement costs and low distribution cost will locate closer to its inputs, milk producers for example will locate close to dairy farms instead of locating close to urban agglomerations. Market oriented firms on the other hand have low procurement costs and choose to locate close to their customers. Bakeries for instance can transport their inputs at a low price while their output needs to reach the market fast on order to be of value.

Some goods and especially services cannot be transported at all, the firms need to locate directly at the market or within reasonable distance from it.

5.3 The role of subsidies for size distribution

Most governments promote the access to cultural goods such as the performing arts in order to make them available to a greater audience. This is mainly done through subsidies, financial assistance without any direct return. These subsidies can take various forms such as tax-exemptions, direct transfer payments or the financing of selected performances and exhibitions.

Opera for instance is regarded as the most depending on government subsidies of the performing arts although it’s limited audience. Wanhill (2008) mentions that opera in the United Kingdom received “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).
Subsidies distort the size distribution of firms and establishments in two ways. The shift in demand equals an increase in market size, allowing firms to enter or stay in the market that otherwise would have been forced to leave. Besides affecting the number of firms, subsidies also affect the size of each institution, allowing them to grow past their otherwise optimal size.

5.4 Why is there a skewed distribution?

In statistics, skewness is referring to the asymmetry of a distribution. In economics, skewed distributions can be observed in many cases, for example in the geographic distribution of economic activity across regions. In general, economic activity tends to agglomerate in a few selected places, usually cities.

Every region has some advantage over others. This can be a comparative advantage, for example access to natural resources, a good physical infrastructure or a highly skilled labor force. Absolute advantages include their size itself, together with a large market that allows for larger scale productions due to higher demand.

One example is the distribution of entertainment services, for instance opera houses and movie theaters across Sweden. The largest operator of cinemas in Sweden is SF Bio AB with 36 theaters in 22 locations. The number of theaters in each location varies to a great extent, 13 are located in the Stockholm region, 3 in Malmö and 1 or 2 theaters in all other locations. The geographical distribution of cinemas is uneven. The reason for this becomes clearer when looking at the location of opera houses. There are only 6 real operas in Sweden, 3 in Stockholm (Kungliga Operan, Folkoperan and Drottningholms Slottsteater), Göteborg (Göteborgsoperan), Malmö (Malmö Opera) and Umeå (Norrlandsoperan). In both examples, there are high fixed costs. Operas and movie theaters require large, centrally located buildings that are expensive to rent or purchase. In addition, in the case of operas, a large number of employees are required.

Figure 3: Effects of subsidies on market demand

*The demand curve is shifted upwards proportional to the amount of the subsidies*
for each production. These expenses need to be recouped by selling tickets, which in both cases is the main source of revenue.

The fixed costs can only be spread over a limited number of people. The potential market is larger for movie theatres than for operas. A movie theatre for instance can show several different movies in one day while an opera has a very limited repertoire for a period of time. That is one reason why there are fewer opera houses than movie theatres and why movie tickets tend to be cheaper than opera tickets. Also, people are less willing to travel long distances to see a movie compared to operas and their restricted supply.

Opera houses are often build as a mean of increasing the attractiveness of a region and a symbol of success, resulting in large luxurious buildings. The ceiling inside Copenhagen’s opera house for example is made of sheets of gold leafs. In addition, opera is a luxury good, often used to display wealth or status.

By locating in or close to population agglomerations, producers of entertainment gain a crucial advantage. As mentioned before, firms and businesses profit from agglomerations, for example through lower transport cost or spillover effects. In the case of the entertainment industry however, agglomerations are far more valuable. They cannot export their services over large distances, the willingness to travel to watch a movie or opera performance decreases significantly for longer distances. In other words, the transport cost for the consumer become unreasonably high. This holds for most other entertainment industries. Adding to the attractiveness of cities is the large share of consumers with high incomes.

Similar patterns are visible in the availability of luxury consumer goods. The demand for high priced jewelry or automobiles is very limited, in addition the willingness to travel to purchase these items is high. Expensive designers for clothes for example locate in key cities such as London, Paris and New York. These cities have a large share of the countries wealthy population, which make up the market for these products.

