

Master thesis Cultural Economics and Entrepreneurship



Where to sell your art?

Price differences between the USA and Europe for
Cindy Sherman's photographs

Colophon

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Abstract

This master thesis sheds light on what the most beneficial location is to sell artworks. In other words: are there substantial price differences between different locations around the world? To answer this question, Cindy Sherman's photographs were used as the main research subjects in this master thesis.

Additionally, the literature review deals with the art market and specifically the law of one price using literature mainly by Pesando regarding cultural economics. The law of one price is the notion that every identical commodity sold at the same time wherever in the world should fetch the same price. To determine whether the objects were identical or near-perfect substitutes, categories were created for the photographs of Cindy Sherman, resulting in 31 categories in total, of which 25 were operable.

A dataset was constructed using 802 auction results for Cindy Sherman's photographs for a period of ten years, from 2002 to 2012. This data was used to compare the different markets (USA, Europe, UK, Europe without UK and Sotheby's New York, Christie's New York and Phillips de Pury & Company New York), in order to identify possible discrepancies in prices.

The main findings of this thesis are that the prices of Continental Europe are significantly lower than elsewhere, whereas one would expect that, due to transportation costs, prices in Europe would be higher. In addition, the results between the three big auction houses in New York were ambiguous. No real conclusion could be drawn, except that the distribution of the higher-priced categories may have had an influence. In addition, it can be concluded that Sotheby's sells more of the smaller highly priced photographs, while Christie's sells more of the larger highly priced photographs. Furthermore, a comparison was made between the course of hammer prices of Sherman's photographs, the S&P500 stock exchange and the Dutch AEX index. Due to this comparison, it could be derived that the economic crisis may have affected the prices for Cindy Sherman's photographs. Finally, there did not seem to be any influence of exhibitions on the prices for the photographs.

Despite the wide-ranging results, there is still demand for more extensive research. It is therefore recommended that a longer running dataset with less unsold items and more items overall would benefit future research, since pairs of sales could not be created for this research and this could have been an important addition.

Preface

Hereby I present my master thesis about the price differences between the different auction locations for Cindy Sherman's photographs. This thesis is the completion of the Master program Cultural Economics and Entrepreneurship at the Erasmus University in Rotterdam.

I have been working on this thesis for six months and I am proud of the result. It took time, effort and perseverance, but finally it is done, as is my time at the university.

The price of art and especially the differences in prices for the arts have always been a main interest of mine. What influences prices and how are they formed? These two questions are the common theme through this thesis. To have the opportunity to truly research what you are interested in is a privilege. Therefore I am very grateful I was in the position to do so.

Firstly, I would like to give a special thanks to my supervisor Filip Vermeylen, for handing me the opportunity to perform this study. Furthermore, his insights, wisdom, feedback and devotion has helped this thesis to become what it is now. In addition, his sometimes firm criticism has had a very positive effect on the end result of this thesis.

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I hope you will enjoy reading this master thesis.

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1| Introduction

This thesis aims to shed light on the law of one price in the art market using photographic images created by Cindy Sherman, which were sold between 2002 and 2012 in New York and Europe. In a time where art seems to have become more an investment opportunity, this seems important. In his book *Art of the deal*, Horowitz (2011) claims, that the gap between the top end and the rest of the market is widening, enabling artists to fetch prices that were unthinkable in other periods. This has created a market that seems worth investing in and inspired a boom in prices for the arts, also influenced by the growing wealth among collectors (Horowitz, 2011). It is always the aim of the collector to purchase the best possible investment; to buy for the lowest price and, over time, sell it for the highest possible price. Keeping this in mind, it is very relevant to research where a collector is able to buy Sherman's photographs at the lowest or highest prices, as this could benefit a collector. Furthermore, claims (for instance by Horowitz, 2011) that the art market is becoming more global can be researched, as more different nationalities are becoming active buyers, and that therefore the market is gaining more power and importance.

The concept of the law of one price entails that the price of a single commodity (identical or near-perfect substitute) is the same at any given time, in any given location, in perfect efficient markets. However, in practice this does not seem to occur and therefore the law is considered to be violated more often than not. Efficient markets will only allow very short violations of the law of one price (Persson, 2010) and therefore it might be concluded that within inefficient markets violations of the law of one price persist.

The main question that arises and forms the basis of this thesis is therefore: what is most beneficial location to sell a work of art, in this case of Cindy Sherman's photographs? In addition, the question whether the art market is an efficient and integrated market is very relevant.

In the field of neo-classical economics extensive, research has been conducted investigating the law of one price, using both raw materials (such as iron) and commodities. However, in cultural economics three articles have been written by Pesando and Pesando & Shum (1993, 1996, 2007) researching the law of one price, where they used prints as the focus of their study. They used the repeat sales of

multiples of prints to compute their outcomes within a period of 30 days. In addition, they specialized in one artist as well, namely Picasso prints. Others that wrote on the law of one price in cultural economics are Mei and Moses (2002). They used the repeat sales index over a longer period of time, disregarding one of the necessary characteristics contemporaneousness (almost sold on the same time) of the law of one price. It is apparent that the law of one price in cultural economics has not yet been thoroughly researched and none concern photographic images as a main research object.

The reason that Cindy Sherman's photographs have been chosen as a research subject is as follows:

First of all, the market for contemporary art is one that has been growing exponentially over the last decade. This is due to the fact that modern art and the old masters have been absorbed into private and public collection over the last century, causing supply to dry up (Horowitz, 2011). This has caused a shift in interest to the contemporary art market, as there is still enough supply to be consumed. This newly found interest in the contemporary art market is key for the relevance of this research as the photographs of Cindy Sherman are part of this market.

Secondly, Sherman was the second best-selling photographic artist in the world (the best was Andreas Gursky) at the time of this research and her art is sold worldwide (Artprice, 2012). This makes Sherman and her photographs interesting and relevant for the current art market and an excellent case study to examine the law of one price and whether it applies to the art market. In addition, the photographic market is still a young one and therefore much can be learned and studied within this market.

Thirdly, a factor that contributed to the decision to study the auction market is the fact that the sales data from the auction market is much more accessible than the sales data from the primary market (such as galleries), as no sales data from galleries is disclosed to the public.

Finally, as a woman in a mainly masculine world, she is among the best-selling female artists in the sector. This makes a study into her prices relevant considering gender.

In order to research possible price differences between locations, categories were created to be able to compare the photographs. Most artworks are unique and illiquid goods, which make them difficult to compare, let alone indentifying identical or

near-perfect substitutes. Almost all of the photographs could be placed within the created categories, with a total of 31 categories. Within each category it was assumed that the photographs are near-perfect substitutes of each other and therefore comparable.

An elaborate dataset comprising 802 items has been constructed to facilitate this wide range of comparisons. To compare the different markets, statistics were calculated for each category and for each location (such as the USA, Europe, the UK, Continental Europe and Sotheby's, Christie's and Phillips de Pury in New York). However, not all locations could be evaluated for a number of categories due to a lack of data entries within those categories.

This thesis not only focuses on the comparison between the locations within the categories, but also on the general statistics of the whole dataset. In addition, mean hammer prices between locations per square centimetres are compared and a ranking has been made consisting of the mean hammer prices per square centimetres per category. Furthermore, the course of the hammer prices per year has been examined and compared to the S&P500 index (an index consisting of the 500 largest companies in the USA) and the Dutch AEX index, to identify whether the economic crisis could have had an impact on the art market.

An overview has also been created containing all of the auction houses that are featured in the dataset, including their buyer's premiums and VAT/sales taxes (appendix B). The information from this table was used to compute a ranking of the auction houses using the mean and median of the whole dataset and calculating the final prices with the transactions costs and taxes included. With this ranking it is possible to determine where, in theory, Cindy Sherman's photographs can be purchased for the lowest and highest prices.

Finally, to see whether exhibitions have an influence on the prices for Cindy Sherman's photographs, the courses of the mean hammer prices of different locations were examined.

This master thesis incorporates the following sections:

The first section presents an overview of literature related to the subject, including a description of the art markets themselves, more specifically the primary market and the secondary market. Next, the process of art auctioning is discussed. Moreover, the price of art and its determinants are examined. Furthermore, art as an investment opportunity

and the returns for art are mentioned, which is a big incentive for many collectors to invest in the art market. The law of one price is explained for both classic economics and cultural economics. The literature review presents the other anomalies, from which the law of one price is one. This demonstrates that the auctioning process, while regulated to a certain extent, has many psychological flaws. Finally, the market for photography is discussed and the artist Cindy Sherman is introduced.

The third chapter of this thesis covers the methodology, consisting of a survey of research methods used by the other scholars that researched the law of one price. Furthermore, the repeat sales index is explained, which is used by all the previous scholars who researched the law of one price in cultural economics. This is followed by a small introduction into transaction costs and taxes, which are important as taxes differ around the world and transaction costs differ between auction houses. In addition, currencies and their influence on prices between locations are briefly discussed. Furthermore, an introduction into the art markets of New York and London is included, as they are the main focus of this master thesis. Finally, the dataset and methods used to compute the results are explained.

The fourth chapter presents the results. Firstly, the results derived from the complete dataset are explained, followed by the results per category. Then the results on the prices per square centimetres are discussed. Thereafter, the economic crisis comparison and the ranking of auction houses around the world are examined. Finally, the impact of exhibitions of Cindy Sherman on the prices of the photographs is considered.

Finally, the conclusion and discussion gives insight into the world of Cindy Sherman's photographs and its price distribution across different locations.

2| Literature review

In this chapter, several economic and cultural economic theories are discussed in order to illustrate previous research in relation to this study.

This literature review aims to shed light on most of the art auction literature that is currently available and is related to the questions proposed in this master thesis: how does the location of an auction house affect the price of an artwork? In this literature review all definitions and terminology necessary to understand the topic are explained. Firstly, the art market is discussed and a distinction is made between the primary market and the secondary market. In addition, the auctioning mechanism is addressed extensively. Secondly, the price of art and its determinants are discussed, both in terms of artwork related, artist related and external factors. In addition, art as investment is discussed to outline why collectors might want to collect. Thirdly, the law of one price both in neo-classical economics and cultural economics is covered. Fourthly, the other anomalies, of which the law of one price is one, are discussed. Finally, the market for photography is thoroughly addressed and the artist Cindy Sherman is introduced.

2.1| The art market

The art market differs substantially from other markets. To start with the art market deals with a vast array of heterogeneous goods, some may even be unique. The supply curve for the arts is therefore inelastic; this clarifies why some artworks fetch much higher prices than others at auction (Velthuis, 2011). In addition to this discrepancy to the financial markets, the art market is also under the influence of transaction costs, which tend to be much higher than in other markets. Moreover, insurance, storage and shipping costs, have to be included (Horowitz, 2011). This results in a negative cash flow when holding the assets; in other words, having art in ones possession will even cost one a certain amount of money (Horowitz, 2011).

Furthermore, art is not a liquid product, which makes it harder to trade. Especially considering that auctions only take place every several months. Also, unlike financial assets, artworks cannot be divided. This implies that it is illogical to purchase a work of art with more buyers than one (Velthuis, 2011).

Moreover, the lack of transparency in the art market is striking. It is impossible, or at least very costly, to find out if and how much buyers are willing to pay for certain

items. In addition, when the art is purchased both at auction and in galleries, the identities of the buyers are not disclosed. This contributes to the lack of transparency (Velthuis, 2011).

Additionally, information asymmetries also characterize the art market. When a participant has more knowledge of a work of art, he might be able to make excess return on the item than someone who is less knowledgeable (Velthuis, 2011).

Finally, what distinguishes the art market from others is that art is a credence good. This entails that the value of art cannot be objectively determined and relies on the credibility of the experts within the art world (Velthuis, 2011).

Horowitz (2011) mentions that art is also a ‘positional good’, which implies that “their value is correlated to the relative desirability as predicted upon rarity and the social prestige of ownership” (Horowitz, 2011). This is closely linked to the sociological notion of conspicuous consumption. Conspicuous consumption is the notion that an individual spends a lot of money on luxury items, such as artworks, with the only goal to show off its wealth and power, while maintaining or attaining social status (Shubik, 2003). Therefore, prices for the arts can be inflated.

Literature on the art market usually divides the market into two parts: the primary market and the secondary market or resale market (Velthuis, 2011). In the primary market, artworks are sold for the first time and prices are set, mainly in galleries; however, museums can also fulfil this purpose. In the secondary market, works of art that have been on the market before are offered and sales are usually made by art dealers or auction houses (Velthuis, 2011). This implies that in the primary market, art flows from the artist to the gallery and from the gallery to the collector. While in the secondary market art that was formerly owned by a collector or museum is sold to the auction house or dealer and then back to another collector (Stournaras, 2009).

It is, however, noteworthy to mention that efforts have been made to divide the art market into three parts: the primary art market where artists sell their art to gallery owners or collectors, the secondary art market where dealers sell to collectors and the tertiary market where both dealers and collectors sell art to other dealers or collectors using auction houses (Singer & Lynch, 1994). While it gives an alternative to the conventional division, it is not widely accepted.

Furthermore, in recent years the division between the markets has blurred even further. Gallery owners have infiltrated the auction market and started bidding on the items of the artists they have under their wings, to make sure prices stay up. In some cases, artists went straight to the auction house, rather than their gallery, to sell art for the first time, e.g. Damien Hirst (Horowitz, 2011).

2.1.1| Primary art market

As previously mentioned, the primary market is the market where art is sold for the first time, mostly through galleries. Galleries are commercial spaces where artists can host small exhibitions and the dealer invites his network of collectors and other possible interested parties. The job of the gallery owner or art dealer is to create an environment where the artist can sell as many works as possible. However, gallery owners do not merely want to be seen as capitalist merchants or marketeers, they prefer to be referred to as patrons or promoters of the art scene (Velthuis, 2005). In addition, they refuse to see art as a commodity, as opposed to auction houses, and emphasize on the value of art as a cultural good (Velthuis, 2005). When a sale is made at an exhibition, the dealer and the artist split the sales 50/50, with room for a 10% difference (Shubik, 2003). Usually, galleries represent around 10 to 30 artists, however, big establishments can have up to 50 artists under their wings (Velthuis, 2011). A gallery has a monopoly on an artist, excluding a small pool of important, famous and established artists, due to the fact that an artist is regularly only represented by one gallery (Velthuis, 2005).

Multiple studies show that buying in the primary market requires a good, stable and trustworthy relationship of the collector with their dealer. When a collector expressed a certain amount of loyalty over the years to their dealer, the collector is more willing to present high end and exclusive pieces to the collector (Velthuis, 2005). Furthermore, this behaviour leads to the behaviour that art dealers might not even sell the artwork to the highest bidder, but to the collectors with whom the gallery owners have the best relationship and are able to trust that the collector does not sell the artwork on the auction market afterwards (Velthuis, 2005). Within the primary market circuit, selling artworks obtained in the primary market on the secondary market is highly frowned upon and the relationship between dealer and collector can be substantially harmed (Velthuis, 2005). To ensure that this does not occur, a so-called ‘gentleman’s agreement’ is made between the dealer and the buyer (Velthuis, 2005).

In addition, these intimate social ties can even help the art dealer to survive in times of economical or financial lows, as important collectors of the gallery can present themselves as ‘backers’. This implies that the wealthy collectors vouch for the gallery in difficult times (Velthuis, 2005). Therefore, they have an important role in the decision-making, prices and even success rates of the gallery at hand.

The same relationship that has been built up with collectors is also constructed with the artists the gallery represents. Mutual respect, trust and loyalty is vital for a good relationship between art dealer and artist, also because the relationship tends to be long-term and monogamous (Velthuis, 2011). The primary market is therefore also characterized as being motivated by the love for art and is not merely money oriented (Velthuis, 2005, Horowitz, 2011). This results in an internal contradiction for the art dealers in the primary market. They do not want to be seen as commercial enterprises, but they do strive to sell as much artworks as possible (Velthuis, 2005). This contrasts heavily with the auction market, where investing in art is of high priority and making profit is an aim. In his book (*Talking Prices*) Velthuis (2005) notes, when speaking to gallery owners, that some artworks might be more popular than others, because the content or colours are more appealing. This leads to a friction between demand and supply, as the gallery owner might put pressure on the artist by asking him to make more of that particular artwork. However, interfering with the artistic freedom of an artist is taboo. The expression “make me a pink one” is therefore also used as an inside joke (Velthuis, 2005).

Working with art that has not been firmly established in the sector carries great risks, as there is not yet any information on how the item can perform. Pricing in this market is therefore also highly experimental and prices are generally set by the artists themselves (Shubik, 2003). While one might think prices are lowered when an item fails to sell, galleries hesitate to do so, as this would imply that the artwork has dropped in quality rather than demand (Sagot-Duvauroux, 2003). Prices are not decreased as they are presumed to harm the status of both the dealers as the artists themselves in the eyes of their peers (Velthuis, 2005). Also, the variation in prices in the primary market is smaller than those at auctions (Sagot-Duvauroux, 2003). However, the 2001 study performed by Candela and Scorcu on the art market for prints and drawings in Italy noted that the prices of galleries and auction houses do show similar performance

(Candela & Scorcu, 2001).

Because galleries work mainly with new and young artists, the profit made on the established artists is invested in the younger generation, as they still carry great risks (Velthuis, 2011).

Deriving prices, sales, turnover and revenue from the primary art market is very complex. Dealers do not give information on sales and prices, they are even very secretive about it. This secrecy regarding the prices probably arises due to the fact that the gallery owners negotiate with buyers and do not want other possible buyers to find out what was agreed. This usually occurs in “the back room”, the commercial nerve centre of the gallery (Velthuis, 2005). This results in a market that is difficult to study. However, Rengers and Velthuis (2002) did conduct a study into the determinants of prices for contemporary art in Dutch galleries using data from a Dutch subsidy arrangement (the BKR: *Beeldende Kunst Regeling*). Findings of this research are discussed later in this literature review.

2.1.2| Secondary art market

The secondary art market includes all transactions of artworks that have been sold before. This can occur at auction or at art dealers (not to be mistaken with galleries). In the secondary market mostly deceased artists are traded and the diversity of artists is much smaller than in the primary market. The number of living artists traded on the secondary market is consequently even smaller (Velthuis, 2005).

A characteristic of the secondary market is that information is much more transparent and accessible, in contrast to the primary market. Sales prices are public information and can be found easily. However, it remains undisclosed who purchased the artwork.

On the secondary art market, art appears that has been sold before in the primary market and therefore risks are considered to be lower. The secondary market, therefore, attracts more visitors than the primary market. Not only because the art presented is more established than the art in the primary market, but also because entry boundaries are said to be lower. Possible buyers are usually more hesitant to enter a gallery than they are of entering an auction, also due to more anonymity at auctions (Velthuis, 2005).

However, it is strange that mainly established art appears on the secondary market, as it

is assumed that the economic worth and historical standing of these artworks is already identified, in contrast to the primary market where value still needs to be determined. Using the auction mechanism would therefore be more useful in the primary market, because then the supply and demand can determine the prices (Velthuis, 2005).

It is often claimed that the secondary market sets the benchmark for prices in the primary market. This is in consistency with the Veblen effect, as mentioned by Velthuis (2005). This effect implies that the quality of an artwork is mainly derived from its sales price (Velthuis, 2005). Thus prices set at auction are considered to be truthful and therefore prices in the galleries are adjusted accordingly. Hutter et al. (2007) indicated: “there are no auction prices without prior price construction activities in the dealer market” (Hutter et al, 2007). This implies that while prices at auction may influence prices in the primary market, the opposite is also true. However, the art dealers in the primary market feel that the auctioning mechanism can harm the prices and therefore the status of the artists (and the gallery which represents them). The auction market is therefore said to be a parasitic mechanism by the gallery owners, as auctions can result in large price volatility (Velthuis, 2005).

Auction prices are thus determined by demand and supply. In other words: the number of bidders bidding for an artwork results in the final price acquired, clearing the market afterwards (Ashenfelter, 1989). This is not the case for the primary market, where prices are set without knowledge of the possible demand.

2.1.2.1 | Auction houses and the art of art auctioning

The oldest established auction house dates back to 1674; however, even in the ancient Greek times there is evidence of products and items being auctioned (Doyle & Baska, 2002).

The commonly used auctioning method to auction art is the English auction, also known as the ‘ascending price’ auction. In this format, the bidding starts low and the auctioneer steadily increases the price of the item, allowing those interested to place a bid. Once nobody else is willing to pay a higher price, the item is ‘knocked down’ or ‘hammered down’ and the bidding stops. The expression ‘hammered down’ refers to the auctioneer beating his hammer on the table when the sale is made. The last and thus final price that is called out by the auctioneer is the selling price of the item, the so-called ‘hammer price’ (Ashenfelter & Graddy, 2002).

The auction houses earn their wages by charging the buyers and sellers a commission. The buyers pay a 'buyer's premium' and the sellers pay a 'seller's commission'. The total sales price for the buyers is thus the hammer price plus the buyer's premium, which usually is 12% to 25% of the hammer price of the item (VAT/sales taxes also need to be paid, when applicable). The premium can be lowered for large sales and is negotiable when a buyer purchases a significant number of items, or is a frequent purchaser. This, however, is the exception rather than the rule. Buyers usually purchase only a fraction of a whole sale and therefore special terms are not of interest (Ashenfelter & Graddy, 2003).

The seller's commission, as well as the buyer's premium, depends on the final hammer price and hovers around the 10% of that price. In contrast to the buyer's premium, this commission is far more negotiable. In some cases, sellers can be offered a guarantee and may not even pay the commission. The guarantee is different from the reserve price, as the guarantee is the minimum sales price for the seller offered by the auction house. This means independent of the item's performance at the auction the seller is going to receive a specified amount of money (Ashenfelter and Graddy, 2002). Would it be the case that the item did not meet its reserve price, the auction house would become the new owner of the artwork, paying the seller the guarantee. When the work is sold above the guaranteed price, the profit is split between the auction house and the seller (Velthuis, 2011).

It always is the aim of the auctioneer to sell the item up for auction, since the auctioneer works on behalf of the seller (the auction house is merely a mediator). However, this does not always occur. Some items can be knocked down but are left unsold, as they did not meet the level of the 'reserve price'; this is the bare minimum price for which the seller wants to sell the item. If the item does not reach this level, the item goes unsold and is 'bought-in'. The auction house rarely buys the unsold items; the item can be put up for later auction, sold elsewhere or taken off the market entirely. This is usually due to the negative effect on the price when an item goes unsold, also called the burning effect, which is explained further in this review (page 33). However, when an item goes unsold, this has implications for the auctioneer as well. No seller's commission or buyer's premium is paid to the auctioneer, while the effort has been made trying to sell the item. Therefore, a percentage of the reserve price is charged in

such occasions (Ashenfelter, 2003).

Furthermore, it is customary for the auction house to present a pre-sale catalogue prior to the auction. The catalogue presents information on the items put up for sale, such as the title of the artwork, the artist, the size, the medium and a high and a low estimate. The art experts, who examine the artwork and evaluate its condition, calculate the low and high estimates. What is not published and not even revealed after the sale, is the reserve price. However, it is a common rule that the reserve price is around 70% or 80% of the low estimate (Ashenfelter & Graddy, 2003).

Part of the auctioneer's job is to get the bidding started. This can involve accepting fictitious bids, but only as long as the reserve price has not been surpassed (Ashenfelter & Graddy, 2003). While made by the art experts, the auctioneers have the last say on the spread of the estimates. He is also the one who can adjust the estimates accordingly and make sure the reserve price lies below the low estimate.

Christie's and Sotheby's are the two largest art auction houses in the world at the moment and they are said to form a duopoly (Ashenfelter, 2003). They were accused of price fixing in 2001, as they would benefit greatly in doing so because of high monetary profit (Ashenfelter, 2003). They were said to have divided important clients in order to ensure that they would not have to compete over them and constructed price agreements over their commission rates (Velthuis, 2011).

Since the 1980s, all New York auction houses must announce whether the items up for sale have been sold or not. Previously this was not mandatory and bought-in items could be treated as if they were sold. The common belief is that when the public considers all items to be sold, the rest of the sale performs better and the buyers have more confidence in the sale and the auction house. However, it is becoming general custom to adopt the New York law in other locations where the law has not been enforced (Ashenfelter & Graddy, 2002).

2.2| The price of art

To fully grasp why the prices of artworks are so diverse, it is necessary to examine how these prices might be constructed and what affects them. This part therefore considers the determinants of prices for artworks. Furthermore, a part of this chapter is devoted to art as investment, to better understand why collectors purchase art.

It is vital to consider that the quality of art is reduced to a quantity, namely the price (Velthuis, 2005). In other words, the value of an artwork is merely measured in monetary terms, which is contradictory, as art is considered to be incommensurable (Velthuis, 2005). Furthermore, Velthuis (2005) mentions that, because fine artworks are unique and illiquid items, a change in demand cannot result in a change in supply. This implies that the result is a change in price, which is different in other markets (Velthuis, 2005).

2.2.1| Determinants

The prices of artworks, especially in the primary market, seem to be constructed out of thin air, especially considering that galleries never lower their prices and even steadily increase them (Rengers & Velthuis, 2002). Here the mechanism of demand and supply does not come to an equilibrium, while this is the case for art auctions. Instead of matching supply and demand, they need to create a market for an artist and judge the quality of artworks as such. However, art dealers in the primary market do use a mechanism to determine price, which is the so-called pricing scripts (Velthuis, 2005). This is a set of rules that enable dealers to set prices relatively systematically (Velthuis, 2005). These pricing scripts create structure within the primary market establishing prices, but also structures prices for individual artists throughout their careers (Velthuis, 2005). Prices are so important for artists and collectors because they create a ranking of success. It is therefore difficult to not only determine which aspects are important for the construction of prices, but also which aspects are more important than others. The determinants of prices for artworks can be divided into three groups: artwork related, artist related and external factors that influence prices. These groups are discussed below.

