

ART AS A FINANCIAL INVESTMENT

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The comparatively poor performance of traditional asset classes in recent years has driven the search for greater returns via alternative asset classes. The desire to reap higher risk adjusted returns from diversification into assets which offer low and even negative correlation with equities and bonds is extremely desirable. There has been a huge growth in the traditional alternative investments such as real estate, commodity futures, private equity and hedge fund investments. Additionally, a number of funds specialising in art have recently emerged. These also appear to offer a highly beneficial diversification strategy with extremely low correlation with traditional asset classes. It is important for investors to understand the risk and return characteristics of this new alternative asset class.

In this paper we take a closer look at art as an alternative asset, and look specifically at how this new alternative asset is expected to perform, also during bear markets, when the benefits of diversification are most needed. We look at the risk and return characteristics of art using art market indices, and the prospects for portfolio diversification in the art market using a variety of data across art market sectors, including the Old Master, European Impressionist, Modern and Contemporary art markets. Due to the low correlation of art with other asset classes, we find opportunities for portfolio diversification across art markets and across asset classes. The results hold, even allowing for the high transaction costs, which are encountered when trading art, when spread over a longer time horizon.

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The vogue for investing in art has received a boost from the availability of art price data. In any market, knowledge empowers the consumer and the proliferation of information sources in the art market is testimony to this. Databases, indices, and market reports are now essential analytical tools with which art investors can assess financial performance. A number of indices show average returns for artists and market sectors with data ranging from the 17th century until today.

We will focus on the use of available indices for various art markets to give us an indication of art's performance in a diversified portfolio. These provide a good impression of the risk / return profile for art funds.

The difficulty with these tools is that the information on which they are based is neither consistent nor complete, and this may distort results when they are compared to indices for more transparent markets. It is therefore useful to examine briefly the methods currently employed by these information sources to gain an informed perspective of the results they provide.

The rest of the paper is outlined as follows. In the following section we discuss the current data on art indices and the surrounding methodologies. In the section thereafter we look at the risk and return characteristics of fine art markets. We then analyse art as an alternative asset class in an international diversified portfolio. We take into account the high transaction costs encountered when auctioning fine artworks, as well as the implications of smothered returns, which occurs for assets which are appraisal based. Due to the moderate return found for art in the last 30 years, and the low correlation which art appears to exhibit with other asset classes, including more alternative

assets, we find there is a serious case for holding a small percentage of the investment portfolio in art. At present it is inconceivable to hold an index tracking fund, however there are a number of alternatives means to hold a diversified art portfolio as part of an overall wealth management strategy. We conclude in the final section.

Data and Methodology

Art Indices

The Mei Moses and Art Market Research art indices are the two most widely quoted indicators of art market performance. Both are reliant on data from sales at the main auction houses. However, auction results alone provide an incomplete picture of the market performance because they are only a portion of the whole market.

The dealer market is largely ignored due to an absence of obtainable data. There is some disagreement as to the percentage of the market that dealers comprise. Figures from two recent studies range from a 50-50 split between auction houses and dealers to 70-30 split in favour of dealers. In any event, it cannot be denied that dealers have a significant, albeit unquantifiable, impact upon the art market. The absence of dealers' transactions from the art indices may have a bearing upon the rate of return indicated by the indices. This is due to the fact that dealers may buy at lower prices but sell at higher prices transactions costs, thereby reducing the art investors' rate of returnⁱ. It is likely that art funds, which act more like private dealers than auction houses, adopt a similar strategy and use their insider knowledge and expertise to exploit inefficiencies in the market. This is likely to produce art market returns much larger than the benchmark used here.

There are four main methodologies for producing art price indices; geometric means, average prices, repeat sales regressions (RSR) and hedonic regressions. Chanel, Gerard-Varet and Ginsburgh's [1996] study indicates that over long periods the respective methodologies are closely correlatedⁱⁱ. Issues regarding the various index pricing methodologies are extremely well highlighted in a recent paper by Ginsburgh, Mei and Moses [2006], which specifically compares hedonic to repeat sales regression. Ashenfelter and Graddy [2003] provide an excellent survey of average returns estimated from art price data, currently in the academic literature. We have extended the Exhibit with a few additional studies.

For the purpose of this comparison we shall focus on the data from Art Market Research since it provides a wider and more frequent source of information. We also provide some comparison with the Mei Moses All Art index.

INSERT EXHIBIT 1

These indices show that historically, average real returns for art are moderate. Returns are above inflation and tend to be greater than for government bonds, but less than for equities. There has been a general upward trend of art price increases in the market. See exhibit 1 for the performance of a \$1000 investment in the art market over the period 1976-2006. This is purely theoretical, since trading such an index is not presently possible.

INSERT EXHIBIT 2

The survey of art pricing methodologies in exhibit 2 tends to indicate that the repeat sales methodology provides slightly higher estimates of average returns than the other methodologies for similar time periods. For example, Anderson [1974] provides

RSR and Hedonic price indices for the periods 1780-1970 and 1780-1960 and Chanel, Gerard-Varet and Ginsburgh [1996] for the period 1855-1969. It is of interest to observe the long-run trend in the market, and to note that there have been periods in which art returns have been substantially higher than average.

To evaluate the various index methodologies we use both data from Art Market Research (AMR) and Mei Moses (MM) All Art Index. AMR data is available monthly but only goes as far back as 1976. We include data for the 100% range for each sector. It is important to include the entire distribution in the indices because this takes into account the extreme price movements in the market which are vital in correlation estimation and the analysis of diversification benefits. AMR data uses average returns on a 12 month moving average.

The MM series for the All Art Index dates from 1875 measured on an annual basis and from 1965 on a semi-annual basis. The MM All Art Index is computed using repeat sales initially sold at auction by Sotheby's and Christie's.

In exhibit 3 we have provided the summary statistics for two types of price index methodology. To compare the two series we use semi-annual data from 1976 to 2002ⁱⁱⁱ. Using semi-annual data rather than monthly increases the series' annual volatility, and the shorter time period results in a slightly lower average annual return.

For all indices we calculate the return of the market, i , by the continuously compounded return. This is commonplace in financial economics and more appropriate than measuring cumulative returns. The return is the natural log return of the price index at time, t , such that $\Delta p_{i,t}$ denotes the rate of change of $p_{i,t}$:

$$\Delta p_{it} = \ln\left(\frac{p_{i,t}}{p_{i,t-1}}\right) \times 100. \quad (1)$$

INSERT EXHIBIT 3

From exhibit 3 we can see that the average return on the MM data series for the 27 year period has been much higher than when using the AMR data. Using repeat sales the average return on an annual basis is over 10%, whereas the AMR general art index was just over 5.25% (8% for US artists and 5% for artists in the UK)^{iv}. Stein [1977], Goetzman [1993] and Ginsburgh [2006] all acknowledge the selection bias which occurs from focussing on repeat sales. To be included in the calculation, repeat sales regression requires artworks to be offered for sale at auction more than once. It is thought that artworks that fall drastically in value tend not to be resold at auction^v.

Computing the correlation statistics for the two different index methodologies shows us that at first glance the Art 100 methodology from Art Market Research is only 20% correlated with the Mei Moses All Art Index. (Exhibit 3.B). This is due to smoothing in the AMR index.

Taking a two-period moving average for the return series increases the correlation dramatically. This is especially true for the All Art Index and the US 100 indices, which have a correlation coefficient of 86%. The larger number of observations used for the moving averages provides correlation coefficients nearing 90%. (Exhibit 3.C).

The above results indicate that the two methodologies result in indices that are both good proxies of art market prices of auction sales data.

