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Master Programme 'Cultural Economics and Cultural Entrepreneurship'

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'Fine art photography as a form of investment'

Hyères, France (1932), Henri Cartier-Bresson

(Source: http://www.christies.com/LotFinder/lot_details.aspx?intObjectID=5056705)

Master thesis

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1. Motivation

The idea to research fine art photography market from the investment point of view appeared to become a new and interesting challenge to take. Being relatively immature form of visual art, photography is now occupying an inherent place in global art market and is definitely becoming one the spheres of interests of both professional art collectors and aficionados.

During the research, I found limited amount of specific literature on how fine art photography performs as a form of investment. Previous studies on investing in arts were made primarily on market of paintings, both classic and contemporary ones. In most cases the results showed positive rate of financial return. These optimistic conclusions originated the hypothesis that the rate of return on photography market could also have positive meaning and became a starting point of my research.

Nowadays, I found it extremely curious to find the answers to various questions concerning fine art photography and its place on world art market during recent decades. Being sold and resold, how does fine art photography perform as a form of financial investment? What are specific peculiarities of the photography market? To which extend is the market volatile? Is it worth investing in fine art photography in comparison to alternative assets? And what benefits does it usually bring to the investor except financial ones? And specifically in terms of new century and new trends it has already brought to the global art market, how does fine art photography perform?

In this thesis two major research questions were raised. The first one concerns the place of fine art photography as a form of investment. Art is being sold and resold on primary and secondary markets all over the world, however I found no specific researches made that would give a precise answer on the rate of return on photography at the edge of XX and XXI centuries. Consequently, I processed the data of fine art photography market world auction sales and came up with relevant and promising results. To determine whether this type of art could be considered as a profitable one or not, I constructed average price indices and calculated the rate of return on fine art photography. Despite common prejudices that photography tends to show very small or even negative rate of return, the research showed that fine art photography market is

profitable sphere of investing. The time period of thirteen years, from 1996 till 2008, was considered to be reasonable for researching the rapidly changing photography art market. During this short-run period, rates of return remained predominantely positive and ascendant. To determine the level of risks involved in art market investment procedures, I analyzed the volatility rates on photography and concluded that despite higher rates on returns, the risk factor varies differently for various occasions and creates additional challenge for investors.

The second major question implies the comparison of the result achived to alternative market. To determine whether the fine art photography rates of return are worth being called a relevant sphere of investment, it was decided to compare the results to major market which assets fundamentally could serve as substitutes to the fine art photography. Major alternative market was detected the financial one, where the investments, both direct and indirect, generally occupy the prominent place. One of the most popular and widely used index to compare to is the Dow Jones Industrial Average. The indices are opened to public access, moreover, it is possible to receive the figures from exact time periods, which appeared to be sufficient while comparing it to the results obtained on photography market. Hereby, I computed the average price indices on two markets and came up with intersting and for certain extend unexpected results.

The last but not the least sphere to investigate appearted in the process of analyzing data and making conclusions concerning the general rate of return. While constructing the graphs, it appeared that during the research time period 1996-2008, the photography art market showed bilateral behavior. In the first part, 1996-2002, the price index was instable, while starting from 2003 up to 2007 the price index became to grow steadily and sufficiently. By the end of the time period the rate of return showed amazingly high results, which in comparison to the staring year appeared to be a prominent leap. To explain the progress of fine art photography price indices it was decided to track the characteristic features of the beginning and the end of this highly profitable time period and analyze the moving powers of the price growth.

In research I separated top 1.5 per cent of highly priced photographs in the data and tested the presence of ‘Masterpiece effect’ – evidence, when overpriced artworks result with higher rates of return on investment than the rest of set. Previous studies

showed that the presence of this anomaly differs, the rates tend to vary from negative to positive, so I decided to check whether the anomaly is present in fine art photography market or not and to which extend.

This thesis provides readers with next research methods and results. In chapter 2, general characteristics of art as investment are described. Basing on numerous researches made by cultural economists throughout previous and present centuries, the major principles, practices and results were outlined and the theoretical background concerning investing in arts was formed. The theory was directly attached to the framework and methodology used while processing fine art photography data. I omitted some descriptive paragraphs that usually enlighten the general image of art as investment, and focused on only those which I found important for the research main topic.

In chapter 3, I described the fine art photography market in general and from investment point of view. During the research I found extremely limited amount of literature that fully explained the mechanisms of photography market, history of trends and sufficient explanations of current situation. Therefore, I described how global processes of digitalization affect the fine art photography market. Additionally, the contemporary art fenomena was discussed in chapter 3.

Chapter 4 contains the description of the methodology and data used in research. The total amount of samples exceeds 83,000 so the research method used required specific approach. I made the general overview of auction sales samples including the pitfalls and limitations they brought with. In this chapter, the methodology of constructing price indices was explained, estimation of rates of return on investment and other essential results were described. The empirical study implies the description of variables used in research – the detailed characteristic of variables that directly and indirectly influence the behavior of the trends was also shown in chapter 4.

Chapter 5 provides readers with the results obtained. Here, I gave an answer to the main research question concerning rate of return on investment in arts, analyzed price indices and rates of return using three approaches – monthly, semi-annual and annual. In this chapter, I also outlined the booming character of the market starting from 2003, amounts of ‘bought-in’ artworks and tested the presence of the ‘masterpiece effect’ by analyzing rates of return on top highly priced photographs in annual data set.

Chapter 6 denotes to the comparison of results gained on fine art photography market with alternative assets. First, I describe and compare the results with the financial market, represented by the Dow Jones Industrial Average Index. The major distinguishing features of art as a form of investment, such as volatility, are also described in the chapter. Next, basing on previous studies made on art as investment, I draw the line of similarity between some cases and the results achieved in thesis and conclude whether market appears to my oppinion the attractive in terms of investment profitablity.

Chapter 7 consists of general reflection of the thesis. Here I suggested further topics to be researched accompanied with most important results and conclusions made.

2. Art and Investments

2.1 Introduction

Investing in arts has been a sharp topic to discuss among cultural economists during last four decades. Combining both aesthetical and financial benefits, art as a form of investment has been analyzed and critisized from various points of view. It still occupies an ambivalent place among classic investment porfolios, remaining high-set, risky and ambiguous forms of funds allocation that require not only market cognition, but also specific sence of taste and intuition. Hereby, the question whether investing in arts is worth risk to be undertaken or not, and what benefits buyers will receive remains a topic to discuss.

Naturally, investors pursue obtaining financial benefit from acquiring art works. However, the art market has its own characteristic features and key players. For instance, Frey and Eichenberger (1995 a,b) distinguished 'pure collectors' and 'pure speculators' which presence on the market effects the art prices drammatically and the level of financial risk as well. Investors who are interested in purely economic profit with minimum risks involved are more likely to rely on financial stocks and bonds where the mechanisms are based on global economic climate and future profitability of acquisitions is more or less predictable. Additionally, the natural essense of art works differs from financial assets by the level of liquidity, heterogeneity, uniqueness etc.

In terms of arts, the situation is essentially different. From investors' point of view, the general framework of investing in arts looks the same – buying specific assets with further setting a value on and selling on the same type of market in order to get profit from the deal. Art objects that were selected to invest in, are expected to give profit in either short or long time period. Some scholars[1] have absolutely positive opinion concerning the profitability of art investments. But there are numerous pitfalls that can not be observed at first glance, transaction costs for instance are among them, and in short-run they appear to become a real challenge. Basing on the research results made by numerous scholars, mostly cultural economists of late XX century, it will become

[1] Goetzmann, 1993; de la Barre et al., 1994; Fase, 1996; Gerard-Varet, 1995; others.

obvious how art tend to perform while being a form of financial investment, what mechanisms control the art market and whether the rate of return on investment underperform the financial assets rates or not.

The chapter is organized as follows. First, I describe the extract from previous academical findings on art as investment, market of paintings in major cases. Next, I outline relevant studies made on photography market as investment. Then, I provide description of key factors that distinct art market from classic markets.

2.2 Empirical results on general art market

Starting from the very beginning of researching art as a form of investment, the general opinion concerning the profitability and feasibility of investing in arts remained diverse. Some scholars[2] strongly believed that art is not a good form of investment because it results with negative or too low rates of return. The history of studies on returns on investments in arts dates back to early 1960s, when besides price movements analysis of Rush (1961) and Wagenfuhr (1965), the Reitlinger's data (1961, 1963) was created. Later, it became the fundamental basis of art price movement studies accompanied by further researches concerning the profitability of art as investment.

One of the first and well-known investigations on return on investment in arts was described in Anderson's (1974) research. Basing on the above mentioned Reitlinger's data, he created his own research for artworks sold in 1780-1960 using hedonic method. The research resulted in nominal 3.3 per cent and real 2.6 per cent of annual return on investment in paintings. Additionally, he constructed the repeat-sales regression methodology and applied it to 1,730 samples sold in time period 1653-1970. Anderson came up with the result of 4.9 per cent nominal rate of return on investments, whereas in 1780-1970 the results achieved using the same methodology appeared to be lower (3.7 per cent). The comparison to the Times-Sotheby's Index on various groups (sub-markets) of paintings sold in 1951-1969 represented diverse variations in the nominal rates of return. In some cases when analyzing the rates of specific schools in particular time periods, the return rates appeared to be similar to the returns from financial assets

[2] Baumol, 1986; Goetzmann and Spiegel, 2003

investments. Speaking about long-run, financial returns on arts are considered and proved to be substantially lower than returns on stocks and bonds.

In Anderson's research (1974) the first pitfalls in computing the valid rates of return began to emerge – which method and time framing appears to be reliable and valid to be compared to? And while using it, how is it possible to avoid bias and overcome limitations? The idea of calculating the rate of return of investments became to take on among cultural economists and the results gained created, prooved or refuted started cumulating momentum and popularity.

In terms of chronological order, the next important work was created by Stein (1977), who with the help of geometric mean price index indicated the annual rate of return on investment in paintings created by artists before 1946. The nominal rate appeared to be 10.47 per cent for U.S paintings. The results for the U.K paintings were divided onto two parts considering the original price currency. For the U.S dollar denominated prices the rate of return on U.K paintings was surprisingly close to the previous results, 10.38 per cent annually. For U.K pound denominated prices the annual rate of return was 13.12 per cent. However, author's opinion concerning the profitability of holding art works as a form of investment remained negative – after comparing the results to financial assets, art still remained too risky and not profitable enough to outperform the 'classic' stocks and bonds.

Another widely referred research on investing in arts was made by Baumol (1986), who using the Reitlinger's data discovered the amazingly small rate of return on paintings (0.55 per cent). He extracted 640 samples from auction sales data that occurred in 1652-1961 and came up with the conclusion that besides the poor rate of return, investing in arts is accompanied with the high risk of damage, loss or destruction of an art piece. Additionally, investing in arts requires cognition of market and trends to avoid senseless purchases and extra costs, e.g. buyer's and seller's premiums, transaction costs etc. By comparing the results to British government stocks and bonds, which appeared to be 2.5 per cent on average, Baumol concluded that while locating financial funds in arts, investors loose nearly 2 per cent annually than in case of traditional investing in financial assetes. The negative image of ineffectual investment in arts is competed by analyzing the share of paintings analyzed which tend to show the negative rate of return (40 per

cent) and the share of those artworks which undergo an opportunity loss. Baumol implies that the mechanisms of price formation have random character, investing in art market is a tricky business, and the only real benefit that can be obtained from acquiring art is all about physical returns that are to be described later in this Chapter.

The research made on Reitlinger's data using repeat sales method is represented in works of Frey and Pommerehne (1989a). They collected auction sales samples of 305 artists whose works were sold in both U.S and European auction houses in time period of 352 years (1635-1987). The holding period of artworks analyzed on contrary to Baumol's approach exceeds 20 years which eliminates the limitations made in previous researches. Here scholars resulted with not very high rate of annual return on investing in arts, which in average was 1.5 per cent. As in Baumol's findings, the share of paintings who performed with negative return, remained subtantially high (30 per cent). While analyzing the sub-markets of paintings and connecting the results to the financial assets of specific time periods realted to above-mentioned sub-markets, the rate of return on paintings still mainly underperformed stocks and bonds. Here, Frey and Pommerehne mention the demolishing influence of inflation, stressing on its rapid pace in the second half of XX century. The conclusion I found fully applicable to the results on fine art photography market achieved in my research, implies that the large profits as well as losses from investing in arts usually occur in short-run periods (authors define it here as 20-39 years) and the longer the time of investing is, the smaller rate of returns it obtains. This fenomena is to be described in details in Chapter 5.

Buelens and Ginsburgh (1993) in their research critisized Baumol's findings and negative conclusions concerning rate of return on investments in arts. They devided the whole data into 4 time periods as well as analyzed how different art schools perform during selected periods. On contrary to Baumol's pessimistic conclusion, they came up with the finding that in case of analyzing separate sub-markets (schools, artists) in particular periods, the art tends to outperform financial assets such as bonds even in long-run (exept years of Wars and general insecurity in 1914-1950). Here Buelens and Ginsburgh outline the overestimated role of English paintings, which not only show dominantely positive rate of return, but also have a share of round 50 per cent in the whole data. These findings could be applied directly to the fine art photography market

where the role of author and sometimes school is extremely high. The prints created by famous masters of photography are generally valued higher; the time effect adds substantial value to the artwork and results in outstandingly high prices paid. The factor of taste and fashion trends should not be omitted either, as claimed also Baumol (1986) – those make the market with its price movements unpredictable and therefore risky.

Goetzmann (1993) was among scholars who resulted with positive opinion concerning art as a form of investment. Using both Reitlinger's and Mayer International Auction Records data and applying the repeat-sales method to 2,809 samples for substantial time period of 1715-1986, he came up with average 3.2 per cent rate of return on inevsting in arts. As previous scholars, he devided the whole time period into several sub-periods and analyzed the price movements in each of them. Surprisingly, in some cases art appeared to outperform stocks (1.5 per cent), however still could not beat the rate of bonds (4.3 per cent). Goetzmann concluded that art still remains volatile sphere to invest, however is worth be adding in the investment portfolio due to positive and relevant rates of return.

Pesando (1993) began his research on investing in arts with choosing different from previous studies source of data. He collected 27,961 samples from Gordon's Print Price Annual (1978-1992) that were sold twice during specified period of time and applied the repeat-sales method to construct price indices rates of return on both modern paintings and Pablo Picasso's artworks. The rates appeared to be 1.51 per cent for modern prints and 2.10 per cent for Picasso's artworks. Pesando compared the results with various financial assets such as U.S. Treasury bills (2.23 per cent), stocks and bonds. In case of comparison to bonds in long-run, the rate of return was 2.54 per cent, while the rate on stocks was substantially higher (8.14 per cent). He concluded the underperformance of art as being a form of investment, however he suggested consideration of relative equity of risks involved in both portfoilios. In his research, Pesando also described anomalies that occur on art market by outlining the 'masterpiece' effect.

Later on, in researches made with other scholar, Pesando and Shum (1999) analyzed only Picasso's prints and price movements during the same time period. It naturally appeared that primarly results, as well as those obtained during the second research, underperformed the results of investing in financial assets. The average rate of

return on Picasso's prints was 1.48 per cent annually, when Treasury bills produced 2.29 per cent, U.S stocks showed 9.13 per cent, bonds resulted in 3.45 per cent annually.

Nine years later, Pesando and Shum (2008) returned to the primarly results achieved by Pesando in 1993. Their major goal was to estimate whether the rates of return on Picasso's artworks and general modern prints would change in case of extending the research time period up to 2004. In this modern research authors took into consideration the economic situation that prevailed on that specific time period and detected that art appears to be less risky sphere to invest in. However, in figures art still underperforms financial asstets, though the general image of investing in arts changed drammatically.

The classification of art market into sub-markets according to the school the artists represented belong to, was applied by de la Barre et al. (1994). Authors exctracted 24,540 samples from Mayer International Auction Records (1963-1991) and used another widely used method of computing the rate of return on investments in arts – hedonic price indices construction. The data was sorted in several sub-markets ('Great Masters' referred to well-known painters, 'Other Painters' denoted to randomly chosen artists among the rest of the data). 'Great Masters' apparently demonstrated superiority in nominal rate of return, however it appeared to be twice bigger than in case of 'Other Painters' – 12 per cent versus 6 per cent annually. At first glance, the results obtained appear to be substantially high. In comparison to alternative assets, art tends to outperform stocks and bonds and serve as a relevant and promising form of investment. Authors underline the role of 'masterpiece effect' in case of 'Great Masters' sample; additionally, they imply the outstanding role of physical returns on arts in case extra costs that usually follow the actual price of an artwork demolish the nominal rate of return.

One of the closest rates of return on investment in arts that are related to my findings in thesis were found in Gerard-Varet (1995) studies. He collected the information considering auction sales results of paintings using Mayer International Auction Records (1963-1988) and divided the data into five sub-periods. Using hedonic price analysis methodology, he came up with diverse results of returns. One of the closest meanings both in rate of return and duration of sub-period investigated was in 1976-1988 with its 13.3 per cent annual rate. Here author concludes that in case of long-run period

art can be estimaed as a valid and profitable sphere to invest in, proving the ability of art to overcome inflation and in some cases even outperform financial assets. Additionally, Gerard-Varet analyzed the amount of risk involved into the investment in arts and concludes that generally chosing namely art for financial funds allocation instead of traditional stocks and bonds appears to be less risky. The effect of physical return on investing in arts author found possible but not substantial.

Chanel et al. (1996) focused on Reitlinger's auction sales data of paintings created by 46 artists for period 1855-1969. They resulted with real rate of return of 4.9 per cent after applying the hedonic regression model and divided 1900 samples into five sub-periods. To mention, time periods usually overlaped. For each period they estimated various rates of return, starting from negative (-3.1 per cent for 1915-1949, explained by period of World Wars), up to positive majority (4.3 per cent for 1961-1969; 6.9 per cent for 1855-1914; 13.8 per cent for 1950-1969; 22.4 per cent for 1950-1960). Chanel et al. compared the results of rates of return achieved using different methodologies, e.g. repeat-sales and double repeat-sales, and illustrated that the results did not differ substantially from initial method. Authors also compared the rates of return to returns on stocks and concluded that despite high variance of rate means, in specific period of times (1950-1960) art outperforms alternative markets.