Horowitz (2011) divides the determinants into two groups, the static and the dynamic ones for the secondary market. The static group consists of all the features of the artwork, while the dynamic one has to do with external factors, which can alter over time. He claims that the three most important determinants of prices are provenance (the history of an artwork, where it has been and who its former owners were), availability (scarcity and uniqueness are of influence on that) and differentiability (Horowitz, 2011). Availability needs to be considered the most important one, as this has the biggest impact on prices.

2.2.1.1 | Artwork related

Over the years, the relevance and importance of certain physical properties of an artwork, which influence the price, have changed (Sagot-Duvauroux, 2003). During the Italian renaissance, for example, skill and ability were the most important characteristics. Around the mid-17th century, the choice of the subject became a determinant of price and, since the end of the 19th century, the artist's signature and thus originality is significant. Nowadays, there seem to be several determinants that influence the price of an artwork, such as size, materials, date of creation, medium, labour time, past prices and provenance. Not all are equally important but they do influence the prices and help determine the value of an artwork.

Different studies emphasize on different aspects. In their research on the determinants of prices of contemporary art in Dutch galleries, Rengers and Velthuis (2002) find that the size of an artwork is influential on the price; however, this does not explain price differences between galleries or other artists (Rengers & Velthuis, 2002).

Rouget et al. (mentioned in Rengers and Velthuis, 2002) determined that size, technique and provenance explained 20% of the variance in prices (Rouget et al, 1991 mentioned in Rengers and Velthuis, 2002). When the provenance of an artwork is known, more or less value can be attributed to the artwork, whether it came from an important collector, a museum or was found in an attic is of influence. If an important collector or museum sells an item, it may be assumed that it is of high value and no imitation, this may not be the case otherwise.

The past prices is another determinant that influences the price. It is generally accepted that the prices achieved at auction set the boundaries for prices in the primary market. The gallery owners, when setting their prices, therefore always look at prices fetched at auction for the same artist or similar artworks. However, this does not always occur, as is the case for upcoming artists, because no auction prices exist yet (Velthuis, 2005).

Rengers and Velthuis (2002) also verify that the medium and materials used to make the artwork is a determinant of the prices; for example, oil on canvas paintings are higher-priced than aquarelle on paper. In addition, as paintings of oil paint on canvas are usually more time consuming these are more expensive than etches or watercolour paint on paper (Velthuis, 2005). This casts doubt on the claim made by sociologists that

art is one of the few goods where there is no relationship between production costs and price (Velthuis, 2005).

Scarcity or rarity of an artwork does contribute to the price as well, as Lazzaro (2006) mentioned. When an artwork is unique, chances are that the demand for the artwork is higher, as the supply is very scarce. In the case of a print or photograph, among other reproducible goods, the supply is higher and prices are generally lower for the item. However, the supply of prints and photographs is not endlessly reproducible, as editions (usually with a scope of 5 to 250) are printed. Lazzaro (2006) concluded that “only the rarest prints fetch significantly higher prices” at auction (Lazzaro, 2006).

Authenticity is another aspect that Lazzaro (2006) researched; the results indicate that the aspect stated above does affect the prices for Rembrandt prints. Closely linked to authenticity is the presence of a signature, which is a validation of authenticity and verifies which artist is responsible for the artwork. Sagot-Duvauroux (2003) wrote that if there were any doubt regarding the artwork’s origin, to whom it belongs, it would inevitably drop in its value.

Horowitz (2011) mentioned several other features that might be important when determining prices, such as weight, shape and colour (Horowitz, 2011). However, these have not been researched to their fullest extent yet.

Finally, the age of an artwork is important when determining the price. When an artwork is old, it is probable that it is scarcer than recent works and can also be of historical importance, as former city views or old customs can be depicted. Hutter (2007) mentions research done by Galenson & Weinberg (2000) and Landes (2000), who found that the age of an artwork has a positive effect on the prices.

2.2.1.2| Artist related

Firstly, the reputation of the artist is mostly constructed by the galleries and museums in which the artist is showed. They advertise and attract media attention and thus focus is laid on the artist. However, initially the artist himself needs to work on his network in order to even be noticed. Sagot-Duvauroux (2003) quotes Moulin (1992) stating “she shows that a considerable proportion of the value of works of art lies in the outcome of the interaction between different actors involved in the art market” (Sagot-Duvauroux, 2003), making his network one of the most important factors for his reputation.

However, it should be noted that reputation has nothing to do with the talent or skill of

an artist. In this respect it is much more important to be a good marketer of their own product: the artworks. The reputation of an artist correlates with its prices, when an artist becomes more established and well known, his prices will consequently grow as demand rises.

Rouget et al. (1991, mentioned in Rengers and Velthuis, 2002) looked at the age of an artist as a determinant of prices of artworks and (in addition to size, technique and provenance) found that the age of an artist was of importance. The older the artist, the more time he had to establish his reputation and thus prices are bound to be higher. However, it matters even more whether an artist is deceased or not. This is called the death effect. The death of an artist has an incredible influence on the scarcity and thus the price of an artwork. When an artist dies, the output of the artist comes to a halt. This increases the scarcity of the artist, as no supply is added to his oeuvre (Ekelund, Ressler & Watson, 2000). Consequently, demand rises as collectors keep on buying the art and the supply decreases.

Rengers and Velthuis (2002) noted in their conclusion that there is room for more determinants in their research and that gender might be a useful addition. Traditionally, only men were able to pursue a career in the arts. This might have changed, but the art market is still a mainly masculine workplace. This would imply that prices for men are higher than for women. However, with new media such as photography and video art, this might not be the case as both men and women have been present in this market since the beginning. In 2005, Velthuis did research into the gender issue and discovered that indeed women received lower prices for their artworks than men (Velthuis, 2005).

Finally, education might have an influence on prices as well. However, this might be due to the fact that art academies have brought forward new artists who are able to form a network more easily. Being autodidact just implies that the artist has not yet had any real opportunity to form a circle of artists and other connections in the art world around him. Coming from an established and famous art school is no guarantee for success and hence highly priced artworks.

2.2.1.3| External factors

The expert opinion or peer reviews are of great importance to the prices of artworks. They determine, or at least judge, the artwork's value at a certain time. For example, at auction a pre-sale catalogue is presented with a low and high estimate. These estimates are calculated by the art experts and give an estimation of the value of the artwork that is up for sale. It is assumed that the estimates are unbiased and fully informative, meaning that prices are not unnecessarily driven up due to high estimates. The high estimate might be a goal for the seller, but this may also discourage possible buyers from bidding and consequently lower the hammer price. However, according to Bauwens and Ginsburgh (2002), a seller does not accept an estimate that is too low, as this influences his reserve price negatively.

In 1989, Ashenfelter showed that the estimates correlated highly with the actual hammer prices and that the estimates of the auction houses thus can be perceived as truthful.

Valsan and Sproule (2007) concluded that there might be a possibility for overestimation by the art experts. But this had merely to do with the reserve prices set by the seller. The reserve price may force an art expert to raise the low estimate, as the reserve price must remain below the low estimate. When a seller values his item very highly (either because of the endowment effect or due to trends in the art market), a high reserve price is consequently set, resulting in a high low estimate. Therefore, the low estimate should be considered a better predictor of the final price than the high estimate (Valsan & Sproule, 2007).

Bauwens and Ginsburgh's (2000) also conducted research in the field of estimates, about the prices of English silverware. They came to the conclusion that the pre-sale estimates were biased and not fully informative. Sotheby's overestimated low-priced items and underestimated the high-priced items, while Christie's undervalued more systematically. The tendency for both auction houses to undervalue is larger when the items increase in price. A possible explanation for the overestimation of lower priced items is to discourage buyers who search cheap collectibles, hence hoping to keep prices higher. For the higher priced items the more possible buyers the better, as they can bid against each other and drive up the prices. This is one of the most important price determinants says Sagot-Duvaouroux (2003). As they attempt to outbid

each other, prices can rise unexpectedly. Therefore, Sotheby's, Christie's and Phillips de Pury & Company host their auctions around the same time in the same town, benefiting from the presence of possible buyers (Sagot-Duvauroux, 2003).

Ashenfelter and Graddy (2002) presumed that a big variance between the low and the high estimate implied that there is a lot of uncertainty about the value of the item.

Furthermore, awards and grants offered by the art experts help raise prices for an artist. On the one hand, this is due to a boost in (media) attention. This attention implies that more possible buyers become familiar with the artist. On the other hand, it raises the prices because it is a validation of the reputation and skill of the artist. However, Velthuis (2005) shows in his research that not all grants or awards have this positive effect. Small grants result in slightly lower prices; large individual prizes produce a downward pressure on the price of the artist as well. However, when an artist is commissioned by the government to make an artwork in the public space, this results in higher prices. This maybe due to a sign of recognition and more overall visibility of the artist (Velthuis, 2005).

However, as Sagot-Duvauroux (2003) says, it is important to keep in mind that trends and fashion do influence prices as well. An artist can fall out of fashion and consequently be sold for lower prices. In addition, taste is of importance, not everyone likes the same style and the diversity in the taste of buyers influences the prices.

In addition, the reputation of the gallery itself is important for the prices that can be asked for the artworks presented by the gallery (Velthuis, 2005). A higher reputation may lead to more sales, due to the fact that more collectors trust the gallery owners taste and opinion, consequently leading to higher prices.

Moreover, the effect on the price when a museum acquires a work is large, this due to the fact that a museum is considered to be a gatekeeper. When one purchases a work, this is a confirmation of its value and artistic importance, resulting in a price increase for all other works of the subsequent artist (Velthuis, 2005).

Finally, other externalities that can influence the prices of artworks are the so-called three D's, Death, Divorce and Debt (Horowitz, 2011). These three D's influence the supply of the artworks on the market. Changes in supply imply changes in scarcity, which consequently means changes in prices.

2.2.2| Art as an investment

High sales prices for artworks are becoming more frequent and it appears that prices continue to rise. This has already been noted in early stages of this process and art, as an investment opportunity, has therefore been a popular research subject. Many researchers have written about the art as an investment opportunity in the past. A selection of these scholars is therefore discussed in this part.

One of the first of many to look at art as an investment is Baumol (1986). He stated that the rate of return on investment for works of art was close to zero (0,55%) per year, where a risk adverse bonds investor could have gained a return of 2% per year (Baumol, 1986). However, this research did not conclude that one should stop collecting art. The aesthetic pleasure derived from an artwork should not be overlooked and collecting art is thus still worthwhile. Although, this might not be a monetary return, it certainly is a psychological one.

In 1993, the ‘floating crap game’, as named by Baumol, was revisited by Buelens and Ginsburgh. They conducted the same research, but the results were somewhat different. For the restricted sample (Baumol left out re-sales which were 20 years apart) they obtained an annual return of 0,87% and 0,65% when working with all re-sales. This deviates from Baumol’s findings of 0,55% return; however, this is regarded to be in the same region. The dataset of Baumol covers over three centuries (1650-1960). Buelens and Ginsburgh subdivided the period into four parts (1700-1869, 1870-1913, 1914-1950, 1951-1961), inspired on historical events. They also distinguished different schools of painters to research the returns. This resulted in several outcomes that provide a different view than the negative one Baumol sketches. Buelens and Ginsburgh concluded that “paintings are much less liquid than paper assets, require special storing and transportation conditions, and, especially nowadays, large insurance costs. If markets were perfect, these additional costs should indeed be reflected by larger returns...” (Buelens & Ginsburgh, 1993). However, this does not seem to be the case in this research.

Goetzmann (1993) performed another investigation into the returns of paintings using (similar to Baumol) the data collected by Reitlinger on auction results. His research focuses on the comparison between art and financial assets such as (English) stocks and bonds. His research concluded that there was a basic connection between

stocks and bonds and art. He also stated that both wealth and taste influenced the demand for art (Goetzmann, 1993).

While previous researchers only used the repeat sales method to compute returns, the article by Chanel, Gerard-Varet and Ginsburgh (1994) explains the hedonic price index related to art. As artworks are heterogeneous, they all have different characteristics. The hedonic price index takes these characteristics into account when computing the returns. The advantage of the hedonic pricing method is that all sales can be used instead of only re-sales, which implies that a lot of information is lost when only using re-sales. The article concluded that “(...) uncertainty is concerned with the tastes of future generations. In the long run the art market is hardly predictable but may be predictable in the short run” (Gerard-Varet et al, 1994). This statement implied that one cannot predict taste but within the same ‘taste period’ prices can be predicted. This makes the returns on art hard to predict as they change every ‘taste-period’.

In 1995, Gerard-Varet wrote another article considering the art market, art trade and returns on art. Prices of artworks depend on many different variables. Not only production costs and size or type of artwork, reputation of the artist and aesthetic quality are of importance here, but also buyer income and rates of return on other assets (such as stock and bond investments). In the conclusion, Gerard-Varet stated that, in order to better understand the art market, it is necessary to “better understand the ‘dynamics of tastes’ for art objects” (Gerard-Varet, 1995). It appeared that taste in most cases affects the demand for art and thus its prices, a statement consistent with an earlier article written by the same author.

Frey (and Eichenberger, 2003) surveyed twenty studies estimating rates of return on art objects. This paper identified flaws that previous research failed to see regarding the field of returns on art objects. Firstly, the data is uniform as all research has been based on auction data and in most cases even on several famous data collections (such as Reitlinger’s auction data). Secondly, transaction costs and taxes have not been taken into account. Thirdly, the comparison to financial assets is fairly superficial and does not take all aspects into account (Frey & Eichenberger, 2003). In addition, they noted that a general shortcoming of all the research into this topic is that the behaviour and/or psychic aspect is disregarded.

The article also distinguished between pure speculators, those who collect for

investment reasons, and pure collectors, those who collect for the psychological returns having art for pleasure reasons (Frey & Eichenberger, 2003). For pure speculators the possible returns on the arts are very important, while collectors ignore this aspect.

Chanel, Gerard-Varet and Ginsburgh used the hedonic price index and repeat sales regression on paintings to look at the efficiency of the art market. They pointed out that earlier researchers exemplified the art market, in comparison to the financial market, to be an inefficient market due to the fact that trade is infrequent, transactions are individualized and the product up for sale is illiquid, heterogeneous and unique (Chanel et al, 1996). However, they also pointed out that differences between the financial market and the art market in terms of returns do not imply an inefficient art market, just a different one.

2.3| The law of one price

As early as 1977, a fair share of literature has been published on the law of one price in economics. Peter Isard was one of many who published work on the law of one price. According to Isard (1977), the law of one price in economics is: “In the assumed absence of transport costs and trade restrictions, perfect commodity arbitrage insures that each good is uniformly priced (in common currency units) throughout the world” (Isard, 1977). However, this concept is made for a world in which there is perfect competition. This is hardly ever the case and therefore the law of one price is systematically violated. Goods, in this definition, should be considered to be commodities and these commodities should be identical or at least near-perfect substitutes. Otherwise they cannot be compared to the same commodities in different markets. Markets, in this definition, should be considered to be locations all around the world where goods are traded, which can be countries, continents or cities.

Arbitrage is a very important concept for the law of one price. Arbitrage implies that one either sells or buys goods in one place and sells it at another place. This is what markets all over the world have been trying to avoid. However, they do not always succeed. The aim is to make money out of this process, due to price differences that occur simultaneously in different markets. In other words: the direct opposite of the concept of the law of one price. Prices tend to stay the same due to the work of arbitrageurs.

Purchasing power parity is another theory closely linked to the law of one price. While prices all over the world for the same good at the same time should be the same, currencies are not and neither is the purchasing power. What an American can pay for corn, for example, might be completely different to what a Senegalese is able to pay. The purchasing power is skewed, as the American probably earns more and therefore has more to spend. However, corn is an identical product all over the world, whether it is harvested in America or Senegal. Therefore, it should theoretically cost the same (here transaction costs do not even matter). Currencies, incomes and taxes do differ and therefore prices in different countries differ as well. Countries in different states of economical and financial stability and prosperity can therefore not be compared to each other. Relatively speaking, prices might be the same when percentages are compared; in absolute terms, they are distinct.

Prices differ amongst countries, but they should not differ more than the transactions costs of moving the commodity to the sales location. This, however, does not seem to hold up when examining the evidence presented by the extensive research performed over time.

In 1982 Crouhy-Veyrac and Crouhy wrote an article on the law of one price. This article slightly criticizes the articles by Isard (1977) and Richardson (1978), as they found that the harsh attacks in the other articles were not completely founded. Both studies of Isard and Richardson drew conclusions about the law of one price regarding exchange rates and prices of identical goods in different currencies (thus markets) (Crouhy-Veyrac & Crouhy, 1982). However, they did not take transfer (transportation) costs into account, which was the main critique of the 1982 article. These transportation costs are important when working with goods such as commodities. Since commodities are illiquid goods, the buyer wants to receive the purchase in his possession (when the good is liquid, legal evidence of ownership generally suffices) (Crouhy-Veyrac & Crouhy, 1982). Where both Isard and Richardson found evidence that the law of one price did not hold (outside of the case of raw materials), Crouhy-Veyrac and Crouhy were more moderate and said the evidence was weaker than others considered it to be. The second assumption that the law of one price would hold for primary products, but not for more sophisticated manufactured goods, was also toned down as no real evidence to support this assumption was found. The third and last recommendation was

made for future research, stating that the limits concerning transfer costs needed to be fully investigated (Crouhy-Veyrac & Crouhy, 1982).

As more research went into the law of one price, which is more violated than not, new critiques and revisited articles appeared. While earlier research looked at relatively short periods of time, Ceglowski (1994) emphasized on the necessity of long-term analysis. Ceglowski analysed “time-series behaviour of a unique set of carefully matched, disaggregated export prices for manufactured goods from the U.S Germany, and Japan over the period 1974-90” (Ceglowski, 1994), to see whether a stable long-term relationship existed.

The results “reveal protracted deviations (...), indicating that global exports of similar goods from different sources are not priced identically” (Ceglowski, 1994). However, Ceglowski warned for several possibilities that could influence the results. Primarily, the dataset may accidentally involve goods that are not near-perfect or close substitutes. Secondly, changes in export prices and additionally price discrimination, such as pricing the market, could have had an influence. Finally, the low quality of the tests used to research the law of one price could have impacted the results (Ceglowski, 1994). Specifically Ceglowski mentioned that, while the duration of this research was longer than others, it might still be too short to draw conclusions.

Miljkovic (1999) published a critical review concerning the law of one price, stating it is the most frequently tested law in economics and still has no definitive outcome. Miljkovic (1999) gave the ‘Big Mac’ example explaining that Big Mac prices differ all over the world. While the actual Big Mac burger might not be traded, its ingredients are and everywhere around the world a Big Mac tastes and looks the same. What does differ are the local labour inputs, “value-added taxes and differing profit margins across locations, depending on competition” (Miljkovic, 1999). This caused a price difference of \$4.15 (\$5.20, in Switzerland and \$1.05, in China). A substantial difference considering it is the same product all over the world, of the same quality and with the same ingredients.

The article summed up several reasons for the consequent failure of the law of one price in research, namely pricing to market, exchange rate risk, geographical separation of markets including transportation costs and institutional factors that influence price settings in different markets (Miljkovic, 1999). Pricing to market implied that demand

per country could differ. In other words, elasticity for products varies per country (Miljkovic, 1999). The lower the demand, the cheaper the product is bound to be. However, when the demand is higher in another market, it is probable that it is also priced higher. This is a form of imperfect competition whereby exporters use price discrimination across different markets (Miljkovic, 1999). The other reasons, mentioned above, are self-explanatory.

In 2003, Lamont and Thaler discussed the law of one price for an array of financial products. While examining different cases they came to the conclusion that for those financial products the law of one price did not hold (however, they only looked at a particular set of products subject to the law of one price, while overlooking the majority of financial products). The concept is simple: it is assumed that when the law of one price is violated, arbitrageurs step in to adjust the prices and maintain equal levels throughout the different locations. However, arbitrageurs do not always step in to save prices from being unequal, due to the high risks that may arise when doing so (Lamont & Thaler, 2003). Therefore, prices may stay asymmetrical.

McChesney, Shughart and Haddock (2004) examined the law of one price again and summed up the contradictions that bother the law of one price. While researchers added new *ceteris paribus* (all things being equal) conditions to save the law of one price from its contradictions, they created two problems. When modified to include transaction costs, the law became internally contradictory, as it allowed different prices in different markets for the same product. Furthermore, economists have applied the law excessively. They were trying to force markets to conform to the abstract economical models of pure competition, which do not exist in practice (McChesney et al, 2004).

2.3.1| The law of one price in Cultural Economics

The law of one price in cultural economics has been researched before and results from this research varies strongly.

Pesando (1993) found that for modern prints there seemed to be differences between several sales locations. The main observation derived from Pesando's research (1993) was that prices at Sotheby's New York were around 14% higher than for Christie's New York, prices in New York were 7% higher than in London and between New York and Europe the difference was 10%. Pesando indicated that especially the difference between Christie's and Sotheby's New York was exceptional. As there are no

differences in the regulations or geographical barriers between the two, it was difficult to explain why the prices were higher at Sotheby's than at Christie's. One possible explanation was that the number of lots sold at Sotheby's was more than twice as high as the number of lots sold at Christie's. This resulted in more visitors and possible buyers attracted by Sotheby's rather than Christie's. The larger audience could result in more bids and possibly more aggressive bidding, due to the larger number of foreign buyers. This could possibly drive prices up at the auctions (Pesando, 1993).

A possible explanation for the difference between London (Europe) and New York could be the large population of Japanese collectors located in New York who bought art during the eighties. The study of Hiraki, Ito, Spieth and Takezawa (2009) supported that theory.

In 1996, Pesando and Shum wrote another article on the law of one price for modern prints. This article showed similar results to those presented in the 1993 article. However, they performed the calculations on an even more homogeneous dataset than in their previous article. The results confirm the hypothesis, implying that for the market of modern prints and in particular for the prints of Picasso, the law of one price was violated.

In 2007, Pesando conducted yet another study on the law of one price on Picasso prints (a further examination of his research in 1993 and 1996) together with Shum. This research included new data for the period 1993 – 2004 in addition to the existing data from 1977 – 1992. Results from this data showed that the previous findings of 14% higher prices between Sotheby's and Christie's New York were reversed. In this study, Christie's New York achieved 12% higher prices than Sotheby's New York; however, still no real explanation could be formulated for this outcome. Another result was that, although there was a decrease from 9% to 7%, the prices in New York still remained higher than in Europe (Pesando & Shum, 2007).

Mei and Moses (2002) found mixed evidence from their research into the law of one price, where they researched the differences in prices between Sotheby's and Christie's New York. The place of transaction for American art did not seem to have an influence on the price. For impressionist art, it was most beneficial to buy at different auctions and to sell the artworks through Sotheby's. For old masters there was a negative return when the paintings were bought at Sotheby's, indicating that Sotheby's

would sell for a higher price than other auction houses (Mei & Moses, 2002). However, the return between the two auction houses on artworks did not seem to be very different. Buying from a small auction house and selling through the two big ones seemed to be the best way to receive higher returns (Mei & Moses, 2002).

2.4| Other anomalies and effects that influence prices at auction

It has been a common assumption that the secondary market, the auction market, sets the boundaries for prices in the primary market. However, the auction market is not without psychological defects and other problems. The big difference with art and other auctioning items, as previously mentioned, is that an artwork usually is a unique piece and not reproducible. Furthermore, quality differences are of influence and prices can therefore differ substantially. In addition, art does not only have monetary value but also psychological value. In contrast to stocks and bonds investing in art, owning art and subsequently enjoying its presence gives pleasure. These factors make the auctioning of art a business with a multitude of irrational behaviour. Some of these phenomena are discussed in the section below.

2.4.1| Ramping the art market

Ramping the art market implies that dealers and agents of artists deliberately bid on artworks of their artists to make sure the price goes/stays up. They do this to ensure the artist's work remains expensive, enabling them to demand high prices in their dealerships and galleries. Even collectors of a particular artist may participate in this behaviour, making sure that the rest of the artworks in their possession remain of high value (Reid, 2007).

2.4.2| Bidding as winning

Recently, the art market has been overflowing with wealthy people wanting to buy art, as art is a symbol of status, especially for the new rich. This small group of fortuneds regard an auction almost as a game they need to win. This mentality resolves in the bidding as winning trend, pushing up the prices of artworks as they are bidding against each other for the artwork they want to purchase (Reid, 2007).

2.4.3| Masterpiece effect/survivorship bias

The masterpiece effect is the assumption that the most expensive paintings receive the

highest returns. A common advice that art experts provide is “buy the best (most expensive) painting you can afford” (Pesando, 1993). However, several studies indicate that the masterpiece effect is more likely to be negative rather than positive. Respectively Pesando (1993), Mei and Moses (2001) and Ashenfelter, Graddy and Stevens (2002) found similar negative results. However, Ashenfelter, Graddy and Stevens found no effect on the impressionists. According to Mei and Moses (2002), two buyers bidding against each other for a masterpiece results in an above-normal price. When a masterpiece returns to auction, it falls back to its mean price and therefore a negative return is created on the artwork. Goetzmann (1996) made another assumption regarding the negative masterpiece effect and called it the ‘survivorship bias’. This theory entails that only the expensive high quality artworks maintain their position within the sample, even if their price decreases, while the lower priced artworks fall out of the sample. Thus it may seem like the masterpieces have underperformed, while less expensive artworks have disappeared, creating a skewed sample.

2.4.4| Burning effect

The burning effect occurs when an item that has been put up for auction goes unsold and subsequently has been bought-in. It is claimed that this influences the future value of the item negatively, the artwork is then said to be burned. Beggs and Graddy (2006) find that this claim is one to be adopted. The average decrease in return is about 33% and paintings that were brought back to auction within two years suffered a loss of 55% (Beggs and Graddy, 2006). The observed burning effect could have several explanations. For instance, a seller could have a high reserve price while hoping the artwork acquires a high hammer price. However, when the item fails to sell, the seller might choose to lower his reserve price. This results in a lower low estimate and consequently a possible lower hammer price in a second sale. Furthermore, when an artwork does not sell the first time around, the seller might experience an urgency to sell. He might lower his reserve price, instead of keeping the item off the market for a while (Beggs and Graddy, 2006). In addition, when one artwork of a seller got sold for a much higher price than expected, he is likely to value all of his other works more highly and set higher reserve prices for them. When his artwork is bought-in in a next sale, he is likely to lower his reserve price again to a reasonable amount. When the artwork is then sold, the data will show the burning effect (Beggs and Graddy, 2006).