The collection of information from databases is however, problematic for a number of reasons^{vi}. Ashenfelter and Graddy's [2003] study contends that an empirical discrepancy in one year can materially alter the overall rate of return by up to 5%. We

also find evidence of this phenomenon when the Mei & Moses All Art Index is compared to the General Art Index of Art Market Research for the period 1976-2002. A difference in their estimations of the return after the art market bubble burst in 1991 results in a significant difference between the average return figures thereafter. This can be observed in exhibit 4, where both indices are plotted together. We see that the repeat sales index does not capture as significant a downturn as the AMR data does.

INSERT EXHIBIT 4

This difference also indicates the importance of liquidity during downturns in the art market. The number of art sales is likely to be greatly reduced in downturns, with the market becoming more illiquid. There is a greater degree of liquidity risk facing the art investor than with other financial assets. With artworks not reaching their reserve prices and not being sold, this will have an effect on the prices included in the price indices. Fewer transactions result in larger estimation errors. At present little information is available on market liquidity over the empirical time series. This problem is especially significant for the case of repeat sales regression estimations, which are constructed with fewer observations. It is likely that the price estimation error which occurs after the art market crash in the early 1990s was due to this issue with repeat sales estimation. Mei & Moses suggest that art does significantly better during wartime, using the example of four U.S. wars this century [Forbes, 2001]. During these periods art appears to outperform stocks. This may also be due to the lack of liquidity during these periods, and is a highly interesting point that requires further investigation.

Evidently, fundamental problems exist with art databases and indices. However, both are becoming more sophisticated and accurate at providing objective information on

what is a notoriously difficult asset to value. Comfort can be taken from the fact that the Standard & Poor's was recently overhauled. If well-established, traditional investment indices are still tweaking their assumptions, art indices may also be forgiven for refining their models over time.

Although the information provided by the databases and indices is not complete, it is the best market information that is currently available. The information provides us with a good indication of the general trends in the market. Moreover market anomalies and inefficiencies may lead to much higher realised returns.

Investment skill lies in interpreting the available information, assessing whether the risk-return ratio is acceptable, and deciding whether the investment is appropriate to an existing portfolio. Taste adds an additional, unquantifiable element of risk to art investment even after market analysis has been undertaken. Art as a direct investment presents a risky investment opportunity, although purchasing according to personal taste results in an aesthetic benefit which can potentially outweigh any financial benefit or loss incurred.

When considering art as an indirect investment, where the non-pecuniary benefits are not obtained, then an investor would be advised to opt for an alternative investment vehicle (AIV) or art mutual fund (AMF) where risk diversification through the securitization of artworks is more likely to result in greater financial returns.

Fine Art Market Performance

To analyse the performance of a variety of art markets we focus on the data indices produced by AMR. These indices also allow for a breakdown of the fine art market into various sectors.

For the various schools, movements and periods the average prices of sales by individual artists are combined to form an equally-weighted portfolio. For the purpose of this analysis we use the General art index as well as the following four sectors of the art market: Old Masters, European Impressionists, Modern and Contemporary.

The General art index contains a mixed basket of over 100 well-known artists ranging from Basquiat to Canaletto. The index covers a variety of artists from different sectors and countries, constituting a diversified index of art. The index comprises art sales data from over 109,000 auction sales.

The Old Masters index consists of European artists until the 18th century. There are over 25,000 sales included in the index with artists from Brueghel (1568–1625) to Constable (1776-1837).

The index for European Impressionist art contains a smaller sample of 25 artists, for example, Manet (1832-1883) and Matisse (1869-1954). The period includes European Impressionist artists in the late 19th century and also some Post-Impressionists. The number of sales included in the index is lower than for other sectors, with just over 22,000 prices included.

Modern art contains a higher number of artists and sales prices, with over 63,000 transactions included. These range from Kandinsky (1866-1944) to Bacon (1909 - 1992). There may be some disagreement among art historians about the exact definitions of the classification of 'Modern' art.

The final sector is Contemporary art, for which there are over 21,000 sales included in the data. The index is newer with data starting in 1985. Artists covered include Freud (1922 -) and Hirst (1965 -).

The choice of artists, which is shown in the appendix, is a highly subjective but representative choice. The indices, therefore, provide a general indication of art sector price movements.

In exhibit 5 we see that prices over the past 30 years the various sectors at times have diverged quite substantially, particularly during the period of the bubble (1988-1991), which affected Impressionist art more than other sectors. Starting at 1000 in 1976, the indices today range between the 5400 level for general art index and the old masters market, to the 6300 level for European Impressionists.

INSERT EXHIBIT 5 & 6

Including contemporary art and rebasing the indices from January 1985, we can see that this sector has outperformed all others over the past 20 years. Impressionists were the lowest performers, with their greatest returns having been made in the late 1970s. This can be seen in exhibit 6.

Risk and Return

Fine Art Markets

Using data from January 1980 until February 2006 we have 25 years' worth of monthly return data for a variety of sectors. In exhibit 7 below, we can see that the general art index has given an average annual return of 6.5%. More specifically, Old Masters have generated 5.5%; European Impressionists, 6.3%; and Modern averaging

around 7.5%. Contemporary (data starts in 1985 so we take the slightly shorter 20 year period) offered the highest returns at a 9% annual basis.

INSERT EXHIBIT 7

Taking a representative, hypothetical fund which holds a composition of 30% Old Masters, 15% European Impressionists, 15% Modern and 40% Contemporary, the average return using data from the various sectors is 7.05%. This is for the 20 year period, since data on Contemporary art starts in 1985.

Descriptive statistics are shown in exhibit 8. The European Impressionists have been the most volatile market with an annual average standard deviation of the series of more than 15%. Old Masters have been the least volatile with only a 7% average annual standard deviation.

INSERT EXHIBIT 8

In this section we take a closer look at the risk and return characteristics of the sectors, focusing specifically on the 25 year period from 1980 – 2006. This period is chosen since other asset class data in the later section is only available from 1980.

The fine art indices are themselves not highly correlated. This gives an indication of the potential benefits from holding a diversified art portfolio across artists and across various art sectors. The highest correlation over the period is between the general art index and all other sectors, most likely because each of the individual sectors feeds into the general art index. The correlation coefficients range between 27% and 53% for the 4 individual art sectors. Modern art and the general art index are 76% correlated.

INSERT EXHIBIT 9 & 10

Looking at the return-risk ratio of the various sectors we see that Modern and Contemporary art offer the highest return for a unit of risk, where risk is measured by the standard deviation of returns. Per unit of risk the fund composition also offers an attractive return of 1.02. Though the average return is slightly less than for the Modern and Contemporary markets the risk is alleviated through a well diversified portfolio where returns per unit of risk are as high as for Modern art.

INSERT EXHIBIT 11

The risk-return trade off can also be depicted graphically as shown in exhibit 12. Generally, there is a positive trade off between risk and return. The relationship of a higher expected return required for an investor to face greater risk underpins modern finance theory. The higher the return and the lower the risk the more desirable the index from a financial point of view. In this case the most attractive point from a financial point of view is the top left hand corner of the graph. This is illustrated for both the Modern and Fund composition markets.

INSERT EXHIBIT 12

Asset Class Framework

The financial markets analysed represent the major asset classes. We use the Morgan Stanley Capital Indices^{vii} for US equity, (MSCI US), UK equity (MSCI UK) and world equity (MSCI World), Lehman Brothers Aggregate Corporate Bond Index (available only for the US) and North American Real Estate Investment Trust Index (NAREIT). For the Hedge Fund data series we use the Credit Suisse/Tremont Hedge Fund data series dating from 1994. We use the US and UK 10-year Government Bond

Indices, and UK Government Treasury Bills, which have only been available on a monthly basis from 1980. Data is collected from Datastream, Global Financial Data, NAREIT and Credit Suisse/Tremont. Descriptive statistics are given for a variety of time horizons for all asset classes in exhibit 13.

