Price elasticity and other factors of demand for a Dutch theatre

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Abstract Using the 2004-2013 sales data of a Dutch theatre, I estimate demand for the performing arts. Particularly, I investigate ways to derive Price Elasticity of Demand (PEoD) from revealed preference using panel data and analyze the data on different levels of aggregation (i.e. per month, per performance and per artist). First, I examine the effect of performance characteristics (i.e. n^{th} time performed, premiere, uniqueness, reprise, weekend) on demand. Secondly, in an attempt to find a more detailed explanation for the decline in theatre visits since 2008, the start of the financial crisis, I find that consumer trust does not significantly influence demand. Because during this crisis the government applied a higher VAT on performing arts, I was able to estimate the decrease in theatre visits in the short runas a consequence of the overall higher VAT, ignoring heterogeneity, in determining price of theatre. Finally, I attempt to control for the heterogeneity of the performances (in terms of popularity and artist) and succeed to some extent; by constructing a measure for popularity from search engine data and using a weighted average of PEoD estimates per artist, the quality differences between performances are partially included in the model for estimating demand.

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voor de mooie mensen

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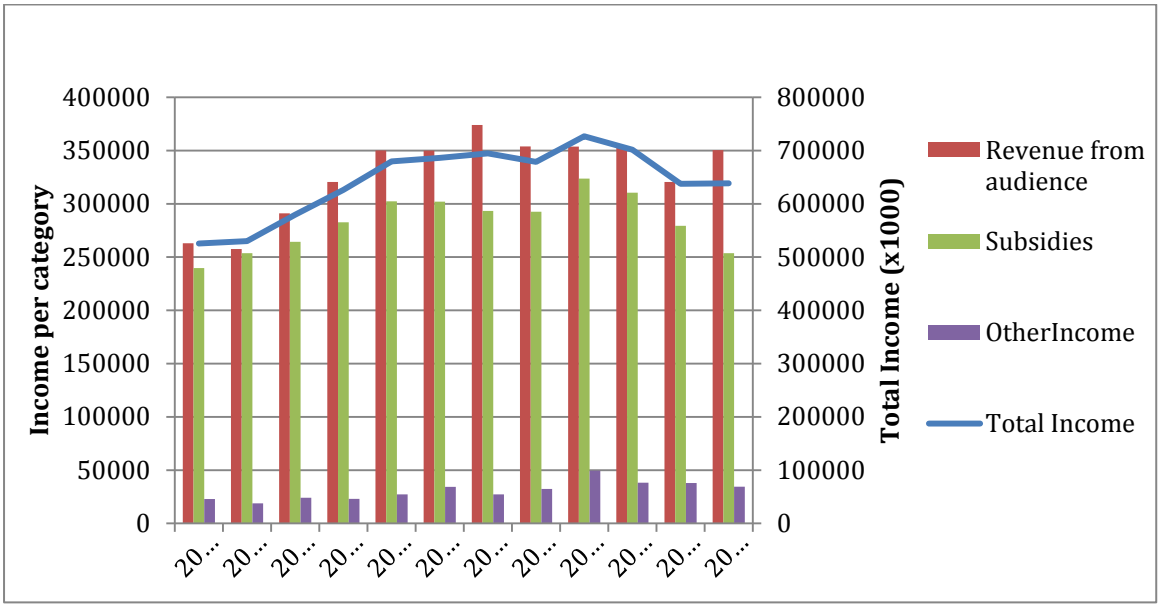
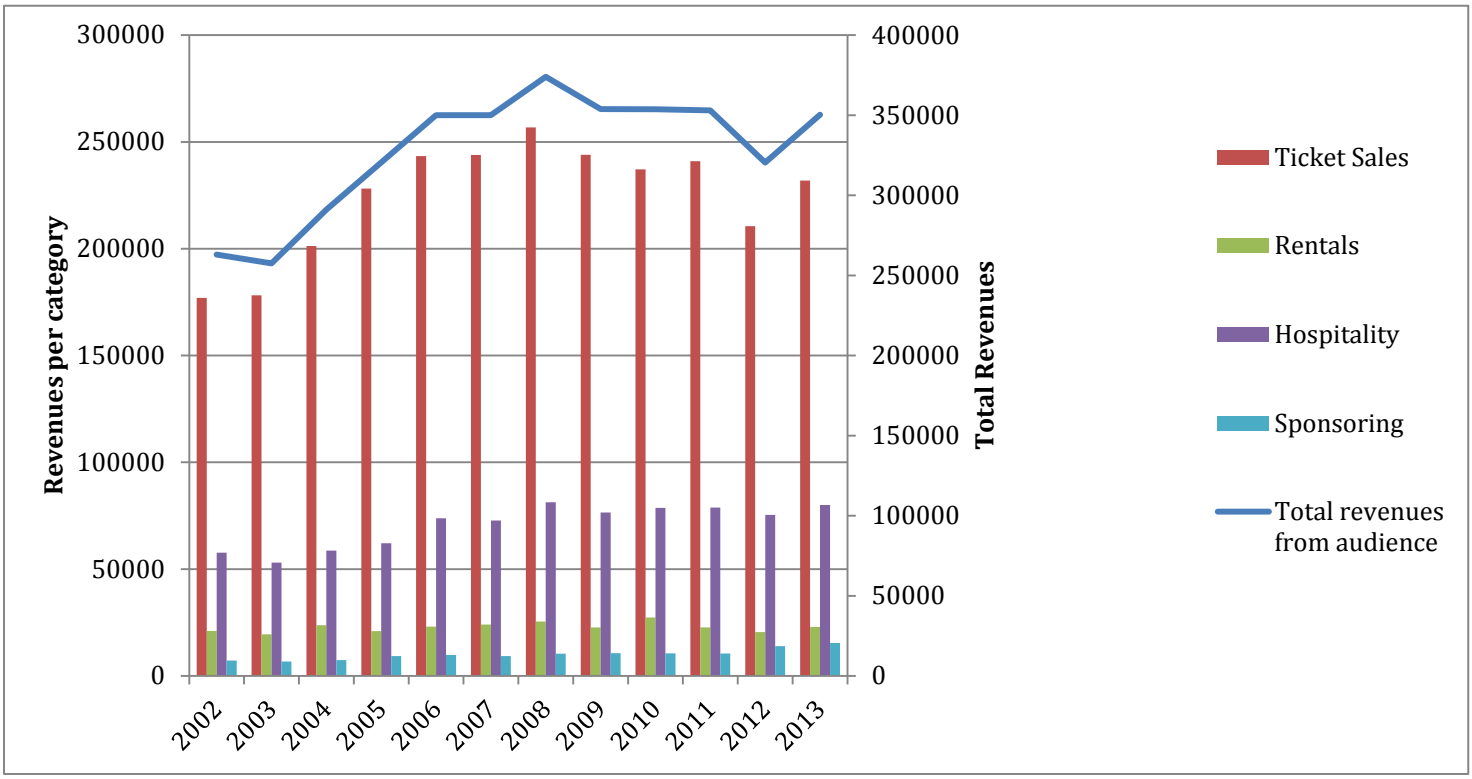
1. Introduction

In recent years the national government in the Netherlands has expressed the desire for theatres to become less dependent on subsidies and more capable of earning their own income (Ministry of OCW, 2010). Nationwide, the most important source of income for the theatre sector is ticket sales, as depicted in graph 1a and 1b. But the numbers in the Netherlands (graph 1a and 1b) show that from 2008 until 2012 the audience revenue has declined to slightly below the 2005 level. Blankers et al. (2012) say that the visits to all performing art forms have declined as a consequence of the economic crisis. They say that this decline is highest with the privately owned theatre producers, city halls and other middle to large sized theatres. Even though the number of visits slightly increased in 2013, as shown in graph 2, the numbers of the past ten years don't match with the government's idea of earning more revenue from audience; instead of compensating for the decline in subsidies by increasing audience revenue (i.e. selling more and/or higher priced tickets), theatres have earned less audience revenues. The economic crisis may be the cause of this disruption, but some questions arise. What aspect or aspects of the economic crisis have caused this decline in visits? To what extent can the change in demand be explained by other changes? What role can pricing play in increasing audience revenue? Has the tax raise from mid-2011 to mid-2012 caused severe damage to audience revenue? Is there a change in the economic circumstances of the visitors (on the demand side) or in the performing arts output (on the supply side)? This research originates from these questions and leads to the main research question: **"How do price and other factors affect demand for a Dutch theatre?".** A theme throughout this thesis will be the change in demand that resulted as a consequence of the financial crisis. In order to answer this research question models will be derived from literature and the parameters will be determined using an OLS regression. This will hopefully contribute to the understanding of the determinants of demand for theatre and how they change in times of economic recession. To get a good understanding of which determinants can influence demand for theatre it is important to link concepts from theory to the practical context of theatre in the Netherlands, particularly around the financial crisis.

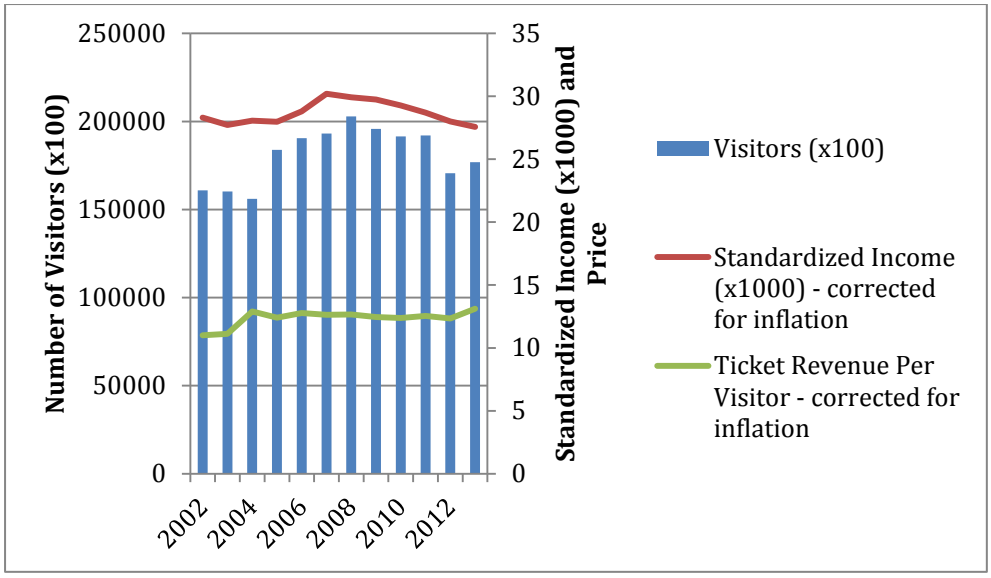


Graph 1a – Theatre Income in the Netherlands – *Source: CBS (2015)*



Graph 1b – Theatre Revenues from audience in the Netherlands – *Source: CBS (2015)*

Price increase can be a reason for consumers to not attend the performing arts (Colbert, Beauregard and Vallée, 1998). Over the last five years ticket revenue per visitor has not increased, but for a yea prices did increase as a consequence of a raise in VAT. Ticket revenue per visitor slightly decreased while aggregate demand for theatres also decreased by 5.2 % (Blankers et al., 2012). With the trend of theatres becoming more marketing minded (Boorsma and Chiaravalloti, 2010) it is essential to understand the factors that influence the relationship between price and demand (Bijmolt, Van Heerde and Pieters, 2005). The most recent studies on Price Elasticity of Demand (PEoD) in the Netherlands claim that demand for the performing arts in the Netherlands is price inelastic (De Groot, 2007; Goudriaan, De Groot and Schrijvershof, 2008; Blankers et al., 2012). However, there is no unambiguous conclusion on PEoD. In some cases it is not even clear if the role of price on demand is positive or negative (Lichtenstein, Ridgway and Netemeyer, 1993). Seaman (2006) says that for price elasticity the results are mixed. The majority of studies show the PEoD to be inelastic, but according to Seaman (2005) this might be due to the overly aggregated nature of the price estimation. Levy-Garboua and Montmarquette (1996) say that future studies should be more econometric, using more large data sets and with more room for taste preferences. In this study I meet the first two requirements and explore a way of meeting the third.



Graph 2 – Visitors vs. Price and Income – *Source: CBS (2015)*

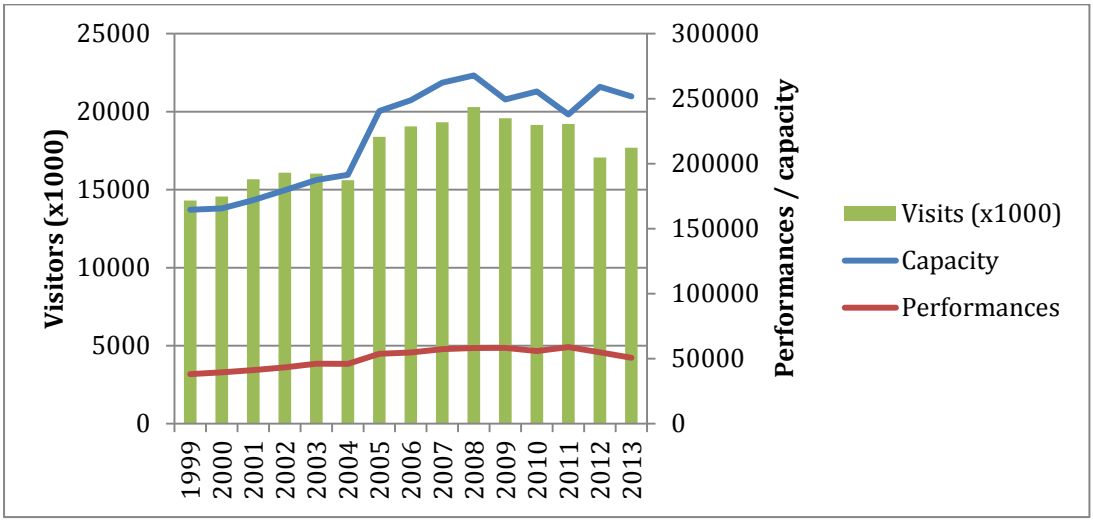
Particularly of interest in this research is that for a year, from mid-2011 to mid-2012, the government raised taxes (VAT) on the performing arts. In graph 2, it's depicted how in 2012 the number of visits is at its lowest in a nine-year-period. Demand, public subsidiaries and theatre managers are interacting concepts (Werck and Heyndels, 2007) and political-economic interference can influence demand (Krebs and Pommerehne, 1995). So therefore it's interesting to see how much of the drop can be attributed to the higher taxes. The question is to what extent this tax raise has influenced demand? How did theatre visitors respond to this price change? Aside from price, consumers' income and the price of substitutes have often been used to explain demand for theatre (Colbert, Beauregard and Vallée, 1998).

What's interesting in graph 2 is that, while ticket revenue per visitor remains relatively constant, the number of visitors and the standardized income per person appear to follow a downward slope from 2007 onwards. It is important to note that both ticket revenue per visitor and standardized income have been corrected for inflation. This inflation is mostly what puts the income under pressure and causes it to decrease. This fuels the idea that because life got more expensive during that period, visits to the theatre dropped. This could imply the income was used to fulfill more basic needs or spent on more attractive substitutes, but economic resources are not a major determinant of arts attendance, instead (art) education is a more important determinant (Borgonovi, 2007).