Finally, if an artist is experiencing a downwards trend, it is likely that other sellers may lower their reserve prices to make sure their artwork is not bought-in. A downward trend is simply correlated with a failure to sell and thus a drop in price (Beggs and Graddy, 2006).

2.4.5| The afternoon effect/declining price anomaly

The declining price anomaly is a phenomenon that has received a lot of attention, not only in the art auctioning sector but in other sectors as well. The effect implies that the prices of an auction are lower in the afternoon than they are in the morning; therefore a declining price curve can be observed over the course of a day. Beggs and Graddy (1997) have performed research in this area and found that the prices drop along with the estimates. During the day the estimates of the items sold decline, as do the hammer prices. Several other studies have been conducted on the declining price anomaly, but they are difficult to apply to art auctioning, mostly because the studies have been done on homogeneous products instead of heterogeneous products (such as artworks). Ginsburgh (1998) finds that the presence of absentee bidders (a buyer who is not present at the actual sale but sends a ceiling bid for certain items) can generate a declining price (Ashenfelter and Graddy, 2002).

2.4.6| Catalogue effect

The catalogue effect is the belief that the place of the artwork in the pre-sale catalogue of an auction is important for the hammer price of the artwork, as is the order in which the art is presented during the auction (Deltas & Kosmopulou, 2000). When the item is shown at the start of the auction, more bidders are likely to be present, and more bidders consequently implies more bids resulting in a higher hammer price. This reasoning could also be an explanation for the declining-price-anomaly, as more bidders leave the auction during the course of the day (Sagot-Duvauroux, 2003).

2.5| The market for photography

Photographs were on sale in galleries as early as in the 1850s, such as P&D Colnaghi in London (Dixon, 2001). Photographic auctions appeared around that time too; in London, the first auction took place in 1854. The first auction sale in the USA took place almost a century later, at the Swann Galleries in 1952 (Dixon, 2001). However,

photographs were not considered a true art form until 1859 (Pompe, 1996) and from the early 20th century photographs had become an established collectable (Dixon, 2001). The reason why it took time for photography to become integrated in the art world as art, was due to the impersonal and mechanical process used to produce them. Nowadays, a work of art is “more accepted for the significance of the final image, rather than the process (e.g. computers) used to achieve the end result” (Pompe, 1996), which was different in the past.

Photographs are now an accepted form of art and appear in every major museum around the world. While paintings do achieve significantly higher prices than photographs (top price for a painting is 250 million US Dollars, where photographs stall at a little over 4 million US Dollars), they are gaining importance, attention and popularity. This is especially true for smaller collectors, who are not able to pay the exorbitant prices for paintings, but are offered a more viable opportunity purchasing photographs. This statement is one that is made repeatedly, when considering photography as an opportunity to collect or invest, in the literature on the market for photography. The market for photography is thus claimed to be a market for young collectors (Kinsella & Peers, 1999). Young collectors are often drawn to the market for photography, not only because of its lower prices, but also due to the fact that photography can be understood more easily than, for example, contemporary art paintings. In other words, the market is more accessible and has low entry barriers (Struder, 1993).

Museums have a large impact on the market for photography, more than in other sectors. They are key trendsetters in the young and thin market for photography (Peers, 1993). In the case of photography, museums also have contributed to the public awareness and educated visitors and possible collectors. Because the history of photography is still young the valuation of museums for photography has influenced the buyers (Dixon, 2001).

It was not until 1975 that the major auction houses such as Christie’s, Sotheby’s and Phillips de Pury & Company started to schedule fall and spring auctions specifically for photographs (Pompe, 1996). The boom experienced by the painting market in the 80s, due to the Japanese investors buying large quantities of art in New York, was also apparent in the photography market. This created above-normal prices

which declined over the 1990s and started rising again from the turn of the century. However, claims have been made that the significant drop experienced in the painting market was not as steep in the photography market (Studer, 1993).

A big uncertainty in the market for photography is the possibility for endless reproductions from one negative. This uncertainty hugely depresses prices for photographic images due to the high uncertainty levels in the scarcity of the photographs (Peers, 1991). In theory, prints can be produced endlessly; however, the market for photography is said to be self-policing as dealers and artists carefully track the editions of the photographs (Goff, 1997).

Making limited editions of the prints of a negative is one way of ensuring some level of uniqueness. Photographers, however, only started applying this method in recent years. During the boom of the 1980s, as demand was very high, the photographers supplied vast quantities of the prints that were in vogue. Furthermore, when a certain print achieved high prices at auction, the market becomes flooded with the multiples of this photograph. This depresses the prices of the identical examples, as the supply suddenly peaks (Peers, 1993 and Peers, 2006).

Other factors that affect prices for photographs in particular are “print quality, importance of the photographer and of a particular photograph within the photographer’s work, beauty of composition, physical condition, authenticity, rarity, vintage, history, signature, stamp, date, notes of photographer, presence in prominent collections and exhibitions, and prices achieved at auctions” (Studer, 1993). There is a lot of overlap with the price determinants for the art market in general when looking at the price determinants Studer (1993) has identified. The market for photography is a relatively young market, therefore it is not yet very stable and fluctuates heavily. Past performances for photographs might therefore not be the best indicators of future performances or returns (Pompe, 1996). In addition, Velthuis (2005) mentions that when an edition of a photograph is close to selling out prices are bound to be higher for the few works that remain on the market (Velthuis, 2005).

When the artist himself prints the photograph, the price is the highest. When a famous printer makes the print, the price also remains high; however, unknown printers do suppress the prices (Peers, 1991). The further the print is made from the date of creation of the negative and the artist himself, the less desirable it becomes (Peers,

1991). The most desirable photograph is therefore, a signed, dated and numbered print made by the photographer himself from the original negative at the time the negative was taken (Peers, 1991). When the negative no longer exists, the price of the photograph is bound to be higher as no more reproduction can be created (Peers, 1991).

Pompe (1996) found in his article that, for the period between 1980 and 1992, art photography has proven to be a good investment. However, there might be a case for an upward bias as the market has been escalating within this period (Pompe, 1996). In addition, collectors have only become knowledgeable since 1990 and prices up to this date might not be very accurate.

When focusing on more recent years, it is apparent that the photography market has been booming. More attention has been paid to photography and prices are rising steadily. Prices have doubled between 1998 and 2008 and more than 11,600 photographs were sold in that period (Artprice, 2010). However, when the economic crisis hit in 2009, the prices plummeted to their 2004 levels. In 2010, the prices picked up quickly and rose to their 2008 level again. Yet, the market for photography still only represents 2% of the total auction revenue generated by fine art in 2010 (Artprice, 2011). In addition, the market for photography is mainly located in New York, which accounts for 7 of the 10 top bids made on photographs (Artprice, 2011), making New York the absolute market leader for art photography worldwide.

2.5.1| The case of Cindy Sherman

Cindy Sherman was born in 1954 in Glen Ridge New Jersey, near New York, and started making photographic images in the early seventies. She is famous for her self-portraits and as a photographer she takes on every role: the author, director, make-up artist, hair stylist, wardrobe mistress, décor designer and, of course, the model.

Over the years she has made many photographs in very different styles, almost always self-portraits; however, she does not mean them as self-portraits (Gopnik, 2012). She disguises herself, acting as if she lives another life (Gopnik, 2012). One of the reasons why Sherman's photographs have stood the test of time, is the fact that her oeuvre is not a collection of random images, but that she has a relatively cohesive story centred around a central theme of gender and identity (Forrest, 2012).

Artprice mentioned that the works of Cindy Sherman are about distance; the distance she creates in her works, even when depicting herself, from the spectator, in many

different disguises (Artprice, 2010).

Attributing the retrospective exhibition in the MoMA this year, the Financial Times mentions, “In an era obsessed with image, Sherman has focused on identity and how we present ourselves” (Financial Times, 2012). Furthermore, the article addresses that the art Sherman creates “holds a mirror up to society, calling attention to the strangeness of thing we tend to see as normal, like fashion, makeup, and plastic surgery” (quote: Erin O’Toole in the Financial Times, 2012).

Sherman has a degree in painting and photography from the State University Collage of Buffalo. Because she could not express herself fully through painting, she started using the photo camera as a medium instead. When she graduated she moved to New York, where she still lives and works.

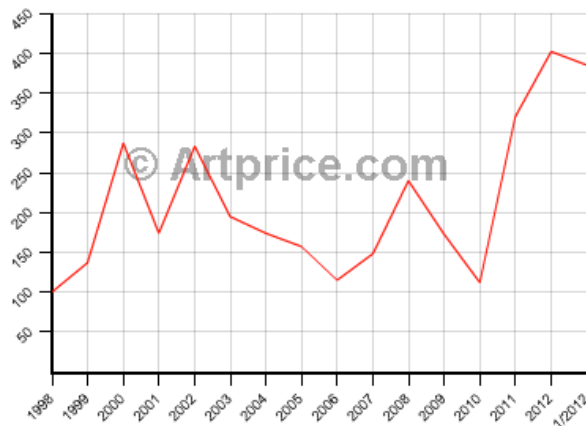
Her first series was the Untitled Film Stills, which have become iconic for the entire oeuvre. They are highly sought after and, together with series such as Centerfolds and History Portraits, they are amongst the most expensive photographs in her oeuvre. However, other series, such as Fairy Tales, Disasters, Sex pictures and Horror and Surrealist Pictures, which are less sought after, demonstrate grotesque and monstrous images (Artprice, 2010).

In May of 2011, she reached her highest sales price yet at Christie’s of 3,4 million US Dollars for a photograph out of the Centerfold series. This auction price was the highest price paid for a photograph at the moment (Gursky topped that only five months later with 4,3 million US Dollars). The price was one million Dollars higher than Sherman’s previous record of November 2010, acquired at Phillips de Pury & Company (Artprice, 2011). When looking at top auction results for photographs, it is noticeable that Cindy Sherman covers the chart with three places. Only Andreas Gursky is a better-selling photographer, covering five places in the ranking (including the first). This makes Cindy Sherman the second best-selling photography artist at the moment.

Auction prices for Cindy Sherman have been fluctuating heavily over the last couple of years. Steep descents and ascents can be derived from her index, as can be seen from Graph 1 below.

Price index

Base 100 in 1998 (For all categories)



Date	Index	Growth rate
1998	100	0%
1999	137	+37%
2000	287	+108%
2001	174	-39%
2002	283	+62%
2003	195	-31%
2004	174	-10%
2005	157	-10%
2006	115	-26%
2007	148	+28%
2008	240	+62%
2009	173	-28%
2010	112	-35%
2011	320	+184%
2012	402	+25%
01/2012	385	-4%

100 EUR invested in 1998 in a work of Cindy SHERMAN (1954) have an average value of 385 EUR in January 2012

Graph 1 | Price index for Cindy Sherman from 1998 to 2012, source: artprice.com

Apart from the high peaks, still almost 40% of her photographs are affordable at lower prices than €6000 (\$7291) (Artprice, 2012). These prices are still relatively low for a top-selling artist, making Cindy Sherman a good investment opportunity for smaller collectors.

Segmentation of prices 1997-2011

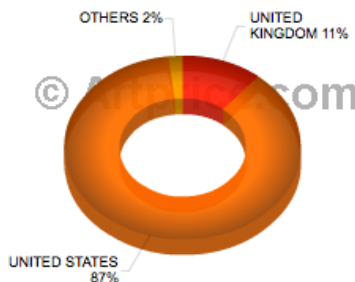
Segmentation of hammer prices by price segments (EUR)	
Top hammer price	2,369,120
90 % of hammer prices are under	125,962
80 % of hammer prices are under	65,153
70 % of hammer prices are under	39,436
60 % of hammer prices are under	26,107
50 % of hammer prices are under	15,115
40 % of hammer prices are under	5,951
30 % of hammer prices are under	3,000
20 % of hammer prices are under	1,646
10 % of hammer prices are under	1,000

Table 1 | Segmentation of prices for Cindy Sherman from 1997 to 2011 in Euros, source: artprice.com

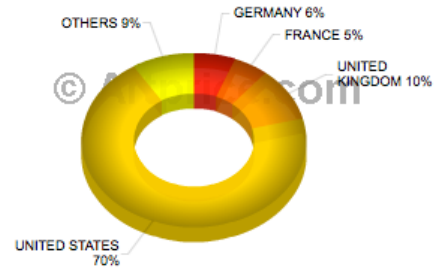
The Figures 1 and 2 below, show that the USA is the dominant country of both turnover and transactions of Cindy Sherman’s photographs. This is conform to the previously discussed literature, which claimed that the market for photography is mainly based in the USA. However, it is notable that while Germany and France respectively claim 6% and 5% of the transactions for Cindy Sherman’s photographs, they are not featured in

the figure of turnover. This implies that sales prices of the transactions made in both France and Germany are low.

Artist's turnover 1997-2011 weight by country

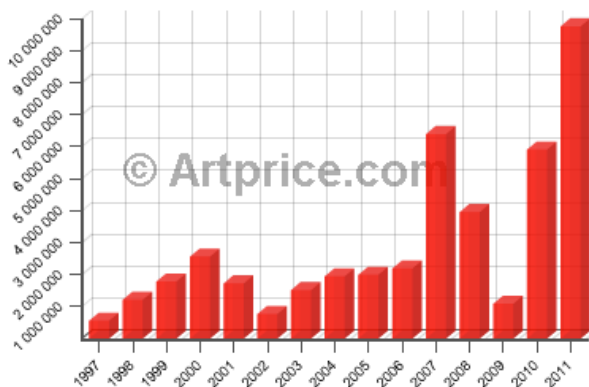


Artist's number of transaction 1997-2011 weight by country



Figures 1 + 2 | Cindy Sherman's turnover between 1997-2011 weight by country + Cindy Sherman's number of transactions between 1997-2011 weight by country, source: artprice.com

Annual auction turnover 1997-2011 (EUR)



Date	Value (EUR)	Growth rate
1997	553,308	0%
1998	1,208,530	+118%
1999	1,779,707	+47%
2000	2,559,937	+43%
2001	1,727,778	-32%
2002	764,261	-55%
2003	1,517,191	+98%
2004	1,940,946	+27%
2005	1,991,437	+2%
2006	2,187,789	+9%
2007	6,392,439	+192%
2008	3,956,581	-38%
2009	1,089,260	-72%
2010	5,904,731	+442%
2011	9,757,403	+65%

Bar chart 1 | Annual auction turnover for Cindy Sherman between 1997-2011 in Euros, source: artprice.com

It is apparent from Bar chart 1 above that turnover for Cindy Sherman has fluctuated substantially. In a later part of this research a comparison is made to the S&P500 and the Dutch AEX index, which shows the possible influence of the economic and financial turmoil around 2008 and 2009 on prices for Cindy Sherman's photographs. In addition, it can be concluded that Sherman was receiving more popularity and attention from 2007 onwards. The economic crisis that hit in 2009 decreased the turnover; however, when the economy picked up, turnover did rise quickly to their earlier levels and beyond.

3| Methodology

This part describes the methods and data that have been used in this master thesis. Firstly, previous scholars are addressed in order to form a clear idea of what has been researched in the past and how, plus what the possibilities are in researching the law of one price in the cultural field. The repeat sales index, which is used by all the previous scholars, is explained thereafter. Furthermore, transaction costs and taxes are briefly addressed, as these may have an influence on hammer prices and sales performance. Moreover, currencies are shortly touched upon as fluctuations may have an influence on prices between the different locations. In addition, the two cities New York and London, which play a main role in this research, are assessed. Finally, this chapter accurately describes the research procedure, what is researched and how the research is performed.

3.1| Survey of research methods

The law of one price in relation to cultural goods was first addressed in the article, “How Auctions Work for Wine and Art”, by Ashenfelter (1989). This article generated the interest for the law of one price in the cultural field. Ashenfelter only briefly mentioned of the law of one price and its occurrence in an auction of wine he attended. No further research has been conducted regarding the phenomenon in the article.

James Pesando did the first in-depth research into the law of one price in cultural economics in 1993. The law of one price has several requirements that need to be met to perform a significant and valuable research into the matter. These requirements are, as previously mentioned, that the commodities researched are identical (or at least close substitutes) and sold at the same time (or at least contemporaneous). To make sure the requirement of identicalness was met, Pesando used prints. These prints are produced in multiples and thus identical, unlike other segments within the art market (Pesando & Shum, 1996).

To have a complete record of the prints sold at the major auction houses (such as Sotheby’s, Christie’s, Hotel Druout, Hauswedell & Nolte, Kornfeld, etc.) Pesando used the *Gordon’s Print Price Annual*, which has published auction results for prints since 1978 (Pesando, 1993 and Pesando & Shum, 1996). The dataset covered print data from 1977 to 1992. The prints are identified by artist, title and the catalogue raisonné number

(reference catalogue). Furthermore, information is provided on the price, location, the date of the sale and whether the print is signed or not (Pesando, 1993 and Pesando & Shum, 1996). The price mentioned is inclusive of the buyer's premium (typically from 25% to 12%, depending on the height of the hammer price). The prices, if the sale did not take place in the USA, were converted to US dollars using *The Wall Street Journal's* daily conversion rates (Pesando, 1993 and Pesando & Shum, 1996). However, no reference has been made on the condition or quality of the print in the *Gordon's Print Price Annual*, an aspect that can influence the price substantially.

Pesando (1993) used modern prints for his research instead of old master or contemporary prints, because the condition and quality of old master prints can vary tremendously and this could harm the requirement of identicality. In addition, the contemporary prints are more likely to be in good condition and of excellent quality. However, they are less likely to have a sales history at auction and thus repeat sales could be scarce (Pesando, 1993).

As previous research into the law of one price has clearly identified, it is necessary to compare the prices of identical prints that are sold at the same time. This, however, is not completely possible. Therefore, the notion of contemporaneousness (not exactly at the same time but within a certain time frame) was settled for. The objective was to facilitate as much participation as possible, as auction houses do not plan their auctions at the exactly the same time but shortly after each other (Pesando, 1993). As a result, Pesando identified a window within which the sales must have taken place to be contemporaneous. Obviously, the wider the window the higher the number of identical prints sold at auction. Conversely, a wide window also implies that the notion of contemporaneousness could be overlooked too much. The window chosen in this study was 30 days, which meant that the sales of the same print in different markets needed to occur within this window. After the window had passed, re-sales in a new window of 30 days were collected (Pesando, 1993 and Pesando & Shum, 1996).

Consequently, the price of the first sale of a particular print was identified and then compared to the price of the second sale of an identical print (the item was said to be identical when the title, catalogue raisonné number and whether it is signed or unsigned, was the same) in all different markets. If two or more sales occur, within the window in the same market, the mean price was used (Pesando, 1993 and Pesando &

Shum, 1996).

In 1996, Pesando wrote another article in collaboration with Shum on the law of one price, largely using the same data and methodology as in the previous article. However, the focus here was on only one artist of modern prints, namely Picasso (in the previous article, in addition to the collection of all modern print, the artists Picasso, Chagall and Miró are specifically highlighted). Only looking at one artist strengthens the concept of the homogeneousness that the goods need to have in order to research the law of one price. In addition, the prints of Picasso are of more similar quality and condition than, for example, Toulouse-Lautrec (Pesando & Shum, 1996). Furthermore, the article provided an even more specific research into the law of one price using the Vollard Suite (named after an art patron and publisher Ambroise Vollard), which is a set of 100 etchings, aquatints, engravings and dry points made from 1930 to 1937 by Picasso (Pesando & Shum, 1996). Here there is even less variation in quality and condition. The Vollard Suite was published in 1939 in an edition of 300: 250 impressions on small paper, 50 impressions on larger paper and three on vellum (Pesando & Shum, 1996). Adding to the identicalness of the prints, they were all in black and white and almost all prints were signed by Picasso. The three impressions on vellum were excluded from the sample, as they demand much higher prices because of scarcity. The dataset for the Vollard Suite is much smaller; therefore, the window of contemporaneousness was prolonged to 90 days.

In this article, the period for the dataset is 1977 to 1993 (one year longer than the previous article). In addition, the article makes a subsample where pairs were excluded if the higher-priced print sold for more than double the price of the other (Pesando & Shum, 1996).

From 2002, the article by Mei and Moses (Art as an Investment and Underperformance of Masterpieces) changed direction and researched the law of one price using only re-sales for high quality paintings, instead of using prints to control for the identicalness. They examined the return differentials for artworks sold at different auction houses over a long period of time. “If there is a systematic pricing bias from one auction house to the other, then we should expect to see systematic difference in the return for artworks sold at different houses” wrote Mei & Moses (2002).

Mei and Moses (2002) created a database based on catalogue information retrieved

from the New York Public Library and the Watson Library (at the Metropolitan Museum of Art) for the auction price history (Mei & Moses, 2002). Each re-sale pair was considered to be a unique point in the database, that holds over 5000 entries. The time period that was selected had a duration from 1875 to 2000 and contained 4896 price pairs in total, consisting of 899 pairs from American paintings (between 1700 and 1950), 1709 impressionists and modern paintings (between the third quarters of the 19th and 20th century) and 2288 old master and 19th century paintings (created after the 12th century and before the third quarter of the 19th century) (Mei & Moses, 2002). The law of one price has been researched between the auction houses, where the differentials are Sotheby's, Christie's or other (for buying, for selling only Sotheby's and Christie's are used). Their null hypothesis was "that there is no difference between prices realized at different auction houses so that the returns realized from different auction houses are equal" (Mei & Moses, 2002).

The main drawback of using the repeat sales index, as used by Mei and Moses (2002), is that it does not take the contemporaneity into account and thus fails to perform full in-depth research on the law of one price.

3.2| Repeat Sales Regression

Pesando (& Shum, 1993, 1996, 2007) and Mei and Moses (2002) used the repeat sales regression to examine the law of one price. Goetzmann (1993) explained the repeat sales regression as a method that "uses the purchase and sale price of individual properties to estimate the fluctuations in value of an average or representative asset over a particular time period" (Goetzmann, 1993). Gérard-Varet (1995) describes the repeat sales regression as a method that considers only those artworks sold at least twice within a period, "to estimate an index by regressing the change in the (logarithm of the) price of each work on a set of dummy variables" (Gérard-Varet, 1995 and Chanel, Gérard-Varet & Ginsburgh, 1996). In other words, the repeat sales method evaluates the price increase or decrease over a period of time and has therefore been utilised as a method to analyse the returns for artworks.

On the one hand this method has been shown to be a valid way of examining price differences over time for artworks, as these are eminently heterogeneous, infrequently traded and illiquid. However, this method is also subject to an array of

disadvantages. As the repeat sales regression only uses the data from double or multiple sales, a lot of other data is disregarded. For example, from the 13,000 transactions collected by Anderson (for the period 1653-1970) only 1730 are pairs of prices of the same painting could be made (Candela & Scorcu, 1997). Furthermore, a resale of a painting in a short period of time is unlikely, in contrast to stocks and bonds, because of the possibility of capital loss when an artwork is resold too soon (Candela & Scorcu, 1997).

Moreover, auction houses appear to have little motivation to sell works with a low demand (or public interest) due to the fact that artworks are subject to taste and trends. This can cause owners of unfashionable artworks to retain their items resulting in a bias in the dataset. In addition, an upward bias might occur when sellers are only willing to sell their artworks when the value of the artwork has increased (Agnello, 2002).

An advantage of the repeat sales method is that it controls for quality differences of artworks, as it only uses a repeat sale of the same artwork. This also represents a drawback, because only the same artworks are used. This results in a homogeneous dataset, as the rest of the (heterogeneous) sample was disregarded (Chanel et al, 1996).

Additionally, faults in translation and currency conversion can present errors in the data, especially old records can present different manners in logging or use translated names that are not familiar (Chanel et al, 1996).

Further, external factors can influence the ambiance at auction and result in lower or higher prices fetched at auction; for example, prices can be higher due to the presence of influential buyers or collectors of particular artists (Agnello, 2002). This could result in returns that do not correspond with the actual value.

Also taxes (the fiscal environment) differ amongst countries and this violates the notion of *ceteris paribus* (all things being equal) and therefore has an influence on the way in which buyers behave on different auctions in different locations (Candela & Scorcu, 1997).

In addition, it is worth mentioning that all the research into the returns of artworks are based on auctioning data, leaving out all sales by galleries and subsequent sales by art dealers. While the data collected might be heterogeneous, it is also homogeneous because only one type of data is looked at, namely the one collected

through auctions (Chanel et al, 1996).

Finally, re-sales can also only reflect artworks of high quality because the “lemons” (damaged or inferior goods) do not appear more than once and fall out of the sample (Agnello, 2002 and Chanel et al, 1996).

3.3| Transaction costs and taxes

In the previous research into the law of one price transaction costs and taxes were consequently overlooked. In the part on the law of one price in neo-classical economics it was apparent that they do emphasize on the fact that the law of one price does not take transaction costs, transportation costs and taxes into account. It is thus of great importance that this research does look at transaction costs, transportation costs and taxes.

Transaction costs in art auctions are the buyer’s premium and the seller’s commission; the chapter ‘The art of art auctioning’ in the literature review (page 16) has mentioned these two transaction costs. The transaction costs differ per auction house but are also adjusted to the height of the hammer price. The higher the hammer price, the lower the percentage of commission that has to be paid (between 12% and 25% of the hammer price).

From a theoretical point of view it can be concluded that, because Cindy Sherman works and lives in New York, the prices there might be lower than in Europe, due to the transportation costs, as it is very costly to transport highly valued artworks, not only due to transportation itself but also because of insurance costs.