INSERT EXHIBITS 13 & 14

In exhibit 14 we have plotted the risk and return trade off for the variety of asset classes. We see a general trade off between risk and return. Due to the smoothed nature of the art market return series we have also included desmoothed art index which accounts for the moving average in the series. The risk is substantially higher for the same level of return, and hence should be more reflective of the true volatility in the market. This desmoothing process is common in the finance literature for real estate and hedge funds. We shall use this desmoothed data later in our analysis on optimal portfolio allocation.

In exhibit 15 correlation statistics are given for the 25 year horizon. Art has a low correlation with other asset classes; the highest being with commodity futures with a monthly 9% correlation and the most negatively correlated with North American real estate investment trust whose returns are correlated at -8%. Domestic real estate and art's correlation tends to be higher.

INSERT EXHIBITS 15 & 16

Correlations with other asset classes remain low even after accounting for various time horizons (See exhibit 16). During the recent bear market for equities, when commodity futures prices, government bond indices, and real estate markets have all

risen the correlations between art and other asset classes has been positive, albeit quite low.

INSERT EXHIBIT 17

The return per unit of risk for the various asset classes shows that over the past 20 years, hedge funds have offered the most attractive returns, with UK government bonds also offering a good return per unit of risk. NAREIT, art and equity also offer attractive investment opportunities. The level to which these assets can reduce risk in an asset portfolio depends crucially on the extent to which the returns are correlated with each other. The lower the correlation, the higher the diversification benefits, and the greater the ability of the portfolio to maintain returns whilst reducing risk. This results in more moderate returns being made with a lower standard deviation around the expected mean.

INSERT EXHIBIT 18

For the lowest 10% of returns on the UK equity market for the last 25 year period, the average return on other financial assets varied between -6% for world equity and 1.4% for US corporate bonds. UK government bonds also provided good protection with returns close to the average 9% over the same period (see exhibit 13 part A).

Art provides significantly greater monthly returns during these months than the other asset classes. This is, of course, affected by the smoothing process inherent in the data.

Portfolio Diversification

To determine optimal portfolio allocations, we need to make an assumption about the expected return distribution of asset classes. Our best prediction of the future is

helped by looking at the historical distribution of returns as an estimate of future expected returns. This, of course, depends on the time horizon chosen in the past. We have provided a number of descriptive statistics as well as correlation coefficients for the time horizons of 25 years, 15 years and 5 years. Data on UK government bonds are only available on a monthly basis since 1980. Since Government bonds are a crucial element of any well diversified portfolio, we optimise the portfolio using data from the past 25 years.

Importantly, investing in art has large transaction costs, sometimes as much as 30% of the sale price. This can be minimised by taking a long time horizon. For this reason, we suggest a time horizon of 25 years.

In exhibit 19 the risk-return trade off between the various asset classes is shown along with the optimal portfolio when art is also included. Also shown is the capital market line where the risk free rate (where the risk is assumed to be zero) intercepts with the y axis and the optimal portfolio of assets. The investor can obtain any position along the capital market line by holding a proportion of his wealth in cash, with an expected return equal to the risk free rate and the optimal portfolio.

INSERT EXHIBIT 19

The optimal portfolio is derived from the perspective of a UK investor who has the possibility of investing in the following indices: World, US and UK equity, US corporate bonds, Commodity Futures Index, North American Real Estate Investment Trusts (NAREIT), 10 year UK Government Bonds, Art Index and Hedge Funds.

We first optimise the portfolio excluding an investment in art. This assumes the risk-return profile from the past 25 years and generates the following combination of these assets held is given in exhibit 20.

INSERT EXHIBIT 20

Including General Art in the portfolio we find that the low correlation with the other asset classes results in a high allocation of art into the portfolio: over 20%. This is derived using the General Art index rather than the fund composition, which would be an even higher percentage allocation in the optimal portfolio. Therefore the more conservative return from the General art index does not over-emphasise the art allocation.

INSERT EXHIBIT 21

An important feature of the data methodology behind the indices is the moving average, which results in a positively autocorrelated series. It is important in the analysis on risk and return and on portfolio diversification that the true market risk and return levels are calculated. In the next section, the desmoothed data results in a more volatile return series which is more in line with the true art market volatility.

The section from this point on will take transaction costs into account, which has the effect of reducing the returns made on the series. We will look at how these two effects of greater risk and lower return affect the optimal portfolio allocation. Finally, we will include hedge funds in the optimal portfolio allocation.

Desmoothing Returns

At first glance the art market does not looksto have been too volatile. However the lower volatility on the art market is highly likely to be due to appraisal–induced biases,

occurring during the indexation of the art data, and hence smoothing the returns. This has the effect of generating volatilities which are substantially lower than the true volatility appearing in the market.

Since the data for the art indices are generally appraisal based, they therefore need to be analysed carefully. Whilst it is a highly valuable source of information regarding behaviour in the art market there is of course a difference between the appraisal based returns and the true market returns. It is the true market returns which actually represent the economic opportunity cost to investors, and the statistical properties of which, which are directly comparable to alternative asset classes. The illiquid nature of the art market, with infrequent valuations, and averaged price quotes, leads to a smoothing in the returns. It is therefore imperative that the series are ‘desmoothed’ so as to eliminate, as far as possible, any underlying autocorrelation, which tends to be characteristic of these smoothed series of appraised returns. The most widely used approaches are those of Geltner [1993], from the real-estate finance literature, and now also common in the Hedge Fund literature (Brooks & Kat [2001] and Kat & Lu [2002]). Geltner adjusts the return series to eliminate the first order autocorrelation. Assuming that the observed (smoothed) return on the art index, r_t^* , is a weighted average of the true underlying return at time t , r_t , and the observed (smoothed) return at time $t-1$, r_{t-1}^* :

$$r_t^* = (1 - \alpha)r_t + \alpha r_{t-1}^* \quad (1)$$

Simply rearranging enables us to determine the actual return which if we assume is an AR(1) process acts to eliminate the first order autocorrelation.

$$r_t = \frac{r_t^* - \alpha r_{t-1}^*}{1 - \alpha} \quad (2)$$

If the first order autocorrelation of the smoothed series is positive then the standard deviation of the actual return series will be greater. However if the first order autocorrelation of the smoothed series is negative, then the standard deviation of the actual series will be lower. If the autocorrelation structure is more complicated then the more rigorous process developed by Okunev and White [2003] can be adopted to remove higher levels of autocorrelation in the smoothed series.

$$\alpha = \frac{(1 + a_{0,2} - 2d_1 a_{0,1}) \pm \sqrt{(1 + a_{0,2} - 2d_1 a_{0,1})^2 - 4(a_{0,1} - d_1)^2}}{2(a_{0,1} - d_1)} \quad (3)$$

Where the constant, α , to desmooth the series, is a function of higher orders of autocorrelation^{viii}. This approach is directly applicable for art indices, which also exhibit exceptionally high autocorrelations in reported returns. There is indeed evidence of smoothing in the returns, and for these series which are positively autocorrelated has the effect of diminishing the risk apparent in the asset class, hence we need to correct for the smoothing, resulting in a more volatile ‘desmoothed’ return series.

We find that using the more simplified approach from Geltner does not completely eliminate the first order autocorrelation in the time series for art. The more sophisticated approach from Okunev and White [2003], which takes into account higher orders of autocorrelation into account, does result in a desmoothed series, that no longer suffers from first order autocorrelation. The high, positive autocorrelative structure present in the art series results in the desmoothed series exhibiting significantly higher volatility.