So what changed the spending pattern of the consumer if not the resources available? Jansen (2003) says that consumer trust can be a predictor of private spending from year to year. He defines consumer trust as the weighted average between the consumer's willingness to buy and the perceptions of the economic climate. The consumer trust in the Netherlands was very low in 2012 (Appendix 1) at the same time demand for theatre tickets was at its lowest point in ten years, as is shown in graph 2. From a practical perspective, it is opportune that CBS measures consumer trust on a monthly basis, therefore allowing for analysis on a less-aggregated level than would be necessary for yearly income. Consumer trust is an attitude rather than a form of actual income or behavior. This means that, to approximate economic conditions, this thesis incorporates an attitudinal element in an econometric model of demand for a specific theatre over a large timespan.

This study will also look into factors on the supply side per performance. The effect of some performance characteristics (e.g. genre, premiere vs. non-premiere, unique vs. non-unique, reprise-vs. non-reprise), based on the research using sales system data by Lamaanen (2013) on demand will also

be studied. As well as a weekend vs. weekdays based on the research by Corning and Levy (2002). These output characteristics on the performance-level can also influence demand (Werck and Heyndels, 2007). Another supply-side explanation for the decline in theatre visits would be that because of the decline in subsidies less performances and/or less capacity is supplied leading to a reduced income. However, as is depicted in graph 3, the number of visits also declined when capacity rose and the number of performances appears relatively stable over time. In this graph capacity represents the total number of theatre seats available in the Netherlands. Therefore it seems as though there's another factor than supply causing a drop in demand for theatre. Nevertheless, this graph does not provide insight into the nature of the output provided, only into the number of performances and the capacity, and therefore it would be interesting to see if the frequency (i.e. number of performances) and the nature of the output (e.g. more/less popular performances) have changed and could have a part in the decline of theatre visits.



Graph 3 – Visits, Performances and Capacity of Dutch theatres – *Source: CBS (2015)*

In continuation of the research on what drives demand for theatre and what caused the decline in theatre visits around the economic crisis, I will also look at if the pricing strategy could be refined to increase sales revenue. How can theatres increase sales revenue? What is the right pricing strategy? According to Throsby (1977), theatres base their pricing strategy on costs, demand or ideological motives. Especially the ideological based pricing leads to price discrimination, often keeping the price artificially low. This non-price rationing benefits certain segments, but from an economic perspective it would be more attractive to maximize the utility for every consumer, thus optimizing revenue (Volpano and Bilotkach, 2008) which is especially attractive to theatres in light of the recent policy developments.

Dolan (1981) suggested that one of the steps necessary to improve pricing policies is to find an optimal price structure. An optimal price structure would use price and product differentiation based on quality (Huntington, 1993). But how can heterogeneity be accounted for? Lamaanen (2013) has succeeded in creating a model for estimating demand, based on the sales data of an opera house, partly controlling for heterogeneity by including performance characteristics. However, the opera house in Lamaanen (2013)'s study programmed only one genre. To control for heterogeneity, this study will examine to what extent models can be applied to specific artists and how this differs from the more aggregate estimates of demand factors. To approximate a measure of quality, the popularity of the artists, based on data from search engines, as it develops over time will be incorporated in the model.

This might be a factor influencing price and demand simultaneously, because the greater the interest of a theatre patron, the less sensitive to price this patron is (Colbert, Beauregard and Vallée, 1998) and the price is endogenous and set by the theatre itself (De Groot, 2007). So the popularity or perceived quality of a performance may determine both at what level the price is set as the level of demand for the performance. This is especially relevant because of the capacity constraints of theatre halls (De Groot, 2007), which make it more interesting for theatres to account for heterogeneity to differentiate prices based on quality to maximize yield. In other words: how can a theatre use the heterogeneity of the performing arts to its advantage?

Personal motivation and structure of the thesis

My personal motivation for performing this study is that I believe that a theatre sector earning its own income also earns artistic autonomy. I think the mission of the theatre sector should be to be able to produce as many artistically autonomous performances as possible and that one of the ways to do so is by maximizing audience revenues. Of course, attempting to maximize revenue has the risk of leading to theatres only catering to demand rather than autonomy. This however is only the case if theatres fail to recognize the heterogeneity of tastes and willingness to pay on the demand side and performance characteristics on the supply-side. This heterogeneity allows for marketing strategies and more specific pricing strategies that allow for price differentiation. I think the heterogeneous nature of the performing arts allows for cross subsidization as a long-term strategy to finance loss-making activities that theatre managers care about (James, 1983).

This thesis is a study of demand for theatre aimed at using a model based on revealed preference to predict demand for a single theatre on the per month-, artist-, and performance-level. The study is structured as follows: in the next chapter, chapter 2, the theoretical framework will be explained through a literature review aimed at providing an overview of what the factors of demand for the performing arts are and to explain how some of these concepts are operationalized for this research. In chapter 3 the methodology, data collection and research design of this thesis will be expanded upon. This is where the variables to research the determinants of theatre demand will be explained in detail. Also the method of data collection as well as a description of the data source (the theatre) will be discussed. After this, in chapter 4, the results will be interpreted and the output of the analysis is presented to provide further insight into the determinants of theatre demand on the three levels mentioned before. Finally, chapter 5 will contain conclusions, discussions, limitations and recommendations for further research that can be drawn from this research, as well as the implications for academics and theatre managers.

2. Theoretical Framework

Just like the majority of studies that have been performed on demand for theatre, this paper can be placed with the econometric studies. This means a model will be used to predict demand by looking at a set of determinants and their parameters. There is no illusion that this model will be exhaustive in explaining every aspect of the complex concept of demand for theatre. So why do it? Boot (2014) describes the way economists work: he says they create models to look at the world from a simpler perspective to understand it a little better. This is also the aim of this research: to understand demand for theatre in the Netherlands a little better by investigating what does and what doesn't influence demand for a specific Dutch theatre. The model in this paper will examine demand by looking at the price, economic environment, popularity and substitutes.

Demand for the performing arts is a complex concept because the arts are generally heterogeneous in nature (Throsby, 1994), taste preferences are different for each individual consumer, even per performance, (Urrutiaguer, 2002) and consumers are driven by psychological factors and motivations (i.e. aesthetics, education, escapism, recreation, self-esteem enhancement and social interaction) (Swanson, Davis and Zhao, 2008). Next to that, consumption is not really consumption and it is unclear what people consume when experiencing the arts (Klamer, 2002).The utility for the consumer can thus only be ascertained afterwards, classifying the arts, and performing arts in particular, as an experience good (Nelson, 1970). Because of this the consumer is often unable to make a well-informed decision based on attributes that can be known prior to purchase. This leads to information asymmetry between supplier and consumer in the arts when the information about the product is mainly "created, processed and distributed by the supplier" (Trimarchi in Towse, 2011, p. 357). The control of the supplier over the information that reaches the consumer means that the supplier can choose to either share or withhold information in order to convince the consumer to purchase.

This influence of the supplier on the demand is called 'supplier-induced demand' and creates a risk for the consumer (Willis and Snowball, 2009). This is because the utility the consumer expects previous to consumption on the basis of the information shared by the supplier might differ from the utility experienced at consumption. This is also shown in the difference between arts marketing and traditional marketing: where traditional marketing is aimed at meeting the needs of the consumer, marketing in the arts is aimed at finding the right consumer for the supply (Colbert, 2003). A first way of overcoming this problem is by sticking to the art that proved a positive experience in the past, also called habit formation (Krebs and Pommerehne, 1995). This theoretical conjecture has been used to explain why future consumption depends on past consumption (Seaman, 2006). But risk can also be a utility-increasing factor for an art consumer (Willis and Snowball, 2009); experimenting and finding art that is really enjoyable makes the occasional bad experience acceptable. It is acceptable because it is a novel experience that the consumer is looking for, a form of positive uncertainty that is desired by users because the surprise can generate strong and positive emotions (Hutter and Hoffman, 2014). This makes it difficult to compare with other products, because the value is not physical but self-generated (Hutter and Hoffman, 2014).

Nevertheless, reducing the bad experiences is attractive and this need is partly covered by a system of third-party assessment, where a great deal of information about quality is produced and exchanged by experts, critics and consumers themselves (Trimarchi in Towse, 2011). Or, as Hutter and Hoffman (2014) put it: a system of praise and price to reach stable values; where the third-party assessment together with the quality-signaling function of price help a consumer to maximize utility in the form of more positive and less negative experience. To navigate through this third-party assessment and the broad cultural offering, consumers need cultural capital (Bourdieu, 1986) which consists of the accumulation of cultural assets (i.e. cultural goods, qualities of mind and character and qualifications). The way to acquire this capital is by education, consumption and discovering individual taste preferences. This is also related to the notion of learning-by-consuming (Lévy-Garboua and Montmarquette, 1996). Learning-by-consuming assumes that by attending the arts the consumer discovers what tastes and preferences he or she has, leading to either positive or negative feedback. This theoretical construct distinguishes between preferences and actual behavior. Therefore asymmetric information between supplier and consumer can still exist, because the knowledge about preferences does not mean knowledge of product characteristics. Apart from this, the level of cultural capital also changes the utility experienced for different types of art, which is called rational addiction; where positive experiences in the past lead the consumer to want more and more in the future (Lévy-Garboua and

Montmarquette, 2003). So because developing cultural capital increases the utility experienced and decreases the costs of searching and assessing third-party it can be seen as an investment and enjoying the arts can be seen as a return on that investment, as Klamer (2002) explains the economic perspective. And therefore the decision to attend the arts is still a decision based on weighing the benefits and the costs, representing the essential economic calculus of pain and pleasure. But what are the conditions under which consumers will make that initial investment? What are the factors that determine demand for the performing arts?

A prominently present factor in demand for performing arts studies is the price of attending. Just like in art auctions price is the primary source of objective information (Ashenfelter and Graddy, 2003) in theatre price is a way for the consumer to take away uncertainty, to some extent. In order for someone to attend the arts, the benefits (i.e. positive experience) must outweigh the costs (i.e. market price and shadow price). Besides from this, the consumer has to have enough capital (both cultural capital as capital in the form of time and money). Seaman (2006) says that a rise in arts appreciation does not necessarily mean a rise in observed attendance. This is because there is a distinction between shadow price (i.e. effort made to appreciate art) and market price (i.e. ticket purchase). Shadow price contains not only the price of a theatre ticket, but also the search costs of finding information to reduce risk of a bad experience (Globerman, 1978). It also contains the opportunity cost of investing time and the transaction cost associated with traveling to the theatre and spending money before and after the show. As for the market price, own price elasticity has often been reported to be inelastic (Lévy-Garboua and Montmarquette, 1996). It is tempting for any art aficionado to explain this insensitivity as proof that the benefits of attending the performing arts by far exceed the monetary costs of the ticket and consumers want to attend theatre regardless of the price. However, this does not take into account alternative explanations for the estimated price inelasticity. One alternative explanation is that theatre output is limited because of capacity constraints, causing a right censoring in the demand for theatre. This means the demand could have been higher at that price than measured in audience numbers, simply because the room was full, thus biasing the estimate of price elasticity. Next to that, prices are often kept artificially low to attract more audience or be friendly to a specific audience group (e.g. students or seniors) (Kolb, 1997). This causes a biased result for price elasticity estimates because consumers may be indifferent to price changes as at a low price-level, but less so on a high price-level. Another reason the estimates of price elasticity may be distorted is again the information asymmetry between supplier and consumer. As there is no objective standard for the quality of a performance and the price of the performance is endogenous (i.e. determined by the supplier), the price can be a signal of quality (Urrutiaguer, 2002). As a recent health economics study found that two groups when given the same saline, but different information about the price-level, the group that thought to be taking a more expensive medicine reported more improvement in their health (Begley, 2015, January 28). Lichtenstein, Ridgway and Netemeyer (1993) also say that the role of price on demand can be both positive as well as negative.

Nevertheless, most studies report negative price elasticity (Seaman, 2005). Recent studies on PEoD in the Netherlands claim that demand for the performing arts in the Netherlands is price inelastic (De Groot, 2007; Goudriaan, De Groot and Schrijvershof, 2008; Blankers et al., 2012). This is consistent with many international studies on demand for performing arts, as is shown by Seaman (2005). However, in his overview of empirical research on PEoD, there are a number of articles with at least some results that contradict the claim that demand for the performing arts is price inelastic. Pricing can also be used as a strategy to maximize revenue, audience or even quality if cross-subsidization is used. Throsby (1977) explained there are three ways theatres set prices: based on costs, based on demand

or based on ideological motives. Especially the last one can lead to price discrimination when certain segments are charged differently (Courty, 2000). This can occur on three levels: the individual level (e.g. negotiating with each separate customer), the volume level (e.g. group discounts/surcharges) and the group level (e.g. charging people pertaining to a group different) (Leslie, 2004).

However, from an economic perspective price differentiation is more attractive than price discrimination (Langeveld and Stooker, 2013). Especially because there is a large psychological and subjective factor the interpretation of it (Monroe, 1973). Price differentiation needs at least a slight difference in the product. This is different from price discrimination where the same product is sold at different prices to different individuals or groups. Price differentiation therefore implies a level of 'self-incrimination' where the customer chooses to pay a higher price because he or she beliefs the benefits outweigh the costs thus maximizing personal utility (Harford, 2008). In particular it is attractive to differentiate price and product based on quality (Verboven, 2002), thus providing every consumer with the opportunity to maximize utility whilst at the same time maximizing yield as an organization. This pricing strategy would lead to a PEoD very close to zero; as an individual price is set for each consumer demand would be constant. Technological advances have made it possible to implement such price strategies (e.g. dynamic/smart pricing, Langeveld and Stooker, 2013) and to find out per artist, per performance and potentially even per targeted segment or individual consumer if price could have been set higher or lower.

Aside from price another predictor often used to predict demand for the performing arts is consumers' income (Colbert, Beauregard and Vallée, 1998). Income elasticity is found to be positive and elastic in most studies Zieba (2009), which supports the notion of the performing arts as a luxury good (Moore, 1966). However the results for calculating income elasticity are ambiguous (Seaman, 2006). Moore's (1966) own study did not yield the expected result of a significant income elasticity of +1. He says this might be because of the higher opportunity costs that go with a higher income; the higher an individual's income the more income lost when spending time in a theatre and not at work. Gapinski (1986) also mentioned this as an explanation for the unresponsiveness of attendance to income. Zieba (2009) derived significant income elasticity above one for the disposable income and even higher for the full-income (calculated by including the opportunity cost of leisure). Her conclusion was that an increase in price of leisure time – opportunity costs - counterbalances the increase in full-income and based on this; art can be seen as a luxury good. However, the explanatory power of income on demand has been questioned (Snowball, 2008). Even though it has an impact on demand, education is a much greater determining factor than any other personal characteristic (Castiglione, 2011). Therefore income may actually be a mediator or a by-product of the effect of education on demand. Other conditions and environmental changes can influence consumer behavior as well (Peter and Olson, 2001).

This paper is also aimed at studying the demand of the performing arts in light of developments in the economic environment. The world has experienced (or is still experiencing) a financial recession (The Economist, 2013, September 7th) and the consequences of this have been visible in the Netherlands as well. Meanwhile VAT on performing arts was raised from 6% to 19% over the period of a year (from July 1st 2011 to July 1st 2012). Politico-economic interferences and differing interests like this show there is interaction between demand for the performing arts, public subsidiaries and theater managers like in the article by Krebs and Pommerehne (1995).