Angello and Pierce (1996) studied the performance of the most expencive and popular artists' paintings in 1971-1992 in America using the *Annual Art Sales Index.* The nominal rate was computed with hedonic regression and resulted in 9.3 per cent of annual return, which in its turn underperformed nominal rates on stocks (13.1 per cent). Authors divided the data into sub-periods and resulted with 6.3 per cent for 1971-1979 and 14.3 per cent for 1980-1992. They also tested the presence of 'masterpiece effect' and were among first scholars who came up with positive results.

Later, Angello (2002) returned to the research made with Pierce (1996) and added to data 25 artists, calculated rate of return and resulted with negative index of -1.2 per cent nominal. However, in real terms the rate appeared to be positive (4.2 per cent). Angello outlined top priced artworks and tested the 'masterpiece effect' once more, concluding that highly valued art pieces overperfrom general rates. Additionally, those

artworks were not characterized by high level of volatility, which made this set more attractive form of investment.

In 2002, Mei and Moses came up with a new data on art market of paintings and used the repeat-sales method of computing rates of return on 4,896 auction sales samples. During time period 1875-1999 the rates of return were deduced at the annual level of 4.9 per cent; authors also constructed indices for four groups of paintings – Impressionist, modern, American and Old Master. The results outperformed financial assets (bonds) more than twice, however underperformed rates of return on equity. Art market was also detected to have lower percentage of volatility. Mei and Moses investigated the 'masterpiece effect' on highly-priced paintings and detected negative rate. In general, authors concluded that art could be a profitable form of investment (in case transaction costs are prolonged over time).

2.3 Empirical results on photography

Despite limited amount of research papers found on particularly fine art photography market, there are still some investigations that considered to be relevant for this thesis. One of the major one I chose was made by Pompe (1996). Key topic concerned exactly the rate of return on fine art photographs and enlightened its place on the market. Using the data of *Photographic Art Market,* author processed 37,400 auction sales samples and came up with 1,192 observations of photography purchase that occurred two or more times during 1980-1992. Essential to mention, that the period invesigated is substantially close to the time period discussed in the thesis – here we both speak about the short run of 13 years, which I found an interesting case to compare. Pompre's findings resulted in high average annual rate of return on photography - round 30 per cent. However, half of rates appeared to be negative. Author proceeded case analysis by categorizing total set into six sub-markets according the century and origin of photographers. For those who were creating photographs in XIX century, the sub-markets were divided into European and American groups. Starting from XX century, the amount of photographers worldwide increased, therefore artists were divided to European, American early XX century, 1920s and 1930s, and 1940s to present. Pompe analyzed the

rates of return on investment in each of six sub-markets and came up with various conclusions. First, standard deviations appeared to be high, which symbolized the presence of risk in photography investments. Second, the most profitable sub-markets in terms of financial funds allocation were American artists of early XX century (24.2 per cent) and American artists of XIX century (19.9 per cent). The average return on total data set after adjusting the rate of return was 10.1 per cent.

Naturally, high performance of specific sub-markets occurred due to the presence of famous photographers in sets. Their artworks are generally valued higher and appear in auction sales data more often. Pompe analyzed the impact of individual photographers by computing average rate of returns on artworks created by Emerson, Cameron, Weston, Dater, MacPherson, Kertesz, Man Ray, Cartier-Bresson, Bisson Freres, Baldus, Adams, Steiglitz, Penn and other masters. Rates for individual photographers appeared to be substantially higher comparing to general results. For instance, average rate of return on Kertesz's photographs was 209 per cent, Weston's – 141.6 per cent, Dater's – 93.7 per cent. Surprisingly, in the research for individual photographers, artworks of key persons in photography world such as Baldus, Adams, Brassai, Emerson and Penn gained negative rate of return. Pompe implies that for investors it is more reasonable to consider the performance of particular artists than focusing on specific time period. Here, the name of photographer is proved to be an important element while constructing the investment portfolio.

Another significant conclusion made by Pompe outlines the difference in behavior patterns of photographs and paintings while being a form of investment. Average annual rates of return on photography appeared to be higher than returns on paintings in short run[3]. The decreasing of rates were also proved to be slower than paintings. Here it is necessary to understand the rapid development of world photography market in 1980s and the discrepancy in history of these two markets.

[3] Author exctracted data from the *Daily Telegraph Art 100 Index* in time period 1980-1992

2.4 Art as investment

2.4.1 Secondary market

On secondary market of fine art photography, there are artworks represented which were sold at least once before. Another condition when the artworks are being sold on secondary market implies the death of artist[4]. On this type of market generally complete information concerning the artwork is being provided, so for investors such conditions appear to be less risky comparing to the primarily market. Auction houses appear to be a universal representative of the secondary market; moreover, the information collected from auctions is widely used in researches on art market. In this thesis, I also used the information of auction sales worldwide, so here I briefly described key characteristic features of this type of secondary market.

One of the most popular types of auctions where art is being sold is called "English" or "Roman". Here, starting from the initial price set, the bidders continue to raise bids until the item is not 'hammered down'[5]. However, the item which is formally was 'hammered down' does not always appear to be sold. Before the auction takes place, sellers set the reserved price – the minimum price for the artwork to be sold. If during the bidding the hammer price does not reach the reserved price, the lot is said to be 'burned' or 'bought-in'. The fact concerning whether the lot was actually sold or not is remained in secret till the end of the auction, which in turn creates additional atmosphere of hazard.[6]

2.4.2 Physic returns

Art being a form of investment usually brings holders two types of benefits. The first one, financial, has already been discussed, but the second one - physic, makes the art

[4] Research on impact of death effect on demand was described by Ekelund Jr., R.B., Ressler, R.W. and Watson, J.K. (2000)
[5] Ashenfelter and Graddy, 2003
[6] Ashenfelter, 1989;

stand out from generally accepted forms of investment. For certain extend, art contains an aesthetic value which adds complementary benefits to portfolio. However, methods of estimating rates of physic returns are developed as properly as methods of estimating the financial returns. Stein (1977) was among first scholars who tried to track the physic returns on art investment by computing an average rate on 'viewing services'. Frey and Eichenberger (1995) suggested to measure consumprion benefits from holding art by estimating rental fees for art objects which in fact seemed to be a weak method to test as soon as the rental art market was not developed properly in 1995. On contrast, to achieve quantitative results, they offered to measure willingness to pay by analyzing key factors that attract people to arts exhibited. Authors offered to collect information on travel costs, hedonic property prices, wage equations or by applying the contingent valuation method in order to determine physic benefits for arts.

Recent studies suggested another method of computing physic rates of return that were concluded from Baumol's (2007) assertion that in terms of competitive market all forms of investment result in same amount of returns. In this case, to deduce the rate of physic return researches should compare general rates on alternative markets, financial for instance, where art rates are lower. It is suggested that the difference between them will illustrate the actual rate of physic return. The main pitfall of such method lies in the condition that art underperforms the financial market, which is not always true.[7]

Value of physic return could also be influenced by types of buyers that are present on the market in researched period of time. Frey and Eichenberger (1995a) described two types of buyers, 'pure collectors' and 'pure speculators' who sufficiently influence on the general climate of art market. In case there is a predominance of 'pure collectors', who originally do not aim on obtaining financial benefits from holding arts, the level of consumption benefits increase.

2.4.3 Transaction costs

The procedure of actual purchasing of the item that was hammered and reached and/or exceeded the reserved price is followed by extra costs. In the data on fine art

[7] Atukeren and Seçkin, 2007

photography analyzed in this thesis, the prices are described including buyer's premium and stated in U.S dollars. This makes the process of deducing price indices and rates of return more reliable and close-to-life.

First, the buyer has to pay so-called 'buyer's premium' – the percentage calculated out of the hammered price that usually varies from auction to auction. In 1980-1990s the buyer's premium was at the 10 per cent level – being set in 1979 by two giants, Christie's and Sotheby's, the percentage of commission had started to increase only since 1992.[8] Nowadays, not all auction houses are willing to display the percentage of buyer's premium to the wide audience, leaving the data for only those individuals who are willing to obtain this information. However, the official figures of the premium to be paid can be found on the websites of auction houses or received by request. Using the example of Christie's, we see that the buyer's premium varies according to the country dependiong on the place where auction sales take place, and differ due to the hammer price of the lot. In Netherlands, for instance, the buyer's premium for all lots except wine is 29.75 per cent if the hammer price is or below €20,000; 23.8 per cent for lots hammered for €20,001-€800,000; €14.28 per cent for lots over €800,001.[9] Interesting to mention, that the buyer's premiums in another giant – at Sotheby's - are identical, though the middle rank of price is €15,000 instead of Christie's €20,000.[10]

Second, the seller has to pay seller's commission to the auction house. Those types of payments serve as a reward to the auction house and play inherent role in the whole procedure of selling and buying arts.[11]

To other transaction costs art insurance, transportation, restoration, storing is also included. When all factors are summed up, it appears that artworks require substantial additional costs which sometimes reach significant amounts. However, previous studies showed that many scholars do not include transaction costs in research, while some of them agrue that transaction costs affect the overall market image only in short run.[12] In this research I took time period of 13 years which appears to be a short-run in terms of general patterns of researching art market as a form of investment. The information

[8] Vogel, 2000; Ashenfelter and Graddy, 2004
[9] Buyer's Premium Information, Christie's Official Website
[10] Buyer's Premium Information, Sotheby's Official Website
[11] Ashenfelter and Graddy, 2002
[12] Frey and Pommerehne, 1989a

concerning the transaction costs remained unavailable, however the impact of costs on final price remained substantial and was not spread over time due to the short time period.[13] I could suggest that in long-run the role of transaction costs will be the same as on market of paintings, but here, their weight and influence should not be omitted.

2.4.4 Taxes

Taxation issue appears to be an important element in art purchase procedure. Due to substantial differences in national policies where auction sales take place, the fact that taxation affects the final price should not be excluded. Speaking about prolonged periods, it becomes a real challenge to track the policy systems and rates of taxes in specific time and country, so the question whether include or not to include taxes paid remains tricky. Additionally, the information concerning national identity of buyers and sellers are usually confidential, so the amount of money paid for taxes is extremely hard to estimate.

Nowadays, for instance in the Netherlands, tax legislation implies buyers to pay the lowest rate of VAT that concerns arts, books and antiques – 6 per cent[14] Christie's Amsterdam already include VAT in prices in catalogues; Sotheby's Netherlands mention including all local taxes in the catalogued price of art[15]. For other auction houses the VAT presence or absence in price listed varies.

There are also other types of taxes that generally occur while purchasing art, such as sales and property tax and inheritance tax.[16] Hereby, I conclude that omitting taxes paid with the purchase of artwork can sufficiently influence the results of research on how profitable investing in arts can be.

2.4.5 Risks

Investment climate of particular market is determined by various factors and risks involved is one of them. While deciding whether the particular asset is worth

[13] Scholars who took into consideration transaction costs are Frey and Pommerehne (1989a), Pesando (1993), Pesando and Shum (2007), Locatelli Biey and Zanola (1999), Landes (2000)
[14] Tax and financial advice for expatriates in the Netherlands
[15] Buyer's Premium Information, Sotheby's Official Website
[16] Inheritance Taxes in United Kingdom

investing or not, numerous calculations and market research analysis are required to be completed. Price movements tend to fluctate in retailation to complex of internal and external influential factors, and for investors it appears to be essential to forecast as precisely as possible future situation on the market. In case of making wrong or inaccurate forecast while omitting important and sometimes crucial details, the results of investment can bring massive losses. However, the prediction of expected future risks as well as returns appears to be possible only in one case – detailed examination of realized rates of return that occurred in the past. For this purpose financial experts use specific tools to forecast the market behavior basing on past results, for instance time series analysis, scenario analysis, arithmetic average, geometric (time-weighted) average etc.[17] All methods are used in order to reduce the amount of risks involved in the investment process and gain planned profit in selected period of time.

Risks in art market appear to happen even more frequently, first of all because of it's sophisticated nature. They are directly correlated to market cognition – people who do not know who-what-where structure of the photography art world can barely make a reasonable investing which will bring financial profits. However, here the point is to detect the level of risks that are generally present in the market. One of the methods implies the deduction of standard deviation mean. The index obtained shows the rate of volatility that prevails on certain market (trend)[18].

2.4.6 Anomalies in behavior

Art market is also characterized by various anomalies that distinguish commonly accepted theories. I desided to focus on detailed description of the 'masterpiece effect' that implies rates of return outperformance of highy priced artworks in comparison to general portfolio.

One of well-known scholars who detected and analyzed the 'masterpiece effect' was Pesando (1993). From the hypothesis "…it's always better to buy one $10,000 object than ten $1,000 objects, or one $100,000 object - if that is what you can afford -

[17] Bodie, Kane, Marcus, 2008
[18] Knight, J. and Satchell, S. 2002

than ten $10,000 ones"[19] he derived that in case of art market, there could be the presence of the fact that rates of return on highly-priced artworks outperform the general investment portfolio. The research at the same topic has been done by Goetzmann (1996), Barre et al. (1996), Ginsburgh and Jeanfils (1996), Pommerechne and Feld (1997), Mei and Moses (2001), Ashenfelter and Graddy (2002). On contrast to e xpectations, Pesando found that 'masterpieces' seriously underperform the general portfolio; so did several other scholars (Goetzmann (1996), Ginsburgh and Jeanfils (1997), Flores J. et al. (1999). Some of scholars (Anderson (1974), Pesando (1993), Mei and Moses (2002a, 2005), Landes (2000)) detected that the rates of return on highly-priced artworks underperform the average rate of return that prevails in the market. The positive effect was deduced in few other research papers (Agnello and Pierce (1996), Agnello (2002)). In my thesis I decided to test the presence of 'masterpiece effect' for fine art photography market, the results are to be found in chapter 5.

On art market there are many more anomalies that occur due to various reasons. For instance, endowment effects (when art object is evaluated higher than one not owned[20]), opportunity costs effect (when collectors isolate themselves from considering the returns of alternative uses of funds[21]), sunk cost effect (past efforts to build a particular genre or school of art[22]), bequest effect (physic return carries over and above the notional value[23]). In this research no more explanations and testing of art market anomalies will be provided, however the full description of results achieved on 'masterpiece effect' experiment provides us with relevant information concerning photography market.

2.4.7 Comparison to financial assets

Basing on conclusions received from cultural economists research papers, it can be clearly identified that comparing art as investment to investing processes at financial

[19] Quote originally taken from *Art and Auction* ["Antiques"], September 1988, p. 131
[20] Thaler, R.H., D. Kahneman and J.L. Knetsch, 1992
[21] Frey, S. and Eichenberger, R., 1995a
[22] Worthington, A. and Higgs, H., 2003
[23] Worthington and Higgs, 2002

market appears to be a traditional and widely used method. In order to identify whether art should be included in portfolio or not, including following risks involved and profit obtained, it is reasonable to draw the line of similarity between two markets and analyze levels of volatility and nominal rates of return.

One of the most common methods used is comparing price indices of art market to Dow Jones Industrial Average. Consisting of information on average stock prices of 30 giant corporations, the Dow Jones has been permanently displaying the performance of world stock market since 1896.[24] The main characteristic feature of this index is called price-weighted average as soon as it originally included the average share of 30 stock prices represented by 30 key companies. However, nowadays the procedure of computing the index is slightly different and involves averaging adjustments in case of stock split, payment of stock dividend of 10 per cent and more or replacement of one key company by another.[24] Undesirable for global economy, the representative companies are changing too frequently, being replaced by other giants, somehow because of necessity to represent the broad market. This entails visible fluctations that negatively influence the level of Dow Jones Industrial Average and, as a result, the world economy.

Price indices obtained while researching the fine art photography market were desided to be compared to the Dow Jones index. First, the information concerning daily, weekly, monthly etc. indices is available for public audience, can be accessed without limitations and used in the research. Originally, the rates of return of investment in arts were analyzed on annual basis; in this research, I added the semi-annual analysis in order to specify nominal rates of return on various time periods. The Dow index was also available on semi-annual and annual basis. Consequently, it was decided to compare the art market of fine art photography to the performance of world stocks represented by the Dow Jones Industrial Average.

[24] Bodie, Kane and Marcus, 2008

3. Fine art photography market

3.1 General overlook

Fine art photography can surely be called a relatively new type of art. Invented at the beginning of 19th century, photography itself is considered to be among youngest forms of visual arts. Starting from the very beginning of its invention, photography prints have been a sphere of interest to collect. People were fascinated by pictures with their precise and realistical images, moreover, photography became a new form of reflecting the surrounding world with the help of material tools. However, photography was not recognized as a form of art at the beginning. Ansel Adam's photographs were sold for ridiculously low prices, when nowadays his artworks occupy the place in world's top ranking.

Moonrise, Hernandez, New Mexico (1941/1970s)
Source: http://www.alindergallery.com/

In 1981, his legendary "Moonrise, Hernandez, New Mexico" was sold for $71,500 and beat the world's record of photography price for that time.[25] Substantial changes were made primarly by artists themselves – going back to history of photography market, it is

[25] Kennedy, R., 2006

clearly observed how both schools and talented individuals emerged at the market, how names became widely known and how particular photographs were growing in strenght and gaining reputation.

From major perspectives, photography differs from paintings. Considering basic differences such as the process of creation of the artwork, time spent on it and tools used, photography can hardly be compared to paintings on general basis. Additionally, photography is sometimes called 'lazy painting' which formally involves less crafts and time. But if we deepen into sophisticated world of fine art photography and attach all the aspects of the creation of masterpieces, it will become obvious – photography nowadays is being acknowledged as merited form of fine arts.