By desmoothing the returns to account for the autocorrelation in the data, we find that the risk increases substantially from 6.5% to 11.5%^{ix}. By taking a universal 5%

increase in the monthly standard deviation for the art series, we see how this affects the optimal portfolio allocation. This reduces the allocation in art substantially, by roughly half, from over 20% to just under 10%, with the 10% reduction in art roughly equally spread among the other asset classes in the portfolio. The low correlation still results in art providing a highly attractive portfolio investment. World equity still remains unattractive given the slightly lower return-risk ratio than the other asset classes and the relatively high correlation with the US equity market; in this case 90% correlation. This is seen in exhibit 22 below.

INSERT EXHIBIT 22

Transaction Costs

Art's high transaction costs spread over 25 years equals 1.5% per year. Despite these costs, art still remains an attractive, but small portfolio allocation.

INSERT EXHIBIT 23

Including Hedge Funds

Hedge funds provide an attractive return per unit of risk. This means that hedge funds also provide an interesting asset to include in a diversified portfolio. Including them in the portfolio allocation analysis, we find a much higher allocation into hedge funds and art's allocation reduced to only 3%. From exhibit 15 we saw that the correlation of hedge fund returns and mainstream asset classes was higher than between other alternative asset classes. This is because hedge funds, rather than being an

alternative asset class, offer investment strategies for investing in mainstream assets, mainly equities.

We find that optimising the portfolio with the inclusion of hedge funds in the four previous scenarios; i) without art, ii) with art, iii) with desmoothed art and iv) with desmoothed art and transaction costs, produces the following portfolio allocations.

INSERT EXHIBIT 24

For each of the four scenarios, the allocation into art is increasingly lower and there is a large percentage allocation into hedge funds. Hedge funds over the period analysed here have been the preferred investment to equity.

Summary and Conclusions

Faced with underperforming portfolios, investors are continually seeking alternative assets and sophisticated solutions to reap high returns whilst minimising risk. In this paper, we have taken a close look at the financial implications of including art as an alternative asset class. This previously non-transparent market is becoming more accessible via the increasing availability of indices and data on the art market. Additionally, art funds offer investors the opportunity to invest indirectly into the art market.

Indirect investment into the art market results in losing the aesthetic pleasure from holding the art; however, financial gains can be made through pooling resources with the help of experts, whilst gaining from diversification benefits. The art fund market is still in its infancy. There are few alternatives and these are only available to investors willing to

invest at a substantial level. Entry levels are at present still high. In time, these funds may become more accessible to the mainstream investor through pooling joint interests.

The results in this paper show that art's low correlation with other asset classes offer diversification benefits from holding art in an investment portfolio. Optimal portfolio allocations using empirical returns over the past 25 years provide support for investors to consider art an attractive, albeit small addition to their investment strategy.

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Appendix – Index Constituents

General All Art

Pierre ALECHINSKY, Helen ALLINGHAM, Sir Lawrence ALMA-TADEMA, Michael ANCHER, Karel APPEL, Georg BASELITZ, Jean Michel BASQUIAT, Albert BIERSTADT, Pierre BONNARD, Fernando BOTERO, Francois BOUCHER, Eugene BOUDIN, Arthur Merric Bloomfield BOYD, Georges BRAQUE, Bernard BUFFET, Sir Edward Coley BURNE-JONES, CANALETTO, Marc CHAGALL, Sandro CHIA, Giorgio de CHIRICO, Pieter CLAESZ, Jean Baptiste Camille COROT, Gustave COURBET, Salvador DALI, Montague DAWSON, Otto DIX, Jean DUBUFFET, Max ERNST, Henri FANTIN-LATOUR, Lionel FEININGER, Lucio FONTANA, Myles Birket FOSTER, Jean Honore FRAGONARD, Sam FRANCIS, Thomas GAINSBOROUGH, John William GODWARD, Jan van GOYEN, Jean-Baptiste GREUZE, Atkinson GRIMSHAW, Francesco GUARDI, Keith HARING, Henri HARPIGNIES, Childe HASSAM, Paul-Cesar HELLEU, John Frederick (snr) HERRING, Ferdinand HODLER, Antonio JACOBSEN, Johan-Laurents JENSEN, Johan Barthold JONGKIND, Asger JORN, Jan van KESSEL, Ernst Ludwig KIRCHNER, Moise KISLING, Paul KLEE, Gustav KLIMT, Willem KOEKKOEK, Oskar KOKOSCHKA, Willem de KOONING, Nicolas de LARGILLIERE, Carl LARSSON, Marie LAURENCIN, Fernand LEGER, Lord Frederic LEIGHTON, Sir Peter LELY, Bruno LILJEFORS, Nicolaes MAES, Rene MAGRITTE, Michele MARIESCHI, Ben MARSHALL, Henri MATISSE, Sir John Everett MILLAIS, Joan MIRO, Claude MONET, Giorgio MORANDI, Sir Alfred MUNNINGS, Emil NOLDE, A R PENCK, Pablo PICASSO, Serge POLIAKOFF, Pierre Auguste RENOIR, Sir Joshua REYNOLDS, Jean-Paul RIOPELLE, Diego RIVERA, Hubert ROBERT, Dante Gabriel ROSSETTI, Salomon van RUYSDAEL, Gino SEVERINI, Dorothea SHARP, Leon SPILLIAERT, Carl SPITZWEG, Alfred STEVENS, Marcus STONE, Abraham STORCK, Antonio TAPIES, David (younger) TENIERS, Fritz THAULOW, Archibald THORBURN, Giovanni Battista TIEPOLO, James Jacques Joseph TISSOT, Maurice UTRILLO, Louis VALTAT, Edouard VUILLARD, Andy WARHOL, Tom WESSELMANN, Jack Butler YEATS, Anders ZORN

Old Masters

Ostias I BEERT, Nicolaes BERCHEM, Louis Leopold BOILLY, Francois BOUCHER, Jan (elder) BRUEGHEL, Jan (younger) BRUEGHEL, CANALETTO, Annibale CARRACCI, John CONSTABLE, Aelbert CUYP, Arthur DEVIS, Carlo DOLCI, Sir Anthony van DYCK, Jean Honore FRAGONARD, Frans I FRANCKEN, Thomas GAINSBOROUGH, Theodore GERICAULT, Luca GIORDANO, Jan van GOYEN, Jean-Baptiste GREUZE, Francesco GUARDI, Giacomo GUARDI, Giovanni Francesco GUERCINO, Jan Davidsz de HEEM, Egbert van HEEMSKERK, Meindert HOBBERMA, William HOGARTH, Melchior de HONDECOETER, Jean Baptiste HUET, Jacob van HULSDONCK, Jan van HUYSUM, Julius Caesar IBBETSON, Antonio JOLI, Jacob JORDAENS, Jan van I KESSEL, Nicolas LANCRET, Nicolas de LARGILLIERE, Sir Thomas LAWRENCE, Sir Peter LELY, Carle van LOO, Nicolaes MAES, Alessandro MAGNASCO, Michele MARIESCHI, Ben MARSHALL, Adam Frans van der MEULEN, Jan Miense MOLENAER, Klaes MOLENAER, Joos de MOMPER, Peter MONAMY, Jean Baptiste MONNOYER, George MORLAND, Alexander NASMYTH, Charles-Joseph NATOIRE, Jean Marc NATTIER, Aert van der NEER, Adriaen van OSTADE, Isaac van OSTADE, Jean Baptiste OUDRY, Giovanni Paolo PANINI, Jean Baptiste PATER, Giambattista PIAZZETTA, Giovan Battista PIRANESI, Guido RENI, Sir Joshua REYNOLDS, Marco RICCI, Sebastiano RICCI, Hubert ROBERT, George ROMNEY, Salvator ROSA, Thomas ROWLANDSON, Sir Peter Paul RUBENS, Jacob van RUYSDAEL, Salomon van RUYSDAEL, Paul SANDBY, Francis (elder) SARTORIUS, John Nott SARTORIUS, Jan STEEN, George STUBBS, Giovanni Battista TIEPOLO, Giovanni Domenico TIEPOLO, Jacopo TINTORETTO, Joseph Mallord William TURNER, Lucas van UDEN, Willem van de (elder) VELDE, Simon VERELST, Nicolas van VERENDAEL, Joseph VERNET, Paolo VERONESE, David VINCKEBOONS, Simon de VLIET, Sebastian VRANCKX, Jean Antoine WATTEAU, Jan WEENIX, Adam WILLAERTS, John WOOTTON, Philips WOUWERMAN, Joseph WRIGHT OF DERBY, Jan WYNANTS, Johann ZOFFANY, Francesco ZUCCARELLI