Transaction costs are generally higher in the USA than in Europe and more uniform. The buyer’s premiums differ significantly between auction houses in Europe (see appendix B). This might be another reason why prices could be lower in the USA as people do take the extra costs into consideration when purchasing an artwork and stop their bidding sooner.

However, when looking at taxes, it can be derived that these are lower in the USA. It is apparent that sales taxes in the USA differ between states and cities (within those states) but never exceed 9,5% (Chicago). Meanwhile in Europe, the VAT varies between the 19% and 21% (except for the UK, where VAT on art sales are exempt). It must be taken into consideration that almost all sales taxes and VAT are fully or

partially deductible when leaving the state and/or country. This makes it very hard to control what the final price of an art sale in reality could be, because information on buyers never is released to the public and thus it cannot be researched to its fullest extent.

Other taxes that influence the purchase process in the arts are the import and export taxes, which are different for each country. Tariffs or duty is a tax, which is levied on imported products; different countries and different products have different tariffs (<http://export.gov>, 2012). This makes it hard to compute final sales prices, as it is unknown where the art objects are possibly exported to. The global duty now is approximately 5%, but countries do change the tariff or additions on top of the duty are made. Free trade agreements do exist as well, making it even more vague (<http://export.gov>, 2012). The European Union is an example of such a free trade area, as are the United States.

3.4| Currencies

US Dollar to 1 GB Pound exchange rates



Graph 2| US Dollar to 1 GB Pound exchange rates, source: <http://finance.yahoo.com/>

From Graph 2 above it is possible to establish that the exchange rates of different currencies fluctuate considerably. The differences in currencies influence the final prices of artworks purchased as, for example, an Englishman purchasing art in the USA benefits from the exchange rates between the US Dollar and the GB Pound. In addition, this thesis has converted all the foreign currencies to the US Dollar (Euros, GB Pounds, Swedish Kronas, Danish Kronas, Hong Kong Dollar, et cetera). Because exchange rates differ every day, this has resulted in a dataset with very diverse prices. Therefore the

median is not used regularly. In previous research concerning the law of one price the influence of the exchange rates and different currencies have been mentioned, though no real attention has been attributed to the phenomenon. For this study it is necessary to keep in mind that these differences in currencies could strengthen the case for the violation of the law of one price for Cindy Sherman's photographs.

3.5| The art markets of New York and London

For the sake of this investigation, the main locations that were investigated are London, New York and Europe as a whole. Asian sales for Cindy Sherman's photographs are more often the exception rather than the rule and are therefore excluded. It would have been interesting to see how an established artist does in an upcoming art market such as China and/or Hong Kong. However, sales are too little to derive useful insights.

The intention was to research the law of one price between New York, London and Hong Kong. Having major hubs in three different continents seemed important and could have generated information on the functioning of those three very distinct markets. However, while Hong Kong is the most 'Western' city in Asia, as all other auction hubs in Asia, it still focuses mainly on Chinese art. This raises a problem, as significantly less Chinese photographers are sold in the West (London and New York). This would result in an insignificant research and could give a skewed result, as Chinese buyers are more interested in Chinese art (and thus pay higher prices for it). For this research of Cindy Sherman's photographs, it was therefore chosen to only focus on New York and London, with an addition for 'Europe as a whole' and 'Continental Europe'.

For a long time, New York was the untouchable centre of art auctions. Not only because it fetched higher prices, but also because there seemed to be more buyers, more sellers, more auctions and more artworks. When examining the figures (3 and 4) below, by Artprice, its place has been taken over by China, which occurred during 2010. The USA comes second and the United Kingdom third.

Traditionally, London and Paris were the art hubs in the world; this changed over time with upcoming markets such as New York. Now the tables have again turned, causing China to take over the first place in auction sales. As the economy is growing in China, collectors and/or investors have more money to spend and are able to buy more

art than before. This can explain the shift to China when looking at turnover and revenue. While it is the largest, the Chinese art market sells almost only Chinese artworks, which makes it a fairly homogeneous market, keeping in mind that almost all artworks are unique thus making the art market in itself heterogeneous.

2011 Fine Art auction sales revenue
Breakdown by country

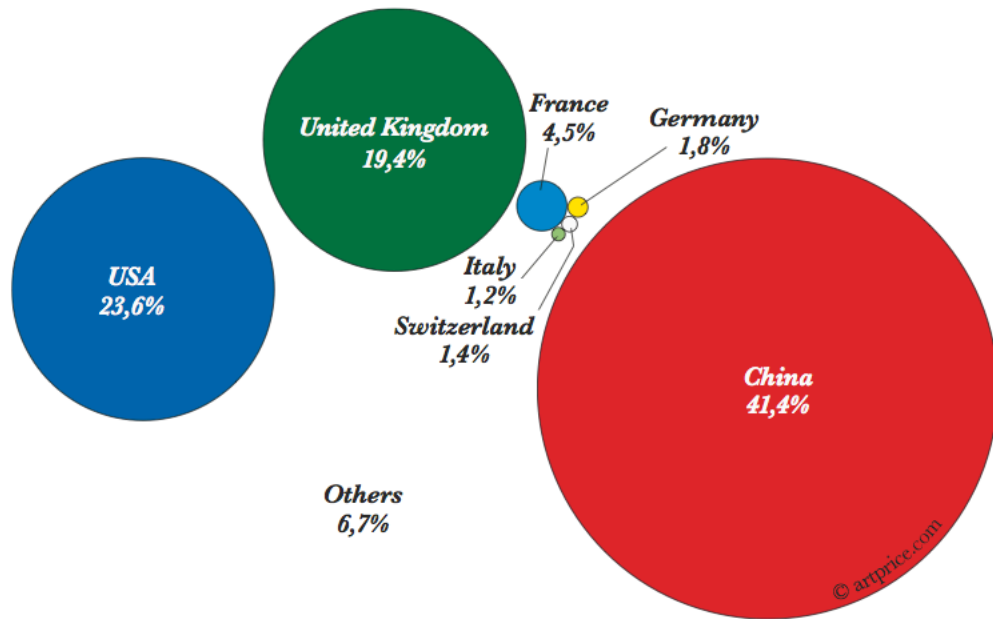


Figure 3| Fine art auction sales revenue percentages over 2011, breakdown by country, source: artprice.com

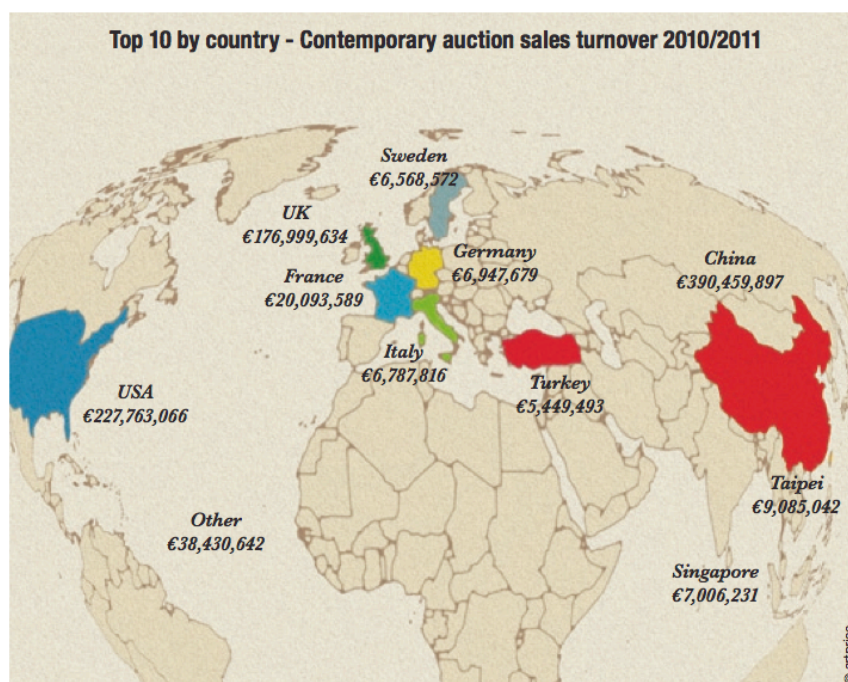


Figure 4 | Contemporary auction sales turnover in US Dollars 2010/2011, source: artprice.com

Worldwide Sotheby's sells the most lots of the fine arts. However, Christie's has the biggest turnover, as can be derived from Diagram 1 below. From that diagram it can be concluded that Christie's achieves higher prices in general as their turnover is higher, but the number of lots sold are smaller than for Sotheby's. Therefore, the focus in this thesis lies on both auction houses, as both have a significant share within the art auction market. Table 2 (on the next page) provides an overview of the most important auction houses in New York for the contemporary art sales. From this data it can be concluded, as Sotheby's has a higher turnover in New York, that Christie's performs better in the rest of the world. While Phillips de Pury & Company has no place in Diagram 1, it is not possible to compare it to the other two auction houses. However, in Table 2 it is possible to see that Phillips de Pury & Company comes third in New York for the contemporary art sales. Therefore, the analysis of this thesis focuses on those three auction houses in New York. It can be very interesting to see whether the auction houses of New York present price differences while they are located in the same city, with the same taxes and buyer's premium, and are therefore under influence of the same conditions.

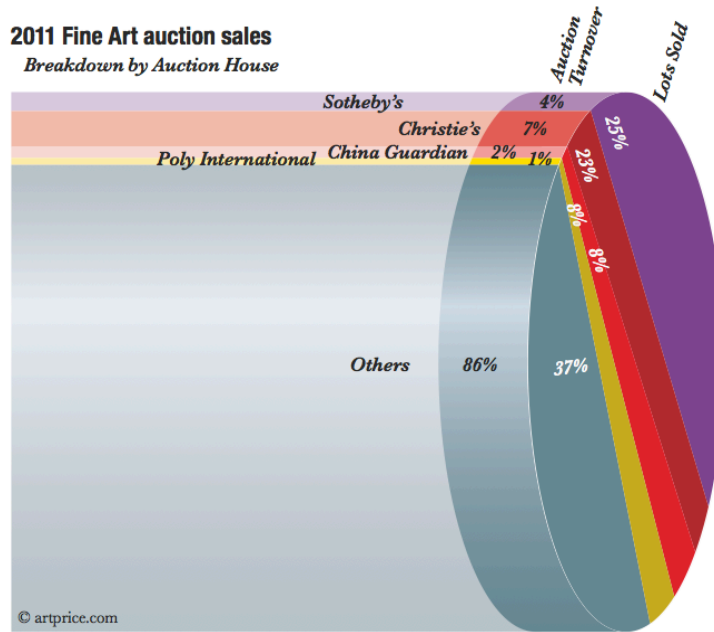


Diagram 1 | Fine art auction sales percentages over 2011, breakdown by auction house, for both turnover and lots sold, source: artprice.com

Top 5 Auction Houses - New York contemporary art sales (2010/2011)

Rank	Auction House	Auction Turnover	Max Hammer Price
1	Sotheby's	€ 88,523,332	€ 10,804,500
2	Christie's	€ 76,148,603	€ 10,441,500
3	Phillips de Pury & Company	€ 57,000,351	€ 4,277,400
4	Bonhams	€ 571,137	€ 27,944
5	William Doyle	€ 409,527	€ 198,082

Table 2 | Top 5 auction houses of New York contemporary art sales 2010/2011 in US Dollars, source: artprice.com

3.6 | Dataset and method

In order to use the law of one price, as mentioned previously, it is important to consider homogeneous goods (or at least close substitutes or near-perfect substitutes) and have a notion of contemporaneousness. Pesando used prints to control the quality differences and in particular modern prints to control the differences in the condition of the prints (this can be the case with old master prints) and avoid that the prints may not have been sold enough on the secondary market (which can be the case for contemporary prints). Furthermore, in order to verify the notion of contemporaneousness, he used a 30-day window within which the print should be sold in different markets using the repeat sales

index.

This research is structured in the same manner, but photographs are used instead of prints, as the main research subjects. Strictly speaking, artworks cannot be classified as commodities. However, reproducible goods, such as prints, photographs and CDs, are exceptions (Horowitz, 2011). Therefore, as prints have been studied before, this research used photographs to fulfil the same purpose. Photographs have the same specifics as prints, namely being printed in a fixed number of editions, thus the multiples are identical to each other and prices in different markets can be compared. Photographs are, while gaining popularity, not as established as prints. It is a relatively new medium and not as far spread as other forms of art. Both Sotheby's, Christie's and Philips de Pury & Company have auctions which focus on photographs in particular and the data from those auctions is essential for this investigation. However, this research has not used the same photographs (or the multiples), but has clustered the photographs into different categories.

Moreover, in order to increase the notion of identicalness between photographs, only works of Cindy Sherman have been used. Earlier in the literature review, she has been introduced and her place within the photographic market has been established.

The categories are developed based on the different series that Cindy Sherman has produced during her life. 31 categories in total have been created, from which five are not from a series that Sherman produced. These five were added because the photos were in abundance in the dataset and not using these data entries could harm the research or make it incomplete.

The subsequent categories are:

No.	Year	Category
1	Up to 1975	Early works (A Cindy Book)
2	1975	Untitled ABCDE
3	1976	Bus riders
4	1976	Murder mystery
5	1977-1980	Untitled film stills
6	1980-1981	Rear screen projections
7	1981	Centerfolds

8	1982	Pink robes
9	1982	Strong women
10	1983	Fashion #1 (Diane Benson)
11	1984	Fashion #2 (Dorothee Bis)
12	1985	Fairy tales
13	1986-1989	Disasters
14	1988-1990	History portraits
15	1991	Civil war
16	1992	Sex pictures
17	1993	Fashion #3 (Harper's Bazaar)
18	1994	Fashion #4 (Comme des Garçons)
19	1994-1996	Horror and surrealist pictures
20	1995-1996	Masks
21	1995-1997	Office killer frames
22	1999	Broken dolls
23	2000-2002	Hollywood portraits
24	2003-2004	Clowns
25	2008	Society portraits
26	2010	Recent works
27	1982	Marilyn
28	1990	Body part
29	1980	Dual gender
30	1977/1978	Artist at studio/secretary at artist space
31	1990	Mrs. Claus

Table 3 | Categories for Cindy Sherman's photographs

Of these 31 categories, 25 were operable and interesting for deriving statistics. Category 2, 15, 18, 20, 25 and 26 were not used due to a lack of data, too little data entries or too many unsold items for that category.

Although Pesando used data from *Gordon's Print Price Annual* (dating back to 1977), it was deemed more relevant for the purpose of this thesis to use data from artprice.com. This website tracks all auction sales and keeps a detailed database of auction records. Not only does artprice.com publish auction results online, it also

creates reports on the art market. During this research the database contained 27 million entries and consisted of 450,000 different artists. Every entry in artprice.com contains the following extra information: name of the artwork, sales date, hammer price, estimate, category, medium, location, size, auction house, date of the item, lot number, distinguishing remarks (for photography the number of edition), illustrations (place in the catalogue) and if necessary there is an option for notes.

During the course of this research, artprice.com had 1348 results for the photography of Cindy Sherman (1387 in total). This thesis created a dataset with 802 items, dating from 25-01-2002 up to 17-05-2012, producing a dataset covering over 10 years of sales of Sherman's photographs. The data from artprice.com is sufficient in number and has a high level of specificity.

The large dataset was split into different datasets, both per year, per category and per location, to make it possible to see how the different locations performed in general and which categories are popular in which location. Furthermore, statistics per category were computed to be able to make the comparison between the different locations per category.

However, while the purpose was to make pairs of sales within a 90-day period this could not be conducted. There was too little data to form pairs and it would have been impossible to draw viable conclusions. Due to the large share of unsold items that was present in the dataset, no pairs could be formed. To compensate this loss of results, a comparison of the means of the locations within the corresponding categories has been made.

As the existing literature on the law of one price in cultural economics is not yet very extensive, this research aims to make a valuable contribution to this field. New insights and other perspectives may surface.

Only researching Cindy Sherman's photography may seem very narrow and specific, generalizations can be drawn from the results. For other famous photographers, who achieve similar prices as Sherman, such as Andreas Gursky and Richard Price, the results are likely to be similar or at least comparable.

4| Results

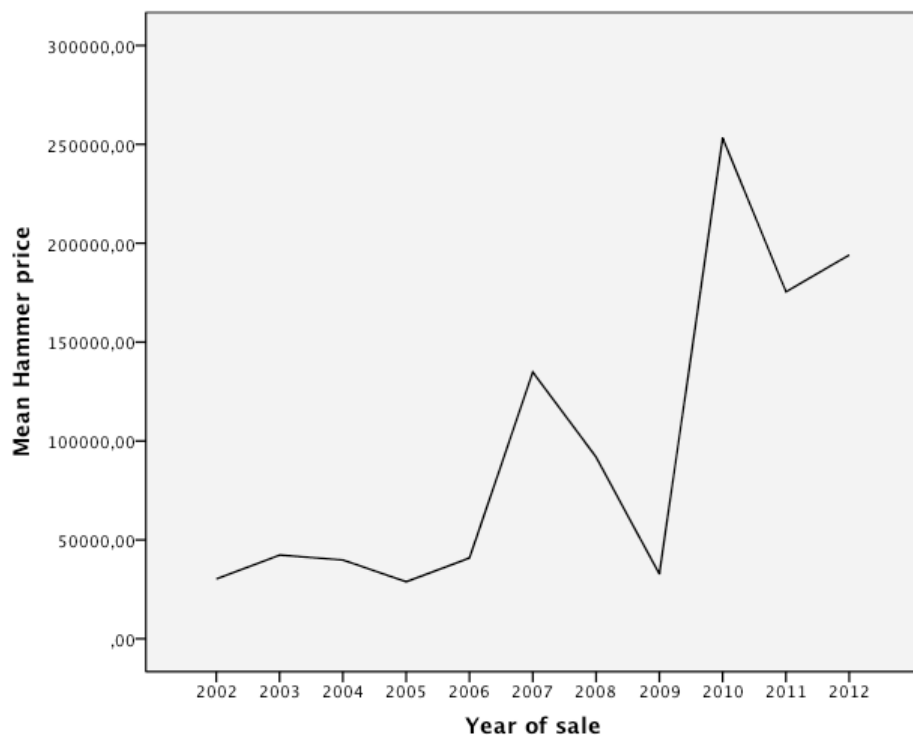
Many insights could be generated by analyzing the dataset of the 802 sales of photographs of Cindy Sherman. Analysis has been conducted on both the whole dataset and parts of the dataset, mainly per category and per location, but also mean hammer prices per square centimetres have been formulated. Also, for the period 2006 – 2010, a comparison has been conducted between the evolution of Sherman's photographic images and the evolution of the S&P500 and the Dutch AEX index. In addition, a ranking of auction houses based on the transaction costs and taxes is presented. Finally, the impact of exhibitions of Cindy Sherman on the prices for her photographs has been examined.

4.1| Results from complete dataset

The results from the complete dataset can provide an impression of the evolution of the sales of Cindy Sherman's photographs. This grants good insight into how and where the prices perform the best.

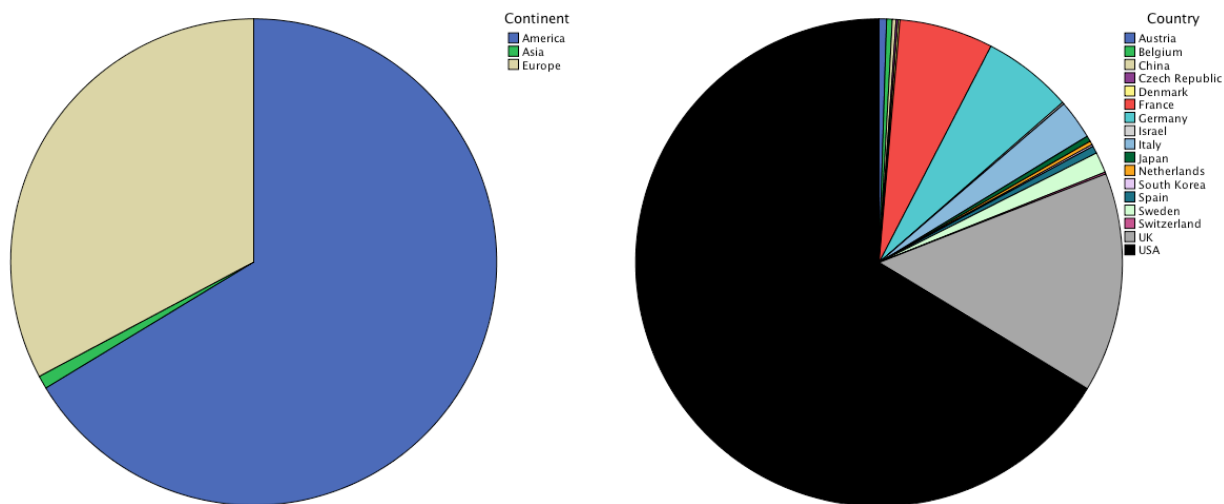
As can be seen from Graph 3 below, the prices have been relatively consistent up to 2006 and prices stayed within a difference of \$12,030.88. The lowest being in 2005 with a mean hammer price of \$28,805.06 and the highest in 2006 with a mean hammer price of \$40,835.94. Since 2006, prices rose to \$134,850.05 in 2007 and steeply declined in 2009 to \$32,694.79. They rose even higher in 2010 to \$253,258.16 and showed a relatively small decline around 2011 to a mean hammer price of \$175,459.62. In the first half of 2012, they slightly rose again to \$194,028.44. However, they have not yet reached their level of 2010. The comparison to the economic crisis and stock exchanges (S&P 500 and AEX) is made later on in this chapter, to see whether the economic crisis could have had an influence on the drop of prices in 2008 and 2009.

Course of the mean hammer prices per year



Graph 3 | Course of mean hammer prices per year in US Dollars for Cindy Sherman's photographs, source: artprice.com

The two Pie charts 1 and 2 below show the selling locations for both continents and countries. From these pie charts it is apparent that, as an American artist, her work is mostly sold in New York. This is followed by the UK, France and Germany.



Pie charts 1 + 2 | Aggregate sales per continent and per country for Cindy Sherman's photographs, source: artprice.com

It can be concluded from both pie charts that sales outside of Europe and America are not numerous and therefore also not of interest to this research. Within this dataset, the only countries outside of Europe and the USA where Cindy Sherman's photographs are sold, are Israel, Japan, China and South Korea.

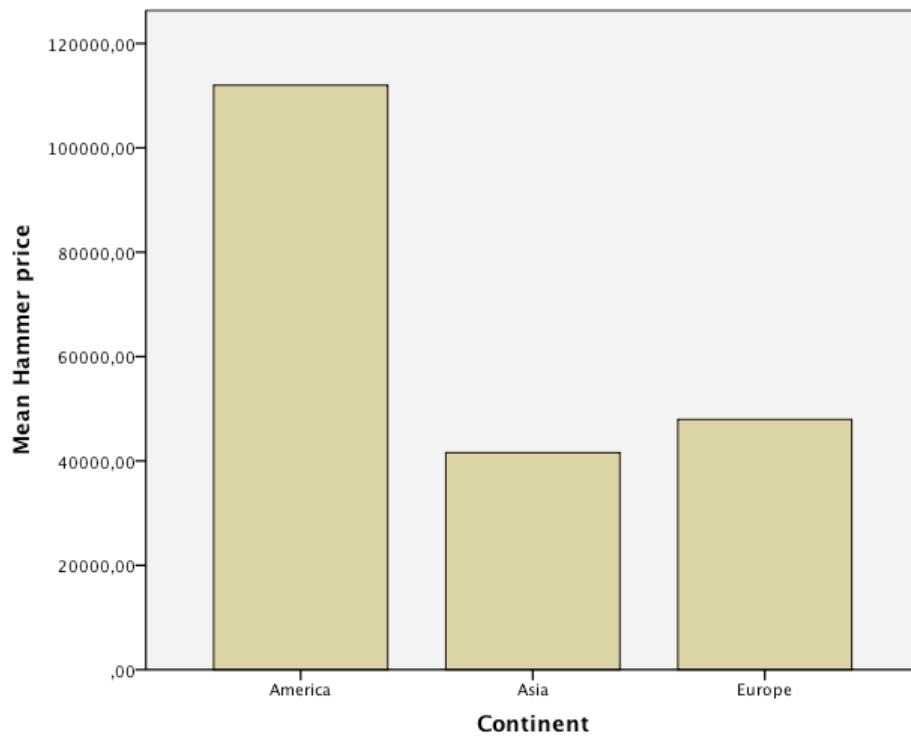
While the emphasis is clearly on the USA with the UK coming second, France and Germany also play a role as a location for Sherman's sales.

It is probable that mainly Americans collect her work, resulting in more sales in the USA. As can be seen from Bar chart 2, it also results in higher overall prices. The higher-prices in America can also occur due to sales of more popular and thus higher priced photographs in the USA. However, this also indicates that there is a demand for those expensive photographic images in the USA. Higher-priced and thus more popular photographs can be unequally distributed between locations resulting in price differences between the locations. This is discussed in the part on categories further in this chapter (page 64).

It is fairly interesting that, no matter how small the sales in Asia might be, they are not very inferior to the sales in Europe in terms of prices.