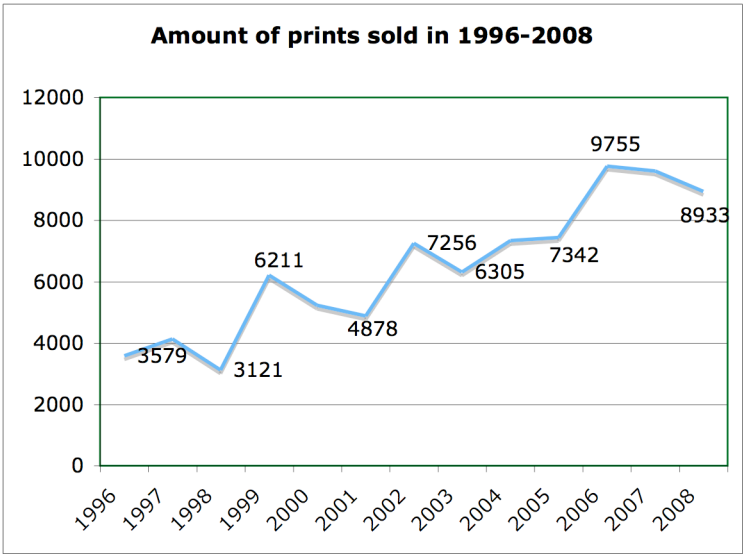
Nevertheless, fine art photography has been growing rapidly since 1980s.[26] Originally being represented by classic artists of XIX-XX centuries, nowadays' market combine both old masters and contemporary photographers who worked up the fame of fine art artists. For instance, one of the most respectful photographic co-operative is Magnum. Founded in 1947 by four Maestros of photography – Robert Capa, Henri Cartier-Bresson, George Rodger and David "Chim" Seymor, Magnum became one of the most influential figures in world photojournalism. They were not only enlightening the events, they combined professions of reporter and artist, bringing an emotional and artistic element and basically directly contributing to the development of fine art photography as we know it nowadays. Moreover, George Rodger had priority of creation portable cameras and more light-sensitive films[27] which in turn contributed in the whole technological development of photography. Nowadays, Magnum remains one of the most respectful agencies in the world with its vast history, ambitious activity and valuable archives of fine art photography. In auction sales data used in this research names of Magnum photographers appear frequently and prices for their prints illustrate the growing weight in the market.

What exactly made photography a form of visual art remains an open question. Quite possible, that the formation of photography market image as we know it nowadays is directly didicated to countless efforts of artists themselves. Through all history of

[26] Pompe, J., 1996
[27] History of Magnum Photography

photography, they contributed not only in the creation of prints, but also in positioning the works as a form of art. Reflecting the world from new, creative and subjective angle, they shifted the place of photography upwards. The example of Magnum agency clearly illustrates this evidence.

As a result, nowadays we see the growing agiotage around fine art auctions and booming prices, which in majority of cases equal to the price level of traditional forms of art. Nevertheless, the place and impact of artists in the development of photography remains prime, but the price boom that occurred in recent years emphasise on extra powers that drive the market. This fenomena is to be discussed in details in this chapter and analyzed basing on the data used in thesis in chapter 5.



Nowadays, the place of fine art photography keeps firming its positions. Auction houses in their turn tend to change the content of artworks offered on sales by adding fine art photography to auction catalogues regularly. Basing on data used in this thesis, I can firmly claim that the amount of photography prints sold on auctions is increasing annually (see the graph 'Amount of prints sold in 1996-2008' above).

3.2 Photography as investment

One of actual question that matters more than others in case of analyzing fine art photography market, concerns its place among traditional investment portfolios. Generally, this type of visual arts is not being totally recognized as a form of alternative financial funds allocation. There are several reasons why doubts concerning the profitability of such investment are still pending among investors. Let me briefly describe them below.

First, art itself still remains relatively illiquid asset and requires plenty of time, knowledge and financial inputs to become a relevant investment with financial benefits. To mention, transaction costs in some cases reach cosmic figures and diminish the actual profitability of the item by increasing its real final price. Second, art market itself is extremely segmented. The amount of buyers and sellers is limited - key players from the supply side are represented by few major auction houses.[28] Third, fine art photography prints are exposed to risk of destruction and/or devaluation. Changing trends and fads of art consumers are not a seldom phenomena in the artistic world, and sometimes can cause harsh conversions in the whole market[29]. Last, but not the least - the fact of physical returns on arts remains relatively uncertain and for some reasons can not be included in investment portfolio (returns unquantifiability is among them).

As it was stated, prices of fine art photography have been constantly growing during last three decades. This phenomenon is clearly observed from the auction data and is being extensively covered by media. It naturally attracted investors' attention – even though prices did not reach the level of astonishing figures paid for famous paintings, they were showing booming character. Starting from 1980s, the general interest in new form of art that presumbably could become a form of investment was expanding more and more. Some scholars admit that the enhanced interest in photography as an alternative form of art was caused by inflated prices on paintings and sculpture.[30]

What has been happening to fine art photography prices during last decade was illustrated by publicity in forms of news and stunning record-breaking auction sales.

[28] Secondary art market is stated as duopoly (Christie's and Sotheby's) since 2007, Artprice, 2008
[29] Bikhchandani, S., Hirshleifer, D. and Welsh, I., 1992
[30] Berman, Ann E., 1995

There are several explanations why photography is becoming more and more valuable and reach astonishing prices. Some experts assume that record breaking sales that are widely covered by media are simply a 'perfect storm' [31] that occures nonregulary and are nothing but a perfect combination of influential factors. In case of particular photograph, this phenomenon can be illustrated by another record-breaking sale of Edward Steihen's platinum print *The Pond – Moonlight* (1904). The artwork itself appears to be highly valued in the artistic world due to the materials and crafts used while creation, the rarity factor, the factor of previous owner and, naturally, the date of creation. In 2006 it was sold for round $3 ml and evidently stired up the whole art world. Experts were assured that such sales are rare and would not happen again in the nearest future, but the very next year, in 2007 Andreas Gursky dyptichon *99 cent II* (2001) was sold for $3.34 ml and for that time became the most expensive photograph in whole history of the market. It could be called the price ceiling for fine art photography and judged as a form of financial funds investment just before the global ecomomic crisis occurred. However, the most recent information concerning the record-breaking prices was widely covered by media in May, 2011. Cindy Sherman's photograph, *Untitled #86* (1981) was sold for stunning $3,89 ml at Christie's New York, disturbing the judgements of experts who truly believed in rarity of extreme expensiveness at the market. The next month, in June 2011 the tintype portrait of *Billy the Kid* (1879-1880) was purchased for $2,3 ml and seems like there is no limit. Photography market became one of the most interesting and promising spheres of visual arts and nowadays attract more and more collectors all over the world, but when and why was that watershed? The analysis of booming market fenomena described in chapter 5.

3.3 Digitalization

Starting from XIX century when the first image capturing and processing happened and looking at photography nowadays, it is reasonable to admit that the changes are substantial. Originally, photographs were created using films, black-and-

[31] Kennedy, R., 2006

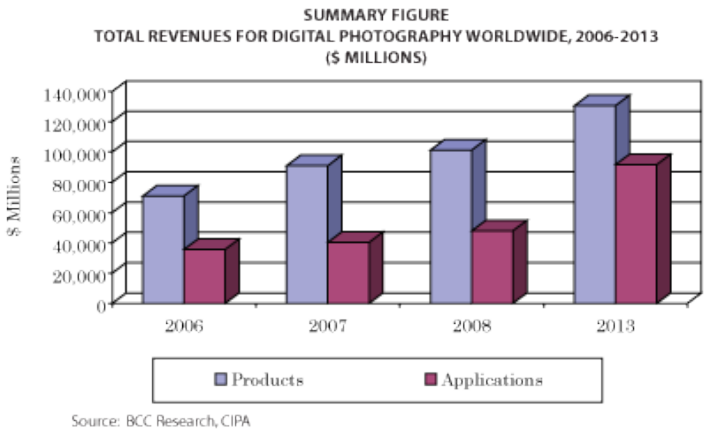
white first, color types of films and printing appeared later[32]. The procedure of creating an image used to be time consuming, required high skills and vast knowledge. Having one film with limited amount of slides in it, photography was not a part of mass market until late XX century. Early photographers, mostly photojournalists, had to be perfectly skilled in all spheres, staring from composing the photograph before pushing the shutter button, up to the printing images in various bathes with chemicals. Such high requirements generated the whole pleiad of artists who were concerned in what they were doing and put all efforts mixed with pure talent to create compositionally correct, technically perfect and aesthetically complete images. As for the beginning of XX century, the photographs created on behalf of honorable artists were in major cases distributed in mass media (newspapers) as the reflection of world events. Those pictures that were eliminated from publishing were collected in archives and private collections, usually of author's ownership. Sometimes negatives were not printed instantly, lost or damaged. In those cases wide publicity could be able to see photographs several years later (sometimes dozens of years after the actual date of negative was taken), printed either by actual author or by another person. Those factors influenced on the final value of the print in different ways, much as in negative way.

Film photography remained classic method of creating images for over a century, before the digital cameras were invented. Digital photography literally flipped over the market and brought substantial changes to its whole structure. It would be not correct to say that this innovative medium of photography replaced the traditional one, however currently large companies such as Kodak, Fuji and Agfa faced substantial difficulties in last decade. Due to global digitalization processes and rapid decrease in demand on films, in 2005 Agfa announced official bankrupcy.[33] Three years later, legendary Polaroid declared the same state of insolency, and even after being purchased by Hilco Consumer Capital Toronto could not restore its positions on the market.[34] Finally, in 2009 Kodak officially announced the end of production their famous and traditional KODACHROME film.[35] Giant corporations are suffering from new era of digital photography, and the

[32] Theory of photography
[33] AgfaPhoto files for insolvency, 2005
[34] HCC and GBB announce closing of Polaroid, 2008
[35] Kodak Retires KODACHROME Film, 2009

inability to meet new market needs make them close down. This evidently influences the artistic world where films are still widely used as a material to make pictures.

In October, 2008 BBC Research published the forecast concerning the future value of digital photography. It suggested basing on previous sales records and general dynamics of the market, that in 2013 the value of digital photography market will be estimated as gross $222.2 billion, with compound growth rate of 8.3 per cent annually.[36] Information offered to publicity provided me with graph of market dynamics of years 2006, 2007, 2008 and forecasted 2013. Such rapid development of digital photography market symbolized that era of photography became subjected to global digitalization processes and will be prospering in the nearest future.



Source: http://www.bccresearch.com/report/digital-photography-market-ift030b.html

From the BBC Research forecast, I can suggest that such prolonged end of film era that we are experience nowadays automatically attracts attention of collectors, factual and potential. It can be compared to the 'death effect' as in case of price for artworks of authors who passed away – the extinction of film photography could increase value of photographs that were produced before and make them more rare and precious. But to my opinion, this fenomena would possibly happen not instantly, for far in several future decades. However, bearing in mind the rapidly growing popularity and technical

[36] The Digital Photography Market BBC Research

characteristics of digital technology as well as some critical remarks of market experts[37], my suggestion could become true even earlier.

3.4 The contemporary art fenomena

To establish the chain between boom in popularity of contemporary art and stunning prices paid for artworks during last decades, photographs in particular, it is necessary to outline key characteristic features that drive the market. For centuries art more or less was a form of investment, with physical returns as an inherent benefit. As previous studies had already shown, rates of return on financial investments were not always positive and were nor always high as well. However, in majority of cases art is not being purchased as an asset that will bring financial profit to the owner. The reversed situation is more likely to happen when speaking about 'pure speculators'[38] that aim to buy art at the lowest prices and then resell it priced higher.

Current market situation nowadays is not well-defined and for some reason vague. Market consists of narrow amount of players both from the demand and supply sides, and speaking about fine art photography, their amount is expanding rapidly. General interest in new form of art is being pinched annually – the photography market appears to be finally opened for collectors and widely recognized and appreciated.

The second half of first decade in XXI century is remarked as an outstanding increase of contamporary art popularity. Contemporary art is attracting more and more collectors nowadays and is surrounded by a mystery cloud concerning the actual plot of such high figures paid for it. Thompson (2008) in his book *The $12 million stuffed shark* describes the amazing fenomena of booming contemporary art market via analyzing all elements – producers (artists), consumers (private collectors and corporate clients) and intermediaries (auction houses and dealers). He admits that art is not a good investment because of its illiquidity, narrow market segmentation of specific art types, high transaction costs, auctions commissions and taxes. By outlining the cyclical character of

[37] Woodward, R., 2006
[38] Frey and Eichenberger, 1995a

art market in general, he concludes that the boom in contemporary art is another bubble that was likely to occur after the ending cycle of Impressionists paintings popularity.

Next important conclusion vanishes provocative headlines in media concerning art being a profitable investment. Thompson implied that the name of collector, private or corporate one, plays way more important role in investment process and provenance of particular artwork occupies one of the major places in it. Nowadays, there are not so many key players who in fact succeed in beneficial investing in arts, and Charles Saatchi is one of them. He is truly believed to be one of the most successful investors in art who is not afraid to open new names and make first steps in contemporary art trend setting. However, even having numerous benefits such as name (image), reputation, market cognition and, important to mention, substantial financial funds, he "loses money on two purchases out of five, earns a moderate profit on two, and makes a large profit only on the fifth".[39]

[39] Thompson, 2008

4. Methodology

4.1 Introduction

In order to compute the rate of return on investment, the average price method was used[40]. After looking over the usual methods used while constructing price indices on visual arts market, this method was considered to be the most appropriate. Let me give a short explanation of the methodogy choice.

At first glance, the repeat-sales method seemed to be universal for calculating the rate of return on photography. Tracking and comparing prices of particular photographs sold and resold two or more times during limited period of time were the first options selected for the research. However, while analyzing the data and variables, it became clear that the method can not be used due to several reasons. The major one assumed that it appeared nearly impossible to determine whether the same particular artwork was resold in auctions. Even being the work of one photographer, having the same title, date of negative or print and even approximately same size, the edition of the sample usually remained different.

After a Flash Flood, Rancho Mirage, California (1979/1984), Joel Sternfeld (Source: http://www.artvalue.com/auctionresult--sternfeld-joel-1944-usa-after-a-flash-flood-rancho-mir-2616685.htm)

[40] Renneboog and Van Houtte (2002) claimed that median price analysis is less vulnerable to influence of outliers; however in my research I separated outliers from general set.

The point is the photographs are usually being printed in series of several copies, starting from two up to dozens of editions. Despite the fact that the picture itself displays same content, the order number of the copy influence the value of the photograph significantly.

We can see, that for instance two editions of photograph *After a Flash Flood, Rancho Mirage, California (1979/1984),* created by Joel Sternfeld, were sold in 2007 with price difference of round 27 per cent. The size differed 1x1 inch only, the number of edition was 7 and 9 out of 50, but the price for the earlier editon was impressively higher. Theoretically, if using the repeat-sales method on several editions of certain photograph while taken into consideration not extremely substantial difference of prices could show the valid results. However, the objective of the research was to determine the most precise rate of return on photography market as a whole, so repeat sales method had to be eliminated.

Another method of calculating price indices, widely spread among market of paintings, is hedonic price analysis. Having all necessary variables, such as name of photographer (consequently information about his reputation, death effect etc.), size, price, name of auction house, number of edition, the price index might have been constructed using this method. The only pitfall that preserved me from analyzing art as investment using hedonic price analysis was the amount of samples available in the data. Having 83,000 records of fine art photography sold during 1996-2008, it appeared to be almost impossible to construct and test the model for each sample. In fact, artworks of only particular photographers could be taken into consideration. For instance, the most famous ones or whose photographs are represented the most frequently in the data. But then again, the total character of the research would be narrowed down to only selected artists, which would limit the results achived to only specific artists and also in case of famous artists would involve way higher prices. As a result, the general image of fine art photography market would be irrelevant and the rate of return on investment would display only the rate of return on the artworks of most famous photographers, omitting the rest of artists with not less valuable masterpieces. That is why it was decided not to use the hedonic price analysis method in the research as well.

Taking into consideration the specific character of the fine art photography auction sales data, average price method appeared to be the most suitable one for constructing the price index. To achieve the diverse image of the fine art photography market, the data was analyzed from three points. Monthly analysis showed the dynamic of auction sales throughout the year and enlightened the most active seasons of sales. Semi-annual analysis analyzed photography prices for each half of the year during 1996-2008, providing us with 26 sets of total sales. This approach was selected as the most reliable and demonstrative one as soon as divided the data into seasonal parts with optimal time intervals according to the general time limit. Additionally it was suggested to test the hypothesis concerning the volatility of prices in the first and the second part of the year. The annual analysis was applied to test whether the difference between semi-annual results and annual is substantial and to outline the general picture of the fine art photography market and its characteristic features including the rate of financial return.

Consequently, I sticked to the semi-annual analysis due to more detailed results and the general research was based on this type of computing the rate of return on investment. Some scholars[41] also used this method in calculating rates of return on arts and I followed their example.

4.2 Data description

The data collection on fine art photography appeared to be a real challenge. Previously, the amount of academic researches made on this market tend to be miserable – at first glance, it seemed that the topic was not investigated properly as, for instanse, the market of paintings used to be. Consequently, the sources of data were inaccessible or simply closed from public approach. Requesting data sales from the major auction houses seemed the only possible way to proceed the research, however then there were big risks involved. The access to auction sales data could be easily forbidden, or the waiting time of the information to come could be extended for uncertain period. Additionally, having the information from several auction houses would not specifically imply constructing comparatively general picture of the fine art photography market. To mention, the

[41] Stein (1977), Renneboog and Van Houtte (2002)

information received even from all auctions all over the area researched (country/region/continent etc.) would not give a true perspective of the whole fine art photography market, as soon as there are lots of alternative markets where art is being sold and resold. Here I faced a real challenge – how to collect the valid, substantial and relevant data that would display the character of market dynamics in different countries? Additonally it was desired to have the data not only from large and established auction houses, but also from smaller auction houses that would specialize on fine art photography.

The Photomuseum in Rotterdam kindly provided me with printed auction sales results catalogues, classified annually. The information there completely fulfilled the requirements for constructing the price indices and calculating the rates of return. However, the major pitfall consisted of the manual processing procedure of all results – it appeared to be almost impossible to work with printed data base as soon as the amount of photographs sold annually was extremely large. In other words, I had three options. The first one was to convert everything from printed books into digital version manually, but it would have taken me extremely long only to complete the task. The second option discussed was about chosing particular author and track the sales activity of his works. But then, the fine art photography market would not be enlighten enough, and narrowing the field of research will narrow the importance of the thesis as well. The third and the final option was about to find a digital version of auction sales on fine art photography. Here, to admit, I succeeded.