European Impressionists

Laureano BARRAU, Jean BERAUD, Eugene BOUDIN, Gustave CAILLEBOTTE, Paul CEZANNE, Edgar DEGAS, Jean Louis FORAIN, Paul GAUGUIN, Armand GUILLAUMIN, Albert LEBOURG, Stanislas LEPINE, Max LIEBERMANN, Edouard MANET, Henri -French MARTIN, Henri MATISSE, Maxime MAUFRA, Claude MONET, Berthe MORISOT, Roderic O`CONOR, Camille PISSARRO, Pierre Auguste RENOIR, Theodore ROUSSEAU, Alfred SISLEY, Max SLEVOGT, Joaquin SOROLLA Y BASTIDA

Modern Artists

Pierre ALECHINSKY, Karel APPEL, Fernandez ARMAN, Edouard ARROYO, Frank AUERBACH, Francis BACON, Willi BAUMEISTER, William BAZIOTES, Max BECKMANN, Joseph BEUYTS, Max BILL, Jules BISSIER, Fernando BOTERO, Louise BOURGEOIS, Alberto BURRI, Reg BUTLER, Alexander CALDER, Giuseppe CAPOGROSSI, Anthony CARO, Baldaccini CESAR, Lynn CHADWICK, John CHAMBERLAIN, Eduardo CHILLIDA, CHRISTO, CORNEILLE, Joseph CORNELL, Richard DIEBENKORN, Jim DINE, Piero DORAZIO, Jean DUBUFFET, Jean FAUTRIER, Lucio FONTANA, Sam FRANCIS, Helen FRANKENTHALER, Alberto GIACOMETTI, Arshile GORKY, Adolph GOTTLIEB, Hans HARTUNG, Dame Barbara HEPWORTH, Patrick HERON, Eva HESSE, David HOCKNEY, Hans HOFMANN, Friedrich HUNDERTWASSER, Robert INDIANA, Asger JORN, Wassily KANDINSKY, Paul KLEE, Yves KLEIN, Franz KLINE, Willem de KOONING, Wilfredo LAM, Peter LANYON, Roy LICHTENSTEIN, Richard LINDNER, Richard LONG, Morris LOUIS, Piero MANZONI, Giacomo MANZU, Marino MARINI, Agnes MARTIN, Georges MATHIEU, MATTA, Joan MITCHELL, Henry O M MOORE, Robert MOTHERWELL, Ernst Wilhelm NAY, Louise NEVELSON, Ben NICHOLSON, Isamu NOGUCHI, Jules OLITSKI, Victor PASMORE, Serge POLIAKOFF, Jackson POLLOCK, Arnaldo POMODORO, Arnulf RAINER, ARNULF RAINER, Martial RAYSSE, Ad REINHARDT, Germaine RICHIER, Bridget RILEY, Jean-Paul RIOPELLE, Diego RIVERA, James ROSENQUIST, Mark ROTHKO, David SIQUEIROS, Pierre SOULAGES, Daniel SPOERRI, Nicolas de STAEL, Rufino TAMAYO, Antonio TAPIES, Wayne THIEBAUD, Mark TOBEY, Gunther UECKER, Emilio VEDOVA, Bram van VELDE, Maria Elena VIEIRA DA SILVA, Andy WARHOL, Tom WESSELMANN

Contemporary Artists

Carl ANDRE, Richard ARTSCHWAGER, Miguel BARCELO, Matthew BARNEY, Georg BASELITZ, Jean Michel BASQUIAT, Vanesa BEECROFT, Ross BLECKNER, Christian BOLTANSKIMaurizo CATTELAN, Sandro CHIA, Francesco CLEMENTE, Tony CRAGG, Enzo CUCCHI, Olivier DEBRE, Wim DELVOYE, THOMAS DEMAND, RINEKE DIJKSTRA, Peter DOIG, STAN DOUGLAS, Marlene DUMAS, Tracey EMIN, Luis FEITO, Rainer FETTING, Eric FISCHL, P.& WEISS FISCHLI, Dan FLAVIN, Gunther FORG, Lucian FREUD, GILBERT and GEORGE, Robert GOBER, NAN GOLDIN, Felix GONZALEZ-TORRES, Douglas GORDON, DAN GRAHAM, Andreas GURSKY, Keith HARING, Damien HIRST, Jenny HOLZER, Gary HUME, Jorg IMMENDORF, Jasper JOHNS, Donald JUDD, Alex KATZ, Mike KELLEY, Ellsworth KELLY, Anselm KIEFER, Martin KIPPENBERGER, Jeff KOONS, Jannis KOUNELLIS, Sol LEWITT, Robert LONGO, Sarah LUCAS, Robert MANGOLD, Brice MARDEN, Mario MERZ, Juan MUNOZ, Bruce NAUMAN, Shirin NESHAT, Chris OFILI, Claes OLDENBURG, Gabriel OROZCO, Nam June PAIK, Mimmo PALADINO, PANAMERENKO, A R PENCK, Michelangelo PISTOLETTO, Sigmar POLKE, Richard PRINCE, Robert RAUSCHENBERG, Charles -American RAY, Gerhard RICHTER, Pipilotti RIST, Mimmo ROTELLA, Susan ROTHENBERG, Thomas RUFF, Edward RUSCHA, Niki de SAINT-PHALLE, David SALLE, Antonio SAURA, Jenny SAVILLE, Julian SCHNABEL, Thomas SCHUTTE, Sean SCULLY, George SEGAL, Richard -American SERRA, Andres SERRANO, Joel SHAPIRO, Cindy SHERMAN, Jose Maria SICILIA, Frank STELLA, Thomas STRUTH, Donald SULTAN, Rosemarie TROCKEL, Luc TUYMANS, Cy TWOMBLY, Jeff WALL, Franz WEST, Christopher WOOL