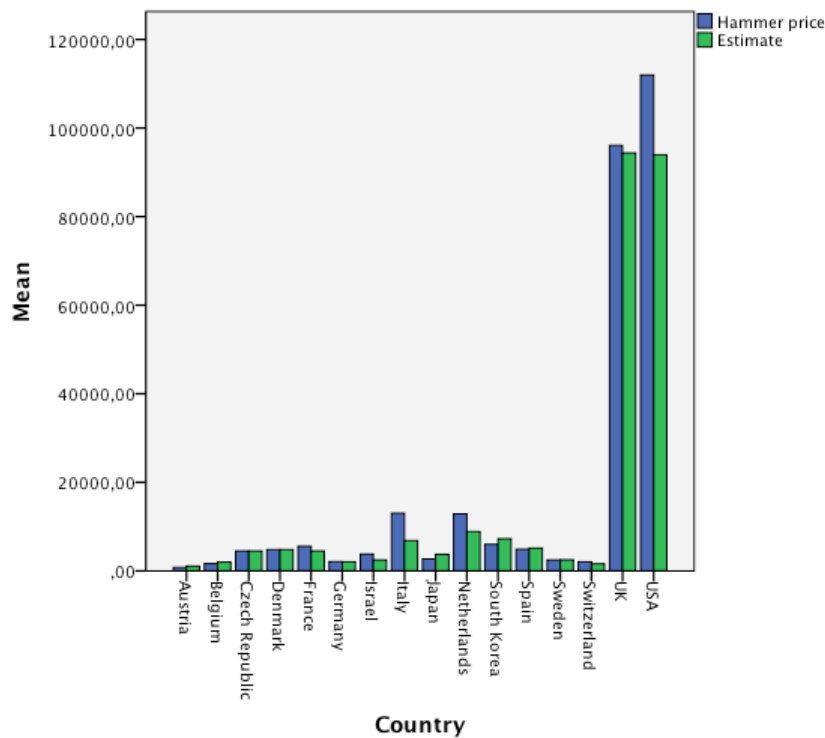
It is also notable that the further the sales are from the home country (the USA), the lower the sales prices. Theoretically, it can be assumed that due to transportation costs the price would be higher the further a sales location is from the home country. This does not seem to apply to Cindy Sherman's photographs worldwide.

Mean hammer prices per continent



Bar chart 2 | Mean hammer prices per continent in US Dollars for Cindy Sherman's photographs, source: artprice.com

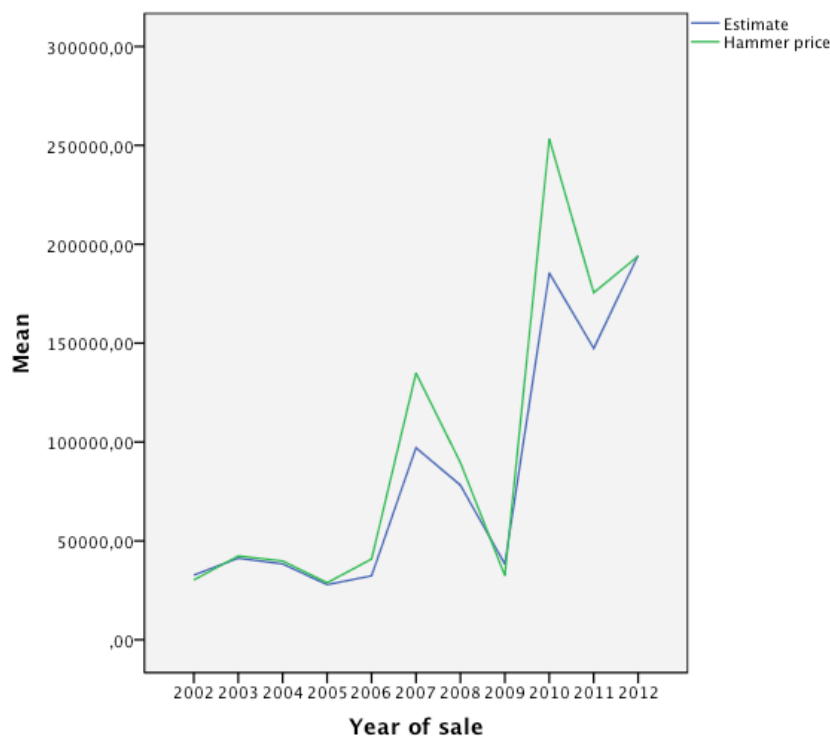
Mean hammer prices and mean estimates per country



Bar chart 3 | Mean hammer prices and mean estimates per country for Cindy Sherman's photographs, source: artprice.com

It can be concluded from the Bar chart 3 above that prices between the UK and USA do not differ heavily. However, prices between UK/USA and the rest of the world (mostly the other countries in Europe) do differ greatly, as they are a mere shadow of prices fetched in the UK or USA. In the same chart, the estimates are displayed per country and it is apparent that estimates lie consequently below the hammer prices. It is also noticeable when addressing the mean hammer prices per year (see Graph 4 below) that the estimates lie consistently below the hammer prices. Especially in the peaks the estimates lie further below the hammer prices. This may be caused by the reserved attitude of the art experts in times when high hammer prices are achieved and finding it hard to adapt to the newly found popularity.

Course of mean hammer prices and mean estimates per year



Graph 4 | Mean estimates and mean hammer prices per year in US Dollars for Cindy Sherman's photographs, source: artprice.com

While Cindy Sherman is a good-selling artist with high auction prices, as seen in the literature review, she too goes unsold at auction at times. The number of unsold items can also be a good indicator of how the photographs are performing, the development in general and, more specifically, per location. In appendix D, the tables per location of the sold and unsold items are presented, both in

absolute numbers as percentages. From the tables it is possible to derive that almost a quarter of all items featured in the dataset went unsold. While the USA, with 532 items sold, more than doubles the total sales of Europe, with 263 items sold, the USA still has a lower percentage of unsold items, 17,9% for the USA and 39,5% for Europe. Within Europe the differences are small, Europe as a whole, UK and Continental Europe achieve respectively 39,5%, 36,8% and 41,8% of the unsold items. The UK shows a little less unsold items and Continental Europe shows a little more, however, they are comparable to each other.

Finally, the table stated below could give an indication of the overall sales activity for Sherman’s photos in the several locations.

Location	Mean HP	Std. Dev.	Mean HP + BP	Std. Dev.	Mean HP + BP + VAT	Std. Dev.
General	\$94,276	\$238,321	\$112,467	\$272,429	\$119,351	\$293,074
USA	\$111,992	\$267,730	\$132,576	\$304,211	\$141,927	\$328,991
Europe	\$47,951	\$123,146	\$58,072	\$145,936	\$58,456	\$145,915
UK	\$96,104	\$167,292	\$114,840	\$196,709	\$114,840	\$196,688
Continenta l Europe	\$5,531	\$13,494	\$6,843	\$16,760	\$7,451	\$18,035
Sotheby’s NY	\$116,253	\$143,164	\$140,039	\$171,478	\$152,466	\$186,697
Christie’s NY	\$172,166	\$354,971	\$203,050	\$401,213	\$215,151	\$432,423
Phillips de Pury NY	\$81,816	\$250,039	\$96,142	\$282,571	\$102,688	\$307,155

Table 4| Mean hammer prices, mean hammer prices + buyer’s premiums and mean hammer prices + buyer’s premiums + VAT/sales taxes and standard deviations per location in US Dollars for Cindy Sherman’s photographs, source: artprice.com

From Table 4 it is apparent that the USA scores above average with a mean price of \$111,992. Europe as a whole has a mean far below of \$47,951, while the UK on its own scores above average with a mean of \$96,104. Mean prices plummet when looking at Continental Europe, only reaching \$5,531. These numbers conclude that the USA is the sales leader when it comes to Cindy Sherman’s photographs, as has been suspected and

suggested by the literature. What is striking is the fact that price differences also exist between the three big auction houses in New York. The following part of this chapter examines this more closely, as one explanation for those price differences could be that one auction house might sell higher-priced and more popular photographs than the other. When looking at the standard deviations, it is noticeable that these are the same or even higher than the mean prices themselves. This suggests that the prices do differ substantially and have a wide range. In other words, that the difference between the top prices and the bottom prices lie far apart.

4.2| Results per category

While the results from the whole dataset are already interesting, they do not make a distinction between the different styles of photography Cindy Sherman has developed over the years. The law of one price requires the items to be near-perfect substitutes to research and the categories, which have been created, satisfy this need.

It is evident from Table 5 below how the (mean) prices for the several categories are ranked and thus which categories are the most popular and priced the highest. This information helps to determine whether the law of one price is violated or that the highly priced categories influence the mean prices in the different locations.

Rank	Category	Mean HP	Std. Deviation	Valid entries
1.	7. Centerfolds	\$621,315.14	\$777,256.50	21
2.	24. Clowns	\$370,222.42	\$309,472.42	12
3.	8. Pink robes	\$320,000.00	\$172,046.51	4
4.	14. History portraits	\$248,245.12	\$180,632.86	33
5.	17. Fashion #3	\$205,000.00	\$273,632.97	5
6.	5. Film stills	\$140,794.82	\$163,127.45	122
7.	12. Fairy tales	\$138,917.67	\$518,770.47	20
8.	11. Fashion #2	\$119,202.50	\$68,778.13	5
9.	16. Sex pictures	\$63,842.42	\$56,892.46	12
10.	6. Rear screen projections	\$54,783.82	\$67,910.00	11
11.	9. Strong women	\$45,574.62	\$32,059.24	26
12.	3. Bus riders	\$33,950.83	\$46,413.11	12

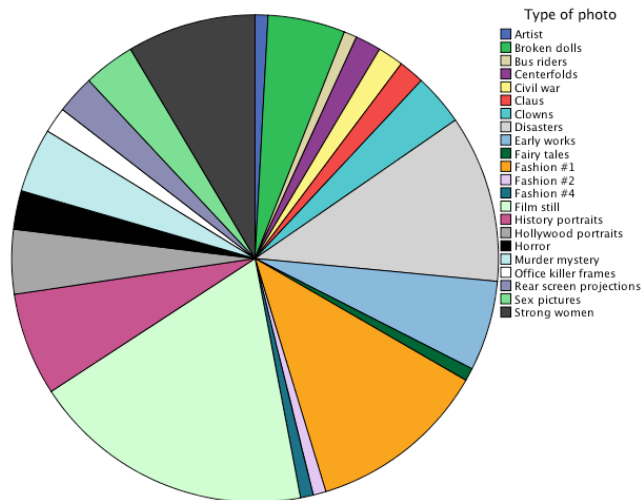
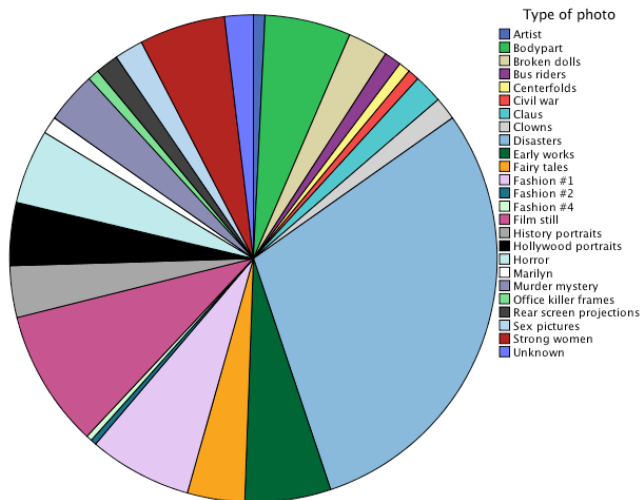
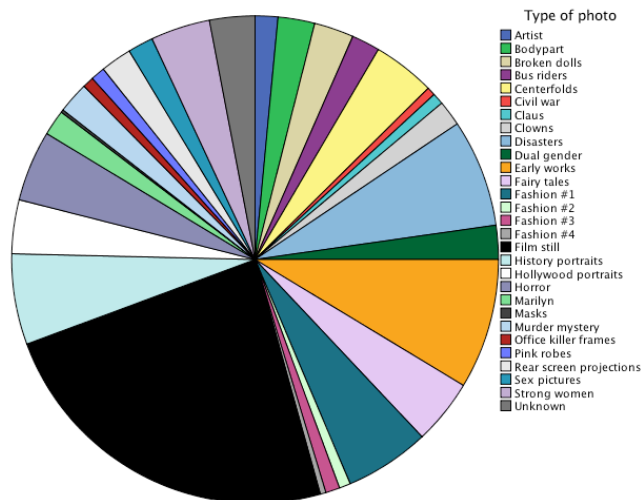
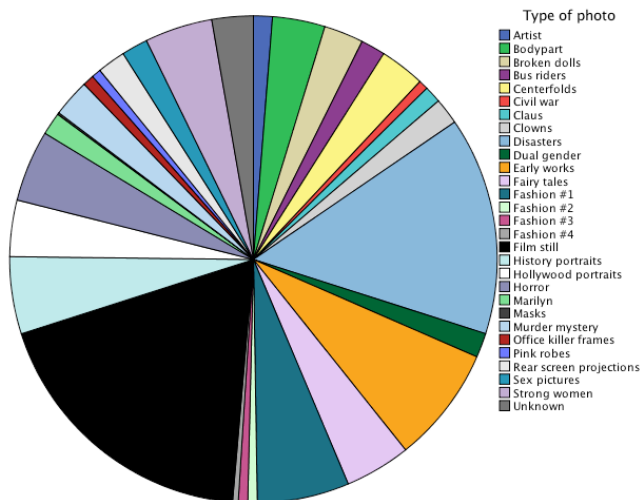
13.	21. Office killer frames	\$33,289.83	\$25,581.37	21
14.	10. Fashion #1	\$26,669.71	\$23,094.28	34
15.	23. Hollywood portraits	\$24,806.57	\$31,538.00	28
16.	27. Marilyn	\$18,449.30	\$9,665.60	10
17.	19. Horror and surrealist	\$13,818.79	\$18,197.16	24
18.	13. Disasters	\$11,597.22	\$21,345.77	63
19.	1. Early works	\$10,296.25	\$20,052.05	40
20.	22. Broken dolls	\$7,921.25	\$4,021.93	12
21.	4. Murder mystery	\$7,422.07	\$6,496.12	15
22.	29. Dual gender	\$7,161.54	\$2,934.22	13
23.	30. Artist in studio	\$6,847.22	\$3,108.57	9
24.	28. Body part	\$1,882.05	\$892.10	20
25.	31. Claus	\$1,233.00	\$364.83	7

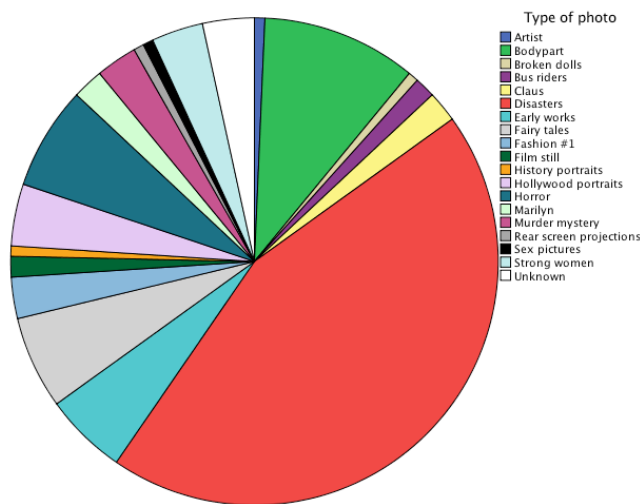
Table 5 | Ranking of mean hammer prices and standard deviations per category in US Dollars for Cindy Sherman's photographs, source: artprice.com

This ranking identifies that prices between categories differ substantially and therefore that the distribution of the categories over the several locations (whole world, USA, UK, Europe as a whole, Continental Europe) can influence the means heavily. The price difference between the first and the last place (Centerfolds and Claus) is \$620,082.14! Between the first and the second place (Centerfolds and Clowns) alone the difference is already \$ 251,092.72.

Appendix E presents a ranking of the top prices per category. Here it is noticeable that a Centerfold photograph fetched the highest price of \$3.4 million Dollars. Considering that this category has also performed the best in the mean hammer price ranking above in Table 5, it is possible to conclude that the rest of the pictures of the category Centerfolds fetch overall high prices. It is possible to conclude the same for the category Clowns. However, Fairy tales, which has the second top price, only reaches the seventh place in the ranking of mean hammer prices. This implies that prices for the category Fairy tales fluctuate and that some peaks might influence the rest of the sample. Other categories perform to expectation and hover around the same place in both rankings.

Distribution of categories per location





Pie charts 3 to 7 | Distribution of categories per location for Cindy Sherman's photographs, source artprice.com

3) Category distribution for whole dataset

4) Category distribution for the USA

5) Category distribution for Europe

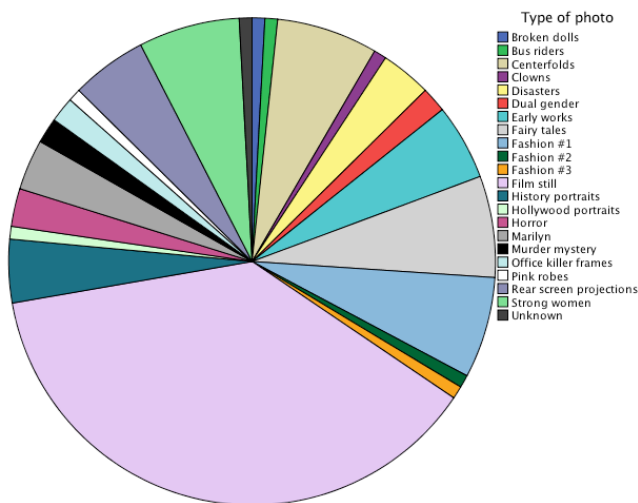
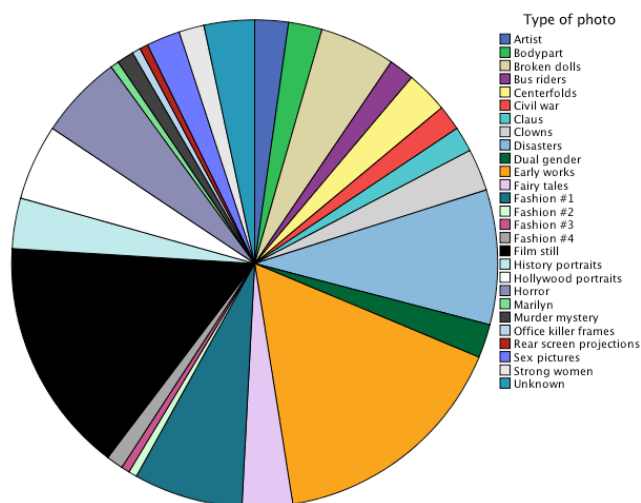
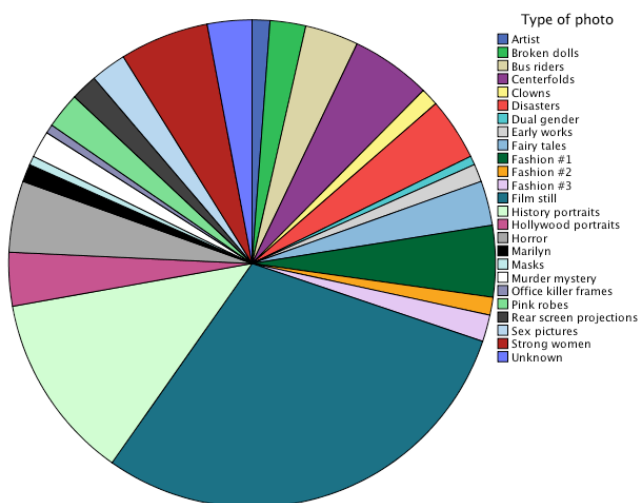
6) Category distribution for the UK

7) Category distribution for Continental Europe

As can be derived from the Pie charts 3 to 7, the distribution of categories is not at all uniform. Different locations imply emphasis on different categories, which can entail that either taste varies strongly, that some categories do not travel easily or that it is not viable for some locations to sell a certain category, for instance due to a low demand. Possibly because of size, or because prices in one location are higher than in another. When examining the ten most highly-priced categories, namely Centerfolds, Clowns, Pink robes, History portraits, Fashion #3, Film stills, Fairy tales, Fashion #2, Sex pictures and Rear screen projections, it is evident that Continental Europe only sells five of the those ten categories (Fairy tales, Film stills, History portraits, Rear screen projections and Sex pictures) and this is less than a quarter of the whole sales. Europe as a whole performs better as eight out of ten categories are sold (Centerfolds, Clowns, Fairy tales, Fashion #2, Film stills, History portraits, Rear screen projections and Sex pictures) and this is around a quarter of the whole sales. The UK performs even better, although with the same categories as Europe as a whole, it makes up for almost half of all the sales. When looking at the USA, it is apparent that all ten highest-priced categories are sold here and that it makes up for half of all the sales. This could be a possible explanation of why the prices in the USA are higher than prices in other places

in the world. However, further in this part more attention is paid to this matter, comparing the mean prices per category at the different locations.

When examining the distribution of the categories at the three big auction houses in New York, Sotheby's, Christie's and Phillips de Pury & Company it is apparent that less than a third of all sales at Phillips de Pury are of the highest priced categories. Sotheby's has the most sales in the highest priced categories (around three-quarters of all sales) and Christie's a little less than three-quarters. This may explain the lower prices at Phillips de Pury & Company while examining the mean prices. The question remains how the price differences can be explained between Sotheby's and Christie's, as the distribution of categories does not seem sufficient.



Pie charts 8-10| Distribution of categories per auction house in New York for Cindy Sherman's photographs, source artprice.com
 8: Category distribution Christie's
 9: Category distribution Phillips de Pury & Company
 10: Category distribution Sotheby's

4.2.1| Top ten categories

When turning to the statistics per category (see Appendices A1 to A25 in the booklet complementary to this thesis), it is evident that not all categories have sufficient data entries from which valid conclusions can be drawn. The aim to make comparisons between locations within the categories can therefore not be examined to its fullest extent, which is disappointing. Therefore, the focus lies on the top 10 priced categories and the categories that have a high number of data entries and thus enough statistics to compare the different locations.

The categories worth examining here are Film stills (5), Centerfolds (7), Fairy tales (12), History portraits (14), Sex pictures (16) and Clowns (24). It is noteworthy to mention that outliers skew the means per locations of some categories. However, these outliers were not excluded because they do represent the possibilities of that location in terms of high sales results, even when it is a singular event.

The first category, Film stills, shows the same differences that were apparent earlier between the USA, Europe and the UK, namely higher prices in the USA and the lowest prices in Europe (as a whole). Looking at the three auction houses in New York the means for Christie's, Sotheby's and Phillips de Pury perform conform to the mean prices calculated before. Christie's takes the lead before Sotheby's and Phillips de Pury & Company. It has to be mentioned that the results here are probably influenced by the fact that Christie's has had a highest sale of \$1,050,000, where Sotheby's fetched \$620,000 and Phillips de Pury \$520,000 as the highest prices.

The second category that is discussed is Centerfolds; a comparison here can only be made between the three big auction houses in New York. Vast differences can be seen here as Christie's fetches a whopping mean of \$960,625 (with a maximum price of \$3,400,000), Phillips de Pury \$512,000 (maximum \$1,100,000) and Sotheby's \$329,166.67. It is noticeable that those singular events can have a drastic influence on the mean prices.

Furthermore, category 12, Fairy tales, shows an even more impressive gap in the means between the USA and Europe. The USA retrieves \$206,857.14, where Europe stalls at \$3,123. It is then again necessary to consider that Europe only had four entries over which the mean was computed. When turning to the means for the three main auction houses in New York, the same vast differences in means are visible. Phillips de

Pury & Company fetched a maximum of \$2,400,000 and has a subsequent mean of \$817,666.67, Sotheby's stayed at \$56,500 with a highest price of \$80,000 and Christie's at \$38,800 with a highest of \$60,000. However, the means are based on low amount of data entries (Christie's: 4, Phillips de Pury: 3, Sotheby's: 5), thus the validity is disputable.

Fourthly, the means of the category History portraits are \$242,857.14 for the USA and \$278,417.80 for Europe (take into consideration that here almost all Europe entries are from the UK). Interestingly enough, it is evident that Europe has the highest mean while one would expect that the USA would generate a higher mean, as was evident from the statistics for the whole dataset. Prices still show much variation when considering the three auction houses of New York. Christie's mean is \$288,947.37 (with a max. of \$580,000), Sotheby's mean is \$196,250 (with a max. of \$260,000) and Phillips de Pury and Company's mean is \$105,000 (with a max. of \$150,000).

Looking at the penultimate category, Sex pictures, it is noticeable that the USA and Europe perform to expectation, respectively \$70,857.14 and \$54,021.80. Christie's and Phillips de Pury perform to expectation with earlier findings, respectively \$84,750 and \$52,333.33.

The last category discussed here is Clowns, where, due to insufficient data entries, only a comparison between the USA and Europe can be made. While the USA performs a little better than Europe, the results tend to coincide with means of \$388,171.43 for the USA and \$373,452.25 for Europe.

What can be derived from these comparisons per category is that results differ highly per category and that maximum (and minimum) prices do influence the means, especially when the number of data entries is low. Usually, however, results do perform according to the general results over the whole dataset presented before. In terms of auction houses, the belief is that the distribution of the categories across the auction houses has a big influence on the price differences between the three. For the difference between the USA, Europe, UK and Continental Europe, the belief is that not only the distribution of the categories is the reason for price differences, but also that prices are generally lower in Europe than in the USA.

4.2.2| Categories with high number of data entries

Categories under consideration here are Early works (1), Strong women (9), Fashion #1

(10), Disasters (13), Horror and Surrealist pictures (19) and Hollywood portraits (23) (all tables with statistics and graphs can be found in Appendix A). These categories all have a number of data entries above 24; therefore better statistical comparisons can be made.

The first category is Early works (50 data entries) and a vast difference between the USA, Europe and UK can be identified, with respective means of \$10,296.25, \$2,748.44 and \$4227. However, it must be taken into consideration that the UK only has three data entries, whereas the USA has forty. The difference between Sotheby's and Phillips de Pury, while they are in the same city, is very big as well. Sotheby's has a mean of \$48,750 (with a maximum of \$140,000) while Phillips de Pury has a mean price of \$6,526.79 (with a maximum of \$26,000), keeping in mind that Sotheby's only has four entries where Phillips de Pury has 28.

Considering the next category, Strong women, it is apparent that the difference between the USA and UK (\$48,473.68 and \$47,567.25) is slight while the difference with Europe is bigger (\$37,705.71); this is consistent with results of the general analysis. In general, Christie's has a higher mean than Sotheby's and this is also the case here as Christie's has a mean of \$53,888.89 and Sotheby's \$43,000.