The natural curiosity, networking and lucky chance acquainted me with Stephen Perloff, publisher of *The Photo Review / The Photograph Collector* magazine. He generously provided me with the oustanding data base on fine art photography that was used in my research. By virtue of this data base, I constructed the substantial and up-to-date research on the photography market that enlightened wide picture of current profitability of investing in specific type of arts. The description of the data base is provided below.

The data on fine art photography auction sales consists of 83,000 samples that were precisely collected during time period of 1996-2008. Being originally converted into digital version, the processing and calculating of such enormous amount of samples

became both possible and reliable task to complete. The layout of the data is similar to general layouts of auction sales catalogues where the information is classified by main groups. Here originally we have 9 columns – the photographer's name, the title of the print, the date the auction was held and name of the auction house, the lot number, the print type, the dimensions of print, the date of negative and the actual print, the estimate prices and the actual amount paid for the print. This layout is considered to be classic one in terms of auction catalogues. However, in order to make the data processable, I decided to split certain columns into separate ones. For instanse, the date the auction was held originally was combined with the name of auction house (abbreviation) and appeared to be in mixed style of time format.

As soon as the date, particulary the month and the year the sale took place, was very essential for the research, it was splitted into three separate columns. The first contained the month the auction sale took place, the second – the year, and the third – the name of the auction house where the artwork was sold. The same procedure was applied to the dimension of the print – the width and the height were separated into different columns (though in this research the correlation between size of print and the price are not investigated, in future analysis the data could be used for calculating price per square inch of print etc). The negative date and the date of actual print are not observed as major variables in this research, though these factors have very important impact on the price of the print.

The main emphasis in the data base was put on two last but not the least variables – estimates and actual sales price. First, the column with estimate prices was separated into two columns with the highest and lowest estimates. Sometimes the estimated price consisted of only one figure; in this case the estimate was decided to be left in the column with lowest estimates. The final column was the most important one – it contains the information concerning the actual price paid for the print. Despite the amount of samples in the data, I had to check each line precisely and eliminate the results that are obviously false, e.g. contain undefined letters instead of figures, consist of only one digit. After adjusting the data base to its final processable version the idea of analying auction sales results in digital version was proved to be the most reliable one. Even having all information required, with manual calculations the mistakes and misleadings in numbers

would be unevitable. The classification and adjustment of the data base in digital version so far requested attention and preciseness, the results achieved were corrected and tested several times, but still the electronic data appeared to be convenient and relatively fast method of calculating price indices and rates of return on investment.

4.3 Variables

4.3.1 Name of photographer

The name of photographer occupies an inherent role in the data set. In fact, it is the primarily variable according to which the rest of data is classified. In the original data photographer's last name is listed first and followed by given name. All list is classified in alphabetical order and devided into two parts (A-H, K-Z) due to limited amount of rows in Excel and total size of files.

If the author of the print is not known, the term 'Unknown' is used. Usually in auction catalogues the term 'Anonymous' is used, though the author of this data base decided to use more favored term 'Unknown' instead. Some photographer's names in samples consist of two authors separated by a slash. This means that the first author mentioned created the negative and the second one printed it. For instanse,

Arget, E./Abbot, B. – Negative was made by Eugene Arget and later it was printed by Berenice Abbott.

Here, I can conclude that to calculate the actual amount of photographers mentioned in the data is not an easy task to complete. It requres manual procession of all 83,000 samples with omitting duplicate authors mentioned in a duplicate cells with a slash as well as unknown authors. In case of proceeding the research on the data with an aim of, for instance, tracking the functional connections between the name of the author and the actual price paid for his artwork, the detailed analysis of this column in data is mandatory. In my research the name of the photographer was considered to be not as important as other variables are so the deatiled analysis was omitted.

4.3.2 Title or description

The second column in the data set describes the full name of the photograph which appeared in auction sales. It includes the name of the print, which was adjusted to the original name given by the author as soon as auction houses often differ in catalogues titles or descriptions for the same image. The effort of describing particular pictures under one title is didicated to the author of the data base who is considered to be profoundly aware of the total market of fine art photography. In some cases the name is accompanied by the print and book edition numbers and the total number of prints in a lot. There are four types of additional information in the title of samples which describe the origin of the photograph, particularly albums, books, photogravures and series. Due to substantial amount of information to be mentioned, albums were decided to be excluded from the list of obligatory remarks in the title column, unless they were composed of work made by one author or works that share a common subject matter. Books where the artwork appears were decided to be listed if the photograph appears in it by mentioning the page or bound-in. In some cases there is a remark 's/n' which reffers to signed and numbered books. This information is included where acceptable. The next type of additional information that appears in the column 'Title' is photogravures. This remark means that the actual photograph that appeared on auction sales consists only of individual prints or as a complete bound volume. To avoid the bias in subject matter, quality and physical condition, small groups of mixed photogravures were extracted from various volumes, even if the author remained the same. The last type is series of related images that also characterize and specify the title of the photograph.

4.3.3 Edition

When the negative is printed, it is a common fenomena that the image is being produced in a limited number of editions. In other words, the same print is created in copies, starting with one up to hundreds. The amount of editions can be unlimited but only in case the author is still living. After the death of photographer the edition of his images is naturally closed and all prints made afterwards are considered to be fake.

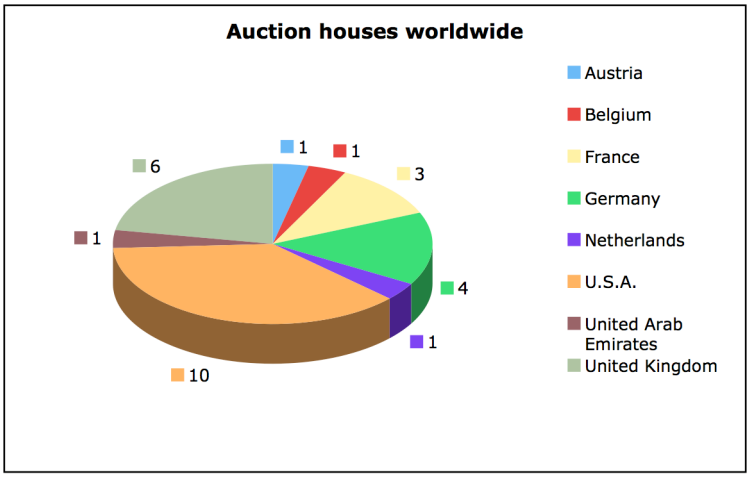
The order number of the edition plays even more important role than the additional information mentioned in the title. With the number of edition the value of the photograph changes, as well as the actual price. The edition is usually described with 'ed.' accompanied by the digit, or written in a form of fraction (e.g. 3/50 denotes to the third edition out of total 50). If the column is empty, it implied that the photograph represented in single edition or there is no information available.

With processing the data with initial aim to construct price indices using repeat sales method, it became clear that the edition of the photograph plays decisive role. Even having the same title of the same photographer, the edition factor makes the process of collecting the same unique artworks almost impossible. Additionally, I found no information on specific auction sales catalogues which would track the reselling particular photographs two or more times. That was the main reason to exclude wide-spread repeat sales method of calculating rate of return on investment in arts and stick to the average price index analysis.

4.3.4 Date and auction house

In original data base the information concerning the month and year of artwork being sold and the place (auction house) was combined into one column. Using Excel formulas, I separated the column into three, changing the month format into numerical (01 for January, 02 for February etc). The next column contained the year photograph was sold, and one more column contained the name of the auction house where the purchase took place.

The information represented in data enlightens the activity of 27 auction houses worldwide during 1996-2008. Some institutions have more that one office in one country, some of them have offices in different countries as well. In fact, there are 18 auction houses mentioned in the data (represented in alphabetical order): Bassenge, Beaussant, Bloomsbury, Bonhams, Bonhams & Butterfields, Christie's, Classique Erotique, Dorotheum, Doyle, Lempertz, Pacific Book Auction, Phillips de Pury, Pierre Berge, Sotheby's, Swann Galleries, Van Ham, Villa Grisebach, Yann Le Mouel. The amount of offices is illustrated in the chart pie below.



It is noticable that the largest amount of auction houses which provided the author of the data base with sales information on fine art photography are located in the United States. Ten auctions, situated in New York, San Francisco, Olympia and Phoenix, are simultaneously considered to be reputable institutions that occupy an inherent place in the art world (Bonhams, Bonhams & Butterfields, Christie's, Classique Erotique, Doyle, Pacific Book Auction, Phillip de Pury, Sotheby's and Swann Galleries). The next rank according to the amount of auction houses mentioned in the data belongs to the United Kingdom, where the whole history of auctions originates from. There are six auction houses, located mainly in London (Bloomsbury, Bonhams, Christie's, Phillips de Pury and Sotheby's). The next in rank goes Germany with two auction houses in Berlin (Bassenge and Villa Grisebach) and Cologne (Lempertz and Van Ham). There are three auction houses in France, Paris (Beaussant Lefevre, Christie's, Yann Le Mouel) and one in United Arab Emirates (Christie's), Austria (Dorotheum), Belgium (Pierre Berge) and Netherlands (Sotheby's).

In some cases the auction house can hold separate sales in one month. Then the additional abbreviation follows the name of the auction house, for example 04/04 SNY-PC reffers to the sale in April 2004 held at Sotheby's New York followed by sales of private collection.

4.3.5 Lot number

In classic auction sales data base the information concerning the lot number of photographs is entered for sake of easy and rapid reference to the particular auction catalogue's illustration and description. I found this information not essential for the research.

4.3.6 Print type abbreviations

The data contains the description of the print type used while creating the artwork. All in all there are 84 types of prints mentioned in the data base, though some of them are more popular than others. This information was also decided to be omitted in the research. In further analysis of the fine art photography and it's price formation the factor of the print type can be used as one of the major variables.

4.3.7 Dimensions

The size of the photograph remains one of the most important variables while caluclating the price of the work. Here, size reffers to the actual image, not paper size and is converted to inches. Height is mentioned first, width always follows. Fractions used were rounded off by the author of the data base to the nearest 1/8".

Instead of metric measurements in various cases the alternative denominations in case the photograph print has non-standard dimension. For instanse, mammoth print, stereoview, plate prints etc.

4.3.8 Negative/Print date

The date of the photograph was captured sometimes does not ovelap with the date it was actually printed. The negatives can be stored for years and printed by another person (in fine art photography it should be preferably done by professional well-known photographer). In case the date of negative differs from the date of print, the information

is written using a slash, where the first year displays the year of negative, and the second – the year of print. If the date is not exactly known, it is mentioned as 'later' or the specific letter is added to the suggested year of print (e.g. 'A' means 'after', 'C' means 'circa', 'ND' means the date is not given etc.)

4.3.9 Estimate

The estimanted price range of the fine art photography is one of the major variables that was taken into consideration while analyzing the market trends behavior. The information provided was stated in two numbers, separated by a dash. It implied the price range the auction house expects the artwork to be sold for, from the lowest to the highest range. Sometimes the estimated price consisted of only one number – in that case, I suggested that it was the lowest estimate.

Buyer's premium is not included in the estimates. Usually buyer's premium is added only after the art was hammered down, but still only in case it had reached the reserved price.

Hereby, I decided to split the column with the variable in two separate columns with the lowest and the highest estimate prices. As a result, I received two trends on the graph that illustrates the price indices growth during 1996-2008.

4.3.10 Price

The most important and sufficient variable in the data is situated at the end of the data base and contains the information on actual price paid for fine art photographs. Prices mentioned are in U.S. dollars, foreign currencies were converted into dollars by author using the exchange rate prevailing on the date of auction.

Prices include the buyer's premium, though do not include VAT.

If the lot failed to be sold during the auction, did not reach the reserve price or did not attract any bids, then it is called 'bought-in' and listed as 'BI' in the data. The presense

of unsold items in the data appeared to be a part of interest for me so I calculated their amount, sorted the results into separate columns and analyzed it in monthly analysis.[42]

In order to make price indices valid in terms of constant inflation of the U.S dollar, it was decided to adjust the level of all price indices to the dollar value of the final year in the data, 2008. As soon as the methodology and, consequently, the results tend to vary, I took two most commonly used methods of correcting the price on inflation. The first method is the Consumer Price Index calculator, which is based on the average Consumer Price Index for a particular year.[43] This information is collected and published monthly by the Bureau of Labor Statistics of the United States.

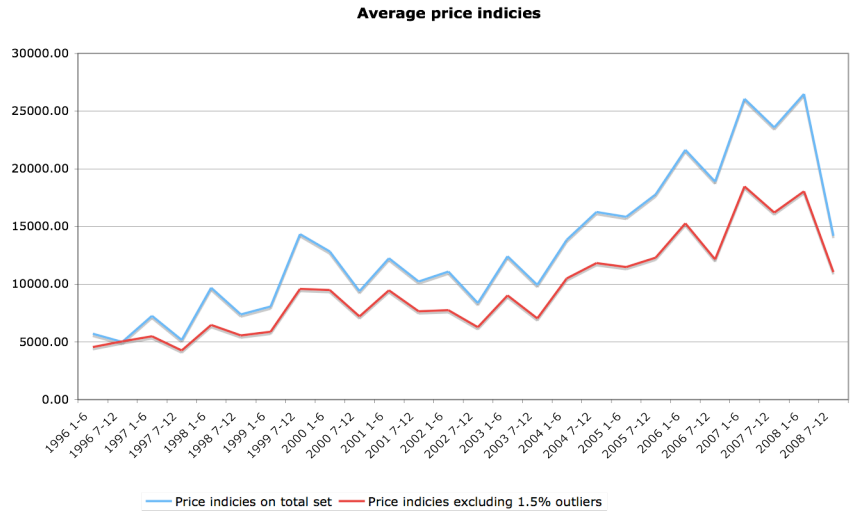
The second tool used to correct the price indices was the GDP deflator, also well-known method that tracks the cost of goods produced relative to the purchasing power of dollar.[44] I decided to test whether the results achieved on calculations will differ substantially and then eliminate one of them. I applied two methods of adjusting price indices for semi-annual analysis only.

4.4 Outliers

While calculating price indices, it became obvious that the price range of fine art photography auction sales differs greatly in each set. The actual cost of one picture could reach six-digit prices as well as could sometimes hardly exceed the price of $100. Specifically, the amount of high-prized artworks occupied relatively small ratio among total sales so I found it relevant to exclude 1.5 per cent of top priced artworks in each data sets. The percentage was chosen not randomly – practical substitution of different percentage (from 1 per cent to 5 per cent) showed that while avoiding top 1.5 per cent in price index calculation, the maximum amount of overprized photographs is being eliminated. By overprized photographs we mean specific photographs sold for sufficiently bigger sums in comparison with the list of all records in a set. For instance, the top performer of May is Jacques-Henri Lartigue's photograph *Renee Perle at Biarritz* (1930) was sold for US $2,84 ml in 1997. The next 1.5 per cent, namely 153 auction

[42] See results in paragraph 5.2 'Monthly analysis'
[43] Bureau of Labor Statistics
[44] GDP Deflator calculations

recordings of top prized photographs, illustrate six-digit numbers and apparently vary greatly from the rest of round 16,000 sales that took place in May. To avoid obvious unvalidation of total results it was decided to leave out 1.5 per cent of top prized photographs and focus on prevailing adequate price range. To illustrate how omitting overprized photographs influenced the general character of the average price index trend, see graph below.



Basing on the graph, it appears obvious that the general behavior of two trends correlate between each other in a very high extend. To prove that the similarity between sets is in fact high, I calculated the rate of correlation. This rate between two trends – the price index including all sales and the price index excluding outliers – appeared to be very substantial and is **0.92**. Here we can conclude that the presence or absence of the outliers in the set does not change the picture of total trend itself. Obviously the absence of outliers in the set downshifts the position of the trend with slight change of its behavior which it fairly observed at the beginning of the time period. The sufficient impact of outliers in 1996-1997 can be explained by comparatively low amount of overprized artworks sold then. The exclusion of top 1.5 per cent affected the general picture in a certain extend changing the character of the trend. However, during further examination of the graph it became clear that trends look way more similar and the correlation between them was mathematically proved and appeared to be 0.92.

Outlining top 1.5 per cent of highly priced photographs into separate data was used also to test the presence of 'Masterpiece effect' for the market. Theoretical description of fenomena is to be found in paragraph 2.4.6 'Anomalies'; the further analysis and results are described in paragraph 5.5 'Testing Masterpiece effect'.

4.5 Limitations

The major limitation that appeared at the beginning of the research implied the collection of reliable data that would serve as a starting point of constructing price indices, calculating the rates of return on investment and finally, give an answer to the research questions raised. The data base received appeared to be a vast and valid source of the fine art phototgraphy market overview and truly helped to complete the research. However, there are still some limitations considering the results achived.

One of them is the limited amount of auction houses observed – there is information from 27 auction houses, which gives an image of only particular side of total fine art photography market. As mentioned before, while taking into consideration the whole market, it is obvious that we miss the primarily market, the 'grey' market and the information from private transactions. Those segments, in fact, occupy large share in the total market and can not be omitted just because the lack of data. Hereby, I suggest that the research made on fine art photography market is limited to the narrower area of secondary market, which due to the data base consists of 27 auction houses.

The next limitation I met while giving an answer on the research questions was the lack of specific literature and academical papers made on fine art photography. The limited amount of literature on the photography from economic point of view was another challenge to undertake. In contrast to the market of paintings, the researched market appeared to be relatively immature and was not the sphere of interest among modern cultural economists. In research papers I succeeded to find, the methods of computing the price indices and calculating the rate of return on investments, differed from methodology I used. The boom of 2002-2007 in fine art photography was not enlightened as well. The general ideas concerning the growth of popularity and prices on contemporary arts during mentioned period of time could be found in more general

sources, such as *The $12 million stuffed shark*.[45] However, in the data it is seen clearly that the substantial part of photographs sold at auctions are not contemporary; moreover, the photography masterpieces of such masters as Ansel Adams and Henri Bresson belong to the first half of XX century. Those artworks can not be called the contemporary art from any point of view considering the peculiarities of it mentioned in the book, so the theory of the price growth still enlightens only the part of data.