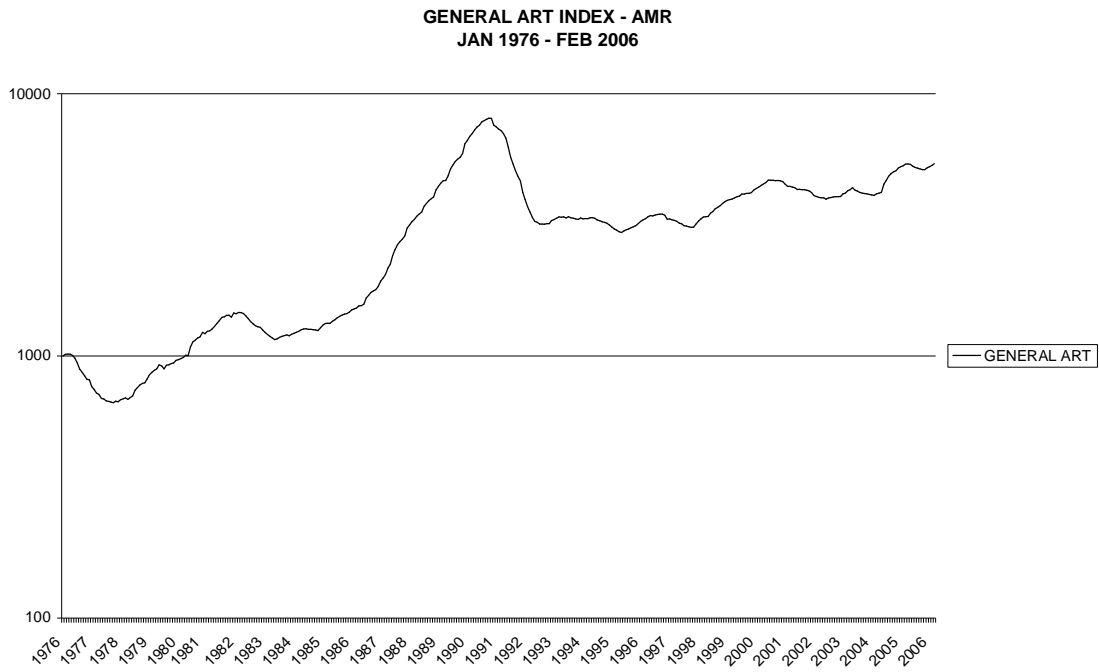
EXHIBIT 1: Estimated Fine Art Market Performance 17th – 21st Century

(As reported by various academic papers by period of study)

Author	Sample	Period	Method	Nominal Return	Real Return	Standard deviation
Baumol (1986)	Paintings in General	1652-1961	RSR		0.60%	
Frey and Pommerehne (1989)	Paintings in General	1635-1949	RSR		1.40%	
		1653-1987	RSR		1.50%	5.00%
		1950-1987	RSR		1.70%	
Buelens and Ginsburgh (1992)	Paintings in General	1700-1961	Hedonic		0.91%	
	Paintings in General	1780-1970	RSR	3.70%	3.00%	*
Goetzmann (1993)	Paintings in General	1716-1986	RSR	3.20%	2.00%	* 5.65%
		1850-1986	RSR	6.20%	3.80%	6.50%
		1900-1986	RSR	17.50%	13.3%	5.19%
Anderson (1974)	Paintings in General	1780-1960	Hedonic	3.30%	2.60%	*
		1780-1970	RSR	3.70%	3.00%	*
Chanel, Gerard-Varet and Ginsburgh . (1996)	Paintings in General	1855-1969	Hedonic		4.90%	
		1855-1969	RSR		5.00%	
Mei and Moses (2002)	American, Impressionist, and Old masters	1875-1999	RSR		4.90%	4.28%
		1900-1986	RSR		5.20%	3.72%
		1900-1999	RSR		5.20%	3.55%
		1950-1999	RSR		8.20%	2.13%
		1977-1991	RSR		7.80%	2.11%
Goetzmann (1996)	Paintings in General	1907-1977	RSR		5.00%	
Fase (1996)	19th Century	1946-1966		11.00%	7.50%	
		1972-1992		10.60%	1.10%	
Stein (1977)	Paintings in General	1946-1968	Geometric Mean	10.47%		
Barre, Docclo and Ginsburgh (1996)	Great Impressionist	1962-1991	Hedonic	12.0%	5.00%	*
	Other Impressionist	1962-1991	Hedonic	8.00%	1.00%	*
Czujack (1997)	Picasso Paintings	1966-1994	Hedonic		8.30%	
Deutschman (1991)	Old Masters	1971-1991		12.30%	6.04%	
Angnello & Pierce (1996)	19th Century US	1971-1992		9.30%	3.25%	
Campbell (2005)	Paintings in General	1976-2004	Average prices	5.73%	1.44%	8.27%
	US Paintings	1976-2004	Average prices	7.94%	3.66%	8.73%
Pesando (1993)	Modern Prints	1977-1992	RSR		1.51%	19.94%
Pesando and Shum (1996)	Picasso Prints	1977-1992	RSR	12.00%	2.10%	23.38%
Frey and Serna (1990)	Old Masters	1981-1988	Hedonic	10.59%	3.20%	
	Modern Contemporary					
Candela & Scorcu (1997)	Paintings	1983-1994		3.89%	0.21%	

* Real returns estimated additionally by Ashenfelter & Graddy

EXHIBIT 2: Performance of Fine Art Market 1976-2006



The General Art Index comprises all art indices from Art Market Research

EXHIBIT 3: Comparison of AMR Average Price data and MM Repeat Sales Indices 1976-2002

Semi-annual log return data 1976/01 – 2002/12

A.	Average Prices			Repeat Sales	
		ART 100	US 100	UK 100	All Art Index
Annual Average Return		5.27%	8.26%	5.12%	10.07%
Annual Average St Deviation		17.11%	15.86%	11.10%	21.88%
Average		0.026	0.041	0.026	0.050
Standard Deviation		0.121	0.112	0.078	0.155
Skewness		-0.837	-0.817	-0.097	-0.277
Kurtosis		1.694	1.029	-1.083	-0.395

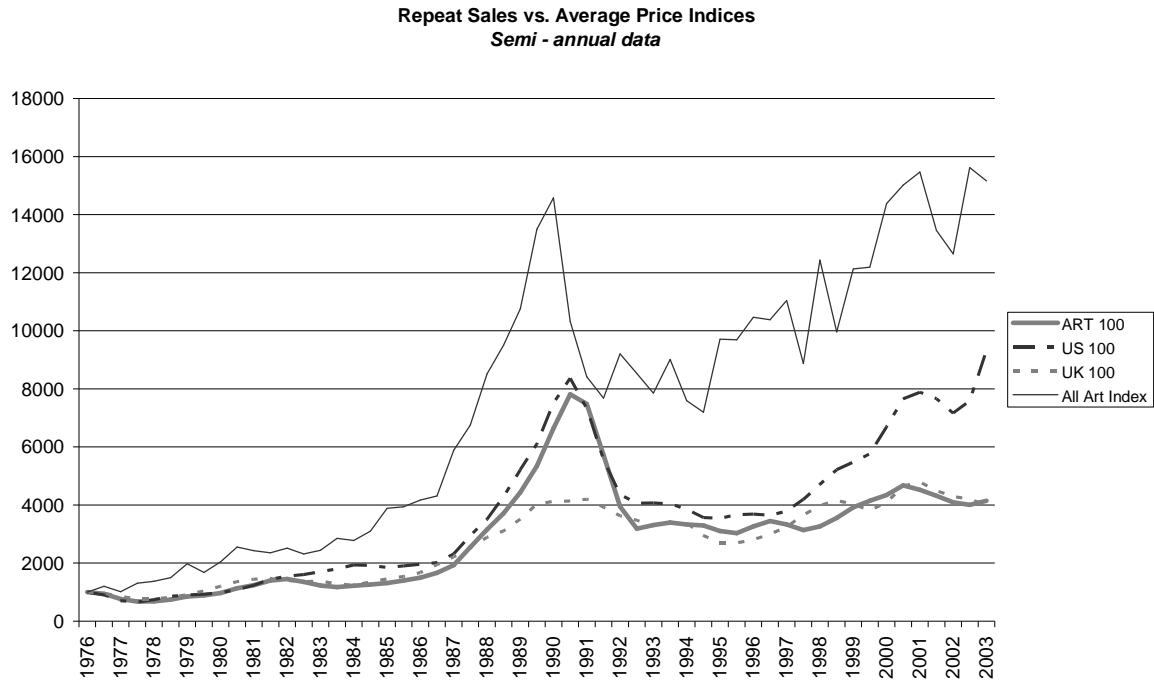
B. Correlation Matrix
Semi-annual log return data 1976/01 – 2002/12

	Average Prices			Repeat Sales
	ART 100	US 100	UK 100	All Art Index
Art 100	1.000			
US 100	0.822	1.000		
UK 100	0.651	0.565	1.000	
All Art Index	0.210	0.221	0.250	1.000

C. Correlation Matrix
Semi-annual log returns - 2 period moving averages 1976/01 – 2002/12

	Average Prices			Repeat Sales
	ART 100	US 100	UK 100	All Art Index
Art 100	1.000			
US 100	0.871	1.000		
UK 100	0.716	0.644	1.000	
All Art Index	0.857	0.714	0.342	1.000

EXHIBIT 4: Comparison of Art Price Indices 1976-2002



Repeat sales All Art Index versus the average price indices from Art Market Research for the general art market (Art 100), a basket of US artists (US 100) and a basket of British artists (UK 100).