Next to that, economic conditions lead to different patterns of demand for the performing arts (Akdede and King, 2005). The low consumer trust, as a consequence of the crisis, has caused private spending to drop (Bloemer, 2008). Jansen (2003) says that consumer trust can be a predictor of private spending from year to year. He defines consumer trust as the weighted average between the

consumer's willingness to buy and the perceptions of the economic climate. The reason it predicts private spending may be the substitution effect: the idea that less first-period consumption, obtains an extra unit of second-period consumption. A limitation to the concept of consumer trust is that it is based on an attitude instead of actual behavior or conditions. Nevertheless it would be interesting to incorporate it in a study, because it is a good approximation to control for the effect of economic malaise and it is measured on a monthly basis. This is an illustration of the trade-off between market data studies and survey-based studies; where survey-based studies can create insights into how consumer's intention is affected by conditions, market data studies allow to create insights into their actual behavior. So in this case: where a survey-based study would be able to collect specific attributes of the consumer, studies based on market data typically cannot. However, studies based on market data also have some advantages, which will be elaborated upon in the research design section.

Colbert, Beauregard and Vallée (1998) say that substitute price is another predictor often used to explain demand for the performing arts. Beaumol and Bowen (1966) introduced the notion of price of substitutes serving as a determinant for the performing arts and several authors have used different ways of operationalizing this concept to measure its effect on demand for theatre. Some have used the price to go see a movie (Baumol and Bowen, 1966) where others have used reading or recreation (Withers, 1980). In the study by Lévy-Garboua and Montmarquette (2003) no evidence for close substitutes for the performing arts has been found. According to Gapinski (1986) the closest substitute for a performance is another performance because performing arts are not homogeneous. Levy-Garboua and Montmarquette (1996) found evidence that the perceived quality of available substitutes and regular reading had a strong negative relation with demand for a performance. This implies that the market for culture is much broader than expected and people make a trade-off between different cultural activities such as spending a night on the sofa reading, going to the theatre or enjoying any other cultural activity.

The role of quality on demand for theatre has been stated by Throsby et al. (1990) as more important than the role of price. This is expected to be found in empirical data as well. But how is quality measured? One of the first to be able to predict demand using the factor of quality was Throsby et al. (1983) using five objective criteria (nature of source material, standard of script, standard of performance, standard of production and standard of design). He concludes that demand can only be predicted based on these criteria in a limited way. In a similar effort Zieba (2011) uses quality indicators, such as artistic wages and décor and costumes expenditure, but they do not prove to be reliable, generalizable predictors of demand. Moving away from objective criteria to individual subjective a priori assessment, Abbé-Decaroux (1994) says it's more about the beforehand perception of quality. Lévy-Garboua and Montmarquette (1996) also acknowledge this heterogeneity of tastes and say the quality is subjective. This subjective nature of quality is accounted for by Radbourne, Jahonson, Glow and White (2009) in their measurement of audience experience. They base their measurement on four areas: learning (knowledge/information transfer), risk, collective engagement and authenticity. They say that the outcome of improving audience experience is more audience engagement and repeat attendance. But this is an assessment *after* the visitor has been to a performance at the theatre. But what determines the a priori assessment of a performance? Willis and Snowball (2009) use choice experiments to look at this beforehand assessment of a performance based on individual preferences ad conclude that different consumers are appealed to different performance attributes based on psychological and socio-demographic factors. Because of this subjectivity and heterogeneity taste preferences are different per individual and therefore hard to asses on a study that is not based on the level of the individual. And as Blaug (2001) says, the market demand and supply functions are an

aggregate of the preferences of individuals. To overcome this problem, Urrutiaguer (2002) sees reputation as a sign of quality and a mean for theatregoers to estimate the quality of a performance beforehand. In line with this, Laamanen (2013) combines press reviews, product characteristics, popularity and seasonality to control for this qualitative reputation. In other words, outside of looking at individual taste preferences and motivations, the performance characteristics and the perception of reputation can be a priori determinants of demand because they are signals of quality for the consumer. This can also be due to more marketing effort or a larger production receiving more nationwide press-coverage.

Research Gap

This study is aimed at exploring the predictors of demand for the performing arts, especially in light of the recent decline in theatre visits in the Netherlands. It's aimed at establishing whether the cause is located on the supply-side (e.g. different output or output characteristics) or on the demand-side (e.g. changing taste preferences or economic conditions) or both. Doing this will hopefully shed more light on the demand function of the performing arts and how it is affected by changes in the environment, serving both an academic as a managerial purpose. For this reason, much attention will go to the concept of price, as it is relevant for both theatre managers aiming to refine their marketing strategy as for academics striving to better understand the mechanics of price. Studies calculating price elasticity of demand for theatre in the Netherlands have reported price elasticity's between -0.43 (De Groot, 2007) and -0.35 (Goudriaan, De Groot and Schrijvershof, 2008). They calculated the price elasticity based on the data by the VSCD to which only large-sized Dutch theatres can join. One of the limitations to these studies is that they are based on highly aggregated data, creating the possible flaw that instead of comparing different audience sizes at different prices, in fact they are comparing differences between theatres, both intended by the theatre (e.g. mission) and unintended (e.g. reputation). Within the econometric studies, the highest level of aggregation is the yearly average price and number of visitors per theatre (e.g. Zieba 2009) and the lowest is a segmentation of individual customers per performance (e.g. Corning and Levy, 2002). Seaman (2006) and Swanson, Davis and Zhao (2008) also argue that the use of more disaggregated data would be statistically superior. By looking at the specific case of a theatre over a number of years, I want to test if the price elasticity measured for a specific theatre would lead to different results than the results of De Groot (2007) and Goudriaan, De Groot and Schrijvershof (2008). Focusing on just one theatre is strength, since it is a confined area and presumably many environmental factors (such as venue, programming and audience experience) will remain roughly constant, as well as a limitation to generalizability. This could be covered for if more theatres open up their data. Unfortunately there may not be more theatres in the Netherlands willing to share their sales data of the last fifteen years and they may not even have it available. In the next section I will discuss in more detail how I plan to do this research, make the tradeoff between accepting limitations and dealing with them regarding the scope of this research and attempt to find an answer to the research question of what determines demand for theatre.

3. Methodology

In this section the methodology to explore the determinants of demand for the performing arts will be presented. First, the research design and the trade-offs that had to be made to reach the results will be expanded upon. Secondly, the research unit from which the data were collected will be discussed to show the reliability of the data. Thirdly, the variables on all three levels of research for which data was

collected will be described. After this, in the fourth section, the models created to answer the research question will be discussed, as well as the expectations based on existing literature and empirical data. And in the last section I will discuss the strengths and limitations of this research design.

Research Design

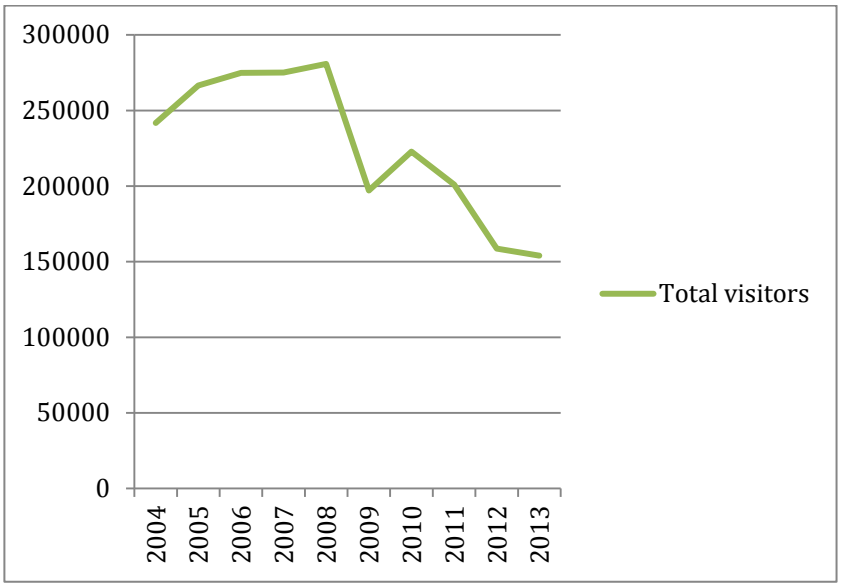
This research will use revealed preference (RP) to study the determinants of demand for theatre. Grisolía and Willis (2011) distinguish between RP and stated preference (SP). SP asks theatregoers to state what their preferences for certain combinations of attributes are compared to another combination of attributes. This has the advantage that it avoids the need to collect data from a large number of productions or theatres, but has the disadvantage that there can be a discrepancy between the way people intend to act and the way they actually behave (Armitage and Christian, 2003). The problem with investigating SP instead of RP is that actual behavior often differs from behavioral intention because of a change in the consumer's environment (Peter and Olson, 2001), the disruptive effect of psychological distance (Trope, Liberman, & Wakslak, 2007) and a consumer's belief of control (Armitage & Christian, 2003). To illustrate: a consumer may be more inclined to purchase an unhealthy snack when he or she is in a specific environment that stimulates the individual to be hungry *(consumer's environment).* This individual may normally care a lot about health, but because the consequences of eating unhealthy are far away from the self at that moment at that place the individual may forget his or her previous intentions and beliefs *(psychological distance).* When the individual feels like there's no other option and maybe feels this is the only food available to him or her *(perceived beliefs of control)* this can both directly influence behavior as a proxy of actual control (maybe it is really too far away) as an indirectly influence it as a belief in one's ability (e.g. I can't walk that far). Therefore this study will use RP to study actual factors of demand for theatre. RP is a model of measured behavior of theatre goers where the outcome (demand, ticket sales, attendance) is a function of some predictors (e.g. the attributes of the good, price and travel costs). All factors in the model will be RP with the exception of the variable used as a proxy for economic circumstances, consumer trust, on which will be elaborated later.

The studies for demand for theatre roughly take place on three economic levels: the macro-level of one or more regions or countries (e.g. Withers, 1980; Bonato, Gagliardi and Gorelli, 1990; Urrutiaguer; 2002; De Groot, 2007; Werck and Heyndels, 2007; Zieba, 2009; Zieba, 2011), the meso-level of one or more organizations or producers (e.g. Moore, 1966; Kolb, 1997; Willis and Snowball, 2009; Lamaanen, 2013) and the micro-level of performances, productions, artists and, last but not least the individual consumer (e.g. Abbé-Decarroux, 1992; Felton, 1994; Lévy-Garboua and Montmarquette, 1996; Ekelund and Ritenour, 1999; Swanson, Davis and Zhao, 2008; Grisolía and Willis, 2011). This study will take place both on the meso-level of organization-wide demand per month, as on the micro-level of per performance and per artist demand for theatre. This research aims to account for the heterogeneity of the performing arts and attempts to incorporate the attitudinal factor of consumer trust into the econometric model for theatre demand. To analyze the data and estimate the parameters of the determinants of the econometric model of demand on different levels a multiple OLS regression will be performed. The models are shown in the 'models and expectations'-section of the methodology.

Research Unit

The sales data used for this research is from a specific theatre in the Netherlands. This theatre has also suffered the decline in theatre visits just like the rest of the sector, as visualized in graph 3.1. An important note on this theatre is that they have a proactive pricing strategy and active adjustments of the prices to each individual performance. There are a number of reasons for choosing this theatre. Firstly,

it is practical because the general manager of the theatre is an accessible and knowledgeable source. Secondly, this theatre has records of sales data over a time span of 2004-2014, which not many theatres possess, let alone are willing to share. And thirdly, because it is the data of a single theatre in one city, we can assume some variables to remain roughly stable over time. This includes demographic variables (e.g. education, age, gender, see appendix 1), but also some variables that are inherent to the organization of the theatre (e.g. reputation, marketing expenditures, organizational culture). Finally this theatre is a large hall, often with multiple performances each day with multiple rooms and a very diverse programming ranging from Opera to Cabaret. This benefits the external validity of the research. Next to the variables collected from this theatre, other variables are collected from the Dutch Central Bureau for Statistics (CBS) and Google Trends and discussed in the section below.



Graph 3.1 – Total number of visitors per year in this theatre

Table 3.1 Genre. characteristics and location of performances

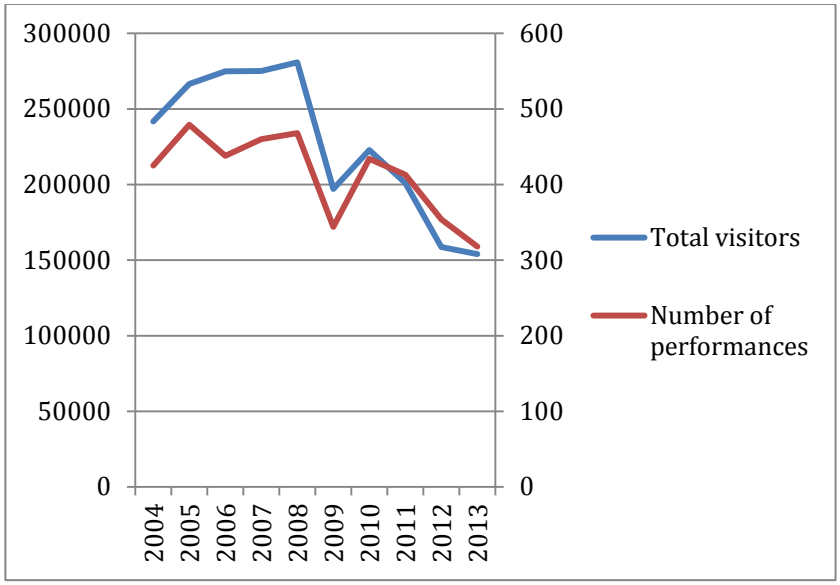
Genre	Not weekend	Weekend	Number of performances	Mean number of visitors per performance	Standard deviation	Price	Standard Deviation
Amateurs	8	42	50	368.2	281.3	€ 10.69	€ 5.73
Cabaret	364	279	643	649.5	497.1	€ 19.20	€ 4.62
Circus	1	3	4	717.3	575.7	€ 35.67	€ 15.02
Classical dance	11	18	29	826.9	291.2	€ 31.42	€ 5.63
Modern dance	98	90	188	238.5	232.6	€ 16.21	€ 8.23
Jazz	18	31	49	217.8	214.8	€ 15.88	€ 4.58
Conventional youth programming	88	257	345	641.7	361.1	€ 16.35	€ 5.64
Unconventional youth programming	37	171	208	151.6	122.5	€ 10.30	€ 3.03
Musical / show	403	491	894	890.9	376.1	€ 35.85	€ 11.52