Firms in industries such as consulting and other business services rely heavily on personal relations which are sensitive to distance. Since they cannot be present in every location with business activity, locating close to major transportation hubs becomes important. This could be for example close to airports such as Stockholm Arlanda.

The location choice is not only important in terms of market demand and buying power. Other structural benefits stem from the agglomeration of firms in the same industry as well as agglomerations of firms in general. Benefits from other firms in the same industry are usually referred to as localization economies, cross industry benefits are called urbanization economies (Henderson, 1997).

Regional networks and production clusters lower transaction costs between firms, facilitate knowledge transfer and lessen the average costs of inputs. Such a cluster can be found for example in the Swedish textile industry which is concentrated around Borås.

Education, research and development within firms also benefits from agglomeration. Universities for example will focus on education in subjects for which there exists a lot of employment opportunities within the area. This leads to a large supply of qualified labor,
another externality. Others include easier access to financial resources and the possible locating of support industry nearby.
6 Size distribution and location of entertainment and arts establishments in Sweden

Before analyzing the size distribution of regions and the economic activity across them, one must define the boundaries of a region. In geographical terms, a region is defined as “a medium-scale area of land or water, smaller than the whole areas of interest and larger than a specific site. A region may be seen as a collection of smaller units or as one part of a larger whole” (Tobler, 1979, p. 521). Crone (2003) defines an economic region as a district or an administrative division of a city or territory that is designed according to some material distributive or productive criteria.

In political terms, regions are defined by the body that governs them. This can be on national level, as well as down to local level depending on the size of the country. There are many factors influencing the extend of such regions, historic and religious influences as well as political and demographic reasons. Sweden for example is officially divided into 21 counties with a total of 290 municipalities. The boundaries of these administrative units can influence the shape of the corresponding economic region. For example, depending on the political situation in the region, some might be more attractive for businesses than other. Different taxation rates or other legal requirements can act as a divider between regions that are identical in a geographical sense.

6.1 LA-Regions

The local labor market is very sensitive to time distance. Jobs become less attractive with increased distance from ones home. A corresponding region can therefore be defined as a number of areas sharing a common labor market.

Figure 4: Illustration of commuting streams

Source: Author, building on Statistiska centralbyrån (2008)
In Sweden, these regions are referred to as LA-regions. When defining an LA-region, one must first identify the center. According to the criteria used by Statistic Sweden (SCB), the center of an LA-region has less than 20% of its workforce commuting to other municipalities (p1 < 20%) with less than 7.5% commuting to a specific municipality (p2 < 7.5%). The remaining municipalities are then assigned to their center according to their strongest commuting pattern. This can be a direct relationship (strongest commuting pattern to a municipality that itself is the center of an LA-region) or an indirect one (strongest commuting pattern to a region that is not a center itself). Figure 4 illustrates the commuting streams from municipality A to the municipalities B, C and D. Municipality A fulfills the conditions to become the center of an LA-region. According to the 2006 classification, 30 LA-regions consisted of a single municipality.

As of 2006, there are 79 LA-regions in Sweden. This number has decreased from 178 in 1970 and is projected to reach a low of 54 in 2030 (Statistiska centralbyråns, 2008). The decrease is mainly attributed to the steady increase in commuting patterns, widening the boundaries of the LA-regions. Formerly independent LA-regions become part of another LA-center, losing their status as a region and contributing to the overall concentration. LA regions are classified by population size, the by far largest LA-region is Stockholm-Solna with 2.3 million inhabitants, followed by Malmö-Lund (1 million) and Göteborg (0.96 million).