4.6 Pitfalls

Working with such comprehensive data base requierd accuracy and control of all operations implemented. First, random errors in formulas that were applied to the data in order to compute price indices produced false results that showed extremely volatile character of the trend. It took me time to correct the mistakes and finally come up with relevant results and trends that show the market dynamics in 1996-2008.

The examination of data, especially three columns with major variables (e.g. actual price of photographs) required manual observation of the figures. In some cases the errors in results appeared because of the presense of random signs, letters, digits. Those were corrected manually by erasing useless information. Additionally, in some cases the information in columns was missing; those lines were eliminated from the research area as well.

The final price of the artwork is mention to not include taxes paid after the purchase if applicable. It means that some of artworks already include the tax paid after the purchase, which makes the results impure. In some cases the tax (VAT) is reasonably high, for instance at Sotheby's Netherlands it can reach 23.8 per cent[46]. Having a substantial amount of samples in the data, I suggest to ignore the discordance in final prices. However, this peculiarity should be mentioned while analyzing the price indices and the final rate of return on investment.

In case of general data research, I would like to mention that as soon as all auction sale records were taken into consideration, there is no classification according time

[45] Don Thompson, 2008
[46] For more information, see paragraph 2.4.4 'Taxes'

periods, schools, themes etc. Moreover, the range of age of photographs varies from early 1820s till actual final year in data, 2008. The implementation of average price index analysis showed average results on total sales without any characteristic features included. In arts, those features can make the price boom or vice versa, but here I did not deepen into narrowed analysis, however using the data base obtained it would be an interesting and vast topic to research.[47]

[47] All options considerning possible fields of research are described in paragraph 7.3 'Future research area'

5. Empirical results on fine art photography

5.1 Introduction

To answer main research questions, I applied three approaches in data analysis. Originally, it was expected to receive rates of return on data, classified according months sales took place. However, the results showed that this methodology illustrates only monthly dynamics of sales. The results achieved were used to detect the most yield seasons according price indices, amounts of artworks sold and items that were 'bought-in'. I suggest this information to be used as a substantial characteristic outline of fine art photography market behavior throughout one year.

In order to provide the broad description of market dynamics and determine how fine art photography auction sales had performed during 1996-2008, it was decided to analyze data using two approaches. The first aproach implies the calculation of semi-annual rate of return on investment with the construction of price index dynamics for each half of the year during 13 years. The second approach implicates calculation of annual rate of return including annual auction sales data. Even though the time intervals used in two approaches do not differ greatly in terms of the whole history of the fine art photography market, I found it reasonable to add semi-annual analysis into the research. With such detailed data procession it was expected to receive more precise and diverse information concerning the rate of return on fine art photography and I succeeded. The results show that the general rates of return on investment differ from each other by 1.1 per cent in real terms. The methodology, the results and the explanation of various fenomena that occurred while processing the data are described in this chapter.

5.2 Monthly analysis

5.2.1 Introduction

Analyzing prices from monthly point was basically the first step in the research. The aim was to calculate price indices for each month and consequently compute the rate

of return on investment. However, while processing the data and constructing primarily graphs it appeared that the actual character of sales is not stable - every month, the amount of items sold was different. The price indices were radically different as well – in one month, for instance, the price index was round $5000 and the very next month it was four times higher. Here, the first pitfall appeared - such outstanding difference could mean only that the method chosen could not be used as a major one to calculate the rate of return as soon as the results would be irrelevant. Hereby, I decided to use the results achieved in order to demonstate the general character of the auction sales activity throughout the year basing on the 1996-2008 time period and analyze which months can be suggested as the most interesting ones for investors.

5.2.2 Measurements

As it was mentioned, the monthly analysis showed the general trend of auction sales activity throughout the year. The whole data was classified according twelve months when auction sales took place. After collecting total sales and bought-in samples for each month, the highest and the lowest average estimates were computed and the average prices were calculated including and excluding top 1.5 per cent of outliers. All estimations were made according basic formula of direct average:

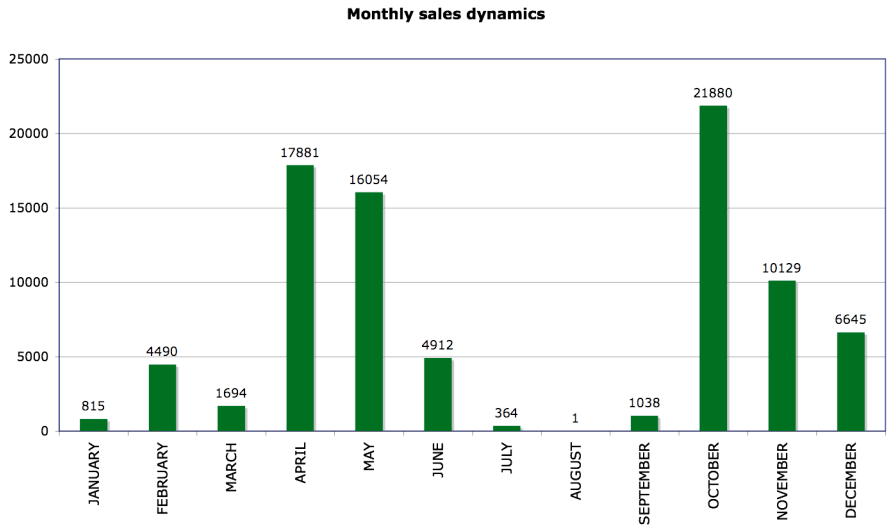
$$(P_1+P_2+\ldots+P_N)/N,$$

where N denotes the amount of data samples in each month, P denotes the price of particular photograph.

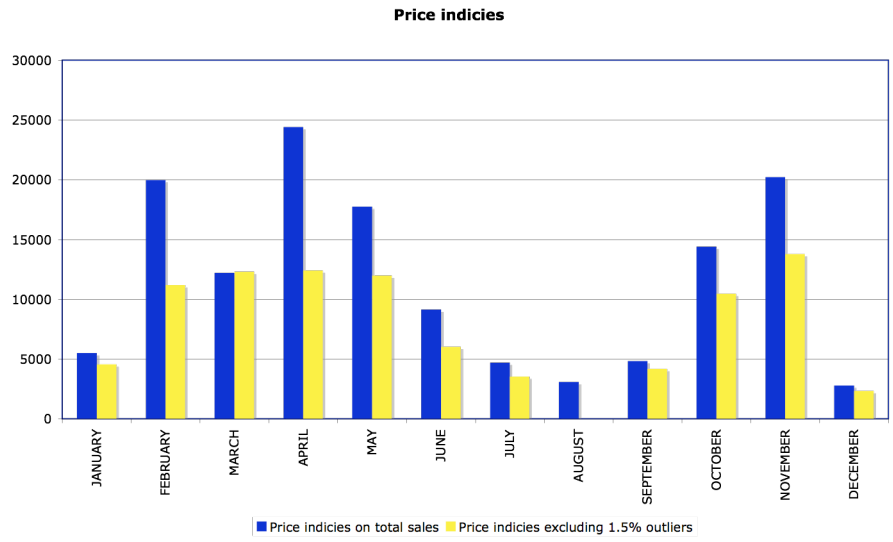
Basing on results of information processed within all twelve months, it appeared that the highest amount of items sold took place in October, April and May; the amount of photographs sold in November occupies the middle rank and during other months the amount of photographs sold is comparatively low. The most passive months of photography auction sales are January, March, July, and September – here the total amount of sales seldom exceeds 1500 items. August appeared to be ‘dead’ month when

the amount of photographs sold was the lowest. In fact, there is only one sample of auction sale in August throughout the whole data.

The monthly trend of fine art photography sales throughout 1996-2008 is illustrated on the graph below.



Such outstanding difference of sales illustrates the seasonal character of auction sales held throughout the year during time period 1996-2008. We can make a confirmed conclusion that the majority of auction houses investigated in the research arranged sales in the middle of spring and autumn; summer and winter appeared to be less active seasons for fine art photography auction sales.



It is reasonable to admit, that the similar situation concerns the highest price indices. After analyzing data, it was calculated that the most yield months appeared to be April ($24,419), November ($20,225), February ($19,971) and May ($17,745).

As it was arranged, the average prices were additionally calculated excluding top 1.5 per cent of outliers. Taking into consideration this criteria, the months ranking appeared to show slightly another results. The highest average prices for fine art photographs excluding 1.5 per cent of outliers appeared in November ($13,787), April ($12,426), March ($12,311), May ($11,990) and February ($11,186). Apparenly the most yield months remain the same as in total sales results. However, while excluding top 1.5 per cent the ranking of highest priced months changes. I concluded that above mentioned months are not only the top performers in total sales - they also contain suffcient amount of photographs-outliers, which in its turn change the rankings of months while being included in calculation.

The monthly behavior of highest and lowest estimetes was easy to predict basing on the results of average prices. The highest results for both ranges were detected in November, February, April, October and May. The price range of estimates usually did not vary much and sometimes consisted of only one price. The estimates of lots usually serve as the estimator of the predicted price - the lowest estimate tend to correlate with

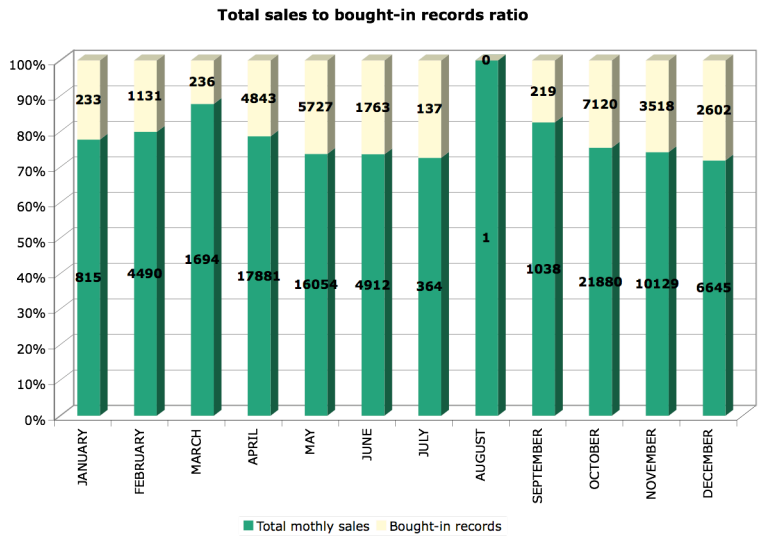
the reserved price set by the seller and the highest estimate usually shows the most desirable price for the artwork[48].

It would be incorrect to say that ultimately all photographs represented during auctions were sold. As Ashenfeter and Graddy (2004) implied, if during bidding price does not reach the reserved price, set by seller, or attracts no attention of bidders at all, then it is claimed that the lot was bought-in. Usually the bought-ins are either omitted from the price indices analysis or used for separate researches. For instance, Beggs and Graddy (2006) with the help of repeat-sales method took into consideration paintings which were resold after being bought-in and tracked whether those lots were sold or 'burned' for the second time. Apparently, the price for the artworks which were resold appeared to be lower than the primary one.

Formally, bought-in artworks have no particular interest for the research on return on investment. However, to illustrate the general picture of fine art photography market in 1996-2008, in this data instead of ommitting bought-in samples, I calculated the amount and the ratio in total sales. These results can be used in future investigations of the fine art photography market.

The amount of bought-ins was computed as the ratio to total sales in each month. The highest share of bought-in photographs varied from 32 per cent to 39 per cent and took place during May, June, July, October, November and December. In rest of months the ratio varied from 13.9 per cent to 28.5 per cent.

[48] Ashenfelter, O. and Graddy, K., 2002



5.2.3 Conclusions on monthly analysis

The character of auction sales activity throughout the year was proved to be seasonal. After computing all monthly results from time period 1996-2008, it became clear that the majority of auction houses, represented in the data, held auction sales in Spring and Autumn. The most active and yield months were identified – May and November. Here, the highest amount of sales correlated with the highest price indices. The ratio of bought-in lots however, appered to be also the highest. It can be explained by high concentration of overall monthly sales in these particular months as well as by the highest price indices of estimates.

The correlation between the highest price indices and the lowest amounts of bought-in lots was detected in March. Here the unusually low figures of bought-in lots are accompanied with the low estimated price ranges. Price indices in turn were high enough to speak about the overall efficiency of the month.

The correlation between lowest price indices and highest amounts of bought-in lots is surely appears to be the most undesirable for the art market. This situation despite the lowest prices and estimates occurred in July and December.

To conclude, in this part I determined the character of auction sales activity month by month and outlined the most successful seasons when the price indices were the

highest as well as the largest total amount of items sold. Basing on thirteen-years dynamic, it can be concluded that the character of the auction sales throughout the year is not stable and seasonal. Spring and Autumn are the most active seasons when the amount of sales and the average prices for fine art photography are the highest. If connect the price of lots and the value, it could be suggested that during these seasons the most valuable artworks are being sold. Consequently, for investors it would be a sphere of interest to pay attention on the auctions held specifically in April, October and November.

5.3 Semi-annual analysis

5.3.1 Introduction

The fine art photography world auction sales data appeared to be a real challenge to process. Containing over 83,000 samples, it was classified according the year when the sale of each sample took place. Next, I divided thirteen annual sets into two halves, from January till June, and from July till December each. As twenty-six sets with semi-annual sales data were formed, I calculated average prices for each set, price index including and excluding outliers, average highest and lowest estimate price indices and the amount of bought-in samples. The exact numbers and graphs are discussed below.

5.3.2 Price indices on semi-annual data

As it was expected, the price indices calculated including and excluding top 1.5 per cent of outliers showed growing, but abrupt character. Starting from the very beginning of the time period researched, up to the world financial crisis in 2008, the prices were growing constantly, but at the same time non-gradually, proving the theory of the art market volatility.[49] Naturally, the position of the trend that denotes to the price index excluding top 1.5 per cent outliers shifted downwards, as soon as the average prices appeared to be lower than in total set. In fact, the character of two trends remained

[49] Goetzmann, 1993; Pesando, 1993

practically the same with a slight distingtion at the beginning. This different behavior of trends here can be explained by the overall price level in 1996-1998, when fine art photography was not sold for relatively[50] high prices (over $10,000) and the role of outliers in each set significantly influenced the price index. Later, the presense of top 1.5 per cent outliers tend to be standard and did not affect the character of the trend while excluding. The correlation index between two trends is proved to be extremely high – 0,99. Such high result can be explained by the small frequent time periods in the semi-annual data as well as by the soft change in prices in those periods.

In order to receive results in real terms, the figures obtained while calculating the semi-annual price index were adjusted to the inflation rate of the final year (2008). In order to achive the most proximate and independent results, the process of putting price indices on the same level was accomplished using two well-known methods - the Consumer Price Index (CPI) Calculator first and the Gross Domestic Product (GDP) Deflator as complementary one. It is essential to admit that without the price correction the rate of return would have provided us with only nominal results, as soon as the real purchasing value of currency (U.S. dollar) tends to change due to constant inflation.

The nominal semi-annualized average price index on fine art photography auction sales including all samples is $13,216. As it was mentioned before, in order to receive results in real terms, the price index had to be corrected on inflation. Here, the price index adjusted to inflation using the CPI calculator was estimated to be $15,162. The same time the price index corrected according to the GDP deflator showed lower results of average $14,881.

The results appeared to be lower after neglecting the top 1.5 per cent outliers in the data set. The nominal semi-annualized average price index including all samples appeared to be $9,736. However, after correcting the prices on inflation using Consumer Price Index calculator the value shifted up to $11,164. The applicance of the GDP deflator showed the average price index to be lower again - $10,962.

For real average price indices I constructed the graph that illustrated the dynamics of trends in 1996-2008.

[50] In comparison to total price level in set

Prices indices trends showed fluctative character and in fact similar behavior during researched time period. From the beginning up till 2001, trends were developing slightly different – trend on total prices indices showed more fluctations than trend with omitted top 1.5 per cent of outliers. With sharp upshift in 1999, followed by rapid decline during next two years, trend on total sales appeared to be more vulnerable to market changes. The second trends demonstrated smoother pace of development, however the level of price values also remained lower. Starting from 2002, both trends duplicated the manner of market behavior and showed rapid growth till 2006, when it was interrupted by simultaneous downshift at the end of the year. In final two years average price indices reached record-breaking points in first semesters and declines in second, followed by substantial downshifts in 2008 due to the world economic crisis.

5.3.3 Rates of return on semi-annual data

The rate of return on investment was calculated using formula:

$$(P_{n+1}-P_n)/P_n,$$

where P donates to the price index, N donates to the particular time set.

According to the calculations processed in the data set, the real semi-annual rate of return on investment appeared to be **7 per cent** while corrected on the Consumer Price Index, and **7.21 per cent** while corrected on GDP deflator.

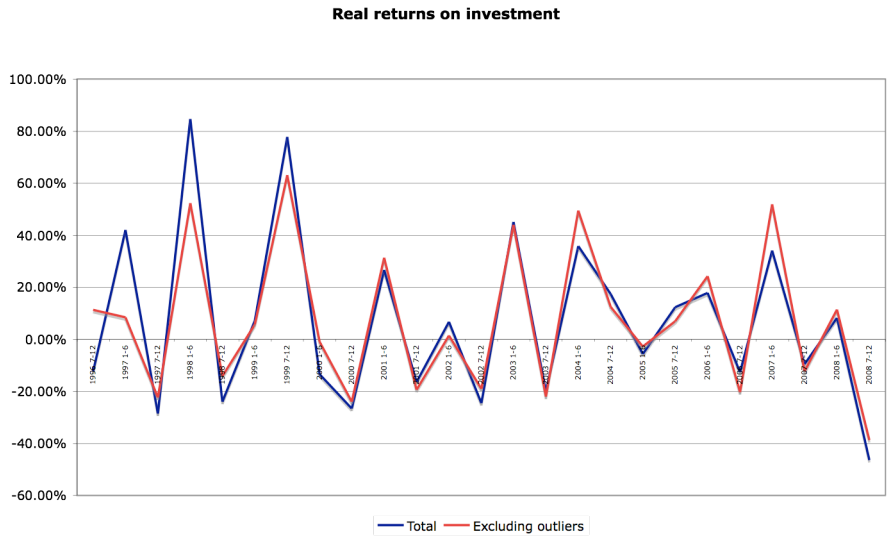
Hence, the nominal rate of return on fine art photography sales excluding top 1.5 per cent is detected to be **7.1 per cent**. After using the Consumer Price Index, the rate of return reached its real level of **5.9 per cent**. The lowest results were achieved using the prices adjusted to the GDP deflator when the rate of return appeared to be **5.81 per cent**. Rates of return on semi-annual analysis of photography market were demontrated in table A 'Rates of return on semi-annual data'.