Category Fashion #1 (34 data entries) has higher means for the USA (\$29,826.92) and the UK (\$19,758) then for Europe as a whole (\$16,408.75). Results for the main auction houses slightly differ from the general results as Phillips de Pury & Company (\$29,300) scores better than Christie's (\$25,285.71) for this category.

Disasters is the biggest category with 62 entries. Interestingly enough, the UK (\$25,463) scores higher than the USA (16,931.43). Due to the fact that this category has many entries, it is the only one for which the Continental Europe statistics could be computed and thus all different locations can be compared to each other. For Europe as a whole prices drop to \$8,930.12 and for Continental Europe prices lower even more to \$4,421.15. Regarding Christie's and Phillips de Pury & Company in New York, the prices differ heavily: \$48,400 for Christie's and \$8,928.89 for Phillips the Pury. For the same category, within the same city, this is a striking difference.

The penultimate category discussed here is Horror and Surrealist pictures. The mean prices between Europe and the USA do not differ heavily (\$13,914.42 and \$13,779.41). However, the mean prices between Christie's and Phillips de Pury do

differ from each other with \$11,871.43 for Christie’s and \$18,441.25 for Phillips de Pury, which is notable since Phillips de Pury performs better in this category.

Finally, the category Hollywood portraits was examined. Here, the mean prices for Europe and USA also coincide (\$24,431.56 and \$24,984.21), which is (as with the previous category) striking. In addition, Christie’s fetches \$38,700 and Phillips de Pury & Company \$22,044.44, which is not surprising.

Numbers and results differ greatly between all the categories. This leads to a very incoherent set of outcomes, as there seems to be no real consistency in these results. Some confirm the general means, while others differ. Due to the great differences and inconsistencies, the law of one price is violated in the case of Cindy Sherman’s photographs.

4.3| Comparison of mean hammer prices per square centimetre

It is not only necessary to look at possible price discrepancies of the photographs of Cindy Sherman as a whole, but also per mean hammer price per square centimetre. By doing this, the request that the photographs are identical is no longer needed, as the price per square centimetres does not reflect the images that are depicted in the photograph. However, it needs to be noted that, despite the fact that the prices per square centimetres are equally comparable, some photographs achieve higher prices than others and that therefore their prices per square centimetres are inevitably higher. The importance of the distribution of the categories between locations is therefore of high influence here.

Means of hammer prices and standard deviation per cm2 per location

Location	Means of hammer prices per cm2	Standard deviation
USA	\$41.47 per cm2	\$94.54
UK	\$26.63 per cm2	\$49.94
Europe	\$14.40 per cm2	\$36.79
Continental Europe	\$3.34 per cm2	\$8.98
Sotheby’s NY	\$67.04 per cm2	\$152.72
Christie’s NY	\$51.24 per cm2	\$94.14

Phillips de Pury	\$26.99 per cm2	\$49.34
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Table 6 | Means of hammer prices and standard deviation per cm2 per location in US Dollars for Cindy Sherman's photographs, source: artprice.com

As is evident from Table 6 above, the USA is the market leader when it comes to Cindy Sherman's photographs, with a mean hammer price of \$41.47 per square centimetre. The rest of the locations perform to expectation, the UK outranges Europe and the former outranges Continental Europe.

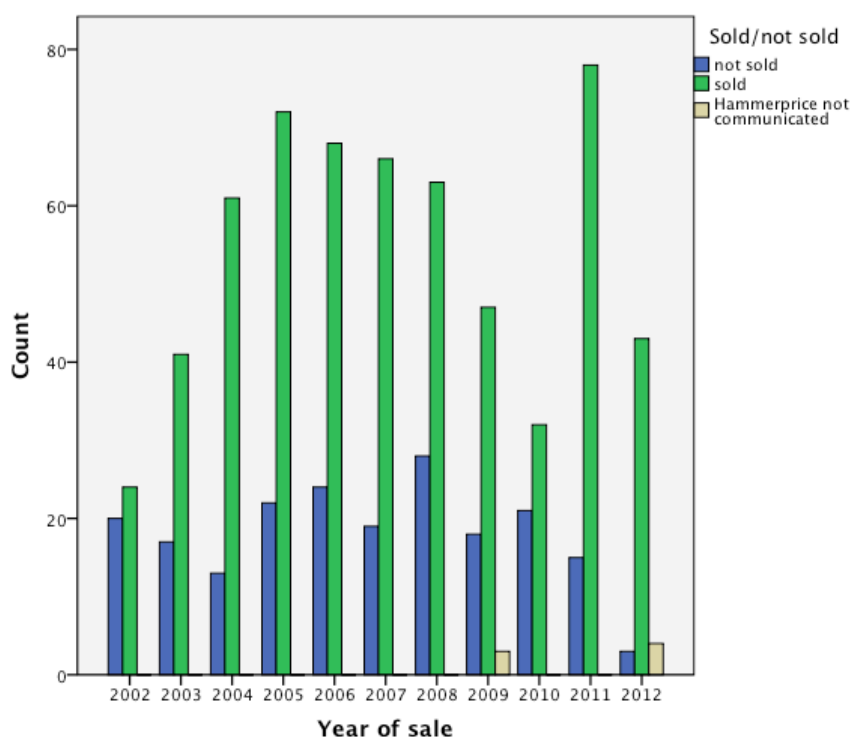
However, when the three auction houses of New York are taken into account, the outcomes are different from the results of the general means of hammer prices shown in Table 4 (on page 60). There, Christie's outperforms Sotheby's, while in this case Sotheby's has a higher mean hammer price per square centimetres of \$51.21. This would imply that the photographs sold at Christie's New York are larger than the photographs sold at Sotheby's. The category Film Stills are small photographs, which are sold at high prices. Other categories such as Centerfolds or History Portraits sell for high prices as well, however, Centerfolds and History Portraits are much larger photographs than the Film stills series. This could be an explanation for the switch between Christie's and Sotheby's in terms of means of hammer prices. It is evident from the Pie charts 8 and 10 (on page 65) that this in fact is the case. Sotheby's sells substantially more Film Stills, while Christie's sells more Centerfolds and History Portraits. This indicates the importance of the distribution of the different categories between the location and the influence it has on their prices.

In Appendix F a ranking is presented considering the different categories and their mean hammer prices per square centimetre. This ranking implies that the category Film Stills achieves the highest mean hammer price per square centimetre. Bearing in mind the statements made above, it is not peculiar that Sotheby's has the highest mean hammer price per square centimetre, as they sell more of the category Film stills than Christie's or Phillips de Pury. The difference between Film stills and the runner up, Centerfolds, is \$27.80 per square centimetre. However, the difference between the number three and four is even larger. The number three, Bus riders, has a mean hammer price per square centimetres of \$80.48 and the number four, Pink robes, has a mean hammer price of \$36.81, resulting in a difference of \$43.67 per square centimetre. It is evident from this ranking that size as a price determinant for Cindy Sherman's

photographs is not completely accurate. Film stills, while one of the smallest categories in square centimetres, still fetches one of the highest prices. Not only per square centimetres, but this category also ranks fourth in Appendix E (a ranking of the top prices for each category) and sixth in Table 5, the ranking of the mean hammer prices per category (page 62). Therefore, this is in contrast with the statements made in the literature review that size is a determinant for the prices.

4.4| Economic crisis comparison

Sold/not sold items per year

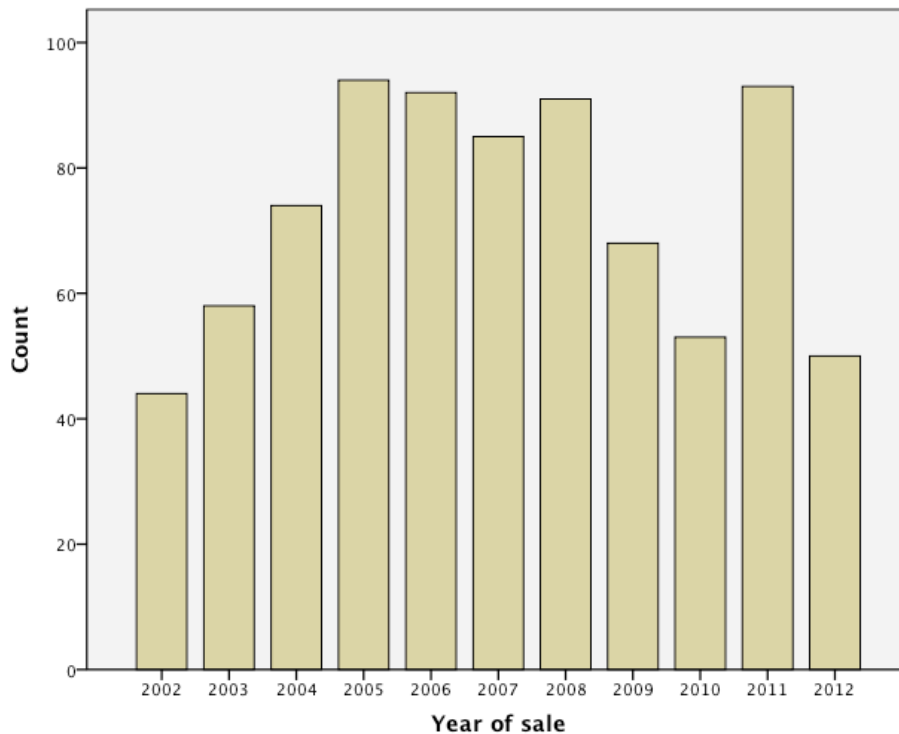


Bar chart 4| Sold/not sold items per year for Cindy Sherman’s photographs, source: artprice.com

From Graph 3, which shows the course of the hammer prices (earlier this chapter on page 57), it is possible to see that there is a steep decline from 2007 with a bottom in 2009. However, there do not seem to be great changes in the amount of unsold items in that period, as is apparent from the chart above. It can therefore be assumed that demand for Cindy Sherman did not exponentially decline, but that prices did. Collectors were not willing to buy the photographs for the same price as in 2007, in other words the value of the photos decreased. However, looking at the number of photographs put

up for sale, it is obvious that this did decline. Relatively, it is possible to say that more items went unsold in 2009 and 2010.

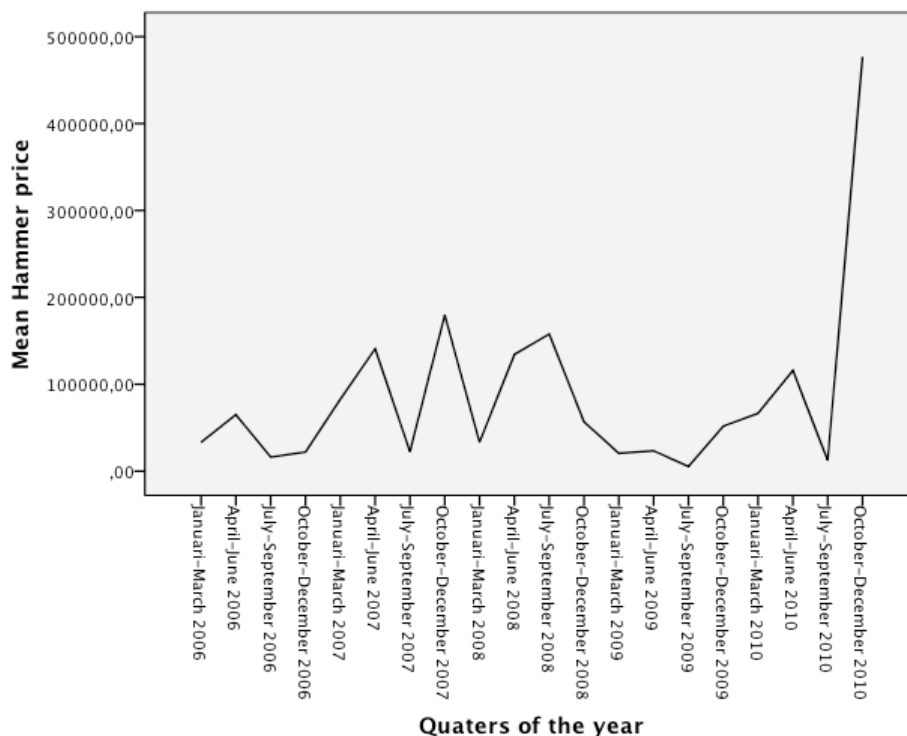
Total sales per year for Cindy Sherman's photographs



Bar chart 5 | Number of total aggregate sales per year for Cindy Sherman's photographs, source: artprice.com

Graph 5 (on the next page) shows the course of the hammer prices from 2006 to 2010, the years in which the economic crisis was felt on the market. It is apparent that the decline starts from July 2008. The summer months are the slowest months in terms of art auctions sales; the busiest period is from September to April. Therefore the small declines in the summer months occur every year and are normal. However, in 2008 and 2009, even in the busier months, the sales did not pick up again. This can be the result of the economic crisis and financial instability occurring at that time.

Course of mean hammer prices from 2006 to 2010



Graph 5 | Course of mean hammer prices from 2006 to 2010 in US Dollars for Cindy Sherman’s photographs, source: artprice.com

Comparing both Graph 3 (page 57) and Graph 5 to the charts of the S&P500 and the Dutch AEX index (Graph 6 and 7 below), it is evident that the decline in the stock exchanges started around the end of 2007. This implies that the art market has a slight lag in declining, as was evident in previous research. This means that the art market is also influenced by the economic and financial situation. This could imply that investors, when the economic crisis started to become noticeable, first started investing in art as another investment opportunity and then dropping out after all.

S&P500 index from 2007 to 2012



Graph 6 | S&P500 index from 2007 to 2012, source: money.cnn.com

AEX index from 2007 to 2012

Graph 7| Dutch AEX index from 2007 to 2012, source: www.beurs.nl

4.5| Ranking of auction houses based on transactions costs and taxes

Appendix B presents a table with all the auction houses that are featured in the dataset of the sales of Cindy Sherman's photographic images. The buyer's premiums of all the different auction houses and the VAT/sales taxes of their countries/states are highlighted in order to provide a good overview of the costs that are added to the hammer price when buying at auction. This information was used to create a ranking using the mean and median of the whole dataset and then calculating what the final price would be for the different auction houses over the world. This ranking is featured in appendix C.

It can be concluded from the ranking that the final prices of the auction houses do differ substantially. The cheapest featured is auction house Larry Gottheim with a price of \$102,172.02 (for the mean) and \$26,010 (for the median). However, it is necessary to keep into consideration that no buyer's premium has been calculated as their website claims: "Our commission rate will depend on the quality and level of the material. Since we don't charge fees that are common with other auctions, this is very

competitive.” (<http://www.be-hold.com>). Therefore, no buyer’s premium is included in the table and this auction house is disregarded, as no reliable final prices can be computed.

The next three auction houses are Asian auction houses and as these have a low representation in the dataset, these too are disregarded.

On the fifth place VanderKindere, Von Zengen, Dorotheum and Bloomsbury auction houses are presented. The fifth place has a price of \$115,017.18 and these four auction houses also have the fifth place in the median ranking with a price of \$29,280. The highest price is acquired at auction house Farsetti (from Italy) with \$140,848.90. This results in a price difference of \$25,831.72. Auction house Farsetti is around 22,5% more expensive than VanderKindere, Von Zengen, Dorotheum or Bloomsbury. For the median the most expensive auction house is Villa Grisenbach (Farsetti is the penultimate) with a final price of \$39,403.20. This results in a difference of \$10,123.20 with the cheapest auction house; Villa Grisenbach is around 34,6% more expensive than the fifth place. Turning to the ranking in general it is apparent that the Italian auction houses dominate the higher priced region, this because of the high VAT in Italy (20% until September 2011, now 21% and possibly from September 2012 up to 23%).

However, buyer’s premiums tend to be different between auction houses and VAT is sometimes not only calculated on the hammer price but also on the buyer’s premium. When paid in cash, the buyer’s premiums can be lowered (for this experiment this lowered rate has not been used). In the literature review, evidence has been presented that buyer’s premiums, though less than the seller’s commission, can be negotiable. Price agreements can be made with the auction house if the collector is a good enough customer; these price agreements are naturally not included in this experiment.

4.6| The impact of exhibitions on the prices

It was evident from the literature review that museums have more influence on the market for photography than on other markets. This probably due to a lack of historic background for the market for photography, as it is still young market and relatively unexplored by collectors. Therefore, consensus on what a high quality work is, or will be, is still ambiguous. The role of a museum is thus the one of gatekeeper and when a

photographic artist is hosted at an exhibition of a museum this has tremendous impact on the market. However, is this also the case for Cindy Sherman? Below Table 7 (in Appendix H the whole table of all Cindy Sherman exhibitions is presented) shows the exhibitions of Cindy Sherman for the period 2003 to 2012. In Appendix K, the courses of mean hammer prices for Cindy Sherman's photographs per year per location are presented, in order to distinguish whether the exhibitions in museums created a peak in prices for that subsequent location.

Cindy Sherman's exhibitions in museums from 2003 to 2012

2003	03-06-'03/ 25-08-'03	Serpentine Gallery	London	UK
2003	06-12-'03/ 07-03-'04	Scottish National Gallery of Modern Art	Edinburgh	UK
2004	21-03-'04/ 01-08-'04	Montclair Art Museum	Montclair	USA
2005	April '05/ June '05	Neues Museum	Weimar	Austria
2006	16-05-'06/ 03-09-'06	Jeu de Paume	Paris	France
2006	02-12-'06/ 28-01-'07	Kunsthaus Bregenz	Bregenz	Austria
2007	09-02-'07/ 13-05-'07	Louisiana Museum for Moderne Kunst	Humblebæk	Denmark
2007	13-06-'07/ 10-09-'07	Martin-Gropius-Bau	Berlin	Germany
2009	April '09/ Aug '09	Metropolitan Museum of Art	New York	USA
2010	15-05-'10/ 05-09-'10	National Gallery of Iceland	Reykjavik	Iceland
2012	26-02-'12/ 11-06-'12	Museum of Modern Art	New York	USA
2012	14-07-'12/ 08-10-'12	San Francisco Museum of Modern Art	San Francisco	USA

Table 7 | Cindy Sherman's exhibitions in museums for the period 2003 to 2012, source: <http://www.artnet.com/artists/cindy-sherman/>

There seems to be no real correlation with exhibitions for the USA (Graph K1), which occurred in 2004, 2009 and 2012. However, a steep rise in mean hammer prices could only be observed in 2009, simultaneous with the exhibition in the Metropolitan Museum of Art. While one would expect that the retrospective exhibition in the Museum of Modern Art (MoMA) in 2012 would have had its influence, but instead of

increasing prices they even decreased.

For Europe as a whole it is possible to assume that also American exhibitions could have had an influence on its prices. Looking at Graph K2 for Europe as a whole, it is evident that the only decline occurred during 2008, where the market rose again from 2009 onwards. There are no significant peaks evident during the time of exhibitions for Cindy Sherman's photographs.

When looking at Graph K4 for the UK a global rise in prices is apparent, steeper from 2006 onwards, with a little decline in 2008 and 2012. Considering there was an exhibition in London in 2003, this did inspire a significant jump in prices for Cindy Sherman's photographs.

Due to the fact that exhibitions in Paris and Berlin were on show in 2006 and 2007, this research has provided the courses of mean hammer prices for these locations as well. Graph K5 for France shows a very fluctuating market with a very steep rise in 2008, subsequently a very steep decline in prices in 2009 and from 2010 another steep rise in prices. The 2006 exhibition in Paris therefore does not seem to have any influence on the prices. However, what did influence the prices to fluctuate so substantially remains unidentified.

For Germany there is even a visible decline in Graph K6, while there was an exhibition on show in Berlin in 2007. A rise in prices is evident from 2011 onwards.

This research concludes that exhibitions for Cindy Sherman's photographs do not have enough influence to change the prices for those locations. It seems that the economic crisis has more influence on the prices, as almost every location shows drops in their graphs between 2007 and 2009.

5| Conclusions and discussion

This final chapter discusses the results and conclusions of this thesis. The main purpose of this thesis was to determine whether price discrepancies existed between New York and Europe concerning Cindy Sherman's photographs.

The general means per location suggest that the prices in the USA are higher than in the UK and the prices in the UK are higher than in Europe as a whole and finally, the prices plummet for Continental Europe. Artprice (2011) noted that the USA is considered to be the market leader in terms of photography sales, which is also apparent from the means calculated for this study. Furthermore, Appendix J shows that the majority of museums that own collections including Cindy Sherman's works are from the USA. This indicates that the interest for Cindy Sherman is higher in the USA than elsewhere.

It is obvious that the higher-priced categories are mostly sold in the UK and USA. Not only the general means support this, but also within the categories themselves. Within the higher priced categories and the categories with high number of data entries the results are relatively consistent. It can therefore be concluded that price differences between the USA, UK and Europe do exist.

When examining Diagram 1 and Table 2 (on pages 50 and 51), considering the turnover and lots sold in the world and in specifically in New York, it is apparent that Sotheby's is the market leader in New York for the contemporary arts. Christie's performs better, having a higher turnover percentage but fewer lots sold, implying that the hammer prices achieved at Christie's remain higher than at Sotheby's. As Sotheby's is the market leader in New York for the contemporary art sales, it may be assumed that Christie's performs better in the rest of the world or at least in other areas than contemporary art sales. There it can be presumed that Sotheby's would be the market leader for Cindy Sherman's photographs, as her photographs are considered to be contemporary art and mostly sold in New York. When considering the general means per locations for the three auction houses in New York, this is not the case; Christie's has a higher mean price over Sotheby's and Phillips de Pury.

However, when turning to the results of the different categories the outcomes are fairly ambiguous. Some show Sotheby's as the market leader in New York, other categories show Christie's or even Phillips de Pury & Company. Looking at the mean

hammer prices per square centimetres, it is apparent that Sotheby's does achieve a higher mean hammer price. This due to the dominance of the category Film stills, which consists of small photographs, at Sotheby's New York. Therefore, the conclusion that the three auction houses in New York differ amongst each other is probably due to the distribution of the highly priced categories between the three auction houses. Christie's sells more of the highly priced categories than the other two auction houses, both in terms of different categories and overall sales.

In addition, the comparison to the S&P500 and the Dutch AEX stock exchanges and the course of the hammer prices of the photographs reveal that the economic and financial turmoil from 2007 to 2009 did influence the height of the hammer prices of Sherman's work. In addition, it can be concluded that the decrease in prices for Cindy Sherman's photographs did have a slight lag in declining.

Moreover, the ranking of the auction houses, featured in the dataset, show that the discrepancies between auction houses are significant, due to differences in buyer's premiums and VAT/sales taxes worldwide. All those distinctions in transaction costs and taxes make for a very unclear and differentiated market.

Finally, as has been said in the literature review by Peers (1993), museums are supposed to have an influence on the market for photography. This would imply that the presence of an exhibition in a sales location would increase prices for photographs. However, no evidence for this claim has been found in this study.

With all the conclusions stated above, it is possible to affirm that the law of one price in cultural economics for Cindy Sherman's photographs has been violated, as price differences within categories occur and cannot be explained. Furthermore, the results of this thesis reject the statements that the art market is becoming increasingly global and integrated. Horowitz (2011), in his book *Art of the Deal*, claims that the art market is becoming more global, with galleries setting up satellite branches in other (mostly economically upcoming) markets. In addition, other nationalities are starting to buy art at auction, making the pool of buyers more diverse (Horowitz, 2001). However, one must beware not to mistake growing mobility and further reaching communication with globalization. Hence, prices are not yet integrated within the whole market. Neither are transactions costs and the differences in taxes worldwide do influence the diversity in prices.

The answer to the main question, what is the most beneficial location to sell Cindy Sherman's photographs, is therefore one of the two big auction houses, Christie's or Sotheby's, in New York. Cindy Sherman's photographs can be bought for the best rates can be done in Europe. However, it must be noted that only the least popular photographs are sold there. Buying in Europe would therefore imply a high search cost and wealthy collectors might therefore choose to buy at the established auction houses in London or New York, even at a higher rate.

While results are numerous, demand for new and more extensive research is needed. Out of 802 entries, 602 were sold at auction, resulting in 200 unsold items; while this is not significantly high, it did skew and influence the results. A longer running dataset with less unsold items and more entries overall is necessary to make better and more extensive contributions to the existing literature. In addition, pairs were unable to be formed; with a more extensive dataset this might have been possible. Pairs of sales would have granted more insight into the price differences between the several locations.