Classical Music	38	122	160	447.8	199.6	€ 21.02	€ 5.04
Light music	269	348	617	625.6	450.4	€ 22.50	€ 8.29
Musical theatre	4	4	8	96.0	50.7	€ 14.98	€ 6.02
Modern Opera	4	8	12	193.1	138.3	€ 21.76	€ 6.02
Traditional Opera	37	27	64	620.1	245.2	€ 33.09	€ 4.11
Operette	2	9	11	612.7	178.2	€ 29.94	€ 3.05
Non-dutch drama	4	0	4	115.3	48.0	€ 17.35	€ 5.59
Conventional Drama	133	94	227	441.5	247.7	€ 22.42	€ 5.27
Unconventional Drama	267	308	575	166.9	179.6	€ 14.01	€ 5.62
Worldculture	50	95	145	335.2	283.5	€ 18.74	€ 5.76
Premiere	11	11	22	718.4	411.4	€ 17.63	€ 12.32
Reprise	61	59	120	921.3	416.2	€ 24.33	€ 8.69
Unique	1037	1338	2375	366.4	340.6	€ 18.00	€ 7.35
Large room	630	781	1411	962.0	367.4	€ 31.48	€ 11.35
Middle room	565	698	1263	370.8	197.2	€ 19.63	€ 5.52
Small room	321	549	870	107.6	58.3	€ 11.93	€ 3.96
Room unknown	320	369	689	582.0	410.2	€ 20.31	€ 9.57
Total	**1836**	**2397**	**4233**	**548.1**	**437.3**	**€ 22.11**	**€ 11.09**

Variables

The outcome variable, demand for performing arts at this theatre, will be defined by the total number of visitors per performance or per time period. In other research (Zieba, 2009; De Groot, 2007) this number is divided by the total population to correct for size and growth of the population and create a per capita number of visits. But because this research focuses on a theatre in one city with no significant changes in population size (see appendix 1) and analyses are made on either a per month or a per performance level, dividing by population will not lead to better results. Preliminary testing showed that the total number of performances (supply) explained about 80% of the variance of total number of visitors (demand) on a yearly basis. This shows that the all-over decline in theatre visits is mostly due to lower output. This shows the nature of theatre demand is supply-induced, as is visualized in graph 3.2. To gain a deeper insight into what determines demand outside of the amount of planned performances, it is therefore studied on a per performance basis as well. The first predictor variable used is price, which is calculated by dividing sales revenue by the number of visitors per performance. This calculation of average price does take into account discounts and/or different rank, which is a limitation to assess the pricing strategy of the theatre. So this research is more aimed at studying different prices between performances than to assess the pricing strategy at a customer (-segment) level. Price is corrected for inflation using the Consumer Price Index (CPI) on a per month base as calculated by the CBS. Next to price, there are some performance characteristics that will be included in the model. First of all there will be a variable of the n^{th} time of the performance to see if times performed effects demand. Dichotomous variables will be created for premieres, reprises and unique performances. It should be noted that premiere in this research means the performance actually premiered at the theatre and reprise means

that a performance or a series of performances was planned for an extra time, after what can be assumed to have been a successful first run. Also, a dichotomous variable has been created for sold-out. At this theatre there was room to add an extra ten seats to the room if a performance was sold out, so if the number of visitors was within ten seats around the maximum capacity of one of the three rooms, the performance was marked as sold-out. This is far from perfect, but at least it will give some idea of the number of sold-out performances to take into account when interpreting the results. To check if this measure makes sense the percentage of sold out performances will be checked with the theatre management. Next to that it will also be checked if the percentage of sold-out performances changes disproportionately at a higher threshold of 30 seats. Last but not least, a dichotomous variable has been created for all the performances that took place during the tax raise; this way the effect of the VAT raise on demand can be observed.



Graph 3.2 Total visitors per year and total number of performances per year at this theatre

On a monthly basis, demand is also the outcome variable and calculated by dividing the total number of visitors in that month by the total number of performances per month. By constructing the outcome variable this way and comparing the average number of visitors per performance on a monthly basis I hope to gain a deeper understanding into the demand-side of theatre. The predictor variable is the average ticket price per performance, corrected for inflation. To approximate the effect of economic environment on demand, consumer trust is included as a predictor variable. This is collected from the CBS and constructed on a monthly basis. The variable consumer trust shows a more interesting development than income, as income is roughly the same in 2004 as in 2013, when corrected for inflation. Income increases slightly in the beginning of the 10-year period and decreases slightly from 2008 onwards, as a result of the financial crisis. But consumer trust has fallen at a higher pace (see appendix 1), potentially explaining decreased consumer spending. This could affect a cultural good such as theatre in particular. To see if changes in the output could have caused the decline in demand, the number of performances that took place in that month is also included in the model. Next to this a proxy was created to account to an extent for the type of programming at the theatre. Preliminary analysis of the data showed that because musical/show is the most programmed genre there is a risk of multicollinearity in adding more than one genre to the analysis. Next to this a regression model can only

contain a limited number of variables in relation to the total number of cases. So only the percentage of performances per month that were musical / show is used as a proxy to see if changes in programming caused changes in the demand. Next to this, the variable to control for the price of substitutes is collected from the CBS: the CPI for musea and for reading has been collected, based on previous research by Withers (1980). Next to these, the CPI for movies and theatre has been collected because Gapinski (1986) says the best substitute for the performing arts is the performing arts due to its heterogeneous nature.

To attempt to control for quality as a factor, I will take a look at a per artist level. I will look at all the artists that performed at this theatre over 15 times. This number is set as a threshold to explore factors of demand for a number of artists, also taking into consideration the scope of this research. The intention of this is to explore how estimations of factors of demand work on the per artist level. For the artists on which this measure is available, I will also include an approximation of popularity. Felton (1992) argues that popularity can be a driver of demand. This variable will be collected from Google Trends and is a representation of the number of times the artist name or a similar search term has been entered in Search Engine Google at a certain point in time relative to the highest number of searches performed at a point in time over the entire timespan for that artist. This way I aim to find a way of controlling for the popularity of the artist at a certain point in time, which may have an effect on demand. Of course a high number of Google Searches can also be caused by the artist receiving negative attention or even by chance, which has to be taken into account when interpreting the results

Processing and Report

To create the dataset needed to perform the OLS regression analysis and answer the research question first of all the raw data set was cleaned of the data that wasn't about live performances (e.g. restaurant, parking, workshops, see appendix 3) and case numbers were added. Then the variable genre was recoded to a dichotomous variable per genre on the basis of this theatre's reporting system. After that the variables weekday, weekend, year, premiere, reprise, uniqueness, number of performances and VAT were added, based on the date and title of the performance. As for the price variable, it was constructed by dividing revenue with the total visitors per performance and adding the taxes (6% in general and 21% for a specific period). After this the variable for CPI was added and all prices were corrected for inflation (2006=100). For the per month level the average price per performance per month was calculated as well as the average number of visitors per performance per month. The consumer trust, approximating economic condition, and CPI variables, approximating substitute prices, were retrieved from CBS (2015). After this on the artist level the popularity variable was retrieved from Google Trends (2015) by looking how much the artists had been searched for on Google relative to their own highest number of searches on Google. This measure was only available for some artists and it is only included for the exploratory purpose of seeing whether or not there is reason to assume it influences either price or demand for theatre.

As previous research (e.g. Zieba, 2009, Laamanen, 2013) has shown the data often needs to be transformed. This is done because otherwise the assumptions of normality are violated and the regression is biased (Fleishman, 1978). Box and Cox (1964) propose several methods to transform the data and provide support for those methods. Field (2009) has made an overview of the uses of data transformation, which is shown in Appendix 2. The need to use transformations and the selection of which transformation is used is discussed in this chapter and depicted in the models for the regression.

a. Per Performance

The first level of analysis is the level on which the data has been collected in the first place: per performance. On average a performance staged at least twice drawing around 548 visitors at an average price of € 22.11. The number of premieres (1%), reprises (3%) made up a marginal amount of the total number of performances, whereas the number of unique performances (staging only once) made up a substantial amount (56%). The theatre sold out 6% of its performances over a 10-year time-period. The theatre manager confirmed the estimate of 6% was in line with expectations. But because this estimate was made using a threshold of 10 seats around the capacity of the room, it was checked if a higher threshold would generate disproportionate results for the estimate of sold-out seats. This, however was not the case and the estimate of sold-out seats showed an almost linear development.

Next to this, 8% of the performances at the theatre were planned during the 6-month period that taxes for the performing arts were raised from 6% to 21%. And finally the table shows the percentages of performances planned during each month, on each day of the week and to what genre they belonged.

Table 3.2 Descriptive Statistics per performance

	Mean	Std. Deviation	Minimum	Maximum
Number of tickets sold	548.13	437.26	2	1583
Real ticket price (€, in 2006 prices)	22.11	11.09	.93	78.06
N^{th} time performed	2.28	3.22	1	32
Premiere vs. non-premiere	.01	.07	0	1
Reprise vs. non-reprise	.03	.17	0	1
Unique vs. non-unique	.56	.50	0	1
Estimated number of sold-out performances	.06	.24	0	1
Higher VAT applied	.08	.28	0.00	1.00
Month				
January	0.11	0.31	0.00	1.00
February	0.10	0.31	0.00	1.00
March	0.13	0.34	0.00	1.00
April	0.12	0.33	0.00	1.00
May	0.09	0.28	0.00	1.00
June	0.04	0.19	0.00	1.00
July	0.01	0.07	0.00	1.00
August	0.00	0.04	0.00	1.00

September	0.04	0.20	0.00	1.00
October	0.12	0.32	0.00	1.00
November	0.12	0.33	0.00	1.00
December	0.12	0.33	0.00	1.00
Day of the week				
Monday	0.03	0.16	0.00	1.00
Tuesday	0.09	0.29	0.00	1.00
Wednesday	0.15	0.36	0.00	1.00
Thursday	0.17	0.38	0.00	1.00
Friday	0.19	0.39	0.00	1.00
Saturday	0.20	0.40	0.00	1.00
Sunday	0.17	0.38	0.00	1.00
Genre				
Amateurs	0.01	0.11	0.00	1.00
Cabaret	0.15	0.36	0.00	1.00
Circus	0.00	0.03	0.00	1.00
Classical Dance	0.01	0.08	0.00	1.00
Modern Dance	0.04	0.21	0.00	1.00
Jazz	0.01	0.11	0.00	1.00
Youth (conventional)	0.08	0.27	0.00	1.00
Youth (unconventional)	0.05	0.22	0.00	1.00
Musical / Show	0.21	0.41	0.00	1.00
Classical Music	0.04	0.19	0.00	1.00
Light Music	0.15	0.35	0.00	1.00
Musical Theatre	0.00	0.04	0.00	1.00
Modern Opera	0.00	0.05	0.00	1.00
Traditional Opera	0.02	0.12	0.00	1.00
Operette	0.00	0.05	0.00	1.00
Non-Dutch spoken Drama	0.00	0.03	0.00	1.00
Conventional Drama	0.05	0.23	0.00	1.00
Unconventional Drama	0.14	0.34	0.00	1.00
World Culture	0.03	0.18	0.00	1.00

4,233 observations

Apart from price itself, the dichotomous variable representing an increase in taxes can help to better understand how audience responds to price change. The variances were equal over the increased VAT-group and the non-increased VAT-group for both the number of visitors, F (1, 4231) = .016, *ns* as for the ticket price, F (1, 4231) = .936, *ns*. And a preliminary look in the correlation matrix showed a significant negative, albeit small at -0.05 at the p <.01 level. This implies that the percentage change in demand that can be designated to the higher taxes, divided by the actual rise in price can show the decrease in demand due to higher taxes. During the time the higher VAT applied to theatre the average price of this theatre increased with 7%, if all of the higher VAT would have been charged to consumers the price increase would have been 12.3% (calculated by dividing the higher taxes of 1.19 with the lower taxes of 1.06) meaning some of the price increase has been suffered by the most inelastic party: the theatre itself. Based on the results from the regression, the decrease related to the higher price due to higher taxes will be calculated.

In order for this data to be analyzed using an OLS regression a few assumptions have to be met. One of those is the assumption of normality which for large numbers can best be tested looking at visual graphs of the frequencies of the data (Field, 2009). The histograms of demand, price and n^{th} time of performance are shown in appendix 5a. They show negative values of kurtosis of demand which indicates that the demand is flat and light-tailed. The positive values of skewness of demand indicate there are too many low scores in the distribution. The flatness of the distribution is likely caused because the data is censored above, as is pointed out as a threat to demand studies in theatre by De Groot (2007); because of the capacity constraints of theatre halls, there is a q_{max} for the Demand measured. This is clearly visible in the histogram as well, where three peaks of demand measured likely demonstrate the total number of seats in the three rooms of the theatre. Even though there are methods available to correct for censoring (e.g. Jöreskog, 2002; Laamanen, 2013), unfortunately the sales data from the theatre is not very accurate in registering in which of the three rooms the performance took place. So I decided to ignore this threat for now and keep in mind when interpreting the results that the estimates may be positively biased (i.e. the outcome variable could have, hypothetically, been higher for the same price).

To check for this bias to some extent I will take the percentage of sold-out performances (6%) of all the performances for which room was registered. The positive values of skewness and kurtosis of price indicate there are too many low scores in the distribution and it's a pointy and heavy-tailed distribution. But because the sample is very large, this is not an accurate measure and a visual interpretation is more reliable (Field, 2009). This is demonstrated in appendix 5a, where it's clear that lower prices occur more often at this theatre. This can also be because prices are kept artificially low, as is the case in many theatres (Kolb, 1997). The times performed was also non-normally distributed (see appendix 5), as would be expected because most performances take place around once or twice. For this reason a logarithmic transformation will be performed on demand, price and n^{th} time of performance in order to analyze the data, as is done in other demand for theatre studies (e.g. Zieba, 2009).

Table 3.3 Test of Homogeneity of Variance

		Levene's Statistic	df1	df2	Sig.
Visitors per performance (logarithmically transformed)	Day of the week	9.44	6	4226	0.00
	Month	5.75	11	4221	0.00

	Genre	23.70	18	4214	0.00
Ticket Price (logarithmically transformed)	Day of the week	20.20	6	4226	0.00
	Month	7.85	11	4221	0.00
	Genre	17.29	18	4214	0.00

As for the variables weekday, month and genre, assumptions of homogeneity of variance have been violated threatening the power of the regression analysis. Also, including all of them as dichotomous variables in a regression analysis is threatened by multicollinearity (e.g. as most of the performances are musicals it is correlated to all the other genres). Next to that, the interest of this research is aimed at what causes changes in demand. For that reason it's mostly interesting to see if programming changed in terms of genre or timing (e.g. more programming in the weekend or more of a popular genre). Therefore I've opted, also regarding the scope of this research, to group weekday/weekend to one dichotomous variable (i.e. Friday to Sunday is weekend, other days is not) to create a proxy for the day of the week. Next to that, as the per performance correlation matrix has shown that the genre is also related to demand a proxy has been selected as a measure of controlling for possible changes in the programming style of the theatre. This proxy is the number of musicals performed as a percentage of the total number of performances per month and will be included in the OLS regression analysis. Musicals have been selected as they appear most frequently over time at the theatre and therefore suffer the least risk of reaching 0 by chance alone (e.g. coincidentally not being programmed at all) and thus the least risk of biasing the results. Finally, the monthly number of visitors will be interpreted visually using graphs.

b. Per Month

To study the effect of substitutes and consumer trust on demand data of a more aggregate nature will be used. The per month aggregate is used as it is the most disaggregate base on which consumer trust and CPI's are collected by the CBS. Next to the total number of visitors per month, the number of visitors for the entire month has also been divided by the number of performances to correct for the activity that took place in the theatre in that certain month. The price is the average price in the same month.

When looking at the Pearson-correlations on the per month level (appendix 6b.), it's notable that just like in the per performance correlation matrix, there is a positive correlation between price and demand. This indicates that the months with the highest average price yield the highest number of visitors, showing the higher-priced plays are more visited.