Table A 'Rates of return on semi-annual data'

Time period	ROI on total set	ROI exc. Top 1.5%
1996 7-12	-12.39%	19.03%
1997 1-6	41.96%	6.00%
1997 7-12	-28.63%	-22.44%
1998 1-6	84.66%	49.96%
1998 7-12	-24.06%	-14.11%
1999 1-6	7.19%	3.44%
1999 7-12	77.73%	63.10%
2000 1-6	-13.48%	-4.18%
2000 7-12	-26.70%	-24.03%
2001 1-6	26.70%	27.76%
2001 7-12	-16.48%	-19.38%
2002 1-6	6.69%	-0.19%
2002 7-12	-24.55%	-19.04%
2003 1-6	45.06%	40.73%
2003 7-12	-20.02%	-22.09%
2004 1-6	35.81%	45.54%
2004 7-12	17.42%	12.46%
2005 1-6	-5.73%	-5.96%
2005 7-12	12.27%	6.98%
2006 1-6	17.84%	20.32%
2006 7-12	-12.71%	-20.34%
2007 1-6	34.15%	47.63%
2007 7-12	-9.53%	-12.28%
2008 1-6	8.18%	7.28%
2008 7-12	-46.45%	-38.77%

After constructing semi-annual analysis, it appeared possible to track the behavior of rates of return on selected time periods. From the graph below the volatile character of prices on fine art photography is clearly observed. Abrupt and fluctating trends displays

the non-stable character of returns, both for total set and set with omitted outliers. Correlation between two trends is 0.91 which is remarkably high value considering the importance of 1.5 per cent outliers and its impact on the trend behavior.



Extremely fluctative zigzagged character that denotes to semi-annual rates of return on photography market could be explained by two factors. First, the time period frequency selected is very dense – only six months are represented in each set, which created the abrupt pace of trends development. Second factor was concluded after analyzing average price indices performance in paragraph 5.3.2 'Price indices on semi-annual data' – generally, in second semesters prices were lower than in first ones, so rates of return were lower as well. The highest rate of return was detected at the beginning of period, however later on rates remained sufficiently high and exceeded 40% nine times in total. The lowest rates were detected in 2008, which is also explained by world financial crisis that caused decline in all spheres related to global ecomony.

5.4 Annual analysis

5.4.1 Introduction

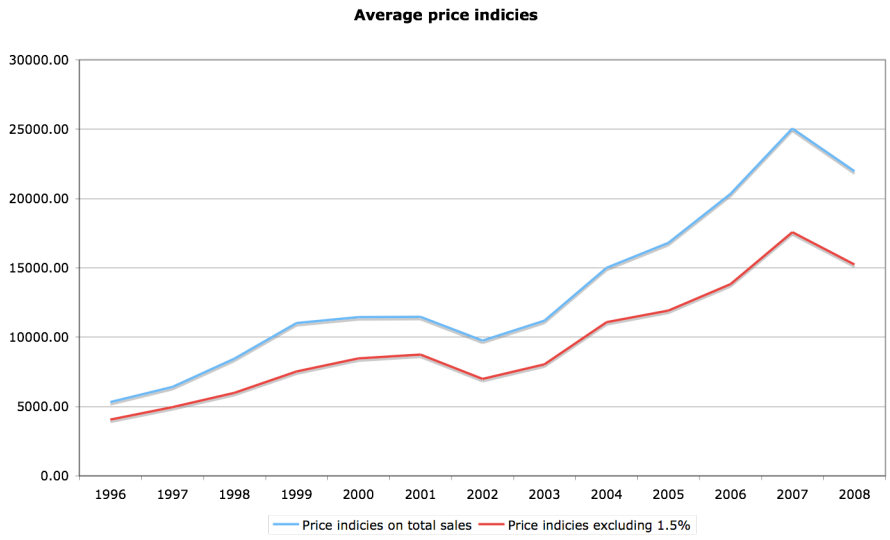
In order to achive more complete image of the fine art photography market, the data was decided to be analyzed from the annual point of view. Being categorized by the year when the photograph purchase took place, I received thirteen sets. For each set I computed the nominal and real price indices, afterwards received thirteen results with real price indices by using first the Consumer Price Index calculator, and then the GDP deflator. All prices were adjusted to the dollar value in the final year, 2008. The character of price indices in data was predominantely growing from year to year, though in 2002 there was a sighnificant decrease of price index – 11 per cent drop comparing to the previous year.

5.4.2 Price indices on annual data

The nominal price index was estimated to be $13,339. After the implemention of CPI calculator the real price index appeared to be higher, $15,354. The results of using the GDP deflator method showed slightly lower average price index - $15,066.

After excluding top 1.5 per cent of outliers, the average price index during 1996-2008 originally appeared to be substantially lower then in the previous case. This is naturally concluded from the pecularity of outliers – this omitted 1.5 per cent represented the highest prices in data. Additionally, the price indices had different character of growing comparing to the results of total samples included. Here the downshift in price index level of 2002 is not an oustanding value, and comparing to the previous year it appears to be higher instead.

Having the average price index figure of $9,566, after correction on inflation using the CPI calculator the index was $10,986, and with the GDP deflator - $10,775. Here we can see that the first method of adjusting the price on inflation tends to show higher results then the GDP deflator, though the difference is not very essential.



Naturally, the price indices were growing in the selected time period. Essential to mention, that in annualized data trends behave in a different manner then in semi-annualized. This graph demonstrates two trends with annualized average prices, first with all sales included and second with omitted top 1.5 per cent outliers. The pace and fluctations are surprisingly similar in both trends, though the trend without outliers is substantially shifted downwards as soon as the general price level is reduced without top 1.5 per cent. However, the correlation between two graphs is proved to be extremely high and ranged at 0.99. Consequently, the elimination of outliers in annualized price indices construction did not effect the behavior of trends dramatically; in fact, it hardly effected it at all. This drives us to conclusion that the role of highly-priced photographs in each set appears to be not as influential as it was expected. The pattern of average price indices growth while eliminating top 1.5 per cent outliers remained practically the same as in case of trend with total sales.

5.4.3 Rates of return on annual data

The annual rate of return on investment in case of including all samples in the calculation appeared to be the highest among all results – **13.71 per cent.** Now it became obvious, that after adjusting price indices to inflation, the rate of return on investment was lower. After implementing the CPI calculator the real annualized rate of return on

investment appeared to be **10.78 per cent**. The results of using the GDP deflator showed that the real rate of return is **11.18 per cent.**

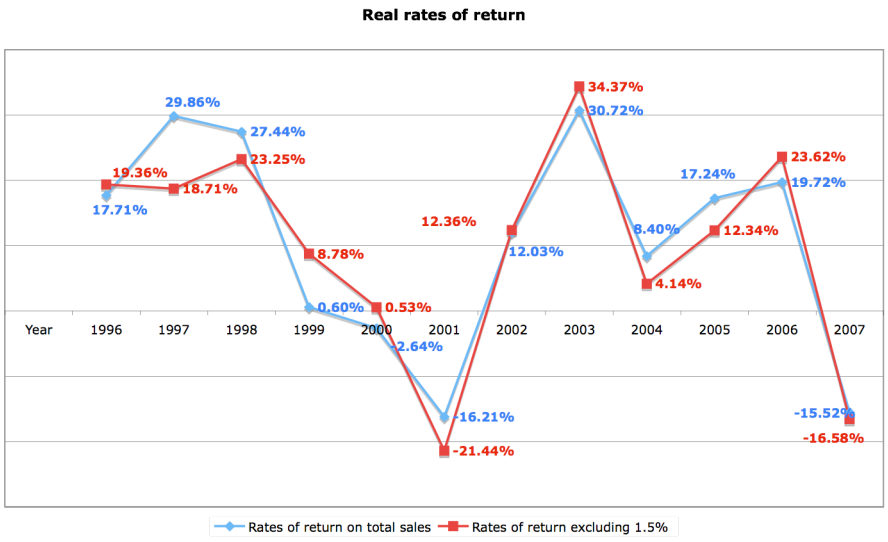
After elimination of top 1.5 per cent of outliers, the annual rate of return appeared to be lower, then while including all samples. The rate of return on nominal price indices was **12.88 per cent.** As we have already experienced on previous calculations, the adjustment of price index to inflation reduces the value. Here, the rate of return on investment excluding top 1.5 per cent of outliers was **9.95 per cent** while implementing the CPI calculator, and **10.37 per cent** with the GDP deflator correction.

Annual results on rates of return on fine art photography market were described in Table B 'Rates of return on annual data'

Table B 'Rates of return on annual data'

Time period	ROI on total set	ROI exc. 1.5%
1997	17.71%	19.36%
1998	29.86%	18.71%
1999	27.44%	23.25%
2000	0.60%	8.78%
2001	-2.64%	0.53%
2002	-16.21%	-21.44%
2003	12.03%	12.36%
2004	30.72%	34.37%
2005	8.40%	4.14%
2006	17.24%	12.34%
2007	19.72%	23.62%
2008	-15.52%	-16.58%

To have a descriptive view of art performing as an investment, I constructed a graph with two trends – rates on return of total sales and rates of return on set while eliminating top 1.5 per cent of outliers. The character of both trends is fluctative and demonstrates how actually volatile art market is.



Starting from the second half of 1997 up to the final year 2008, rates of return of photographs changed dramatically. Having positively promising rates at the beginning, both trends were showing high rates, but starting from 1999 they declined sufficiently. Both trends reached the bottom in 2001, when rate of return on total set was -21.44 per cent and rate for set without outliers was -16.21 per cent. Such outstanding negative drop occurred six years later, when in 2008 rates displayed -16.58 per cent and -15.52 per cent relatively. Historically, the failure of rates of return weights is explained by the global financial crisis that substantially affected world economy and all spheres that are related to it, art market in particular.

However, rates of return showed in majority positive results. For the trend which demonstates the return on total sales, the amount of negative figures appeared to be only three out of twelve results. For the trend where 1.5 per cent of outliers are omitted, the frequency of negative rate of return appeared even less – two out of twelve results. Also, positive rates of return below 10 per cent occurred only twice for set with total sales and three times for set without outliers. Both trends demonstrated positive rates of return above 10 per cent in seven out of total twelve results.

Hence, it becomes possible to conclude that the rates of return on art tend to fluctate, however in majority of cases show positive and substantially high results. To specify the value of volatility in the annualized data set, I calculated the meaning of

standard deviation for rates of return on investment. The rate of standard deviation was 0.1629, so here we conclude that the rate of volatility in this data set was 16,29 per cent.

To see the comparison of the received information with financial market assets, volatility in particular, see chapter 6.

5.5 Testing 'Masterpiece effect'

In case of fine art photography market, I decided to test whether there is a presence of ‘masterpiece effect’ by following the methodology used in previous studies. After processing the data, I came to conclusion that the average share of outliers in each semi-annual and annual set is estimated between 1 per cent and two per cent. For convenience, I selected the 1.5 per cent Constanta for outlining the overpriced photographs. Having two sets with and without top 1.5 per cent of outliers, I noticed that in case of calculating average price indices and rates of return, the presence or absence of outliers changes final values (see ‘Semi-annual analysis’ and ‘Annual analysis’ above). I suggested that if the presence of overpriced photographs affects the results significantly and changes the characteristic features of portfolio, then there could be an evidence of ‘masterpiece effect’.

To test the hypothesis, I collected top 1.5 per cent of outliers annually and applied the same methodology I used while deducing general results on fine art photography market. I decided to stick to the annual data and ignore the semi-annual analysis for the major reason of previous studies. They were constructed on annual basis, and to test the hypothesis and compare the results to scholars’ achievements it appeared reasonable to work on annualized data.

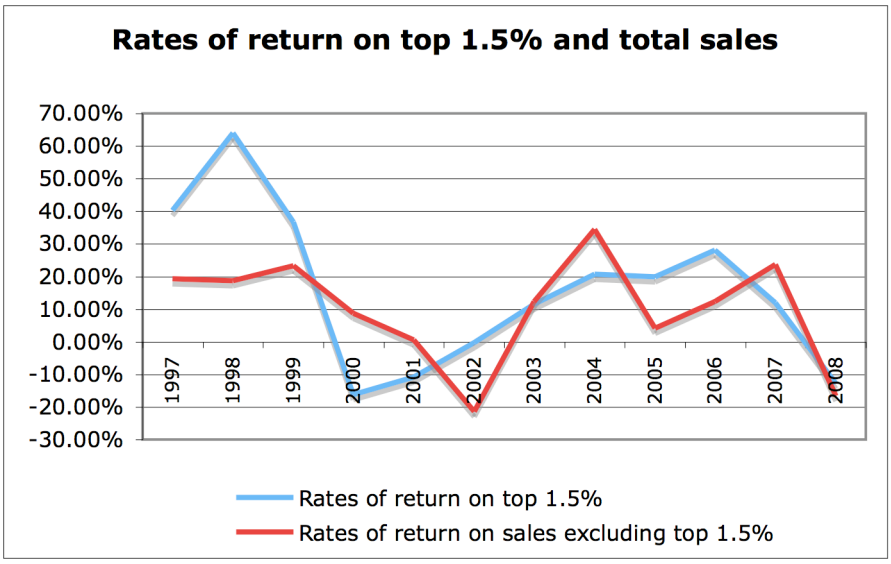
To start with, for annual set I collected 57,881 sale records of highly priced photographs and constructed the average price indices. In advance I would like to mention, that price indices appeared to be stunningly high due to the top 1.5 per cent peculiarity. Hence, the nominal average price index for the most expensive fine art photography was $266,004.45. Without exeption, here I also adjusted price indices to the rate of inflation of the year 2008 and deduced the real average price index which was $303,046.12.

Next, I calculated the rates of return on top 1.5 priced photographs. The nominal rate of return was **19.08 per cent** per annum; the real rate of return was expectedly lower and estimated as **16.07 per cent** per annum. To complete the research, I deduced the level of volatility for rates of return on overpriced photographs and came up with **24.23 per cent** for nominal rates and with slightly lower degree of **24.08 per cent** for real rates. The results were represented in Table C 'Rates of return on outliers and general set'.

Table C 'Rates of return on outliers and general set'

Time period	ROI on top 1.5%	ROI on general set
1997	40.22%	19.36%
1998	63.92%	18.71%
1999	36.60%	23.25%
2000	-16.16%	8.78%
2001	-10.81%	0.53%
2002	-0.20%	-21.44%
2003	11.45%	12.36%
2004	20.70%	34.37%
2005	19.89%	4.14%
2006	28.16%	12.34%
2007	11.93%	23.62%
2008	-12.90%	-16.58%

And here the most interesting part had begun. In this chapter I analyzed the average price indices and rates of return on photography including and excluding top 1.5 per cent of outliers. The 'masterpiece effect' implies that the overpriced photographs outperform general portfolio, and to test it on fine art photography market, I compared the rates of return obtained. Data set where all sales are included had no particular interest, so I used the set where top 1.5 per cent outliers are omitted. The nominal rate of return was 12.88 per cent per annum; the real rate of return was estimated at 9.95 per cent per annum level. In case of testing the overpriced photographs, the nominal rate of return was 19.08 per cent per annum; the real rate of return was 16.07 per cent per annum. Consequently, overpriced photographs really outperformed the general portfolio and here I conclude that the 'masterpiece effect' is really present at the fine art photography market in 1996-2008 and has positive meaning.



Additionally, I wanted to test which set performs better in terms of volatility. I constructed the graphs that illustrated the reformance of two trends of annuallized rates of return – top 1.5 per cent and the rest 98.5 per cent of auction sales. The trend that denotes to top 1.5 per cent appeared to be abrupt at the beginning with sharp decline from 1998 till 2000. Second trend showed smoother character and had been declining sufficiently from 1999 till 2002, afterwards showing rapid growth in next two years and reaching its highest point of 34.37 per cent in 2004. The trend which illustrates rates of return on overpriced photographs after decline in 2000 had been growing smoothly till 2006 and declining till 2008. However, it did not show any extraodinary rates of return as it did in 1998 (almost 64 per cent). It did not outperformed the trend on general portfolio either except one occasion in 2006.

The level of volatility was also calculated. It appeared that the overpriced photography market is very volatile comparing to the general porfolio. In real rates it exceeded the level of volatility on general portfolio in one and half times – 24.08 per cent versus 16.38 per cent relatively. It led me to a conclusion that the market of overpriced photographs represents the most dangerous mix of components – from one point of view, it shows substantially higher average price indices and rates of return, but from another, not least point of view, it appears to be way more risky to invest in. In fact, the investor

should consider this fact while chosing where to locate the financial funds and whether the risk of placing big money in art world is worth it or not.