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7| **Appendices**

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7.1| **Appendix B:** Overview of auction houses featured in the dataset with buyer's premiums and VAT/sales taxes

Name auction house	Country	Buyer's premium	VAT/ sales tax	Buyer's premium incl. VAT	Remarks
Leslie Hindman Auctioneers	USA	Up to \$200,000: 22% \$200,000 - \$500,000: 20% \$500,000 – above: 12%	9,5%		Sales tax and buyers premium added to the final total. Chicago
Van Ham Kunstauktionen	Germany	Up to €100,000 (\$124,288): 21% €100,000 – above: 18%	19%	Up to €100,000 (\$124,288): 25% €100,000 – above: 22%	
Pierre Berge Associes	Belgium	Up to €300,000 (\$372,865): 20% €300,000 – above: 15%	19,6%	Up to €300,000 (\$372,865): 23,92% €300,000 – above: 17,94%	
Bassenge	Germany	17%	19%	25%	
Villa Grisebach	Germany	Up to €1,000,000: 22% €1,000,000 – only part above 1,000,000: 15%	19%		Both Buyer's premium and hammer price are subject to the VAT
Heritage Auctions	USA	Up to \$50,000: 25% \$50,000 - \$1,000,000: 20% \$1,000,000 – above: 12%	NY: 8,875% SF: 8,5%		
Piasa	France	Up to €15.000 (\$18643): 23% €15.000 - €600.000 (\$745712): 20% €600.000 – above: 12%	19,6%	Up to €15.000 (\$18643): 27,508% €15.000 - €600.000 (\$745712): 23,92% €600.000 – above: 14,352%	

William Doyle	USA	Up to \$50,000: 25% \$50,000 - \$1,000,000: 20% \$1,000,000 – above: 12%	8,875%		New York
Boetto	Italy	23%	20% 21%		VAT on hammer price + Buyer's premium
Cornette de Saint Cyr	France	Up to €400,000 (\$497,141): 20,9% €400,000 – above: 10.03%	19.6%	Up to €400,000 (\$497,141): 25% €400,000 – above: 12%	
LAMA	USA	25%	LA: 8,75%		Paid with cash BP 22,5%
Bukowskis	Sweden	Up to SEK 3,000,000 (\$413,862): 18% SEK 3,000,000 – above: 12%	25%	Up to SEK 3,000,000 (\$413,862): 22,5% SEK 3,000,000 – above: 15%	
Binoche Renaud Giquello	France		19,6%	26,07%	
Artcurial	France	Up to €30,000 (\$37,282): 24% €30,000 - €600,000 (\$745,653): 20% €600,000 – above: 12%	19,6%	Up to €30,000 (\$37,282): VAT 4,704 €30,000 - €600,000 (\$745,653): VAT 3,92% €600,000 – above: 2,35%	VAT % of hammer price
David Rago	USA	Up to \$50,000: 25% \$50,000 - \$1,000,000: 20% \$1,000,000 – above: 12%	7%		Lambertville (New Jersey)
Wright Auction	USA	Up to \$50,000: 25%	9,5%		Chicago
Wright Auction	USA	Up to \$50,000: 25% \$50.000 - \$1.000.000: 20%	9,5%		Chicago

Larry Gottheim		No fees	8,375%		Yonkers (New York)
Blindarte	Italy	Up to €100,000 (\$124,285): 23% €100,000 – only part above 100,000: 18,5%	20% 21%		
Stair Galleries	USA	17%	8%		Hudson (New York)
Venator & Hanstein	Germany	Up to €2,000 (\$2,486): 17% €2,000 – above: 13%	19%		
Neumeister	Germany	22%	19%	27%	
Skinner	USA	Up to \$200,000: 18,5% \$200,000 – above: 10%	6,25%		Boston (Massachusetts)
Casa de Subastes Odalys	Spain	18%	18%		
Seoul Auction Center	Hong Kong	Up to HKD 400,000 (\$51,521): 18% HDK 400,000 – 800,000 (\$103,042): 15% HKD 800,000 – above: 12%	--		
Auktionshaus Eva Aldag	Germany	20%	19%		
Von Zengen Auktionshaus	Germany		19%	22%	
Stockholm Auktionsverk	Sweden		25%	22,5%	
Lempertz	Germany	Up to €400,000 (\$497,141): 22% €400,000 – above: 20%	19%		
Mainichi Auction	Japan	Up to JPY 500,000 (\$6,339): 15% JPY 500,000 – above: 10%	5%		
Hampel Kunstauktionen	Germany		19%	27%	
Est-Ouest Auctions	Japan		5%	15,75%	
VanderKindere	Belgium		19,6%	22%	

Tajan	France	Up to €20,000 (\$24,857): 23% €20,000 - €600,000 (\$745,712): 20% €600,000 – above: 12%	19,6%	Up to €20,000 (\$24,857): 27,508% €20,000 - €600,000 (\$745,712): 23,92% €600,000 – above: 14,353%	
Casa d’Aste Babuino	Italy	24%	20% 21%		
Ruellan	France	20%	19,6%	23,92%	
Bloomsbury Auction	UK	Up to £300,000 (\$460,860): 22% £300,000 – above: 12%	--		VAT on arts exempt in UK
Farsetti	Italy	Up to €80,000 (\$99,428): 24,5% €80,000 - €200,000 (\$248,571): 22% €200,000 – €350,000 (\$434,999): 20% €350,000 - €500,000 (\$621,427): 19,5% €500,000 – above: 19%	20% 21%		
Ketterer Kunst	Germany	Up to €25,000 (\$31,438): 25% €25,000 - €500,000 (\$621,427): 22% €500,000 – above: 27%	19%	Up to €25,000 (\$31,438): 32% €25,000 - €500,000 (\$621,427): 29% €500,000 – above: 27%	
Bruun Rasmussen	Denmark	24%		30%	
Dorotheum	Austria			Up to €10,000 (\$12,429):	

Germa Auktionshaus	Switzerla nd	Up to CHF 400,000 (\$413,843): 20% CHF 400,000 – only part above 400,000: 12%	8%		BP subject to Swiss VAT
Swann Galleries	USA	20%	8,875%		
Nagel	Germany	27%	19%	33%	
Bonhams		Since 01-09-2011 Up to \$25,000: 25% \$25,000 - \$1,000,000: 20% \$1,000,000 – above: 12% Before: 20%	NY: 8,875% LA: 8,75% SF: 8,5%		
Phillips de Pury & Company	UK/USA	USA: Up to \$25,000: 25% \$25,000 - \$1,000,000: 20% \$1,000,000 – above: 12% UK: Up to £25,000 (\$39,279): 25% £25,000 - £500,000 (\$785,497): 20% £500,000 – above: 12%	NY: 8,875% UK: --		

Table B1| Overview of auction houses featured in the dataset with buyer's premiums and VAT/sales taxes

Buyer's Premium Sotheby's

To update: Buyer's Premium Chart
(http://www.sothebys.com/help/faq/faq_duringauction.html#a03)

Salesroom, Country or [Department]	Amount of Hammer Price	BP%
London	up to GBP 25,000	25%
	above GBP 25,000 - GBP 500,000	20%
	above GBP 500,000	12%
[London Wine]	All amounts	17.5%
France	up to EUR 15,000	25%
	above EUR 15,000 - EUR 800,000	20%
	above EUR 800,000	12%
Netherlands*	up to EUR 15,000	29.75%
	above EUR 15,000 - EUR 800,000	23.80%
	above EUR 800,000	14.28%
Italy**	up to EUR 15,000	30.25%
	above EUR 15,000 - EUR 800,000	24.20%
	above EUR 800,000	14.52%
New York	up to USD 50,000	25%
	above USD 50,000 - USD 1,000,000	20%
	above USD 1,000,000	12%
[NY Wine]	All amounts	22.5%
Switzerland	up to CHF 50,000	25%
	above CHF 50,000 - CHF 1,000,000	20%
	above CHF 1,000,000	12%
Hong Kong	up to HKD 400,000	25%
	above HKD 400,000 - HKD 8,000,000	20%
	above HKD 8,000,000	12%
[Hong Kong Wine]	All amounts	22.5%
Doha	Up to USD 50,000	25%
	above USD 50,000 - USD 1,000,000	20%
	above USD 1,000,000	12%
Canada	up to CAD 50,000	20%
	above CAD 50,000	15%

These rates exclude local taxes and Artist's Resale Right unless otherwise noted.

*Includes local taxes.

**Includes VAT

Table B2| Percentages for the buyer's premium in different countries for auction house Sotheby's, source: <http://www.sothebys.com>

Buyer's Premium Christie's

Percentage (%) the buyer pays in addition to the final bid price or hammer price in respect of each Lot purchased.

The premiums for Christie's auctions in most categories, unless specified otherwise, are listed by saleroom location. Wherever applicable, sales or value added taxes (VAT) will be added to the final amount. For further information, please contact the Bid Department in the sale location.

Where thresholds apply the higher premium rate shall apply to the portion of the bid price up to the threshold and the lower premium rate will apply to the portion of the bid price in excess of the threshold.

Effective May 2012

Country & Saleroom Location(s)	Premium	Threshold
United States New York	25.0%	Up to \$50,000
	20.0%	\$50,001 - \$1,000,000
	12.0%	\$1,000,001 +
	Wine Sales only 21.0%	No threshold
United Kingdom London (both salerooms)	25.0%	Up to £25,000
	20.0%	£25,001 - £500,000
	12.0%	£500,001 +
	Wine Sales only 15.0%	No threshold
France Paris	25.0%	€0 to €20,000
	20.0%	€20,001 to €800,000
	12.0%	€800,001 +
	Wine Sales only 15.0%	No threshold
Holland Amsterdam	29.75%	€0 to €20,000
	23.80%	€20,001 to €800,000
	14.28%	€800,001 +
	Wine Sales only 15.0%	Up to €150,000
	10.0%	€150,001 +
Israel Tel Aviv	25.0%	Up to \$50,000
	20.0%	\$50,001 - \$1,000,000
	12.0%	\$1,000,001 +
Italy Milan	30.0%	€0 to €20,000
	26.0%	€20,001 to €800,000
	18.5%	€800,001 +

PRC	Hong Kong	25.0%	Up to HK\$400,000
		20.0%	HK\$400,001 - HK\$8,000,000
		12.0%	HK\$8,000,001 +
	Wine Sales only	21.0%	No threshold
Spain	Madrid	25.0%	€0 to €20,000
		20.0%	€20,001 to €800,000
		12.0%	€800,001 +
Switzerland	Geneva	25.0%	Up to Sfr 60,000
		20.0%	Sfr 60,001 - Sfr 1,000,000
		12.0%	Sfr 1,000,001 +
	Wine Sales only	15.0%	Up to Sfr 250,000
		10.0%	Sfr 250,001 +
Switzerland	Zurich	20.0%	No threshold
UAE	Dubai	25.0%	Up to \$50,000
		20.0%	\$50,001 - \$1,000,000
		12.0%	\$1,000,001 +

Table B2| Percentages for the buyer's premium in different countries for auction house Christie's, source: <http://www.christies.com>

Paris

For Paris auctions additional charges apply to lots marked with the f, ff and + symbols.

Amsterdam

Amsterdam rates are quoted inclusive of VAT in catalogues. VAT in catalogues: 29.75% up to €20,000; 23.8% €20,001 - €800,000; and 14.28% on €800,001 and above.

Milan

Milan rates are quoted all-inclusive.

Geneva

VAT of 8.0% is added to the hammer price and to the premium. This tax is refunded to buyers domiciled outside Switzerland upon receipt by Christie's for each object of an export declaration stamped by Swiss Customs. This refund is recovered by Christie's from the Swiss Fiscal Authorities only on presentation of the stamped declaration. The Authorities will not entertain a claim without presentation of this form duly stamped by Swiss Customs. The total amount obtained by adding to the hammer price the buyer's commission and VAT shall constitute the purchase price for the purposes hereof.

7.2| **Appendix C: Ranking of auction houses using transactions costs and VAT/sales taxes per mean and median**

Statistics

Hammer price

N	Valid	595
	Missing	209
Mean		94276,3849
Std. Error of Mean		9770,19561
Median		24000,0000
Std. Deviation		238320,68665
Range		3399825,00
Minimum		175,00
Maximum		3400000,00
Sum		56094449,00
Percentiles	25	3500,0000
	50	24000,0000
	75	85000,0000

Table C1| Statistics over the whole dataset of Cindy Sherman’s photographs, source: artprice.com

Auction house	Country	Buyer’s premium	VAT/ Sales tax	Mean (\$94.276,38)
1. Larry Gottheim NY	USA	--	8,375%	\$102,172.02
2. Seoul Auction Center	China	15%	--	\$108,417.83
3. Mainichi Auction	Japan	10%	5%	\$108,889.21
4. Est-Ouest Auction	Japan	15% (incl. tax)	5%	\$109,124.90
5. VanderKindere	Belgium	22% (incl. tax)	19,6%	\$115,017.18
5. Von Zengen	Germany	22% (incl. tax)	19%	\$115,017.18
5. Dorotheum	Austria	22% (incl. tax)		\$115,017.18
5. Bloomsbury	UK	22%	--	\$115,017.18
6. Stockholm Auktionsverk	Sweden	22,5% (incl. tax)	25%	\$115,488.56
6. Bukowskis	Sweden	18% (22.5% incl. tax)	25%	\$115,488.56

7. Pierre Berge	Belgium	20% (23,92% incl. tax)	19,6%	\$116,827.29
7. Piasa	France	20% (23,92% incl. tax)	19,6%	\$116,827.29
7. Artcurial	France	20% (23,92% incl. tax)	19,6%	\$116,827.29
7. Ruellan	France	20% (23,92% incl. tax)	19,6%	\$116,827.29
7. Tajan	France	20% (23,92% incl. tax)	19,6%	\$116,827.29
8. Van Ham	Germany	21% (25% incl. tax)	19%	\$117,845.48
8. Bassenge	Germany	17% (25% incl. tax)	19%	\$117,845.48
8. Cornette de St. Cyr	France	20,9% (25% incl. tax)	19,6%	\$117,845.48
9. Skinner BO	USA	18,5%	6,25%	\$118,699.85
10. Binoche Renaud Giquello	France	26,07% (incl. tax)	19,6%	\$118,854.20
11. Stair Galleries NY	USA	17%	8%	\$119,127.62
12. Hampel	Germany	27% (incl. tax)	19%	\$119,731
13. David Rago NJ	USA	20%	7%	\$121,050.86
14. Germann Auktionshaus	Switzerland	20%	8%	\$122,182.18
15. Bruun Rasmussen	Denmark	24% (30% incl. tax)		\$122,559.29
16. Swann Galleries NY	USA	20%	8,875%	\$123,172.08
18. Bonhams NY	USA	20%	8,875%	\$123,172.08
18. Phillips de Pury NY	USA	20%	8,875%	\$123,172.08
18. Christie's NY	USA	20%	8,875%	\$123,172.08

18. Sotheby's NY	USA	20%	8,875%	\$123,172.08
18. Heritage NY	USA	20%	8,875%	\$123,172.08
18. William Doyle NY	USA	20%	8,875%	\$123,172.08
18. Wright Auction CHI	USA	20%	9,5%	\$123,879.15
19. Ketterer Kunst	Germany	22% (29% incl. tax)	19%	\$124,588.82
20. Nagel	Germany	27% (33% incl. tax)	19%	\$125,387.58
21. Leslie Hindman CHI	USA	22%	9,5%	\$125,943.81
22. Venator & Hanstein	Germany	13%	19%	\$126,773.43
23. Villa Grisebach	Germany	22%	19%	\$126,870.44
24. LAMA LA	USA	25%	8,75%	\$128,156.94
25. Casa de Subastes Odalys	Spain	18%	18%	\$131,270.42
26. Eva Aldag	Germany	20%	19%	\$134,626.66
27. Lempertz	Germany	22%	19%	\$136,870.44
28. Blindarte	Italy	23%	20%	\$139,151.92
28. Boetto	Italy	23%	20%	\$139,151.92
29. Casa d'Aste Babuino	Italy	24%	20%	\$140,283.25
30. Farsetti	Italy	24,5%	20%	\$140,848.90

Table C2| Ranking of auction houses using transactions costs and VAT/sales taxes per mean in US Dollars

Auction house	Country	Buyer's premium	VAT/ Sales tax	Median (\$24.000)
1. Larry Gottheim NY	USA	--	8,375%	\$26,010
2. Mainichi Auction	China	15%	--	\$27,720
3. Est-Ouest Auction	Japan	10%	5%	\$27,780
4. Seoul Auction Center	Japan	18% (incl. tax)	5%	\$28,320
5. VanderKindere	Belgium	22% (incl. tax)	19,6%	\$29,280
5. Von Zengen	Germany	22% (incl. tax)	19%	\$29,280
5. Dorotheum	Austria	22% (incl. tax)		\$29,280
5. Bloomsbury	UK	22%	--	\$29,280
6. Stockholm Auktionsverk	Sweden	22,5% (incl. tax)	25%	\$29,400
6. Bukowskis	Sweden	18% (22.5% incl. tax)	25%	\$29,400
7. Ruellan	France	20% (23,92% incl. tax)	19,6%	\$29,740.80
7. Pierre Berge	Belgium	20% (23,92% incl. tax)	19,6%	\$29,740.80
8. Van Ham	Germany	21% (25% incl. tax)	19%	\$30,000
8. Bassenge	Germany	17% (25% incl. tax)	19%	\$30,000
8. Cornette de St. Cyr	France	20,9% (25% incl. tax)	19,6%	\$30,000
9. Skinner BO	USA	18,5%	6,25%	\$30,217.50
10. Binoche Renaud Giquello	France	26,07% (incl. tax)	19,6%	\$30,256.80
11. Stair Galleries NY	USA	17%	8%	\$30,326.40
12. Hampel	Germany	27% (incl. tax)	19%	\$30,480

13. Tajan	France	20% (23,92% incl. tax)	19,6%	\$30,601.92
14. David Rago NJ	USA	25%	7%	\$30,816
15. Germann Auktionshaus	Switzerland	20%	8%	\$31,104
16. Bruun Rasmussen	Denmark	24% (30% incl. tax)		\$31,200
17. Swann Galleries NY	USA	20%	8,875%	\$31,356
17. Bonhams NY	USA	20%	8,875%	\$31,356
17. Phillips de Pury NY	USA	20%	8,875%	\$31,356
17. Christie's NY	USA	20%	8,875%	\$31,356
17. Sotheby's NY	USA	20%	8,875%	\$31,356
17. Wright Auction NY	USA	20%	8,875%	\$31,356
18. Ketterer Kunst	Germany	22% (29% incl. tax)	19%	\$31,680
19. Nagel	Germany	27% (33% incl. tax)	19%	\$31,920
20. Leslie Hindman CHI	USA	22%	9,5%	\$32,061.60
21. Venator & Hanstein	Germany	13%	19%	\$32,272.80
22. LAMA LA	USA	25%	8,75%	\$32,625
23. Heritage NY	USA	25%	8,875%	\$32,662.50
23. William Doyle NY	USA	25%	8,875%	\$32,662.50
24. Casa de Subastes Odalys	Spain	18%	18%	\$33,417.60
25. Eva Aldag	Germany	20%	19%	\$34,272
26. Lempertz	Germany	22%	19%	\$34,843.20

27. Blindarte	Italy	23%	20%	\$35,424
27. Boetto	Italy	23%	20%	\$35,424
28. Casa d'Aste Babuino	Italy	24%	20%	\$35,712
29. Farsetti	Italy	24,5%	20%	\$35,856
30. Villa Grisebach*	Germany	22%	19%	\$39,403.20

Table C3| Ranking of auction houses using transactions costs and VAT/sales taxes per median in US Dollars

*VAT calculated on both Buyer's premium as hammer price

7.3| **Appendix D:** Tables of sold/not sold items per location

Sold/not sold items and percentages for the whole dataset of Cindy Sherman's photographs

		Sold/not sold			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	200	24,9	24,9	24,9
	Sold	602	75,1	75,1	100,0
	Total	802	100,0	100,0	

Table D1| Sold/not sold items and percentages for the whole dataset of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for the USA of Cindy Sherman's photographs

		Sold/not sold			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	95	17,9	17,9	17,9
	Sold	431	81,0	81,0	98,9
	Hammer price not communicated	6	1,1	1,1	100,0
Total		532	100,0	100,0	

Table D2| Sold/not sold items and percentages for the USA of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for Europe of Cindy Sherman's photographs

		Sold/not sold			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	104	39,5	39,5	39,5
	Sold	158	60,1	60,1	99,6
	Hammer price not communicated	1	,4	,4	100,0
Total		263	100,0	100,0	

Table D3| Sold/not sold items and percentages for Europe of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for the UK of Cindy Sherman's photographs

Sold/not sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	43	36,8	36,8	36,8
	Sold	74	63,2	63,2	100,0
	Total	117	100,0	100,0	

Table D4| Sold/not sold items and percentages for the UK of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for Continental Europe the UK of Cindy Sherman's photographs

Sold/not sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	61	41,8	41,8	41,8
	Sold	84	57,5	57,5	99,3
	Hammer price not communicated	1	,7	,7	100,0
	Total	146	100,0	100,0	

Table D5| Sold/not sold items and percentages for the UK of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for Christie's New York of Cindy Sherman's photographs

Sold/not sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	18	10,7	10,7	10,7
	Sold	149	88,2	88,2	98,8
	Hammer price not communicated	2	1,2	1,2	100,0
	Total	169	100,0	100,0	

Table D6| Sold/not sold items and percentages for Christie's New York of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for Phillips de Pury & Company New York of Cindy Sherman's photographs

Sold/not sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	31	17,3	17,3	17,3
	Sold	148	82,7	82,7	100,0
	Total	179	100,0	100,0	

Table D7| Sold/not sold items and percentages for Phillips de Pury & Company New York of Cindy Sherman's photographs, source: artprice.com

Sold/not sold items and percentages for Sotheby's New York of Cindy Sherman's photographs

Sold/not sold

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not sold	31	26,1	26,1	26,1
	Sold	88	73,9	73,9	100,0
	Total	119	100,0	100,0	

Table D8| Sold/not sold items and percentages for Sotheby's New York of Cindy Sherman's photographs, source: arprprice.com

7.4| Appendix E: Ranking of categories per maximum prices

Rank	Category	Highest price
1.	7. Centerfolds	\$3,400,000
2.	12. Fairy tales	\$2,400,000
3.	24. Clowns	\$1,200,000
4.	5. Film stills	\$1,050,000
5.	14. History portraits	\$828,091
6.	17. Fashion #3	\$680,000
7.	8. Pink robes	\$500,000
8.	16. Sex pictures	\$210,000
8.	6. Rear screen projections	\$210,000
9.	3. Bus riders	\$170,000
10.	11. Fashion #2	\$160,000
11.	1. Early works	\$140,000
12.	9. Strong women	\$120,000
12.	23. Hollywood portraits	\$120,000
13.	10. Fashion #1	\$105,000
14.	21. Office killer frames	\$85,000
15.	19. Horror and surrealist	\$62,928
16.	27. Marilyn	\$30,000
17.	22. Broken dolls	\$15,829
18.	4. Murder mystery	\$16,000
19.	29. Dual gender	\$12,000
20.	30. Artist in studio	\$12,000
21.	28. Body part	\$4,838
22.	31. Claus	\$1,668

Table E1| Ranking of categories of Cindy Sherman's photographs per maximum prices in US Dollars, source: artprice.com

7.5| Appendix F: Ranking of categories per cm2 mean prices

Rank	Category	Mean	Std. Deviation
1.	5. Film stills	\$111.50	\$147.98
2.	7. Centerfolds	\$83.70	\$105.92
3.	3. Bus riders	\$80.48	\$85.68
4.	8. Pink robes	\$36.81	\$19.24
5.	4. Murder mystery	\$24.84	\$24.11
6.	6. Rear screen projections	\$20.34	\$22.69
7.	14. History portraits	\$18.64	\$12.25
8.	24. Clowns	\$18.63	\$15.51
9.	29. Dual gender	\$16.34	\$6.41
10.	27. Marilyn	\$13.82	\$8.59
11.	1. Early works	\$10.06	\$10.31
12.	30. Artist in studio	\$8.69	\$3.48
13.	12. Fairy tales	\$7.19	\$23.98
14.	17. Fashion #3	\$6.95	\$7.71
15.	9. Strong women	\$6.44	\$5.50
16.	23. Hollywood portraits	\$6.08	\$11.68
17.	19. Horror and surrealist pictures	\$5.93	\$7.96
18.	11. Fashion #2	\$5.47	\$3.13
19.	10. Fashion #1	\$5.22	\$4.32
20.	16. Sex pictures	\$3.71	\$2.09
21.	28. Bodypart	\$2.52	\$1.25
22.	21. Office killer frames	\$1.87	\$0.78
23.	31. Mrs. Claus	\$1.36	\$0.71
24.	13. Disasters	\$1.31	\$1.29
25.	22. Broken dolls	\$1.19	\$0.66

Table F1| Ranking of the categories of Cindy Sherman's photographs per cm2 mean hammer prices and standard deviations in US Dollars, source: artprice.com

7.6| Appendix G: Frequencies of categories in the dataset

		Category number				
		Freque ncy	Percent	Valid Percent	Cum. Percent	
Valid	1	62	7,7	7,9	7,9	
	3	13	1,6	1,7	9,6	
	4	20	2,5	2,6	12,2	
	5	150	18,7	19,2	31,4	
	6	15	1,9	1,9	33,3	
	7	24	3,0	3,1	36,4	
	8	5	,6	,6	37,1	
	9	36	4,5	4,6	41,7	
	10	49	6,1	6,3	47,9	
	11	5	,6	,6	48,6	
	12	35	4,4	4,5	53,1	
	13	115	14,3	14,7	67,8	
	14	41	5,1	5,3	73,1	
	15	5	,6	,6	73,7	
	16	14	1,7	1,8	75,5	
	17	5	,6	,6	76,2	
	18	3	,4	,4	76,5	
	19	39	4,9	5,0	81,5	
	20	1	,1	,1	81,7	
	21	6	,7	,8	82,4	
	22	21	2,6	2,7	85,1	
	23	30	3,7	3,8	89,0	
	24	14	1,7	1,8	90,8	
	27	12	1,5	1,5	92,3	
	28	28	3,5	3,6	95,9	
	29	13	1,6	1,7	97,6	
	30	10	1,2	1,3	98,8	
	31	9	1,1	1,2	100,0	
		Tot.	780	97,0	100,0	
	Missing	System	24	3,0		
	Total		804	100,0		

Table G1| Frequencies of categories of Cindy Sherman's photographs in the dataset