Table 3.4 Descriptive statistics per month

	Mean	Std. Deviation	Minimum	Maximum
Average number of visitors per performance	567.11	163.64	258.50	1364.50
Average number of visitors per month	21691.24	9849.37	649	42519

Average price (€, in 2006 prices)	22.44	5.38	15.10	53.34
Number of performances	34.41	20.50	0.00	68.00
Higher VAT	0.10	0.30	0.00	1.00
Substitute Price Index (Movies and Theatre, 2006=100)	114.72	16.29	91.77	140.99
Substitute Price Index (Musea, 2006 =100)	112.54	13.64	91.16	136.21
Substitute Price Index (Reading, 2006=100)	103.67	5.99	94.37	119.02
Consumer Trust	82.11	14.40	56.00	117.00
Percentage of musicals of the total number of performances	19.73	18.89	0.00	100.00

120 observations

To avoid risks of multicollinearity only one of the three substitute price indexes will be used. Based on Gapinski (1986), who says the best substitute for the performing arts is the performing arts itself, the substitute price of theatre tickets and movies has been selected to be included in the regression model. The consumer price index of theatre visits was normally distributed with moderate negative kurtosis and percentage of musicals was not normally distributed with substantial positive skewness and kurtosis (see appendix 5b). Therefore the percentage of musicals will be logarithmically transformed. All the other variables showed significant positive correlations to the average number of visitors per performance per month. The positive value of the kurtosis statistic for the average ticket price per month (Appendix 5b.) indicates a pointy and heavy-tailed distribution. The positive value of skewness indicates too many low scores in the distribution. The distribution of scores of price and demand per month seems to be not normal looking at the skewness and kurtosis. The positive values of skewness and kurtosis for price indicate too many low scores in the distribution which is pointy and heavy-tailed. And even though the close to zero value of the z-score of skewness indicates an approximately normal distribution, the z-score of kurtosis for demand indicate a pointy and heavy-tailed distribution (Field, 2009). Therefore they will also be logarithmically transformed for the regression analysis.

c. Per Artist

The theatre programmed 19 artists over 15 times, which I used as a threshold to include artists. Therefore the regression will be performed on these artists, of which the descriptive statistics are shown in table 3.5 below.

Table 3.5 Descriptive Statistics

Artist		N	Mean	S.E.	Minimum	Maximum
Acda & De	Popularity	19	26.1053	8.09935	9.70	35.00
Munnik	Demand	19	937.63	443.844	270	1409
	Price	19	31.1519	7.53433	21.05	39.77
André van	Popularity	29	24.8069	8.83621	17.40	47.40
Duin	Demand	29	1360.72	90.177	1098	1428
	Price	29	50.6462	2.28999	47.25	56.25
Bert	Popularity	16	21.9000	10.16766	11.00	32.40
Visscher	Demand	16	1344.13	78.838	1257	1425
	Price	16	24.4182	2.33740	22.21	28.32
Guido	Popularity	0				
Weijers	Demand	15	1067.60	392.885	650	1439
	Price	15	20.3360	2.32374	15.80	23.06
Hans Klok	Popularity	0				
	Demand	32	1078.47	254.633	659	1552
	Price	32	37.8023	10.09150	16.83	54.42
Het Brabants	Popularity	0				
Orkest	Demand	80	502.76	174.615	2	1023
	Price	80	20.4646	4.50779	5.19	29.80
Het	Popularity	0				
Nationale	Demand	25	376.24	153.010	89	631
Toneel	Price	25	21.1290	3.24585	14.12	28.74
Het Toneel	Popularity	0				
Speelt	Demand	19	481.53	160.374	175	676
	Price	19	25.7241	4.31664	18.11	32.20
Het Zuidelijk	Popularity	0				
Toneel	Demand	22	406.64	414.253	69	1374
	Price	22	19.6436	5.00634	8.06	27.76
Javier	Popularity	0				
Guzman	Demand	15	1080.73	318.488	663	1425
	Price	15	20.4306	3.00584	16.31	27.49
Jeugdtheater	Popularity	0				
Hofplein	Demand	24	341.88	127.924	122	617
	Price	24	9.8148	2.93894	5.71	15.32
Kabouter	Popularity	18	42.8889	18.71944	21.80	72.50
Plop	Demand	18	1176.44	326.860	512	1583
	Price	18	15.3436	2.58359	10.37	19.93
Opera Zuid	Popularity	0				
	Demand	20	559.25	282.356	175	1187
	Price	20	31.4011	4.75321	20.03	37.54
ro theater	Popularity	0				
	Demand	27	307.19	166.894	34	604
	Price	27	19.0914	4.93884	1.07	24.86

Theater	Popularity	0				
Terra	Demand	18	378.94	216.811	83	778
	Price	18	14.4380	3.10398	9.58	18.24
Tineke	Popularity	0				
Schouten	Demand	22	1306.27	167.289	804	1428
	Price	22	30.3432	3.32453	25.55	38.09
Toneelgroep	Popularity	0				
Amsterdam	Demand	29	347.86	133.006	131	640
	Price	29	21.2704	3.77630	13.80	30.18
Toneelgroep	Popularity	0				
Oostpool	Demand	15	155.07	130.039	60	567
	Price	15	15.5740	5.42502	5.49	22.01
Youp van 't	Popularity	16	3.6500	2.38160	0.00	6.00
Hek	Demand	16	1382.25	64.023	1258	1428
	Price	16	24.2238	2.50100	21.11	27.66

461 observations

Because on this level the data is the same as on the per performance level, price and demand will also be logarithmically transformed, just like in the research by Zieba (2009). The distribution of popularity is significantly non-normal (appendix 5c). Therefore this variable will be transformed by reciprocal transformation. This reverses the popularity scores, so to make the direction of the coefficients reflect reality, the reciprocal transformation will take place over (100 – Popularity) (see appendix 2). Because price is often endogenous (De Groot, 2007) and the theatre might take factors that positively influence demand into account, price will be tested as a mediator of the relationship between popularity and demand. This is supported by the correlations between both popularity and price and popularity and demand that can be seen in the correlations per artist (appendix 5b). The way to explore this will be elaborated upon at the end of the next section.

Models and expectations

The effect of the independent variables on the dependent variable of demand can be measured by creating three models similar to that of other authors (Owen, 1971; Withers, 1980; De Groot, 2007; Zieba, 2009). The following variables are included in the models:

Y/S = the number of visitors per performance
P/CPI = the average price corrected for inflation
S = the n^{th} time of performance
X_i = vector of performance and play characteristics (i.e. weekend, premiere, reprise, uniqueness)

CPI_Theatre= the price index of visiting a theatre or movie per month, as a substitute
Cons_Trust = the consumer trust per month
PERC_MUSICAL = the percentage of performances that falls under the genre musical or show as a proxy of programming
VAT = Period the higher VAT was applied

Popularity = the relative number of online searches according to Google Trends

And of course α represents the constant and ε the error-term.

Model 1 – Per Performance Demand:

$$LN(Y/S) = \alpha + \beta_1 LN\left(\frac{P}{CPI_t}\right) + \beta_2 LN(S) + y'x_i + \varepsilon$$

The expectations for this model based on the literature would be that price negatively effects demand. The correlations however, showed a positive relationship. It is interesting to see what comes out of the regression when controlling for the performance characteristics. The higher VAT is expected to have negatively influenced demand.

Model 2 – Per Month Demand:

$$LN(Y_t/S) = \alpha + \beta_1 LN\left(\frac{P}{CPI_t}\right) + \beta_2 LN(CPI\_THEATRE) + \beta_3(S_t) + \beta_4(CONS\_TRUST_t) + \beta_5 LN(PERC\_MUSICAL) + \beta_6(VAT) + \varepsilon$$

$$LN(Y_t) = \alpha + \beta_1 LN\left(\frac{P}{CPI_t}\right) + \beta_2 LN(CPI\_THEATRE) + \beta_3(S_t) + \beta_4(CONS\_TRUST_t) + \beta_5 LN(PERC\_MUSICAL) + \beta_6(VAT) + \varepsilon$$

The expectations for these models are similar to the expectations for the first model. In addition, a negative effect of substitutes on demand and a positive effect of consumer trust on demand are expected. Based on the correlations, the percentage of musicals is expected to positively affect demand.

Model 3 – Per Artist Demand:

$$LN(Y/S) = \alpha + \beta_1 LN\left(\frac{P}{CPI_t}\right) + \beta_2 LN(Popularity) +$$

This model will be applied on each separate artist to control for differences in quality. Therefore the price elasticity may be negative. Popularity is expected to have a positive effect on demand.

Strengths and Limitations

The dataset did not contain information on individual purchases, because it was aggregated at a higher level. Also the theatre does not have data available on free passes. These are handled outside of the box office administration and therefore left out of the sales revenue data. Another limitation to the data is that the time of purchase may be different from the performance and often tickets are purchased months in advance. The time of purchase has was not in this dataset. Next to that the information on which in which room the performance took place is incomplete in this dataset. Even though the theatre has records on in which room which performance was, adding this for 639 cases was considered too much

work for this research project. But because the censoring in the data could not be controlled for, the demand may have been higher than actually measured. Therefore an estimate of sold-out performances is made.

The most important limitation of any econometric demand for the arts study is the difficulty of controlling for quality. This omitted variable may very well have the most explanatory value over demand as well as price, but is unfortunately impossible to quantify. In this study a lot of attempts are made to somehow control for quality in a reliable way that is also scalable to a large sample size, but still the danger of the omitted variable seems unaccounted for. Also, income would have been interesting predictor variable, but unfortunately income is measured on a yearly basis, so quantitative analysis would require a relatively large timespan. The number of data points (10) is not enough to derive conclusions about the effect of income on demand for theatre.

Another limitation of a study based on panel data is that there is no deeper insight into changing taste preferences of the consumer. Only one measure of substitutes is used in the model, but maybe other substitutes have become more attractive for the consumer. Frey (1996) already mentions how (theatre) festivals became increasingly popular and that line has continued ever since (Cultuur.nl, 2014, June 25th).

Finally, it would have been interesting to control for marketing efforts. However, since marketing expenditure is booked on a yearly basis, it is difficult to allocate it on the performance or monthly level. There can be differences in the marketing budgets of the artists and producers, even on the per performance or series-level and this could have an effect on demand for the performance, so there is an avenue for future research to include marketing efforts and publicity.

4. Results

To interpret the results of the regression the significant coefficients will be discussed in this section. Apart from the regression, additional statistical tests have been performed to interpret the results more thoroughly. This section is structured according to the three levels of analysis: per performance, per month and per artist.

a. Per Performance

The below table 4.1 shows the result of the OLS regression analysis to estimate model 1 after controlling for some performance characteristics. The negative coefficient of the dichotomous weekend variable showed a negative relationship with demand. The expectation would be that there are more visitors in the weekend. However, as can be seen in table 3.2, there is a difference in programming in terms of genre and location in the weekend. Based on the data for which the room was known (2.397 observations) most of the performances in the smallest room - 549 performances (63%) - took place in the weekend. Also the genres with relatively lower demand (e.g. unconventional youth programming, unconventional drama) mostly took place in the weekend. The average price of attending a performance in the weekend was €21,66 (SD=11.66) and the average number of visitors was 530 (SD=432.42). Outside of the weekend average price of attending a performance was €22,71 (SD=10.27) and average number of visitors was 572 (SD=442.47). This difference in price was significant t (4162.86) = 5.299, p < .01; the effect size was below 0.2: *Cohen's d* = 0.16, which is small according to Magnusson (2014). This on itself might be a result of the pricing as part of the marketing strategy of the theatre as a result of weekend visitors being more price-sensitive. But it is also a support for the claim that demand for the

performing arts depends on the characteristics of the performance; most unconventional performances, drawing smaller audiences, are planned in the weekend in small rooms because visitors are willing to experiment in their free weekend.

Premieres and reprises both lead to increases in the number of visitors per performance. This is different from the results in Lamaanen (2013) and shows that in different theatres there are different responses to premieres and reprises. The performances marked by the theatre as 'reprise' at this theatre have more than 50% more visitors. Because reprises are planned if the first range of performances was proven successful, it is expected that they are more successful than the other performances and more marketing effort can be made. Even more successful are the premieres at this theatre, as they have more than double the amount of visitors than regular performances. In contrast, performances that have been programmed only once received 46.6 % fewer visitors than performances scheduled more times. This shows that uniqueness of a product does not necessarily lead to more rarity and desirability; the consumer estimates the value of a performance based on other aspects than its availability. Not planning these performances more than once is probably the right decision from a financial perspective looking at demand for them.

Obviously, sold-out performances have an above average number of visitors. Even though this is a sine qua non it was included in the regression to get an idea of the level of bias caused by the above censoring of the maximum capacity of a room. The sold out performances were estimated to amount 6 % of total performances and sold-out performances have at least 10% higher demand than not sold out performances, as the standardized coefficient is 0,106 at a p<.01 level. It is possible that the actual demand for these performances is even higher and this could influence other coefficients. On average price (log transformed) was higher for not sold out performances (M = 2.98, SE = 0.02) than for sold out performances (M = 2.98, SE = 0.01). This difference was significant t (331) = 5.09, p < .01; and the effect size was medium using a threshold of .5 (Magnusson, 2014) as it was calculated at *Cohen's d* = .56. This implies there may be a positive bias caused by the right-censored nature of the data; demand was higher than the capacity allowed, but could not be measured. The result that the average price of sold-out performances is higher would implicate that the relationship between price and demand is negatively biased; it would have been more positive if actual demand could have been measured or somehow controlled for (e.g. a censored quantile regression such as performed by Lamaanen, 2014).

The small, not significant coefficient of the n^{th} time of the performance is another indication that demand doesn't depend on how many times a performance is programmed. This is strange because it would be expected that more marketing effort can be made for the performances programmed in series. This contrasts with Laamanen's (2013) result of higher demand for a performance that had been performed more times before. He interpreted this as an indication of the effect of word of mouth on sales. This appears not to be the case for the performances at this theatre. This might be because the theatre in Laamanen's (2013) study had its own company. After a premiere the buzz may start going, whilst for the theatre in this study the promotion has to have occurred before the actual performance.