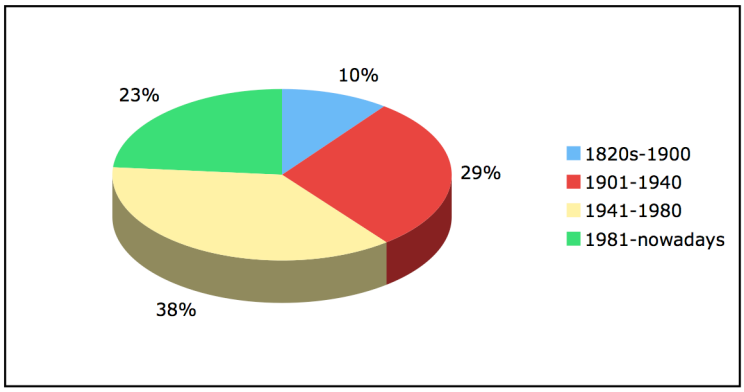
5.6 Boom in photography market

Hypothesis concerning growing popularity of photography on global art market were discussed in chapter 3. Basing on central conclusions that enlightened factors of public interest rapid increase, it was expected to receive confirming results from the data used in thesis. Analysis of price indices dynamics as well as rates of return trends behavior implied that overall character of the market might show growing image. True, starting from 1996, price indices were constantly increasing with high amount of fluctations though. Fluctations were regular and in some cases lead to substantial downshifts which naturally caused negative rates of return. Nevertheless, year 2004 appeared to be a watershed in the whole time period. Starting from 2004, prices were growing rapidly and constantly, interrupted only in the second half of 2006. However, the next year marked the highest price in the whole time period with highest average price of $18,459 (see semi-annual data with top 1.5 per cent omitted). Such extraordinary increase in photography prices is definitely a remarkable peculiarity that illustrates the booming character of total climate in art world. In this paragraph I will describe the reasons for such outstanding performance of fine art photography.

Fine art photography does not belong completely to contemporary art. If we take a look at the names of photographers whose names are represented in auction sales data, or take a look at the date of negative creation, it will appear that share of contemporary artists does not exceed the share percentage of classics. To illustrate this fenomena, I devided the data into four time periods according the year of negative. First group includes the oldest photographs, created from the beginning of actual photography extistance 1820s-1900. Time period seems too large in comparison to following time periods, but it is expained by the small amount of photographs taken due to numerous limitations in photography itself and consequently the amount of artists and prints. With following development and popularization of photography, next time periods described 40 years span, 1901-1940, 1941-1980 and 1981-nowadays. According the auction data, I

constructed the pie chart which demonstrates the actual situation in photography art market in 1996-2008.

Photographs sold in sub-periods



From the pie chart I conclude that the fine art photography market is represented in most cases by artists and consequently photographs created in 1941-1980. The share of photographs made in this time period is the highest (38 per cent) and substantially differs from other periods. When photographs created at the beginning of XX century up to 1940 occupy 29 per cent share, actual contemporary photography is based only on the third rank, more than twice exceeding the amount of XIX century photographs. I suggest to claim artworks created since 1981 as 'contemporary' ones due to general uplift of the market as well as emergence of new artists and trends.

Hence, I came up with a contraversal conclusion. From one point of view, it is clearly obvious that the growing popularity of fine art photography is directly correlated with the boom in contemporary art. From another point of view, fine art photography represented in auction sales data in vast majority outlines photographs made in the middle of XX century. Those are generally related to classic school of photography and do not have much in common with sometimes frankly weird contemorary art analyzed by Thompson.

One of the most reasonable expanations of booming photography market I resulted with infers the implication of economic theory of substitute goods. According to traditional economics, substitute goods are charecterized with positive cross elasticity of demand and are able to replace similar goods in specific terms. In general, when the price

of one good is increasing, the demand on substitute good is increasing as well. This theory can be partly adjusted to the art market situation in researched period, when prices for contemporary art were claimed to reach unprecedented record prices (like with Damien Hurst) and prices in photography were growing as well (see average price dynamics). Unfortunately, this theory can not be developed in a complete amount due to limited access to the contemporary art sales auction data. However, theoretically we can suggest that these two markets provide art goods that in terms of current market situation can serve as substitutes.

Contemporary art as we experience it nowadays is certainly a specific form of art which is appreciated by relatively limited amount of people. It differs from traditional forms of visual art, first of all with its aesthetic plot and, for some extend, utility. True, the purchase of 3-meter stuffed shark (Thompson, 2008) requires much more efforts, costs and material tools to handle it, not mentioning the storage and aesthetical satisfaction. Photographs, even contemporary ones, usually require far less transaction costs and tend to be more understandable for broad audience as a piece of art. Additionally, their value as an art form is growing annually and therefore puts this relatively new form of art on one stage with sophisticated contemporary art pieces. Here I speak about particular occasions, not about art market in general, when the price for both photographs and contemporary art pieces are comparatively related and substantially high to be covered by media and claimed as a good investment.

6. Alternative market comparison

6.1 Introduction

In order to determine whether fine art photography is a good form of investment (here – profitable one), it is necessary to compare the results to alternative market which theoretically can substitute this form of investment. The results achieved after computing price indices and rates of return for semi-annual and annual analysis were compared to the financial market. Dow Jones Industrial Average is one of the most popular and universal index that demonstrates how financial market perform in specific period of time. Luckily, it was possible to withdraw both annual and semi-annual data of exactlty the time period investigated – from the beginning of 1996 up to the end of 2008. Two separate researches were made on semi-annual and annual analysis of financial assets and fine art photography performance and then compared to each other. After providing the step-by-step description of the calculations applied, I came up with first answer on the major research question – whether fine art phography market outperform the financial market being a form of investment or not, and what benefits it brings to investors.

6.2 Comparison to financial assets

6.2.1 Semi-annual fine art photography and Dow Jones Industrial Average

6.2.1.1 Average price indices

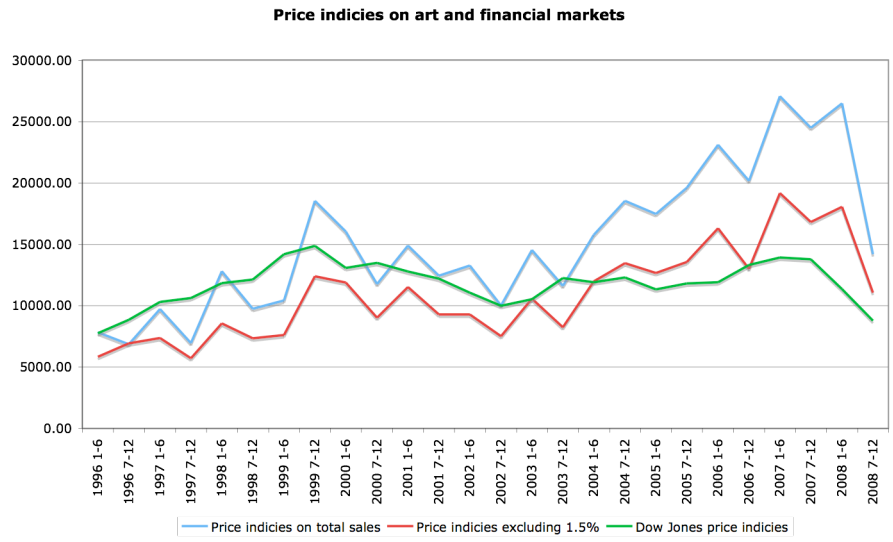
To adjust the data received from the official statistics of the Dow Jones Industrial Average dynamics, first I sorted the nominal indices into 26 separate cells which donate to the actual date in the photography data set. Having the dynamics of the Dow, I calculated the average price index for all 26 records. The nominal average semi-annualized price index was $9,988. Using the results of fine art photography market, it became possible to compare the initial results on photography market to newly achieved index. Here I also had two branches – results on total sales and results on sales without

top 1.5 per cent outliers. As it was calculated, the nominal average price index on fine art photography market was $13,216 on total sales, which appears to be higher then the Dow. In case of set without top 1.5 per cent, the average price index appeared to be $9,736 – slightly lower then the Dow.

Next, in order to adjust the indices obtained from the data, I decided to apply the same method of correcting prices on the rate of inflation. This time I used the Consumer Price Index calculator for all 26 records of the Dow semi-annualized data. Afterwards, I calculated the real average price index for the financial assets and received the figure of $11,775. In fine art photography data the average price index on total sales after implementing the Consumer Price Index calculator was $15,162. In case of omitting the outliers, the average price index was $11,164. One more time, the average index result on fine art photography total sales was proportionally higher, and the index on set omiting outliers was lower than the Dow, which primarly was expected basing on the nominal results.

Average semi-annual results on price indices provided us with information concerning the generalized image of two markets behavior. One of the best methods to determine whether the art market is more risky than the financial one or not, I analyzed the level of volatility in both markets and compared them. The way trends behaved showed the actual amount of risks involved into the investment process and demonstrated which market can be considered as a reliable one.

First, I constructed graphs that showed semi-annual behavior of three separate price indices – total sales, set excluding top 1.5 per cent of outliers and the Dow Jones Industrial Average. From the graph below, it is clearly observed how the price indices changed over time in 1996-2008 and how actually volatile the art market is comparing to the Dow Jones trend. To mention, all price indices were taken as real ones (after adjustments to inflation), so the final picture appeared to be as close-to-life as possible.



The Dow Jones trend appeared to show the most stable manner of development, while trends for fine art photography are in fact characterized as fluctative ones. From the beginning of the time period researched, the Dow Jones index was raising permanently till the end of 1999, when it reached its highest point of $14,858. Starting from the very next year, the index had been declining with a small recovery at the end of 2000 up till the end of 2002. Here it reached its second (after 1996) lowest point of $9,983 and since then started growing steadily. The only remarkable point that illustrated substantial growth of the Dow trend was at the end of 2007 with its average price index of $13,774. Since then, the trend downshifted significantly, which is directly related to the upcoming world financial crisis. At the end of 2008, the Dow Jones average reached one of the lowest points in total set, close to the initial figure of 1996, with its $8,776 index.

Two trends represent the dynamics of price indices change on fine art photography market. In fact, the character of trends is practically similar (the estimated correlation is 0.99). They differ only by the position on the value (Y) axes, where the trend on total sales is located higher than the trend with omitted top 1.5 per cent of outliers. After analyzing the behavior of two trends and how they are compared to the Dow, I came up with the conclusion that in this data the year 2004 appeared to be a watershed in the fine art photography performance and it is to be explained below.

Starting from the very beginning in 1996, the trend on total photography sales has been fluctating. It showed sharp changes in the behavior, however remained growing

over time. It slightly exceeded the Dow index in early 1998 for the first time, and by the end of next year 1999, it substantially overexceeded the financial assets results. However, the trend had begun to decline since then, crossing the Dow trend and showing higher value in four out of six times. The fluctative and very close to the Dow index character of fine art photography total sales trend changed dramatically at the beginning of 2004. After slight underperformance of the Dow index at the end of 2003, this trend began to grow extremely fast. In fact, it illustrated the boom of phototgraphy prices that lasted till the end of 2007. Here the trend reached its highest point of $27,054 and can be completely called the peak of the price boom. Remarkably to mention, that the same semi-annual period of the 2007, the Dow Jones index was only $13,923 – approximately twice lower than the fine art photography performed. The very next year the Dow started declining ($11,350), when photography showed the second outstanding figure of $26,478 and experienced the general decline only at the end of 2008. The final figure in this data set is $14,179 for photography market when the Dow Jones average price index reached $8,776 – again, substantially lower level then the art market did.

The behavior of the trend where top 1.5 per cent of outliers were eliminated from the general set was also compared to the Dow index trend. Prices in this set were lower because of the absence of overprized artworks, consequently the trend was located closer on the value (Y) axis to the financial assets trend. Interesting to mention, that in case of analyzing the set with omitted 1.5 per cent of outliers, the picture is different than previous comparison, however the watershed of 2004 remained clearly defined. Starting from the beginning of the time period, the trend underperformed the Dow index, in majority of cases in a significant way. Trend showed fluctative character, however it came close to the Dow trend only at the beginning of 2003, with decline in the second half though. The next year was remarked by the outstanding growth of the photography prices, which exceeded the financial assets performance and kept outperforming it till the sharp decline in second half of 2006. Nevertheless, the next year the photography prices substantially exceeded the prices of financial assets and reached its highest point of $19,168 while the Dow demonstrated $13,923. The final point of the photography trend reached $11,044 when the Dow showed mentioned $8,776, in this case underperforming the art market in terms of global crisis.

Price ranges changed sensibly through the investigated time period. With sharp declines and rebounds noticed at the photography trends, the fluctative manner of art market dynamics apparently contrasted to the smooth Dow Jones trend. To track price changes over time and determine which market is less risky to invest in, I calculated the rates of volatility on semi-annualized average price indices. As soon as I describe two occasions in photography art market when total sales included and when top 1.5 per cent of outliers are omitted, two rates of volatility were deduced.

Hence, I came to a conclusion concerning the average semi-annualized price indices of fine art photography and financial assets markets. In this case of 1996-2008, which is considered to be a short-run period, the performance of the Dow Jones Industrial Average was uniformely and for some extend expected to perform like that. It is characterized with smooth and steady ups and downs, definitely lacks fluctations and is expected to have a low rate of volatility. The photography trends were on contrast extremely volatile, with rapid ups and downs in even one year. However, in case of total set analysis, the photography average prices outperformed the Dow indices, leaving the trend far below after watershed year 2004. In case of omitting the top 1.5% outliers, the trend behavior did not change, though it shifted downwards on the value axis and underperformed the financial assets trend till the watershed year 2004.

6.2.1.2 Rates of return and volatility

To calculate the rates of return on financial assets, I used exactly the same methodology as in case of fine art photography market in chapter 5. First, I analyzed the nominal rates of return on both markets. Having the nominal rate of 8.54 per cent for total sales and 7,1 per cent for set without outliers, I compared rates to the nominal result of the Dow. For semi-annual rate of return, the Dow resulted in average of **2.3 per cent**. This figure is significantly lower than the rates of return on photography market, where the lowest rate overexceeds the Dow rate in three times. However, the nominal results were preliminary and demonstrated the possible pattern of behavior after adjusting prices to the general level of year 2008.

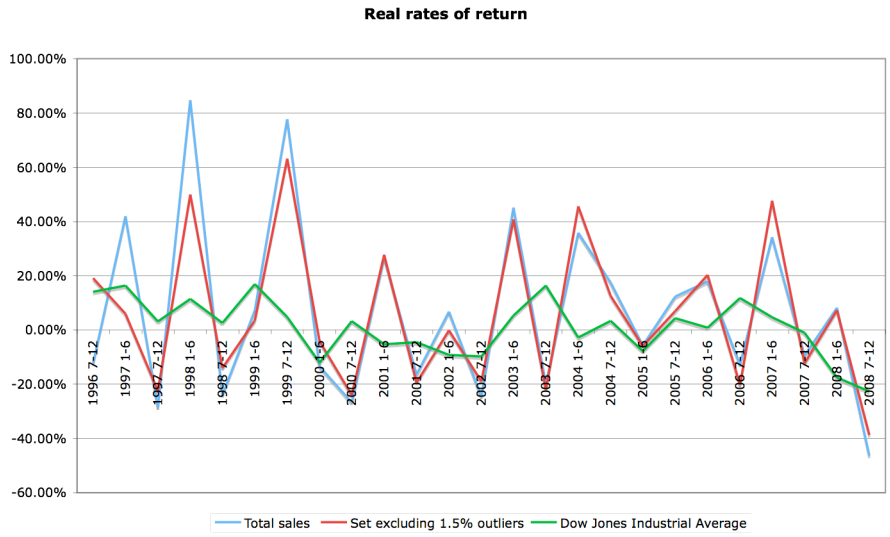
The real rates of return were expected to be lower than nominal ones for all three occasions. The Dow Jones index after adjusting 24 price indices (the last two donate to year 2008 so are not to be adjusted) and calculating the rate of return, I received surpisingly low figure of **1,04 per cent**. Generally, real rates of return on photography were lower than nominal as well – 7 per cent for total sales and 5,9 per cent for set without oultilers. Hence, it is possible to conclude that photography market outperformed the financial assets dramatically, overexceeding the semi-annualized rate in five times for set without top 1.5 per cent and in mostly seven times comparing to the rate on total sales. Rates of return on the Dow Jones semi-annual performance were demonstrated in table D.

Table D 'Semi-annual rates of return on the Dow Jones'

Time period	ROI on Dow Jones
1996 7-12	14.04%
1997 1-6	18.99%
1997 7-12	3.07%
1998 1-6	13.20%
1998 7-12	2.56%
1999 1-6	19.49%
1999 7-12	4.80%
2000 1-6	-9.13%
2000 7-12	3.24%
2001 1-6	-2.64%
2001 7-12	-4.58%
2002 1-6	-7.77%
2002 7-12	-9.75%
2003 1-6	7.72%
2003 7-12	16.34%
2004 1-6	-0.18%
2004 7-12	3.33%
2005 1-6	-4.71%
2005 7-12	4.31%
2006 1-6	4.04%
2006 7-12	11.77%
2007 1-6	7.59%
2007 7-12	-1.07%
2008 1-6	-14.44%
2008 7-12	-22.68%

After computing the rates of return on both financial and photography market, I constructed the graph that illustrated the semi-annuallized performance of assets through

all investigated time period. As it was concluded from the average price analysis, the financial market perfromed in substantially smoother manner than the art trends did. The fluctative and abrupt character of two trends on fine art photography graphically differed from the Dow trend, and to prove this mathematically, I turned to traditional methods of calculating volatility.



For the fine art photography market, which initially was expected to show high rates of volatility, I computed average semi-annuallized index of standard deviation. For the first trend, where all sales were included in research, the standard deviation index was 0.3294. This figure automatically derives to the actual rate of volatility of **32.94 per cent.** For the second trend with omitted top 1.5% outliers, the standard deviation deduced in 0.2745. Concequently, the rate of volatility for this trend was estimated as **27.45 per cent.**

The performance of Dow Jones trends in the rate of return graph implied that the level of volatility would be substantially lower than in case of art market. True, having the real rates of return for the semi-annualized data set, the standard deviation was estimated to be 0.1052. Basing on this result, the rate of volatility of financial market was **10.52 per cent.** In fact, this result appeared to be extremely beneficial for the Dow index performance in observing case, as soon as previous results in majority of cases showed its underperformance.