<table>
<thead>
<tr>
<th>Population size group</th>
<th>Number of regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2.000.000</td>
<td>Stockholm-Solna (8)</td>
</tr>
<tr>
<td>250.000-1.000.000</td>
<td>Malmö-Lund &amp; Göteborg (7)</td>
</tr>
<tr>
<td>150.000-249.999</td>
<td>6</td>
</tr>
<tr>
<td>100.000-149.000</td>
<td>5</td>
</tr>
<tr>
<td>50.000-99.999</td>
<td>4</td>
</tr>
<tr>
<td>25.000-49.999</td>
<td>3</td>
</tr>
<tr>
<td>10.000-24.999</td>
<td>2</td>
</tr>
<tr>
<td>&lt;10.000</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1: Size classes of LA-regions

6.2 Rank-size distribution

The rank-size distribution of agglomerations (regions or cities) often follows a Pareto distribution. When plotting the ranks of cities over their population on a logarithmic scale, the graph emerges as a straight line. This means that their size can be estimated, based on their overall ranking. For example, one can predict the size (by population) of other cities according to the size of the largest city. The city with the rank n will have an estimated size of 1/n multiplied by the population of the largest city. Auerbach (1913) first mentions this relationship for the distribution of city sizes:

---

1 lokal arbetsmarknadsregioner
\[ \ln(\beta) = \ln(A) - \alpha * \ln(x) \] (4)

where \( \beta \) is the overall rank of the city and \( x \) the population of a certain city. For the special case that \( \alpha = 1 \) (referred to as the Zipf exponent) and \( A \) equal to the population of the largest city, this relationship is known as Zipf’s law.

6.3 Rank-size distribution of LA-regions

The LA-regions correspond to the different labor markets in Sweden based on commuting patterns. If market size is proportional to population size, this is representing the distribution of market sizes. The 79 LA-regions were ranked according to their population and the results graphed on a logarithmic scale. The data is based on publications from SCB (2007) using the latest classification of LA-regions from 2006.

The result is shown in Figure 5. The overall distribution follows the pattern predicted by the rank-size rule. Especially the largest regions, Stockholm-Solna and Malmö-Lund are distributed as outlined by Zipf (\( \alpha \) for Malmö-Lund is approximately 1.008). Compared to the overall distribution, the top 3 regions have a larger population than expected. This can have various reasons, in the case of Stockholm-Solna for example its position as the capital city increases the attractiveness for growth (Ades & Glaeser, 1993). Other studies suggest that cities with large sea ports grow faster than average cities (Scandinavia’s largest port is located in Gothenburg, ranked third in population).

The average Zipf exponent for the examined LA-regions is 1.074, a value slightly higher than what would be expected from the rank-size rule. In their initial study with data from 1970, Rosen and Resnick estimated the value of the Zipf exponent for Sweden to be 1.4. Differing from this analysis, they used the proper city limits to measure the population, while pointing out that the Zipf exponent decreases with expanded city limits.

The second observation is the lack of large regions with more than 250,000 but less than 900,000 inhabitants. The third largest region, Göteborg has a population of 964,440, while the fourth ranked Linköping region has 247,697 inhabitants. The Zipf exponent for these regions is larger than 1.

On the other hand, there are 9 regions with a population between 100,000 and 150,000, which is more than what can be expected from the projected rank-size distribution. For these regions, the \( \alpha \)-value is smaller than 1.

The right tail of the distribution is steeper than estimated. However, this can be interpreted as a result of the largest region being over proportionally large, rather than the smaller regions being too small. In addition, the process of consolidation within the LA-regions results in a small number of isolated regions.
6.4 Size distribution and location of entertainment and arts establishments

Art and entertainment establishments are influenced by unique factors in their location choice. Some productions demand a great amount of different labor inputs, which can only be served by a large and diversified labor market. This can be seen in the film industry which is concentrated in locations such as Los Angeles and Mumbai. The size distribution and location of arts and entertainment establishments can be analyzed in a way similar to the rank-size distribution of regions. The term establishment is used since some institutions are not organized in a company structure. It refers to firms when appropriate, otherwise to units of similar kind. Obviously a common unit of measuring the size of these establishments is needed. This analysis uses the number of available seats, aggregated per region, except for the data on concert performances, which uses the number of performances during a calendar year. Although this measure is not as accurate as the number of seats when it comes to comparing across different regions, it proved to be the only reliable and accessible measure. It has been used (measured as...
number of tickets available for sale) in various models of the economics of performing arts firms (Heilbrun & Gray, 2001). Due to lack of available data, the numbers for movie theatre seats only account for theatres from SF Bio AB, which has a market share of close to 70% and is present in all major markets. Accordingly, the distribution of movie theatres is influenced by location choices of the SF movie firm.