EXHIBIT 5: Performance of Various Fine Art Markets 1976-2006

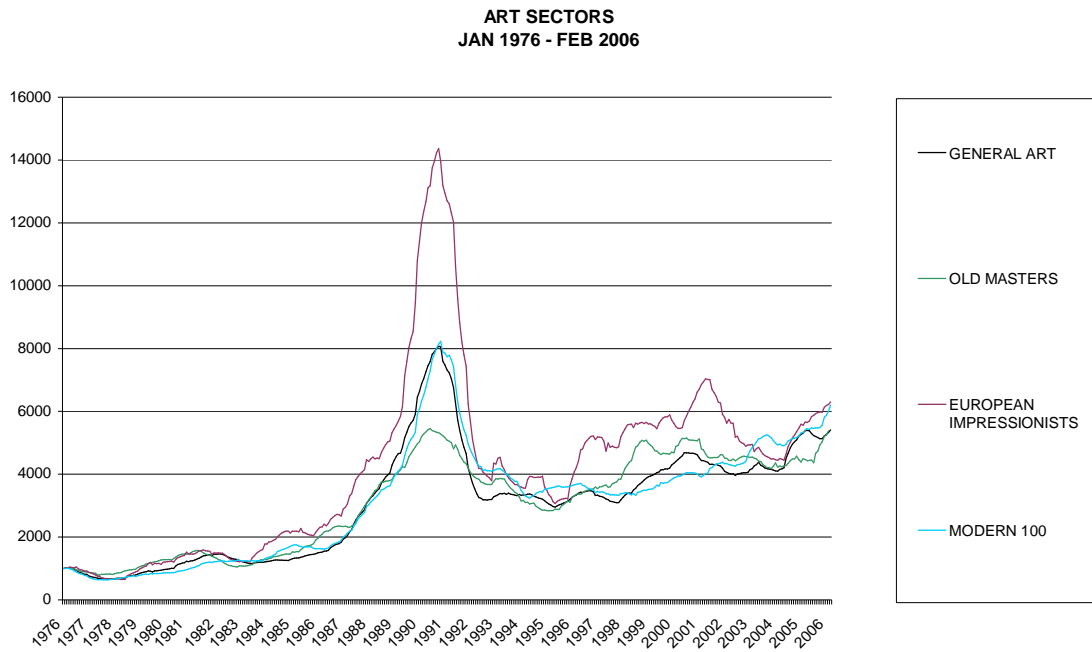


EXHIBIT 6: Performance of Various Fine Art Markets 1985-2006

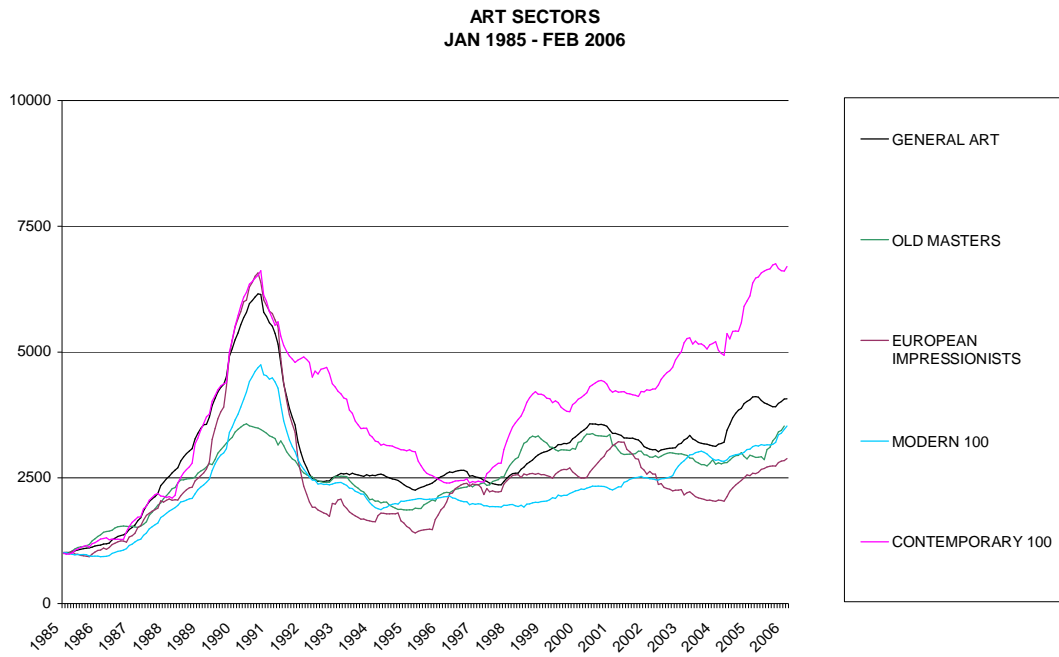


EXHIBIT 7: Average Annual Average Returns for Fine Art Markets 1980-2006

AVERAGE ANNUAL RETURN
Based on Monthly Data: Jan 1980 - Feb 2006
* Data starts in 1985

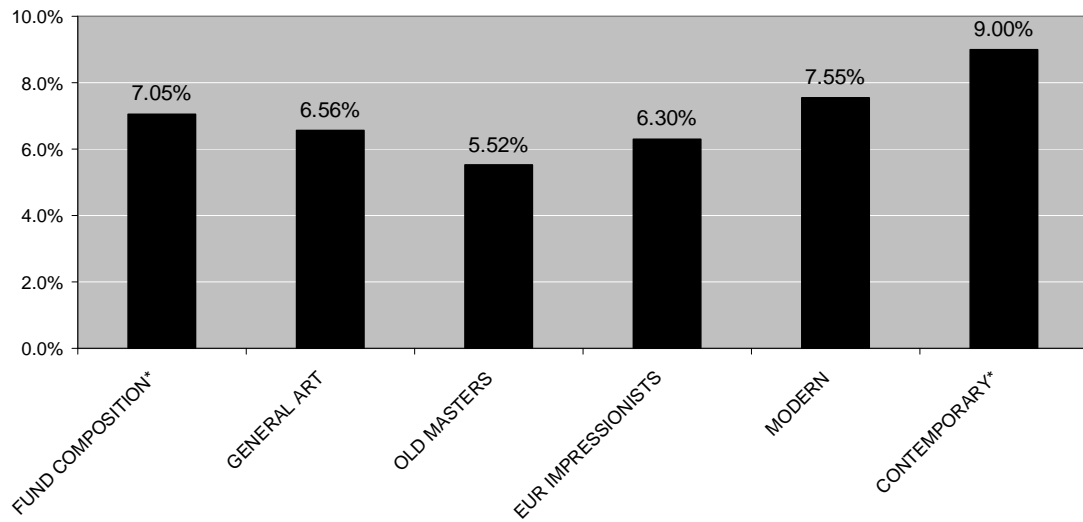


EXHIBIT 8: Descriptive Statistics for Fine Art Markets 1980-2006

	FUND COMPOSITION*	GENERAL ART	OLD MASTERS	EUR IMPRESSION	MODERN	CONTEMP ORARY*
AVERAGE ANNUAL RETURN	7.05%	6.56%	5.52%	6.30%	7.55%	9.00%
AVERAGE ANNUAL ST. DEV	6.92%	8.08%	7.09%	13.12%	7.38%	9.90%
AVERAGE MONTHLY RET	0.006	0.005	0.005	0.005	0.006	0.007
AVERAGE MONTHLY ST DEV	0.020	0.023	0.020	0.038	0.021	0.029
SKEWNESS	0.544	-0.518	0.149	-0.112	-0.146	1.048
KURTOSIS	2.099	3.583	0.469	3.510	3.113	3.562