Hereby, I conclude that the financial market is less risky to invest in when speaking of short run period (13 years) than the fine art photography market. While the level of fluctations in financial rates of return were estimated at 10.52 per cent, the volatility level of photography market substantially underperformed. Additionally, two sets on fine art photography market resulted essentially different. For the set where outliers are excluded, the rate of volatility exceeded the Dow rate in more than 2.5 times and was 27.45 per cent. In set with total sales, the rate of volatility was almost 33 per cent, three times higher than the Dow. Back to the photography trends, comparing two results showed that in case of including or excluding top 1.5% of outliers, the rate of volatility changes notedly. In fact, the presence of overprized photographs in the set affect the rates of return and the level of volatility substantially and leads me to the conclusion that the fine art photography market do experience the 'masterpiece effect'.

6.2.2 Annual fine art photography results and Dow Jones Industrial Average

6.2.2.1 Average price indices

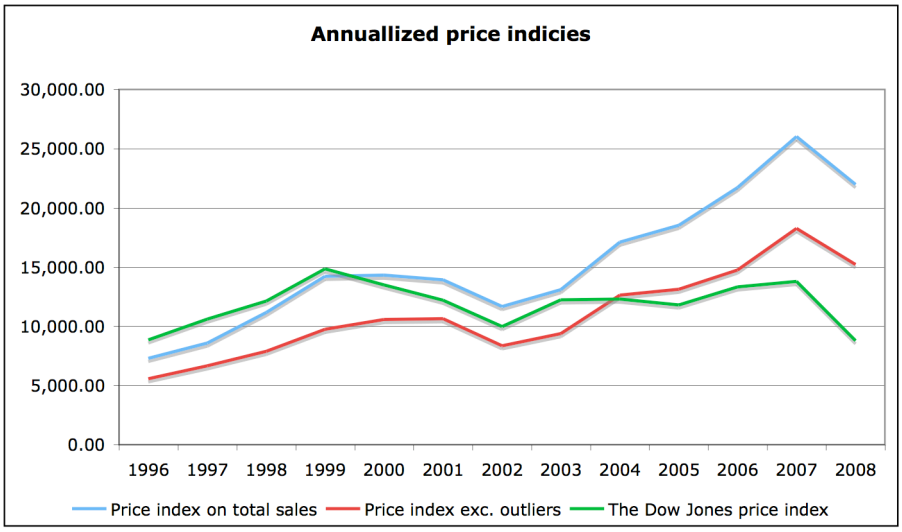
For the annual data I applied the same pattern of deriving averaged price indices and tracking the changes of trends dynamics. Here, I received thirteen years to investigate – from 1996 till 2008 included, and concequently thirteen price indices for each category.

For thirteen records of the Dow Jones Industrial Avearge indices, I computed the nominal mean of annuallized indices. It was estimated at the level of $10,155 and naturally compared to the annual indices on fine art photography market. While extracting the indices received in chapter 5, it is necessary to recall that in fine art photography market I was focusing on two large data sets – one is on total sales of photography market, and second set has top 1.5 per cent of outliers omitted. Hereby, I received two annuallized nominal photography price indices, $13,399 for total set and $9,566 for the set without outliers. The nominal average price index for total sales in photography exceeded the Dow, just as the set without outliers underperformed it. This

situation occurred in case of analyzing the semi-annual data, so from here I expected the results to interhance.

For obtaining the real price indices according to the inflation year 2008, I implemented the Consumer Price Index calculator and deduced three new price index meanings. As described in chapter 5, the average annuallized price index on total sales of fine art photography was $15,354. For the set without outliers the price index was $10,986 – again, lower then the total sales index. For the financial assets market, the Dow Jones average annuallized index after adjustion on inflation was $11,868. Here it is clearly observed that the value of the Dow index is placed just between two trends of fine art photography – below total sales index and above the set without outliers.

To illustrate the behavior of annual price indices, clarify key characteristic features of trends fluctations and determine whether investing in market assets is beneficial or not, first I constructed the graph that demonstrates the annuallized price indices dynamics.



The general appearance of trends behavior for certain extent differs from the semi-annual analog. All three trends are less fluctative and abrupt, which can be explained by extension of time scale in data set. However, key points where each trend showed sharp upshift or decline do correlate with the semi-annuallized graph of average price indices. Let me provide the description of the graph below.

The Dow Jones Industrial Average illustrated the smoothest tendency of annual index change. Starting from the beginning of 1996 with $8,848, it was confidently outperforming photograhy market till it reached the highest point of $14,858 in 1999. Then the steady decline occurred and the financial assets performed worse and worse till 2002. In this period the evidence of being just between two photography trends occurred – the Dow was outperforming the trend without top 1.5 per cent of outliers and underperforming the trend of total sales. The lasted till 2004, when the Dow index did not show enough rate growth to keep beating the photography trend and started constantly underperform the art market. Even the general upshift of 2007 did not change the situation – the Dow reached second ranked highest point of $13,774 and the very next year declined dramatically to the lowest point of $8,776 in the whole financial assets experiment.

Describing how the fine art photography trends performed in annuallized data set, it is necessary to mention the high correlation between them, just as it was experienced in the semi-annual analysis. Here again, two trends are located on different levels of the value (Y) axis due to the elimination of top 1.5 per cent overprized photographs in one of them.

The trend that denotes to the total sales of photography market, had been growing constantly during first three years, however, underperforming the Dow index. The art trend crossed the financial level only after 1999, following the general decline of price indices level till 2002. Just after it reached the point of $11,673 in 2002, it started drill growing, outperforming other trends significantly and finally reached its astonishing highest point of $26,010 in 2007. Such evidence of booming price indices has not been noticied before, in semi-annual analysis. The decline in world economy did not affect the price index level in the same measure as the Dow – the next year point showed approximately the same value as in year 2006. This rapid growth of price indices made me to analyze the booming art market deeply and determine why in five years term the annuallized average price index grew in 122.8 per cent. I deeply hope that the answer provided in chapter 5[51] partly explains this curious fenomena that occurred not so long ago and definitely affected the total art market.

[51] See paragraph 5.6 "Booming photography market"

The trend with omitted top 1.5 per cent of outliers did not demonstrate the surprising growth dynamics as well as did not outperform the Dow trend up till 2004. Starting from the very beginning, it had been located under the financial assets index trend and did not show any sharp changes. The trend had been steadily growing till 2001 with price index $10,638 detected, when the very next year it declined to $8,358. The recovery began the next year, as in case of total sales, when the trend went upwards and in 2004 finally outperformed the Dow. However, it did not show stunning difference between photography and financial indices in the most remarkable year 2007 - $18,250 versus $13,774 respectively. After the general world economy downfall, the price index on photography with omitted top 1.5 per cent of outliers dropped to the level of year 2006, just like in the case of total sales trend.

6.2.2.2 Rates of return and volatility

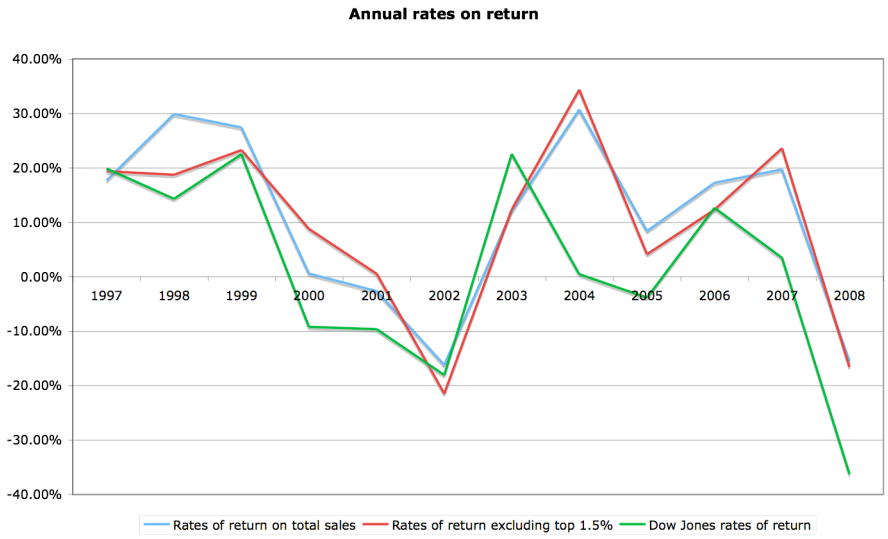
Annuallized rates of return are generally considered to be more widely used than semi-annuallized. With time scale of one year, the character of assets performance is easier to analyze and deduce the level of volatility that occurs when speaking about prolonged time period. Hereby, I turned to the results achived on fine art photography market, both nominal and real ones, and compared them to newly-constructed rates of return on the Dow Jones index. The results are provided below.

Fisrt, the nominal rate of return on fine art photography showed the highest results in the whole research. For total sales, the annual rate was 13.71 per cent; for set where top 1.5 per cent of outliers are excluded, the rate was 12.88 per cent. For the Dow Jones rate of return composition I applied the same methodology and received nominal annuallized rate of return of 4.22 per cent. In case of these results, I conclude that the financial assets rates underperform the rates of the art market sufficiently. This lead me to the hypothesis that the real rates would perform in the same way.

After implementing the Consumer Price Index for price indices, I calculated the rates of return on real results. The fine art photography performed in average with 10.78 per cent per annum for total sales. In case of second set, the rate was slightly lower – 9.95 per cent per annum. The Dow Jones real rates of return showed surprisingly low amount

of 1.56 per annum, which led me to a conclusion that fine art photography market in average substantially outperfromn the financial assets.

However, to determine the correlation between trends and the dynamics of their growth, I constructed the graph which illustrates the behavior of rates of return in investigated time period.



The character of all three trends appear to be more or less similar – with sharp ups and downs, they all followed the same pattern of dynamics throughout the investigated time period. Starting at one common point at the beginning, trends were fluctating till 1999, when suddenly all of them faced unexpected decline that lasted till 2002. Just after reaching the lowest point of negative returns, the very next year all three trends began to grow steadily. The photography trends reached their highest point of 30.72 per cent (total sales) and 34.37 per cent (without outliers), when the Dow marked the next decline with only 0.47 per cent. This trend came close to the trend on photography without outliers only in 2006 with annualized rate of return 12.65 per cent and then declined sufficiently till it reached the lowest negative rate of 36.28 per cent in 2008.

The behavior of fine art photography trends were less fluctative. After rapid recovery in 2003, the rates were up and obviously outperformed the financial assets trend up till the end of time period researched. Interesting evidence in case of two art market

trends was noticed in 2004 and 2007, when the annualized rates of return conducted from the set with omitted outliers in fact outperfromed the trend with total sales. This can be explained by more essential fluctation in prices that occurred in set without outliers, and to determine it, I deduced the level of volatility for three trends.

At the first glance on the averaged price indices graph, the behavior of two photography price indices seemed to be more variegated then the Dow Jones trend. I implemented the same method of deducing the level of risks that operate on certain markets by conducting the standard deviation meaning. Results appeared to be truly surprising and differed from the semi-annual figures.

The level of volatility on the photography market in investigated time period was detected at the level of **16.29 per cent** on the set of total sales. In case of second set where outliers are eliminated, the rate of volatility was approximately the same **16.38 per cent.** Here I proved that the outperformance of second trend without outliers in 2004 and 2007 is valid by estimating the rate of volatility being slightly higher than in case of total sales.

However, the most curious evidence occurred after computing the rate of volatility for the Dow Jones rates – the average rate was **18.08 per cent.** It obviously exceeded the volatility level of the art market and showed the higher amount of rates fluctation. In fact, the financial market suffered a lot because of the world financial crisis; it showed sufficient decline in 2002 as well and for that reason the level of volatility exceeded the rate of the photography art market. Rates of return on annuallized Dow Jones index were demonstrated in table E below.

Table E 'Annual rates of return on the Dow Jones'

Time period	ROI Dow Jones
1997	19.89%
1998	14.32%
1999	22.52%
2000	-9.23%
2001	-9.67%
2002	-18.06%
2003	22.53%
2004	0.47%
2005	-3.86%
2006	12.65%
2007	3.48%
2008	-36.28%

6.3 Conclusion

After processing all data samples it became obvious that the dynamics of the price index is not stable. From the financial investment point of view fine art photography market appeared to be volatile, in fact as most of art markets do. However the upcoming dynamics of the trend starting from 2002 made me conclude that the general character of the rate of return on investment remained positive. Moreover, the results of analysis demonstrated the booming pace of price index growth.

I detected the dynamics of trends development and deduced rates of return on different time periods. Additionally, I analyzed the level of volatility and came up with complementary characteristics of both financial and photography markets. Here, I summed up all findings in Table F 'Research results' provided below.

Table F 'Research results'

	Semi-annual		**Annual**		**Dow Jones Industrial Average**		**'Masterpieces'**
	Total sales	**Sales exc. top 1.5%**	**Total sales**	**Sales exc. top 1.5%**	**Semi-annual**	**Annual**	
ROI (nominal)	8.54%	7.10%	13.71%	12.88%	2.30%	4.22%	19.08%
ROI (real)	7.00%	5.90%	10.78%	9.95%	1.04%	1.56%	16.07%
Volatility	32.94%	27.45%	16.29%	16.38%	10.52%	18.08%	24.08%

Originally, I my primarly aim was to compare general rates of return to rates on financial market, but in process of research I found essential details that could not be omitted. Hereby, instead of two figures I received 21 figures that describe the fine art photography market performance in 1996-2008.

Highest nominal rates of return were detected in set with top 1.5 per cent of overpriced artworks with 19.08 per cent of annual return. Next, annual rates of return on total set resulted in 13.71 per cent; set where outliers are excluded showed slighlty lower rates (12.88 per cent). Semi-annuallized rates in nominal terms demonstrated substantial positive rates of return, 8.54 per cent for total sales and 7.1 per cent for set without outliers. The financial market represented by the Dow Jones Industrial Average Index,

was detected to have lowest nominal rates of return, 2.3 per cent for semi-annual time period and 4.22 per cent for annuallized set.

Real rates of return showed lower values of rates of return on all cases and the ranking was not changed. 'Masterpieces' outperformed with 16.07 per cent annually. Next, total sales on annuallized photography data resulted in 10.78%; in case of excluding top 1.5 per cent of outliers rate of return showed slightly lower value again (9.95 per cent). Third place is again occupied with rates of return on semi-annual data with 7 per cent in real terms for total sales and 5.9 per cent for set without outliers. The financial market rates substantially underperformed the art market, demonstrating 1.04 per cent of semi-annual growth and 1.56 per cent of annual.

However, when markets are discussed in terms of attractiveness for investors, relevant rates of return do not serve as the one and only indicator. Level of risks, discussed in thesis as rate of volatility, play important role when constructing the investment porfolio. I deduced rates of volatility for all cases and came up with next conclusion. In general, financial market in semi-annual time period showed the lowest rate of volatility (10.52 per cent) which naturally created benefits for investors. Here, less risks involved in short-run, however the rates of return are also detected at the lowest level. Consequently, this porfolio was described as the one with minimum risks involved and minimum profit gained. Next, surprisingly, the rates of volatility were detected in annuallized fine art photography data, round 16.3 per cent. To compare, the volatility rate of annual performance of the Dow Jones exceeded by two per cent, while the rates of return for latter were substantially lower. 'Masterpieces' showed comparatively high rate of risks involved, 24.08 per cent for annual frequency. However, in this case the rates of return were detected at the highest point as well. I conclude that for highly priced artworks it is both profitable and risky to invest in fine art photography market, however vast market cognition and profound analysis of market could bring substantial profits to investors. Finally, the highest rate of volatility appeared in semi-annual case, almost 33 per cent for total sales and 27.45 per cent with omitted outliers. Rates of return were not as high as in previous cases, so I conclude that semi-annual time period appeared to be the one with most risks involved and not as attractive to investors as in annual or 'Masterpieces' cases.

7. Thesis reflection

7.1 Conclusions regarding the central research question

The major aim was to determine whether fine art photography could be considered as a good form of financial investment by comparing the rates of return obtained on alternative market. The data on photography sales used in research displayed art market performance in 1996-2008. To receive precise and detailed results, it was classified according three categories - monthly, semi-annual and annual. Financial market performance was also analyzed from semi-annual and annual perspective. Additionally, I compared the performance of top 1.5 per cent of highly priced artworks to the rest of sales and financial assets, testing the presence of 'Masterpiece effect' in fine art photography market.

I concluded, that fine art photography market substantially outperformed the financial market in terms of rates of return. I analyzed the rates of volatility present in each case, and resulted with next conclusion. In situation when investors aims to minimum risks involved, the financial market appeared to be more attractive than the art market, however the rates of return obtained showed comparatively low results. One of the most attractive cases was detected in annuallized analysis, where the level of volatility is slightly higher than in financial market, but rates of return were detected on sufficiently higher level and could be a shpere of interest for investors who pursue financial benefits from aquiring arts. The highest rates of return appeared in the 'Masterpiece' case, however the level of risks involved was also substantial.

In general, I suggest fine art photography to be considered as a profitable form of investment. However, it requires vast market cognition – the behavior of art prices appears to be hard to predict in terms of rapidly changing global environment. This market showed fluctative character of price indicies as well as high rate of volatility, which directly symbolized how tricky and unpredictable photography assets change their value and future prifitability. Nevertheless, art usually brings physic returns to holders, which creates complementary benefits to portfolio.

7.2 Future research area

The data base provided can serve as a substantial base for broad fine art photography market analysis. In terms of financial investment, this market could be classified into sub-categories according the name of photographer, time period they belong to, country/region etc. I suggest that to construct such sub-categories, profound market notion is required, but eventually the results of research obtained would describe the dynamics of fine art photography market in 1996-2008.

To analyze the place of fine art photography in global art world, I suggest to compare the results obtained in this research as well as results on sub-markets to alternative markets, paintings for instance. If possible, the data on alternative marlet should correlate in time scale to receive the most up-to-date and real-in-terms results.

From the data, it is also possible to research the price dynamics on photography sub-markets and add to the list of variables pre-estimated prices and bought-in samples. Testing whether pre-estimates influence the price and tracking the artworks that were bought-in once and then resold, will determine which factors influence the final price of photographs and to what extend.

Additionally, it is suggested to apply other methodologies to calculate rates of return on investments in arts, such as hedonic price analysis etc.

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