There are six opera houses in Sweden, three of which are located in Stockholm. Opera houses are special in the way that they are built to meet specific requirements and are often used for additional productions of ballet, operettas and musicals. Many of the buildings were constructed in central locations that have lasted decades or centuries (Andersson & Andersson, 2006). The Royal Swedish Opera in Stockholm for example first opened in 1782 and although being replaced with a newer building remains at its original location until today.

The total capacity of opera houses is less equally distributed as could be expected. Half of the buildings are located in Stockholm, and together they account for 40% of the total number of seats. The size ranking follows the ranking of regions with the Malmö Operan in second place followed by the Opera of Gothenburg. Both of these Operas have a capacity that exceeds the values predicted by the rank-size rule, the Göteborgsoperan for instance is 80% larger than should be expected. Norrlandsoperan, which is located in Umeå is slightly smaller than predicted by the distribution. Its location however is unusual, with Umeå being ranked 19th in terms of population or market size. It should be noted that with the limited number of operas and therefore the small sample size, estimations according to the rank size rule are difficult at best.

Several factors can help explain this. All opera houses outside of Stockholm were build fairly recently, the Opera of Gothenburg for instance was completed in 1994. In order to spread out the high fixed cost, these newer buildings were specifically planned to accommodate productions outside of the classic opera, such as musicals. This allows for the building to be used on additional occasions, reducing the average costs. In addition, the limited number of performances increases the willingness of consumers to travel greater distances. On average, Operas have less than two performances per week with four to five different productions in one year. In comparison, movie theatres usually show the same movie several times during one day. The location of the Norrlandsoperan in Umeå can mainly be seen as a political decision, financed heavily by subsidies. The percentage of ticket revenues as a part of total income was 3.6% for the opera in Umeå, compared to over 20% in Göteborg (Statens kulturråd, 2008).

The distribution of movie theatres shows an expected concentration in the three largest regions. Noticeable is the concentration of seats in Stockholm, which are almost five times as numerous as those in Malmö and Göteborg. This results in a distortion of the expected rank-size pattern. If the number one rank is excluded, the distribution closely follows the rank-size rule. Possible explanations for this can be found in the company structure of SF Bio AB, which has a high focus on the Stockholm region and the population structure. The Zipf exponent for the distribution of movie theatres has a value of 1.076 and is almost identical to the rank-size distribution of regions.
The distribution of football stadiums follows some of the pattern identified in the distribution of opera houses. Again, the largest aggregated stadium capacities correspond to the regions with the largest population, with the individual capacities exceeding what should be expected according to the rank size rule. The total amount of stadiums exceeds the number of opera houses by far, due to a different demand structure. This study excludes stadiums with a capacity (standing and seating) below 5000. A number of factors are unique to sports in general and football in particular. Successful teams can create a demand that is similar to that in large cities. One example in Sweden is the IF Elfsborg from Borås, whose national titles have resulted in considerable game attendance and in consequence a large stadium being constructed in a population wise smaller region. Larger regions profit from multi-purpose stadiums that are built for a one-time event, for instance the Ullevi Stadium in Gothenburg, which was constructed for the 1958 World Cup, and later serve as home to the local sports teams. The number of medium-sized stadium with a capacity between 15,000 and 20,000 is larger than predicted by Zipf’s Law. Stadium size decreases disproportional to the decrease in rank.

The annual number of concerts follows the LA-regions distribution closer than any of the previous samples. Again, the Stockholm region is larger than expected, with the difference that the number of concerts in the Malmö region is smaller than projected.
7 Conclusions

This thesis has been assessing the location and size distribution of selected arts and entertainment establishments in Sweden. It can be said that in general, the mentioned establishments are primarily located in the regions with the largest markets. In all four researched areas, the top three regions by population were also the top location choices within the industry.