Table 4.1 OLS Regression Per Performance

Model		B	Std. Error	t	Sig.
1	(Constant)	6,423	,029	221,660	0,00
	Weekend	-,138	,030	-4,547	,000
	Premiere vs. not premiere	,917	,209	4,397	,000

	Reprise vs. not reprise	,730	,090	8,095	,000
	Unique vs. not unique	-,924	,030	-30,600	,000
	Sold-out vs. not sold out	,338	,062	5,413	,000
	Higher VAT applied	-,136	,054	-2,511	,012
2	(Constant)	2,634	,084	31,242	,000
	Weekend	-,036	,025	-1,468	,142
	Premiere vs. not premiere	1,191	,169	7,037	,000
	Reprise vs. not reprise	,567	,073	7,716	,000
	Unique vs. not unique	-,464	,033	-14,191	,000
	Sold-out vs. not sold out	,480	,051	9,440	,000
	Higher VAT applied	-,317	,044	-7,168	,000
	Average ticket price per performance (log transformed)	1,172	,025	45,973	0,00
	n^{th} time of performance (logarithmically transformed)	,009	,022	,414	,679

Dependent Variable: Visitors per performance (log transformed)

R^2=.204 for Model 1, ΔR^2=*.273* for model 2 ($p < .001$)

Including the ticket price in the model significantly increases the explained variance of the model. The relationship between price and demand is positive. This is due to the heterogeneity of the performing arts. Lamaanen (2013) finds similar results without controlling for censoring, discounts and quality characteristics. This shows that the theatre charges higher prices for the performances that are more desirable and have a higher demand. This indicates that the pricing is successful; the theatre is capable of identifying performances that are attractive to consumers and consumers are willing to pay more for and act on it by charging higher prices. This theatre uses a proactive pricing strategy and this appears to be effective, for as far as the measure of average price allows to make a statement on this. Of course different prices for different customer(-segment)s were not in the data, but the prices per performance or per artist could be higher to make more revenue; the elastic and positive nature of the relationship between price and demand shows that consumers have no problems in dishing up the asked ticket price. By raising the ticket price up to the point where price elasticity would be close to zero, the total revenue would increase without even decreasing demand. However, thinking back to Throsby (1997) there might be ideological motives at stake to keep prices artificially low. The higher price can also be linked to the size of the production, leading to a better understanding of the cost structure for the consumer (SOURCE!) as well as the opportunity of more marketing effort and publicity; for a larger performance can be sold at a higher price because it receives nationwide attention and thus attracts more visitors.

An interesting exercise is to calculate how demand changed as a respond to the tax raise. The coefficient associated with increasing the VAT in the model is significant and amounts to -.317. So due to the application of higher VAT theatre visits dropped with 31.7%. Because the prices excluding VAT were dropped by the theatre to compensate towards its visitors the price increased with only 7% when the VAT was raised. This means a 7% price increase caused a 31.7% decrease in demand. So every 1% price increase was associated with an inverse change in quantity demanded of 4.53%. In the next

section this result will be compared against the estimate of the effect of applying the higher VAT on a per month level.

So there is a contradicting effect here: increasing all the prices together, as done with raising the VAT, leads to less demand while the effect of price on individual performance is positive. Both of them are elastic, but one negative and the other positive. The explanation for this contradiction is again the heterogeneity of the performances; a pricing strategy can very well be used to differentiate prices between performances or products. But when all prices are raised too much and too fast the short-term effect is that less consumers will visit the theatre.

This shows the conflict of simultaneously raising VAT and asking theatres to earn more revenues; ignoring heterogeneity in theatre will lead to value destruction and mostly on the side of the theatre. To show this I will do a small thought experiment: if a ticket cost €10.- before the VAT-raise (of which €0.57 is taxes) it would cost €10.7 after the VAT-raise because not all is charged to the consumer (of this amount €1.70 is taxes). If the first situation sold a hypothetical 100 tickets, the second situation will sell a hypothetical 68 tickets (rounded down). In the first situation the total amount of taxes earned is €56.60 and in the second situation the amount of taxes earned is €116.68. The theatre earns less revenue while more money is earned in taxes. Of course the effect may be different in the long run than in the short run (Goodwin, 1992); the higher VAT leads to a shock to the consumer and can lead to different effects in the long run.

b. Per Month

Similar to the per performance model, the explanatory power of the per month model also increases significantly when adding price to the model together with number of performances and the substitute price. The results of the regression on both total number of visitors per month as average number of visitors per performance per month show little difference between the two outcome variables, except for the predictor variable number of performances. Planning more performances has a large, significant positive effect on the total number of visitors, but a small, significant negative effect on the average amount of visitors per performance. Percentage of musicals proofed an insignificant factor in the models as well as consumer trust. This indicates that the attitude of the consumer towards the environment does not have an effect on theatre visits. An alternative explanation is that the variable consumer trust is collected from nationwide data and consumer attitude in the area of the theatre or for this segment of the market, consumer trust deviated from the nationwide average. Nevertheless, this result does not make it appealing to include this variable in future research. Another possibility is that the output has changed as a consequence of the change in consumer trust. This would show the endogeneity of the number of performances. However, the consumer trust was non-significantly correlated to both the amount of performances as the amount of unique performances and the proxy for programming of genre, percentage of musicals. To exclude the possibility that the results are tainted because of the element of time (e.g. visitors can book their ticket months in advance and theatre managers program performances mostly at the beginning of the season) a lagged variable of consumer trust has also been entered in the regression. But using lagged variables of consumer trust (from one month up to a year back) don't lead to different results.

Even though the effect size is small, the negative direction of the relationship between substitute price and demand is surprising. As it is also a measure collected from nationwide data, the results need to be interpreted with scrutiny. It is hard to determine whether as a response to higher prices for theatre and movies, demand for theatre falls or whether both demand for this theatre and the price index of theatre and movies are affected by an omitted variable. In other words did the rising

prices for theatre and movie tickets in general cause consumers to make a trade-off between visiting one theatre in favor of the other? Or did an omitted variable, e.g. one or more symptoms of the economic recession, cause both demand for theatre to fall as prices for theatre to rise? An explanation could be that increasing prices in general caused buying power to fall, which could have had a direct or indirect effect on demand for theatre as well. The fact that consumer trust is negatively correlated with the consumer price index of theatre and movies supports this, but as the OLS regression shows no significant relationship between consumer trust and demand the results are inconclusive on this matter and a suggestion for future research would be to include a (mediator) variable to control for economic resources instead of an attitude towards the economic environment.

Table 4.2a OLS Regression Per Month

Model		B	Std. Error	t	Sig.	R2 Change
1	(Constant)	9.643	.207	46.487	.000	0.11
	Percentage of Musicals (log transformed)	.098	.069	1.421	.158	
	High BTW vs. low BTW	-.603	.196	-3.072	.003	
2	(Constant)	4.581	.404	11.350	.000	.832
	Percentage of Musicals (log transformed)	-.044	.023	-1.922	.058	
	High BTW vs. low BTW	-.188	.072	-2.620	.010	
	Average price per month (logarithamically transformed)	.863	.112	7.681	.000	
	Number of performances per month (logarithamically transformed)	.911	.025	36.668	.000	
	Consumer Trust	.000	.001	.082	.935	
	Consumer price index of theatre and movies	-.004	.001	-3.329	.001	

Dependent Variable: Total number of Visitors per month (log transformed)

On the per month basis the application of the higher VAT also shows a negative impact on average theatre visits. The effect is a bit smaller compared to the per performance coefficient estimate, probably due to the higher level of aggregation (the per month DV is an average of all performances that month). The negative effect of the number of performances on the average demand per performance again indicates a cannibalization effect corresponding with the result of the weekend variable found earlier; the more performances are planned, the more the audience is spread out over several performances. This could also be the explanation for the negative relationship between the number of musicals planned and the demand per performance. When only musical percentage and application of the higher VAT are used to explain the demand per performance, musical percentage shows a significant positive relationship to demand. As other variables are included the percentage of musicals becomes negatively related to demand, suggesting that another variable is related to both percentage musical and demand and alters the relationship. This variable is probably price as it is shown in

appendix 6b that these two variables are highly correlated. The VIF collinearity statistic for price is 2.132, indicating a low non-threatening multicollinearity.

Table 4.2b OLS Regression Per Month

Model		Coefficient	S.E.	t-value	Sig.
1	(Constant)	5.981	.098	61.222	.000
	Musical as a percentage of total performances (log transformed)	.116	.032	3.575	.001
	High VAT vs. low VAT	-.166	.079	-2.107	.038
2	(Constant)	4.618	.401	11.527	.000
	Musical as a percentage of total performances (log transformed)	-.058	.030	-1.914	.059
	High VAT vs. low VAT	-.208	.071	-2.920	.004
	Average price per month (logarithmically transformed)	.878	.114	7.694	.000
	Number of performances per month (logarithmically transformed)	-.095	.030	-3.167	.002
	Consumer Trust	.000	.001	.104	.917
	Consumer Price Index of Theatre and Movies	-.004	.001	-3.551	.001

Dependent Variable: Visitors per performance per month (logarithmically transformed)

R^2=.144 for model 1, R^2-change=.596 for model 2 ($p < .001$)

The PEoD per month is estimated at .878, this means that in contrast to the per performance PEoD, the per month PEoD is inelastic. A possible explanation for this is that the per month average number of visitors per performance are already an average of all performances. A first explanation for this would be the effect of time. As Goodwin (1992) explains, behavior of a consumer needs time to change; the effect of a change in price is more visible in the long run because in the short run people stick to their accustomed behavior. However it is more likely that the difference between the per month and per performance is caused by the less heterogeneous nature of the per month average performance. Because a performance is hard to compare with another performance, but the monthly average of performances most likely bears more resemblance with another month. Consumers are not likely to decide to go to the theatre more because the quality of the average performance in that month is so high, but they will go to a performance more because it is more attractive to attend or because it received more publicity or more marketing effort has been made. Heterogeneity and quality are less visible in the PEoD estimate. The implications for pricing strategies of theatre would be that heterogeneity is the major source of advantage; more difference in quality allows for more differentiation on price.

c. Per Artist

Table 4.3 shows the regression per artist. This regression was done to see if by looking at individual artists the heterogeneity of the performing arts was controlled for to an extent. Of course this per artist analysis is not impressive in terms of sample size, but it reminds of the differences between repeat-sales and hedonic price indices in the art market; whilst the former is based small number of paintings, because it only takes into account artworks traded more than once, it is able to correct for quality differences (Ashenfelter and Graddy, 2003). Ideally this study would be able to use the same performance by the same artist in several theatres, but this is an interesting start. Looking at the per artist PEoD the results show that out of the 19 artists that were included for the analysis, two of them showed a positive elastic relationship between price and demand and one showed a positive inelastic relationship at the $p<0.05$ level. For two of the artists the relationship between price and demand was negatively elastic and significant at the $p<.0.05$ level. First of all, this shows price changes effect different artists in different ways. In general the explanatory value of price on demand per artist varies from 10% to 60% also indicating that price can have a different effect on different artists. The result that none of the artist reached significant price elasticity close to zero implies that the theatre could be sharper in setting the price for each performance; the price should have been lower or higher for most artists to earn more revenue.

The results show that for each artist audience responds in a different way to different prices. For example the PEoD for Acda & De Munnik (AM) is negative and elastic, indicating that a 10% increase in price for AM leads to almost 13% less visitors and thus to less revenue from sales. Contrary, Het Zuidelijk Toneel (HZT) has a positive elastic PEoD of 1.789. This means that for a 10% increase in price, the number of visitors increases with 17.89% percent. This suggests a high level of quality difference between the performances of HZT, because the heterogeneous nature allows the theatre to charge a higher price for a performance that is more attractive to attend and leads to a higher demand. For the theatre this also means that the price could have been set even higher, as PEoD is far from zero in economic terms. The differences between the artists might also show that differences in the amount of exposure the artist has received may lead to different valuation by the consumer; this may be the result of more marketing effort (Colbert, 2003) or of more (nationwide) publicity due to the size of the performance.

Table 4.4 Per Artist Regression Coefficients[a]

Artist	Variable	Coefficient	S.E.	t-value	Sig.	R^2
Acda & De Munnik	(Constant)	11.096	1.605	6.912	.000	.307
	Ticket price per performance (Logarithmically transformed)	-1.289	.470	-2.744	.014	
André van Duin	(Constant)	5.132	1.126	4.557	.000	.112
	Ticket price per performance (Logarithmically transformed)	.530	.287	1.848	.076	
Bert Visscher	(Constant)	5.632	.343	16.400	.000	.599
	Ticket price per performance	.492	.108	4.574	.000	

	(Logarithmically transformed)					
Guido Weijers	(Constant)	2.712	2.460	1.103	.290	.183
	Ticket price per performance (Logarithmically transformed)	1.394	.818	1.705	.112	
Hans Klok	(Constant)	7.861	.514	15.286	.000	.094
	Ticket price per performance (Logarithmically transformed)	-.252	.143	-1.768	.087	
Het Brabants Orkest	(Constant)	7.361	.758	9.708	.000	.034
	Ticket price per performance (Logarithmically transformed)	-.420	.253	-1.660	.101	
Het Nationale Toneel	(Constant)	5.814	2.008	2.896	.008	.000
	Ticket price per performance (Logarithmically transformed)	.005	.660	.007	.995	
Het Toneel Speelt	(Constant)	2.931	1.549	1.892	.076	.199
	Ticket price per performance (Logarithmically transformed)	.984	.478	2.058	.055	
Het Zuidelijk Toneel	(Constant)	.277	1.693	.164	.872	.330
	Ticket price per performance (Logarithmically transformed)	1.798	.573	3.137	.005	
Javier Guzman	(Constant)	8.942	1.855	4.821	.000	.082
	Ticket price per performance (Logarithmically transformed)	-.666	.616	-1.080	.300	
Jeugdtheater Hofplein	(Constant)	5.060	.615	8.232	.000	.056
	Ticket price per performance (Logarithmically transformed)	.312	.272	1.146	.264	
Kabouter Plop	(Constant)	10.515	.978	10.754	.000	.445
	Ticket price per performance (Logarithmically transformed)	-1.286	.359	-3.579	.003	
Opera Zuid	(Constant)	.863	2.449	.352	.729	.209
	Ticket price per performance (Logarithmically transformed)	1.552	.712	2.179	.043	
ro theater	(Constant)	4.676	.698	6.700	.000	.059
	Ticket price per performance (Logarithmically transformed)	.299	.239	1.250	.223	

Theater Terra	(Constant)	2.452	1.639	1.495	.154	.204
	Ticket price per performance (Logarithmically transformed)	1.251	.617	2.027	.060	
Tineke Schouten	(Constant)	8.304	1.008	8.239	.000	.060
	Ticket price per performance (Logarithmically transformed)	-.334	.296	-1.130	.272	
Toneelgroep Amsterdam	(Constant)	4.008	1.280	3.133	.004	.066
	Ticket price per performance (Logarithmically transformed)	.581	.420	1.384	.178	
Toneelgroep Oostpool	(Constant)	2.897	.966	2.998	.010	.239
	Ticket price per performance (Logarithmically transformed)	.723	.357	2.023	.064	
Youp van 't Hek	(Constant)	6.753	.372	18.160	.000	.105
	Ticket price per performance (Logarithmically transformed)	.150	.117	1.284	.220	

a. Dependent Variable: Visitors per performance (Logarithmically transformed)

The five artists for which popularity could be collected from Google Trends where used for the regression including popularity. Similarly to the results in table 4.3 the results in 4.4 also show differences between the artists. For example, for Acda & De Munnik (AM) the change in R^2 when adding popularity to the regression model is only .049, whilst for Bert Visscher (BV) the change is higher (.387) and for Youp van 't Hek (YvH) the change in explanatory value is very high (.645). Because of this popularity should not be rejected nor accepted as an explanatory variable. It can only be concluded that in some cases popularity in this form can help explain demand. This is an inspiring result to help build future research and create a more generalizable construct of popularity, which may or may not be constructed from search engine data. The effect of popularity shows to be either negative or positive and in table 4.4 the direction of the relationship between price and demand for BV changes from positive to negative when popularity is included. This is an interesting depiction of the effect of controlling for an omitted variable can have on the results of a regression analysis. What's interesting is that in the case of BV popularity has a negative effect on demand, indicating that more google searches is not always positive for an artist in terms of generating more audience.