7.7| Appendix H: Overview of solo exhibitions in museums by Cindy

Sherman

Year	Date	Exhibition space	City	Country
1980		Kitchen	New York	USA
1980		Contemporary Art Museum	Houston	USA
1982		Stedelijk Museum	Amsterdam	Holland
1983		The St. Louis Art Museum	St. Louis	USA
1983		Musee d'Arte et d'Industrie de Saint Etienne	Saint Etienne	France
1984		Akron Art Museum	Akron	USA
1989		National Art Gallery	Wellington	New Zealand
1990	Sept '90/ Oct '90	University Art Museum	Berkeley	USA
1991	28-03-'91/ 20-05-'91	Kunsthalle	Basel	Switzerland
1994	Nov '94/ Feb '95	The Irish Museum of Modern Art	Dublin	Ireland
1994		Manchester City Art Gallery	Manchester	UK
1995	15-03-'95/ 25-06-'95	Hirshhorn Museum and sculpture garden	Washington D.C.	USA
1995		Museu de Arte Moderna de Sao Paulo	Sao Paulo	Brazil
1995		Deichtorhallen Hamburg	Hamburg	Germany
1996	10-03-'96/ 19-05-'96	Museum Boijmans van Beuningen	Rotterdam	Holland
1996	08-07-'96/ 22-09-'96	Centro de Arte Reina Sofia	Madrid	Spain
1996	15-10-'96/ 01-12-'96	Sala de Exposiciones	Bilbao	Spain
1997	19-01-'97/ 23-03-'97	Staatliche Kunsthalle	Baden-Baden	Germany
1997		Museum Ludwig	Cologne	Germany
1997		Museum of Contemporary Art	Los Angeles	USA
1997		Museo de Bellas Artes	Caracas	Venezuela
1997	26-06-'97/ 02-09-'97	Museum of Modern Art	New York	USA
1998		San Francisco Museum of Modern Art	San Francisco	USA
1998	27-08-'98/ 24-01-'99	Seattle Art Museum	Seattle	USA
1999		CAPC de Bordeaux	Bordeaux	France
2001		Nikolaj Copenhagen Contemporary Art Center	Copenhagen	Denmark
2003	03-06-'03/ 25-08-'03	Serpentine Gallery	London	UK

2003	06-12-‘03/ 07-03-‘04	Scottish National Gallery of Modern Art	Edinbrugh	UK
2004	21-03-‘04/ 01-08-‘04	Montclair Art Museum	Montclair	USA
2005	April ‘05/ June ‘05	Neues Museum	Weimar	Austria
2006	16-05-‘06/ 03-09-‘06	Jeu de Paume	Paris	France
2006	02-12-‘06/ 28-01-‘07	KunsthauB Bregenz	Bregenz	Austria
2007	09-02-‘07/ 13-05-‘07	Louisiana Museum for Moderne Kunst	Humblebæk	Denmark
2007	13-06-‘07/ 10-09-‘07	Martin-Gropius-Bau	Berlin	Germany
2009	April ‘09/ Aug ‘09	Metropolitan Museum of Art	New York	USA
2010	15-05-‘10/ 05-09-‘10	National Gallery of Iceland	Reykjavik	Iceland
2012	26-02-‘12/ 11-06-‘12	Museum of Modern Art	New York	USA
2012	14-07-‘12/ 08-10-‘12	San Francisco Museum of Modern Art	San Francisco	USA
2012		Walker Art Center	Minneapolis	USA
2013	17-03-‘13/ 09-06-’13	Dallas Museum of Art	Dallas	USA

Table H1| Overview of solo exhibitions of Cindy Sherman, source: <http://www.artnet.com/artists/cindy-sherman/>

7.8| Appendix I: Overview of solo exhibitions in galleries by Cindy Sherman

Year	Date	Gallery	City	Country
1980	06-12-‘80/ 07-01-‘81	Metro Pictures	New York	USA
1981	07-11-‘81/ 28-11-‘81	Metro Pictures	New York	USA
1982		Déjà vu	Dijon	France
1982	16-10-‘82/ 13-11-‘82	Metro Pictures	New York	USA
1983	29-10-‘83/ 26-11-‘83	Metro Pictures	New York	USA
1984	07-09-‘84/ 25-09-‘84	Monika Sprüth	Cologne	Germany
1985		Westfälischer Kunstverein	Münster	Germany
1985	05-10-‘85/ 26-10-‘85	Metro Pictures	New York	USA
1987	02-05-‘87/ 30-05-‘87	Metro Pictures	New York	USA
1988	29-04-‘88/ 28-05-‘88	Monika Sprüth	Cologne	Germany
1989	25-03-‘89/ 22-04-‘89	Metro Pictures	New York	USA
1990	06-01-‘90/ 27-04-‘90	Metro Pictures	New York	USA
1990	21-09-‘90/ 03-11-‘90	Monika Sprüth	Cologne	Germany
1992	11-04-‘92/ 09-05-‘92	Metro Pictures	New York	USA
1992	25-09-‘92/ 21-10-‘92	Monika Sprüth	Cologne	Germany
1994		ACC Galerie	Weimar	Germany
1995	14-01-‘95/ 18-02-‘95	Metro Pictures	New York	USA
1995	05-05-‘95/ 29-07-‘95	Monika Sprüth	Cologne	Germany
1996	26-10-‘96/ 23-11-‘96	Metro Pictures	New York	USA
1998	18-04-‘98/ 16-05-‘98	Metro Pictures	New York	USA
1999	15-05-‘99/ 26-06-‘99	Metro Pictures	New York	USA
1999	05-11-‘99/ 12-02-‘00	Sprüth Magers	Cologne	Germany
2000		Greengrassi	London	UK

2000		Galeria Juana de Aizpuru	Madrid	Spain
2000		Gagosian Gallery	Lon Angeles	USA
2000		Hasselblad Center	Göteborg	Sweden
2000	06-05-‘00/ 01-07-‘00	Skarstedt Gallery	New York	USA
2000	29-06-‘00/ 02-09-‘00	Sprüth Magers	Munich	Germany
2000	11-11-‘00/ 06-01-‘01	Metro Pictures	New York	USA
2003	01-05-‘03/ 01-06-‘03	Skarstedt Gallery	New York	USA
2004	08-05-‘04/ 26-06-‘04	Metro Pictures	New York	USA
2004	26-11-‘04/ 15-01-‘05	Sprüth Magers	London	UK
2005		Galerie du Chateau d’Eau	Toulouse	France
2005	20-01-‘05/ 26-02-‘05	Sprüth Magers	Munich	Germany
2006	11-11-‘06/ 16-12-‘06	Metro Pictures	New York	USA
2007		Barbara Krakow Gallery	Boston	USA
2007	23-05-‘07/ 14-06-‘07	Sprüth Magers	London	UK
2008	08-11-‘08/ 20-12-‘08	Skarstedt Gallery	New York	USA
2008	15-11-‘08/ 23-12-‘08	Metro Pictures	New York	USA
2009	18-02-‘09/ 18-04-‘09	Sprüth Magers	Berlin	Germany
2009	16-04-‘09/ 27-05-‘09	Sprüth Magers	London	UK
2009	07-06-‘09/ 08-10-‘09	Gagosian Gallery	Rome	Italy
2011	12-01-‘11/ 19-02-‘11	Sprüth Magers	London	UK
2012	28-04-‘12/ 09-06-‘12	Metro Pictures	New York	USA

Table 11| Overview of solo exhibitions in galleries by Cindy Sherman, sources: spruethmagers.com, metropicturesgallery.com, www.artnet.com/artists/cindy-sherman

7.9| **Appendix J:** Museums with works of Cindy Sherman in their collection

USA

Albright-Knox Art Gallery	Buffalo	New York
Art Institute of Chicago	Chicago	Chicago
Baltimore Museum of Art	Baltimore	Maryland
Carnegie Museum of Art	Pittsburgh	Pennsylvania
Corcoran Gallery of Art	Washington D.C.	Washington
Dallas Museum of Fine Arts	Dallas	Texas
Des Moines Art Center	Des Moines	Iowa
Los Angeles County Museum of Art	Los Angeles	California
Metropolitan Museum of Art	New York	New York
Modern Art Museum of Fort Worth	Fort Worth	Texas
Museum of Art, Carnegie Institute	Pittsburgh	Pennsylvania
Museum of Contemporary Art	Chicago	Chicago
Museum of Contemporary Art	Los Angeles	California
Museum of Fine Arts	Boston	Massachusetts
Museum of Fine Arts	Houston	Texas
Museum of Modern Art	New York	Texas
New Britain Museum of American Art	New Britain	Connecticut
Philadelphia Museum of Art	Philadelphia	Pennsylvania
San Francisco Museum of Modern Art	San Francisco	California
Solomon R. Guggenheim Museum	New York	New York
St. Louis Art Museum	St. Louis	Missouri
Wadsworth Atheneum	Hartford	Connecticut
Walker Art Center	Minneapolis	Minnesota
Whitney Museum of American Art	New York	New York

Europe

Centre Georges Pompidou	Paris	France
Centro de Arte Reina Sofia	Madrid	Spain
Fotomuseum	Winterthur	Switzerland
Hamburger Bahnhof Museum fur	Berlin	Germany
Kunsthau	Zurich	Austria
Kunsthalle	Hamburg	Germany
Kunstmuseum	Wolfsburg	Germany
Louisiana Museum	Humblebaek	Denmark
Moderna Museet	Stockholm	Sweden
Museum Boijmans-van Beuningen	Rotterdam	Holland
Museum des 20 Jahrhunderts	Vienna	Austria
Museum Folkwang	Essen	Germany
Museum Ludwig	Cologne	Germany
Museum of Contemporary Art	Helsinki	Finland
Museum of Contemporary Art	Luxembourg	Luxembourg
Museum of Modern Art	Oslo	Norway
Rijksmuseum Kroller-Muller	Otterlo	Holland
Scottish National Gallery	Edinburgh	UK
Sprengel Museum	Hannover	Germany

Staatsgalerie	Stuttgart	Germany
Stedelijk Museum	Amsterdam	Holland
Tate Gallery	London	UK
Victoria and Albert Museum	London	UK

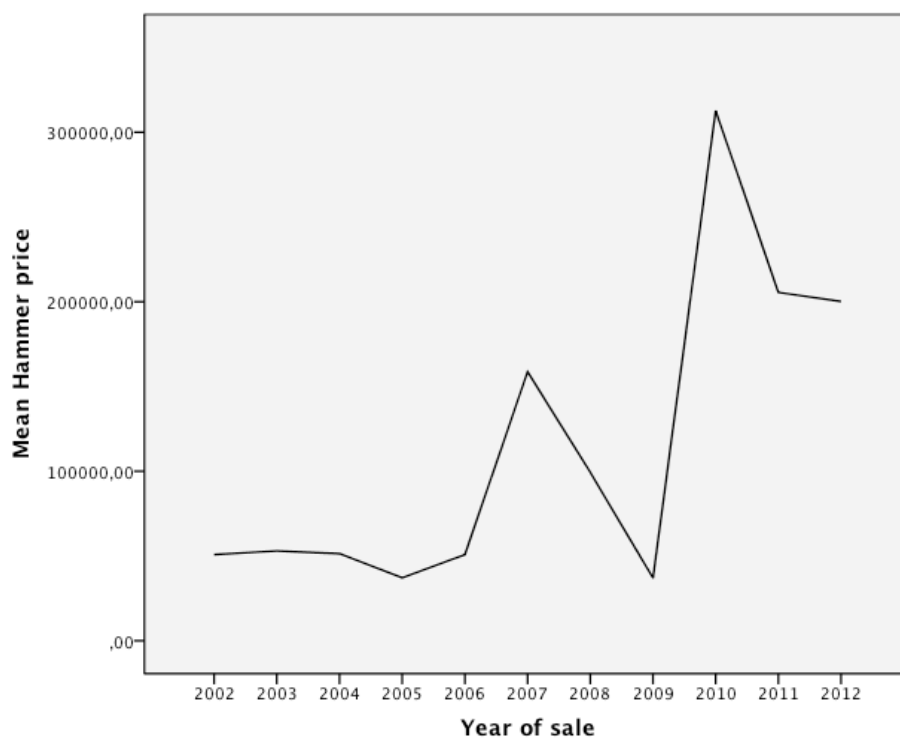
Other

Art Gallery of New South Wales	Sydney	Australia
Art Gallery of Ontario	Toronto	Canada
Australian National Gallery	Canberra	Australia
Israeli Museum	Jerusalem	Israel
Musée d'art Contemporain	Montréal	Canada
Tamayo Museum	Mexico City	Mexico
Tokyo Metropolitan Museum of Photography	Tokyo	Japan

Source: <http://www.skarstedt.com/artists/cindy-sherman/>

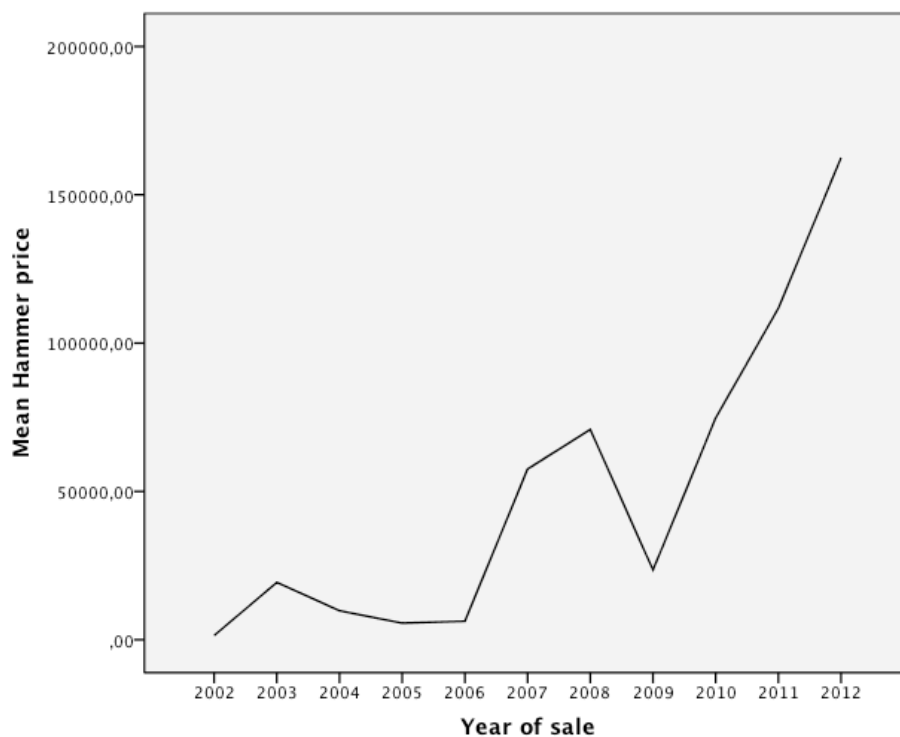
7.10| Appendix K: Courses of mean hammer prices per location

Course of mean hammer prices per year for the USA



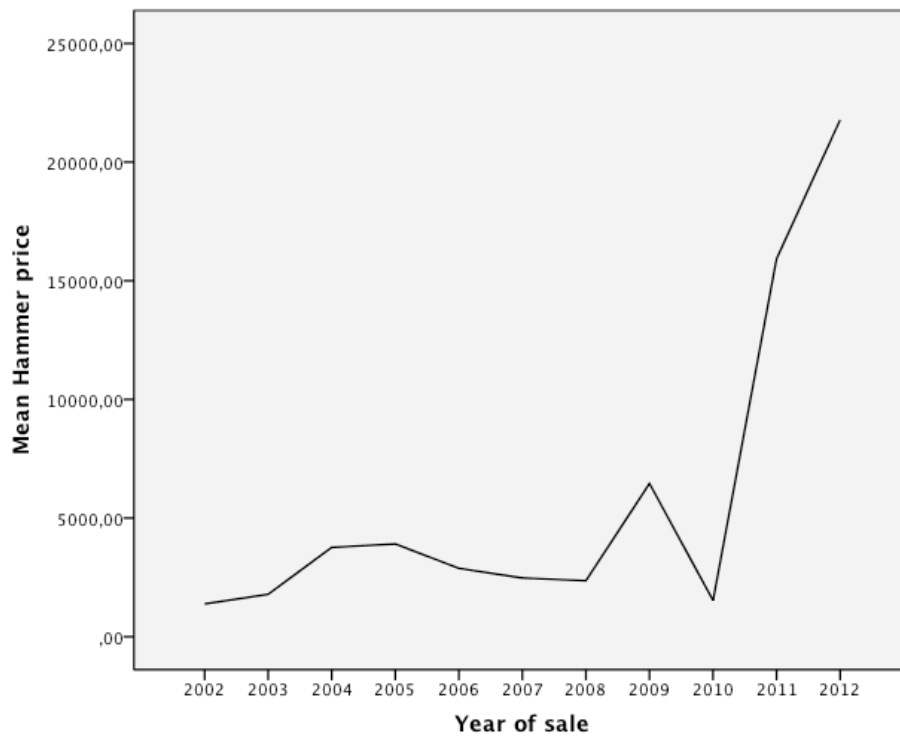
Graph K1| Course of mean hammer prices per year for the USA in US Dollars, source: artprice.com

Course of mean hammer prices per year for Europe as a whole



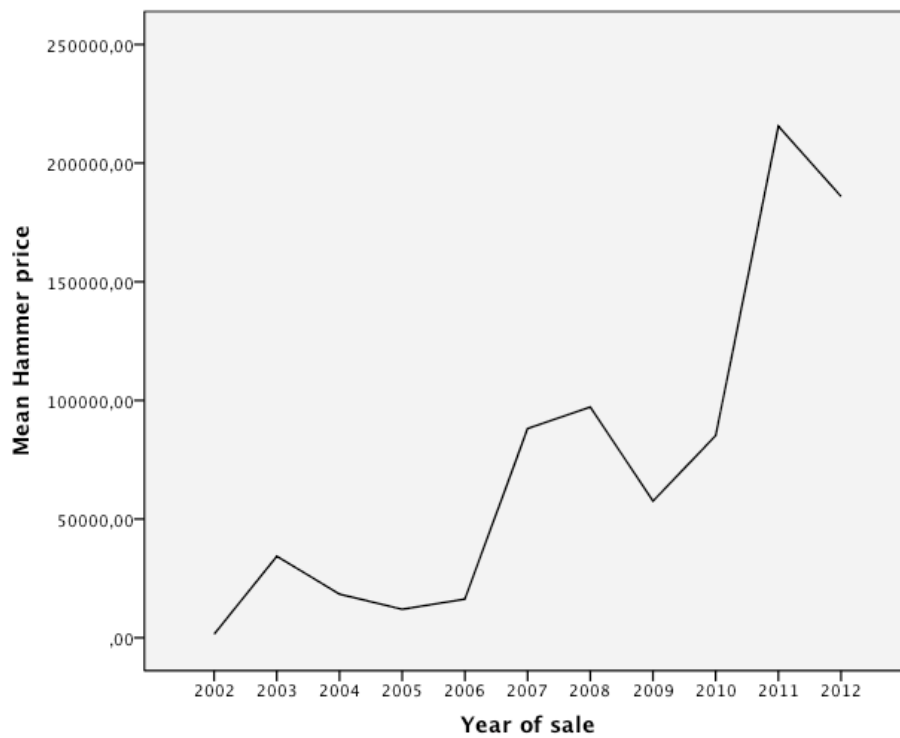
Graph K2| Course of mean hammer prices per year for Europe as a whole in US Dollars, source: artprice.com

Course of mean hammer prices per year for Continental Europe



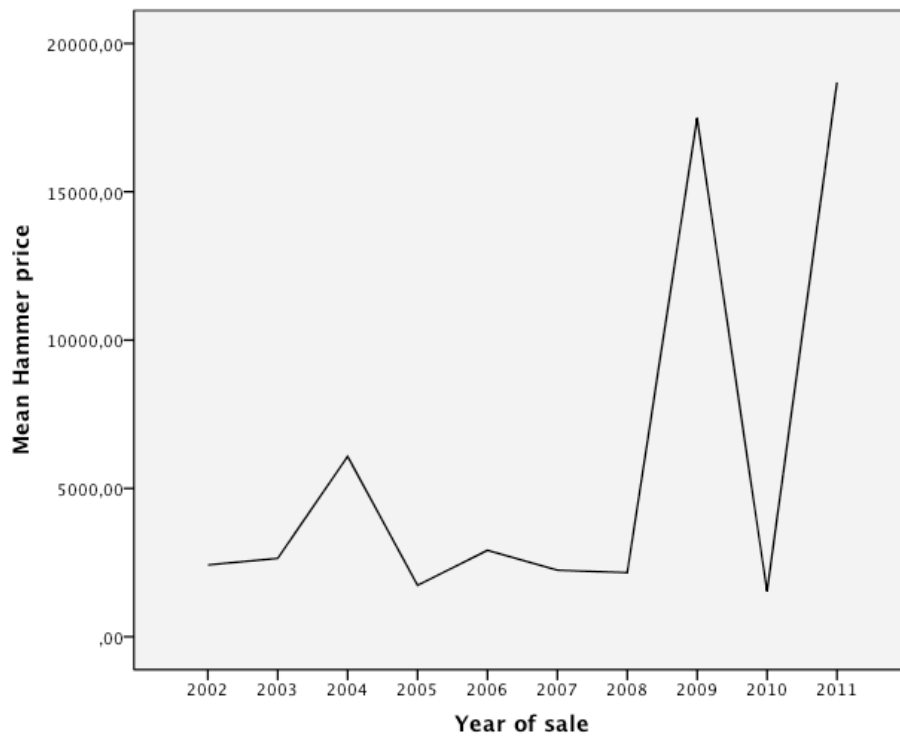
Graph K3| Course of mean hammer prices per year for Continental Europe in US Dollars, source: artprice.com

Course of mean hammer prices per year for the UK



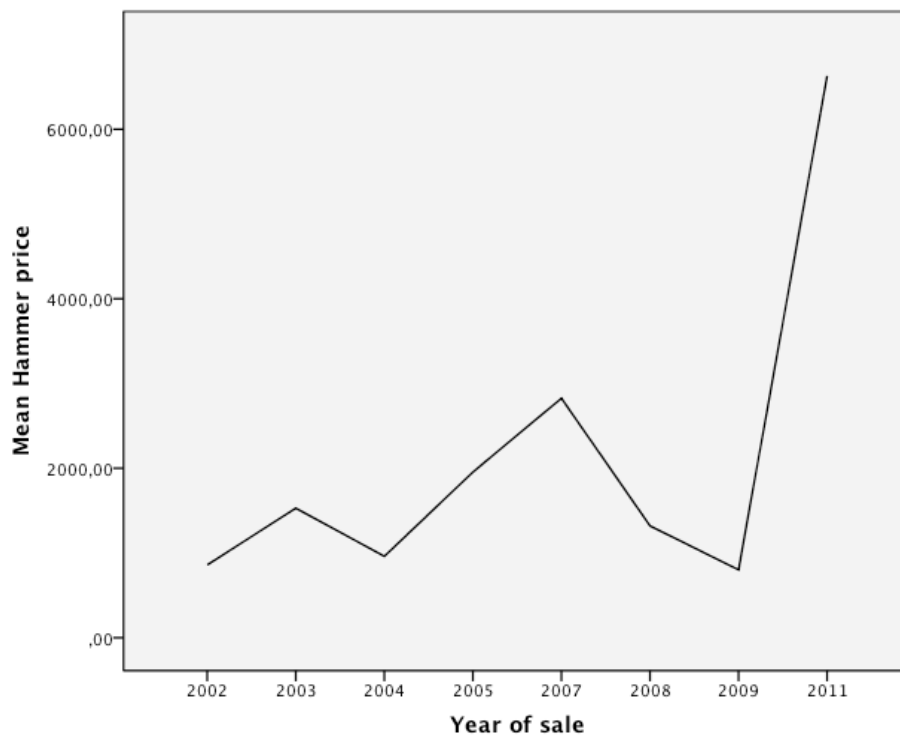
Graph K4| Course of mean hammer prices per year for the UK in US Dollars, source: artprice.com

Course of mean hammer prices per year for France



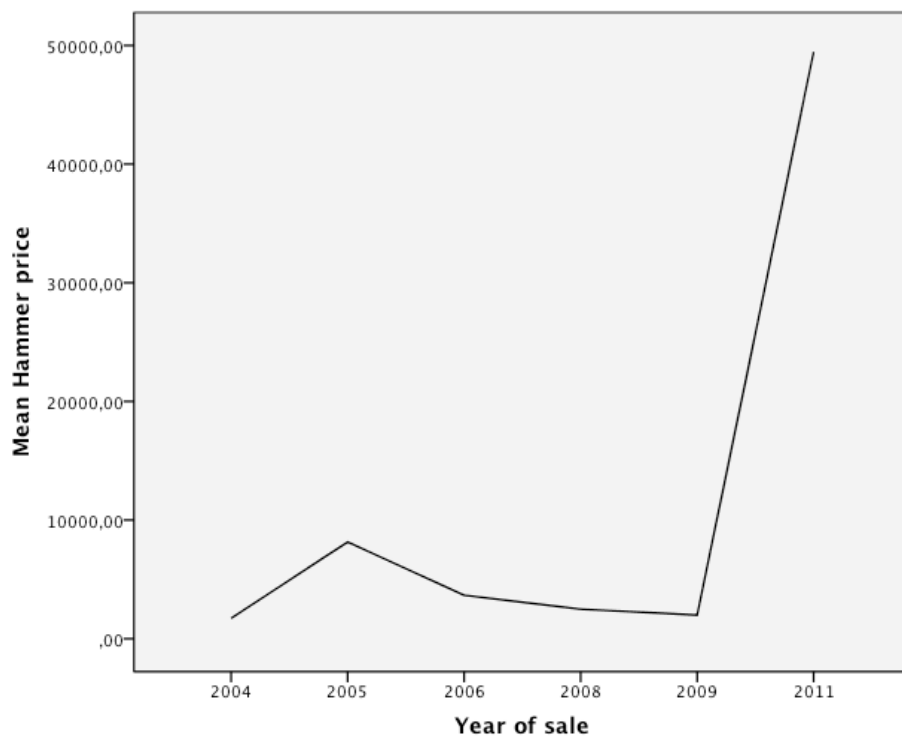
Graph K5| Course of mean hammer prices per year for France in US Dollars, source: artprice.com

Course of mean hammer prices per year for Germany



Graph K6| Course of mean hammer prices per year for Germany in US Dollars, source: artprice.com

Course of mean hammer prices per year for Italy



Graph K7| Course of mean hammer prices per year for Italy in US Dollars, source: artprice.com