What stands out however, in all analyzed datasets, is the position of the Stockholm-Solna region. It accounts for over 25% of the population and equally dominates most of the arts and entertainment sectors. Almost half of the general population of Sweden is located either here or in the Malmö-Lund and Gothenburg regions. Some arts and entertainment industries, for example opera houses, locate exclusively in these areas or are heavily subsidized. The establishments that mirror the population distribution the closest are the ones with a broad consumer base. Concerts for instance cover a wide variety of styles and tastes; the demand for their products is directly connected to the general population.

The importance of locating within agglomerations seems to diminish when demand is determined outside regular markets. The demand for live sport events for example increases with successful teams, a characteristic that has limited effect on other arts and entertainment establishments. Successful artists and performers locate close to large markets to maximize their audience, a move that is impossible for many sports teams.

An interesting point is the development and role of home entertainment. Advances in technology have made it possible enjoy movies and music at home, in a quality that is close to matching the experience in movie theatres or concert halls. This diminishes the impact of the overall population distribution. With home entertainment, the market size is at a minimum. The benefits of locating close to agglomerations are limited to suppliers of home entertainment equipment, however with the increasing market shares for internet retailers, location becomes even less important.

7.1 Suggestion for further research

Further research is warranted for a number of questions that are not answered or discussed in the current paper. As noted by Rosen and Resnick (1980), the distribution of city sizes and their fit for the rank-size rule are directly influenced by defining the limits for urban agglomerations. The Swedish LA-regions are set to be reclassified in 2011, with significant changes to be expected. In addition, other classifications for regions and agglomerations exist which can be studied and compared to the results in this paper.

The forementioned technological advances have an interesting effect on certain sectors within the arts and entertainment industries. New marketing channels for example allow for videos, movies and music to be distributed and sold at virtually no marginal cost in addition to small fixed costs. In contrast, Baumol and Oates (1972) find that the art and entertainment industry has the least benefit from advances in productivity and technology. This and the presence of virtual retailers are bound to have an impact of the size distribution and location of arts and entertainment establishments and demands further research.
A recent trend in the music industry is to organize world tours, a series of performances in different locations all over the world over an extended period of time. These have become major businesses with a large audience and revenues worth millions of dollars.

Related to concert tours are festivals, where a set of different groups and individuals perform at one location. Many festivals take place only once a year or over a limited period of time. As a consequence, festivals have low fixed costs, not being required to maintain an expensive infrastructure. On the other hand, their variable costs are high, which makes their cost structure the opposite of what is found in permanent ensembles. Successful festivals however, suffer from increased fixed costs due to a demand of higher quality productions and facilities, making them more similar to permanent establishments, as mentioned by Andersson (2006) and Frey (2000).

Further research can analyze the market extend for these festivals, which is different due to their concentration in time. A common trend is the further genre specialization of festivals, targeting a smaller part of the general population, which in return calls for an even wider extend of their potential markets.
8 References


## Appendix

### 9.1 Regression Output

#### 9.1.1 Rank-size distribution Swedish LA-regions

**Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
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<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
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\(^a\) Predictors: (Constant), Rank

**ANOVA**

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\(^a\) Predictors: (Constant), Rank  
\(^b\) Dependent Variable: Size

**Coefficients**

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<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
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\(^a\) Dependent Variable: Size
9.1.2 Rank-size distribution Operas

Model Summary

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a. Predictors: (Constant), Rank

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a. Predictors: (Constant), Rank

b. Dependent Variable: Size

Coefficients

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a. Dependent Variable: Size
## 9.1.3 Rank-size distribution annual number of concerts

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*a. Predictors: (Constant), Rank*

### ANOVA

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b. *Dependent Variable: Size*

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*a. Dependent Variable: Size*
### 9.1.4 Rank-size distribution football stadiums

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a. Predictors: (Constant), Rank

b. Dependent Variable: Size

#### Coefficients

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a. Dependent Variable: Size
9.1.5 Rank-size distribution SF movie theatres

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a. Predictors: (Constant), Rank

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Coefficients

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a. Dependent Variable: Size