Table 4.5a Per Artist (including popularity) Regression

Artist	Variable	Coefficient	S.E.	t-value	Sig.	ΔR^2
Acda & De Munnik	(Constant)	10.973	1.599	6.862	.000	.049
	Ticket price per performance (Logarithmically transformed)	-1.786	.649	-2.752	.014	

	Popularity from Google Trends (reciprocally transformed)	133.087	120.697	1.103	.286	
André van Duin	(Constant)	5.143	1.145	4.490	.000	.004
	Ticket price per performance (Logarithmically transformed)	.520	.293	1.772	.088	
	Popularity from Google Trends (reciprocally transformed)	2.318	6.637	.349	.730	
Bert Visscher	(Constant)	7.854	.132	59.336	.000	.387
	Ticket price per performance (Logarithmically transformed)	-.054	.035	-1.551	.145	
	Popularity from Google Trends (reciprocally transformed)	-36.809	1.906	-19.310	.000	
Kabouter Plop	(Constant)	10.281	.936	10.988	.000	.089
	Ticket price per performance (Logarithmically transformed)	-1.282	.340	-3.770	.002	
	Popularity from Google Trends (reciprocally transformed)	11.039	6.522	1.693	.111	
Youp van 't Hek	(Constant)	5.297	.324	16.366	.000	.645
	Ticket price per performance (Logarithmically transformed)	.113	.064	1.764	.101	
	Popularity from Google Trends (reciprocally transformed)	151.390	26.131	5.793	.000	

Dependent Variable: Visitors per performance (Logarithmically transformed)

Table 4.6b Weignted average PEoD	only significant coefficients N	only significant coefficients PEoD	all coefficients N	all coefficients PEoD
Weighted average per artist estimates	208	0,43	461	0,21
Weighted average per artist estimates controlled for popularity	66	-0,43	98	-0,42

The results of the estimates per artist with and without popularity are used to estimate PEoD as a weighted average of all the artists, accounting to an extent for the heterogeneity of theatre. To calculate the weighted average PEoD per artist the artists have been given a weight: the number of performances at this theatre. Both the weighted averages of all per artist coefficients and only including the significant per artist estimates have been included. The results are presented in table 4.6a and 4.6b and show that controlling for heterogeneity shows a different result for the Price Elasticity estimate: just like Lamaanen (2013) the estimate changes from positive to negative. In other words, for the isolated case of a performance by an artist at a specific point of the artists´ popularity price does negatively affect demand.

5. Conclusion

By using ticket sales data from a Dutch theatre, I estimate demand for theatre tickets. The most important results are summarized in table 5.1 below. Because the pricing strategy of this theatre has higher prices for more attractive performances, the results show that the theatre effectively asks higher prices for performances with higher demand. If the theatre wants to raise revenue the prices could even be set higher, until price elasticity measured reaches zero.

Nevertheless ideological reasons (e.g. enabling theatre visitors with all kinds of income to come) or marketing decisions (e.g. generating loyalty by keeping prices low) can also play a role and can b a reason for this theatre to keep prices at this rate. Controlling for heterogeneity by either including a proxy of quality in the model or aggregating to a higher level to create a more homogeneous measure of comparison, in this case the per month average performance, gives lower PEoD estimates than when the population is more heterogeneous. The average quality per month is easier to compare to the average quality of another month, than the average quality per performance to another performance; the per performance data is more heterogeneous and quality plays a bigger role there. To theatres this implies that differentiating prices is most successful when there is a perceived increase in quality; when the consumer perceives the performance as more valuable paying a higher price is no obstacle. But when prices are raised without taking heterogeneity into account average visits to performances drop. This is especially visible because applying the higher VAT significantly decreased demand in the short run and thus revenue for the theatre. However the effect of the VAT may be exaggerated because of the difference between short term and long term price elasticity that could have been caused by psychological effects (Monroe, 1973).

The results also give insight into the relationship of some performance characteristics on demand. The factors premiere and reprise had a mild but significant positive effect on demand, whereas weekend had a mild but significant negative effect on demand. This could be because of the larger number of performances planned in the weekend, indicating that the consumer makes a tradeoff between which performances to visit. The number of performances had a negative impact on demand, also indicating a cannibalizing effect of one performance on the other. The included proxy for substitute price was found to significantly decrease demand for theatre as well, but less than extra performances. This supports Gapinski's (1986) claim that the best substitute for the performing arts are the performing arts. No significant proof was found for consumer trust as a predictor for demand. An interesting path for future research would be to search for another measure of popularity that can be used over several groups of artists. This measure has achieved some results in controlling for heterogeneity.

Table 5.1 Result summary	N	PEoD	N
Per Performance	4233	1,17	
Calculated from period of higher VAT		-4,53	
Per Month	120	0,88	
Calculated from period of higher VAT		-2,97	

		only significant coefficients		all coefficients
Weighted average per artist estimates	208	0,43	461	0,21
Weighted average per artist estimates controlled for popularity	66	-0,43	98	-0,42

I am grateful to the theatre for supplying me with the dataset, which was rich and provided numerous opportunities for research. But of course, just like every dataset, this data had its limitations. First of all it did not specify on individual ticket purchase (e.g. information about when the ticket was purchased, what rank was preferred or at which discount incurred). Because of this aggregate nature the total revenue had to be divided by the total number of visitors to create a measure for ticket price and that is far from optimal. Next to that, the data did not provide detailed information on which performance was sold out or not, for a part of the data this could be derived from the room in which the performance took place. But for the rest of the data the room of the performance was not in the data. This meant that the censoring of the data could not be corrected for and caused a bias in the coefficient estimates. Finally, data on performance characteristics were not in the dataset. This makes it hard to correct for quality and heterogeneity. A lot of the data mentioned as limitations (room, performance characteristics, discounts etc.) was in fact in the theatre archives, however, for the scope of this master thesis, it was too much work to link it to the currently used dataset. This is an avenue for future researchers to take and for (Dutch) theatres to create more linkages between the data in order to be able to analyze and interpret more thoroughly and allocate marketing recourses accordingly.

This article is intended to expand the knowledge on factors of demand for the performing arts. By trying to answer the question of what caused the decline in demand for theatre at the time of the economic recession and what measures can be taken to improve pricing strategy. The first part of the question has to remain unanswered, as consumer trust was not a significant predictor of demand. As for what can be done by theatres to improve pricing strategy, the answer is that performances can be priced even more in line with their heterogeneous nature; price and product differentiation can be used even more to earn more revenues. Nevertheless this may not be in line with the ideological nature of the decision-making around pricing for theatres, often non-profit organizations. Another implication for both theatres and policy makers is that not taking heterogeneity into account leads to value destruction, especially for the theatre.

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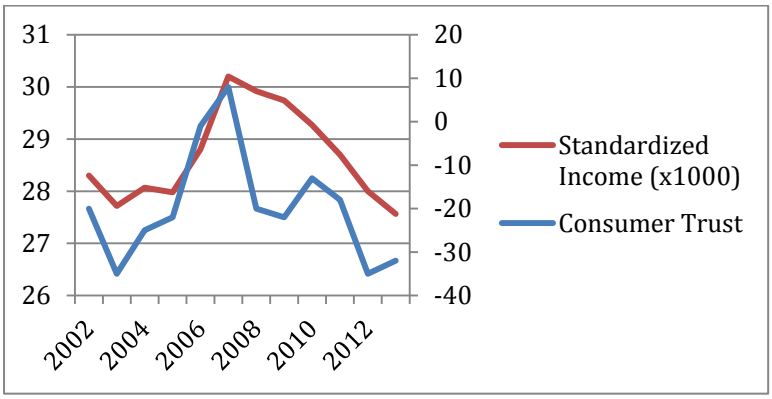
1. Socio-demographic data of the city the theatre is in and Consumer trust

Year	Population	% age <19 vs. 20-64	% age > 65 vs. 20-64	Unemployment
2001	162.308	36,6	23,7	-
2002	163.427	37,0	23,8	-
2003	164.397	37,3	23,9	6,0
2004	166.035	37,7	24,0	7,9
2005	168.054	37,7	24,1	7,8
2006	169.709	37,6	24,2	7,7
2007	170.349	37,5	24,5	5,8
2008	170.960	37,5	24,6	4,6
2009	171.916	37,4	24,9	4,3
2010	173.299	37,5	25,2	5,3
2011	174.599	37,2	25,6	4,9
2012	176.401	37,1	26,3	4,3
2013	178.280	37,0	26,9	5,2
2014	179.663	36,9	27,6	6,3

Leeftijd	Leeftijd totaal	
Herkomstgroepering	Totaal herkomstgroepering	
Geslacht	Totaal mannen en vrouwen	
Regio's		
Onderwerpen	Leerlingen/deelnemers/studenten	
Onderwijssoort	Hoger beroepsonderwijs	Wetenschappelijk onderwijs
Perioden	*aantal*	
2000/'01	5 522	1 001
2001/'02	5 439	1 062
2002/'03	5 795	1 081
2003/'04	6 287	1 166
2004/'05	6 695	1 179
2005/'06	7 107	1 191
2006/'07	7 155	1 220
2007/'08	7 467	1 184
2008/'09	7 716	1 193
2009/'10	8 113	1 307
2010/'11	8 411	1 353
2011/'12	8 753	1 420
2012/'13	9 094	1 366
2013/'14**	9 715	1 305

Sources: CBS/GBA - bewerking ABF Research and UWV Werkbedrijf, 6-5-2015



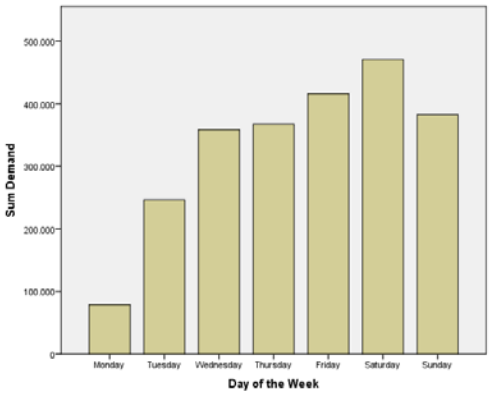
Source CBS (2015)

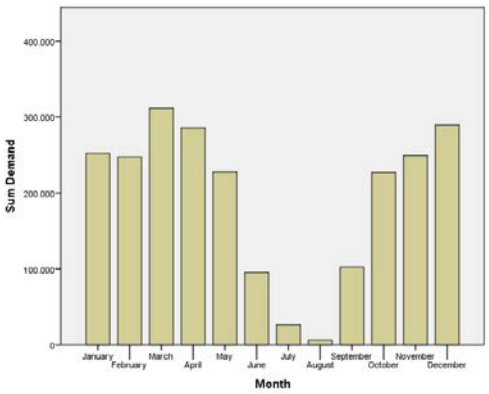
2. Transformations used to normalize the distribution.

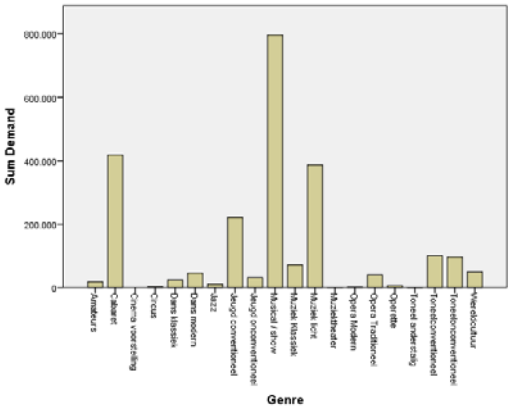
Data Transformation	*Can Correct For*
Log transformation (log(X_i)): Taking the logarithm of a set of numbers squashes the right tail of the distribution. As such it's a good way to reduce positive skew. However, you can't get a log value of zero or negative numbers, so if your data tend to zero or produce negative numbers you need to add a constant to all of the data before you do the transformation. For example, if you have zeros in the data then do log (X_i + 1), or if you have negative numbers add whatever value makes the smallest number in the data set positive.	Positive skew, unequal variances
Square root transformation ($\sqrt{X_i}$): Taking the square root of large values has more of an effect than taking the square root of small values. Consequently, taking the square root of each of your scores will bring any large scores closer to the centre – rather like the log transformation. As such, this can be a useful way to reduce positive skew; however, you still have the same problem with negative numbers (negative numbers don't have a square root).	Positive skew, unequal variances
Reciprocal transformation ($1/X_i$): Dividing 1 by each score also reduces the impact of large scores. The transformed variable will have a lower limit of 0 (very large numbers will become close to 0). One thing to bear in mind with this transformation is that it reverses the scores: scores that were originally large in the data set become small (close to zero) after the transformation, but scores that were originally small become big after the transformation. For example, imagine two scores of 1 and 10; after the transformation they become 1/1 = 1, and 1/10 = 0.1: the small score becomes bigger than the large score after the transformation. However, you can avoid this by reversing the scores before the transformation, by finding the highest score and changing each score to the highest score minus the score you're looking at. So, you do a transformation $1/(X_{Highest} - X_i)$.	Positive skew, unequal variances
Reverse score transformations: Any one of the above transformations can be used to correct negatively skewed data, but first you have to reverse the scores. To do this, subtract each score from the highest score obtained, or the highest score + 1 (depending on whether you want your lowest score to be 0 or 1). If you do this, don't forget to reverse the scores back afterwards, or to remember that the interpretation of the variable is reversed: big scores have become small and small scores have become big!	Negative skew

Source: Field (2009)

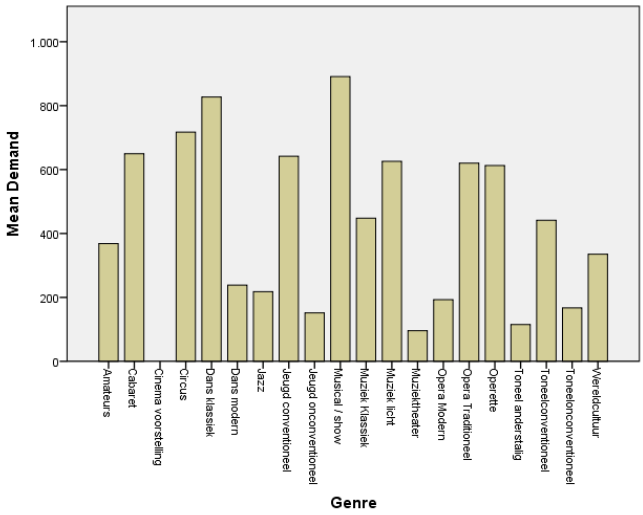
3a. Graphs sums of demand per week, month and genre

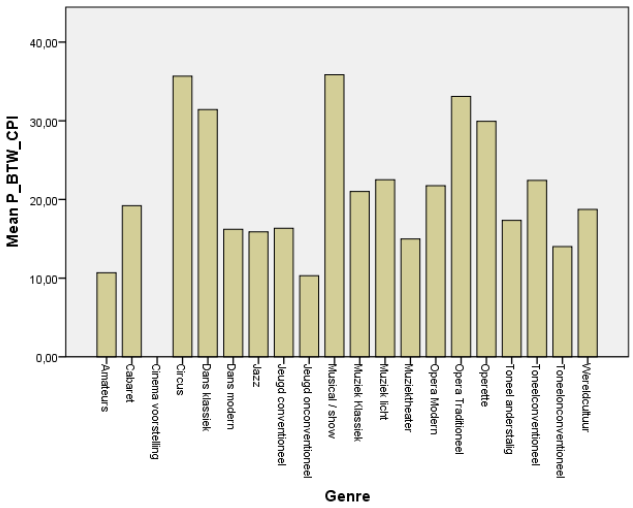




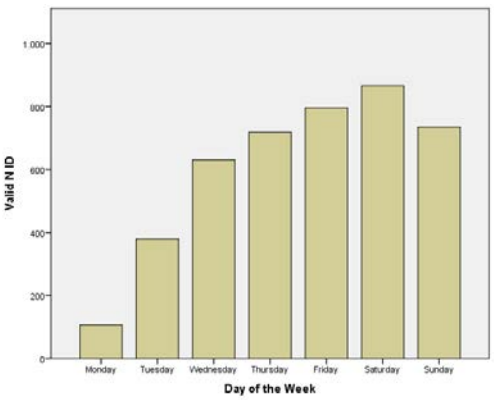


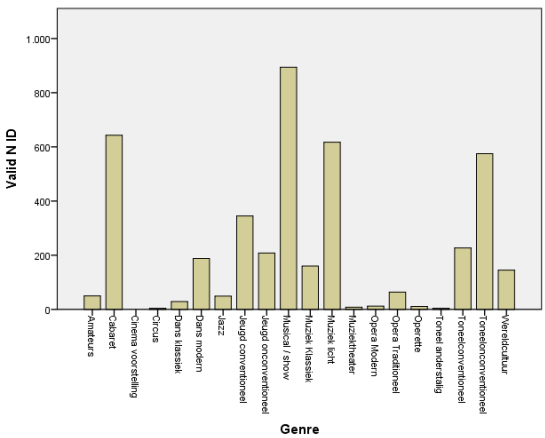
3b. Graphs mean demand / mean average price per genre

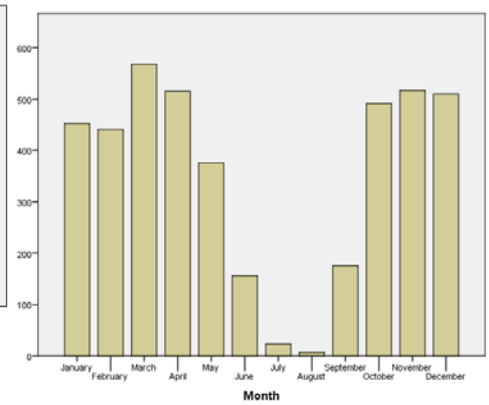




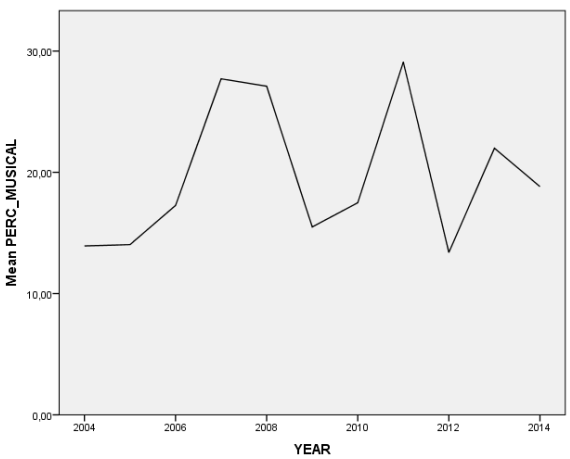
3c. Graphs number of cases per week, genre and month

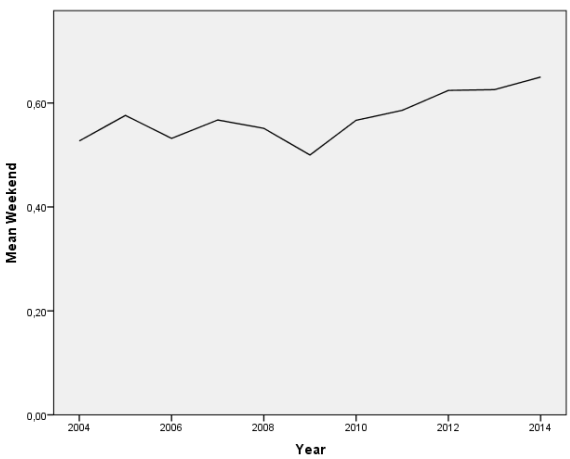






3d. Graphs Musical percentage per year and weekend percentage per year.

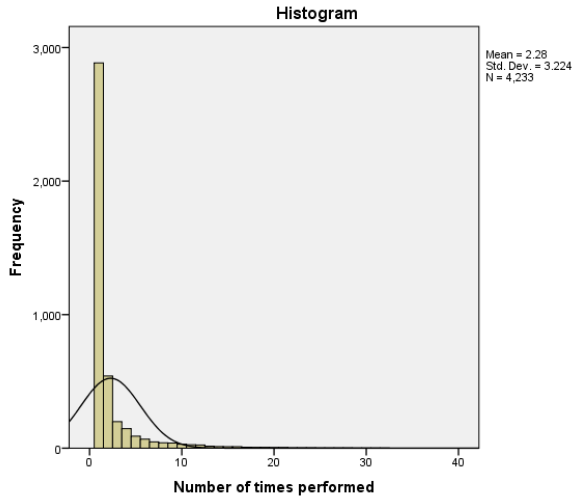


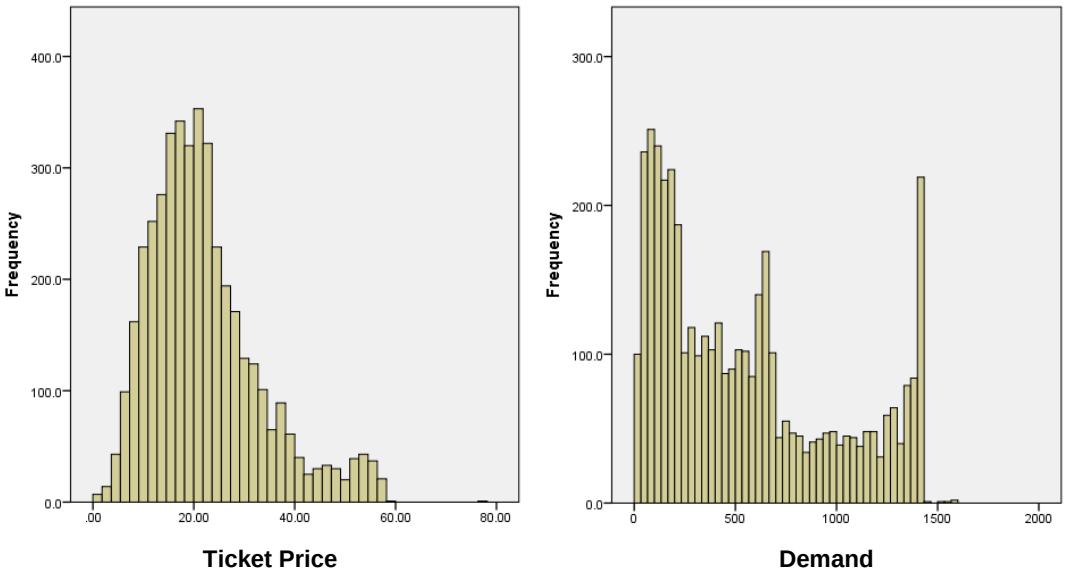


4. Deleted cases, reason: not live performances

DELETED CASES	cases	Reason
ZZZArrangement	13	Hospitality
Vervallen	250	Cancelled
Van	9	Workshops
Rosmalen	10	Arrangement
Meeusfoyer	14	Foyer
Kleedkamer 28	1	workshop
Jos Hofkens	1	workshop
FRONT	21	Hospitality
Externe Locatie	118	External Location
Dansstudio	27	Workshop
Brasserie	96	Hospitality
Attentiepunt	107	Parking
Artiestencafé	1	Cancelled
H	392	Rental
Vervallen /	249	Cancelled
Indoor Dance Festival	1	Festival
Workshops	19	Workshop
Arrangement	98	Hospitality
Besloten Voorstelling	2	Exclusive
Bijeenkomst	1	Exclusive
Rabobank, Vertizontaal en KRO-Bijeenkomst uit Amateurs	3	Exclusive
Cinema Horeca	10	Hospitality
Cursus Workshop	1	Workshop
Festivals en Open Dagen	7	Festival
Jeugdfilm	1	Cinema
Voor-/Nabespreking	1	Introduction
Cinema Voorstelling	10	Cinema
Total	1463	

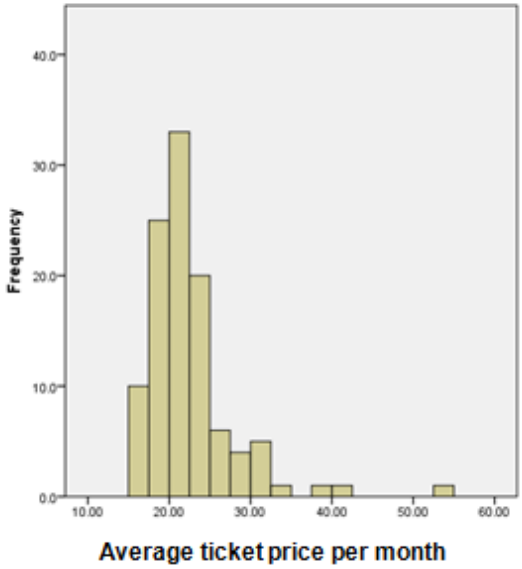
5a Distributions per performance level

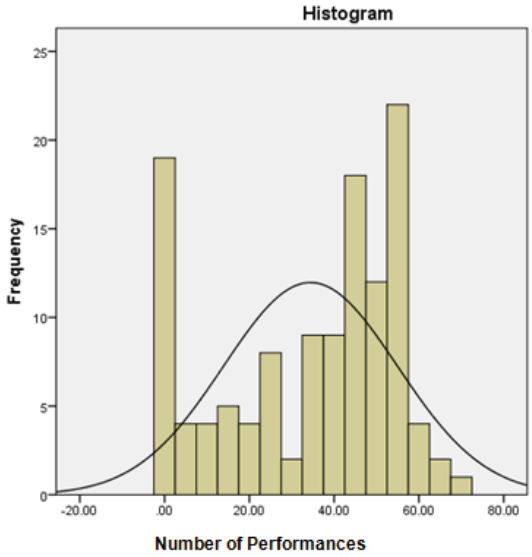


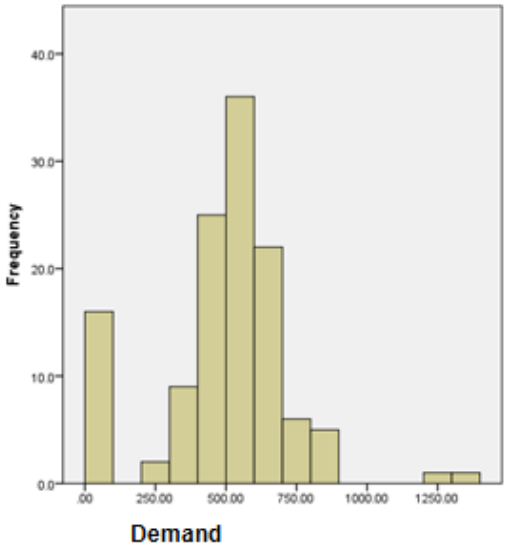


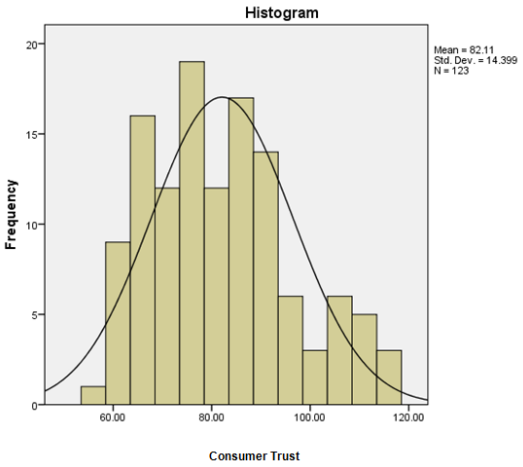
Normality of Distribution per Performance		
	Kurtosis	Skewness
Demand	-10.37333333	18.13157895
Price	14.52	27.81578947

5b. Distributions per month level







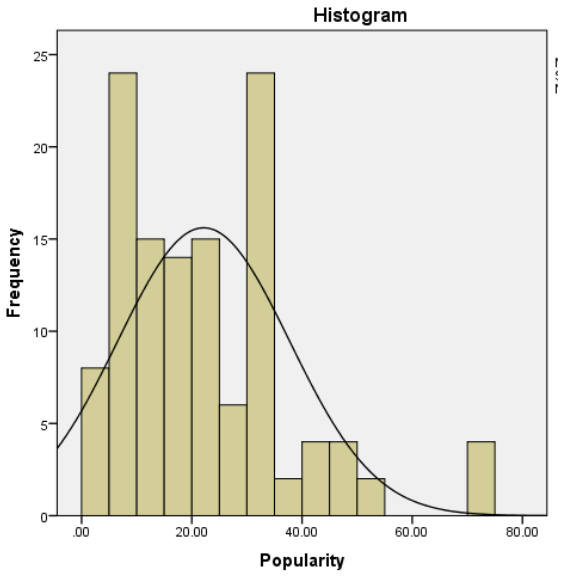


Normality of distribution per month	Kurtosis	Skewness
Demand	1.924	-0.192
Price	10.901	2.2619

Normality of distribution per month	Skewness z-score	Kurtosis z-score
Substitute Price Index (Theatre Tickets and Movies, 2006 =100)	.327	-1.301
Percentage of musicals of the total number of	2.007	6.268

performances

5c. Distributions per artist level



6a. Correlations per performance level

Appendix 6a Pearson Correlations Per Performance

Variables	1	2	3	4	5	6	7	8	9
1. Visitors per performance	-								
2. Average Price per performance	.633**	-							
3. Number of times performed	.326**	.431**	-						
4. Weekend (=1)	-.048**	-.047**	-.097**	-					
5. Premiere (=1)	.028	-.029	-.029	-.010	-				
6. Reprise (=1)	.146**	.034*	-.043**	-.026	-.012	-			
7. Unique (=1)	-.470**	-.419**	-.446**	-.007	.064**	-.027	-		
8. Sold-Out (=1)	.032*	-.083**	-.061**	.057**	-.005	.027	-.008	-	
9. Increased BTW (=1)	-.050**	.068**	-.025	.030	.050**	-.010	.017	-.034*	-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

6b. Correlations per month

Variables	1	2	3	4	5	6	7	8	9
1. Average Number of visitors per Performance	-								
2. Average Ticket Price	.684**	-							
3. Number of Performances	.380**	-.164	-						
4. Consumer Price Index - Theatre and Film	-.135	-.048	-.144	-					
5. Consumer Price Index - Musea	-.189*	-.069	-.210*	.948**	-				
6. Consumer Price Index Reading	-.121	-.181	-.070	.899**	.883**	-			
7. Consumer Trust	.211*	.163	.106	-.415**	-.354**	-.333**	-		
8. Percentage of Musicals	.604**	.757**	.125	.081	.070	.055	.116	-	
9. BTW-increase	-.135	.245*	-.184	.506**	.275**	.277**	-.331**	.074	-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).