EXHIBIT 9: Correlation Statistics for Fine Art Markets 1980-2006

	GENERAL ART	OLD MASTERS	EUROPEAN IMPRESSIONISTS	MODERN	CONTEMPORARY
GENERAL ART	100.0%				
OLD MASTERS	43.0%	100.0%			
EUROPEAN IMPRESSIONISTS	74.0%	33.8%	100.0%		
MODERN 100	76.1%	29.9%	61.1%	100.0%	
CONTEMPORARY 100	53.4%	27.9%	34.6%	53.0%	100.0%

EXHIBIT 10: Return per Unit of Risk for Fine Art Markets 1980-2006

	FUND COMPOSITION	GENERAL ART	OLD MASTERS	EUROPEAN IMPRESSIONISTS	MODERN	CONTEMPORARY
RETURN/RISK	1.02	0.81	0.78	0.48	1.02	0.91

EXHIBIT 11: Risk-Return Ratios for Fine Art Markets 1980-2006

RETURN - RISK RATIO
Based on Monthly Data: Jan 1980 - Feb 2006
* Data starts in 1985

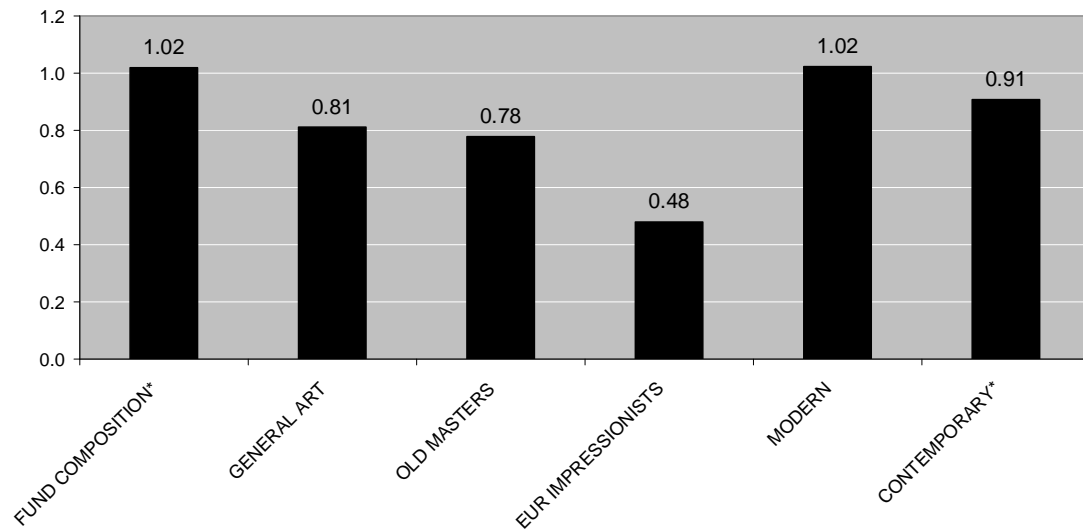


EXHIBIT 12: Risk and Return Trade Off for Fine Art Markets 1980-2006

Risk- Return Trade Off

Jan 1980 - Feb 2006

* data from 1985

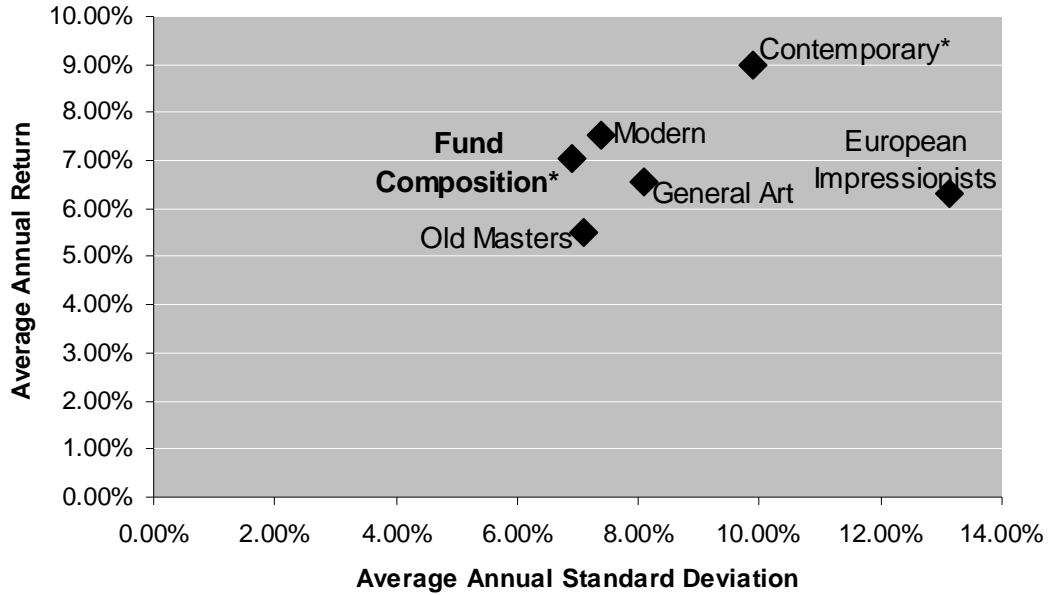


EXHIBIT 13: Descriptive Statistics for Fine Art and Financial Markets

25 Years		World	US	UK	US	Commod	US	10 Y	UK	10Y		
A. 1980-2006		Equity	Equity	Equity	Corporate	Futures	Govt Bonds	Govt Bonds	NAREIT	Art		
Annual Av Return		10.88%	12.39%	13.27%	14.91%	8.42%	8.36%	11.00%	11.98%	6.56%		
Annual St Dev		13.93%	15.16%	16.63%	22.72%	17.44%	8.62%	8.57%	12.88%	8.08%		
Average		0.009	0.010	0.011	0.012	0.007	0.007	0.009	0.010	0.005		
St Dev		0.040	0.044	0.048	0.066	0.050	0.025	0.025	0.037	0.023		
Skew		-1.175	-0.847	-1.270	3.174	0.071	0.138	-0.211	-0.766	-0.518		
Kurt		3.866	3.404	5.755	50.560	1.252	1.274	1.413	2.918	3.583		

15 Years		World	US	UK	US	Commod	US10Y	UK10Y			
B. 1990-2006		Equity	Equity	Equity	Corporate	Futures	Govt Bonds	Govt Bonds	NAREIT	Hedge	Art
					Bonds					Funds*	
Annual Av Return		6.78%	10.28%	8.60%	8.33%	7.36%	6.52%	9.02%	12.10%	10.31%	1.26%
Annual St Dev		14.00%	14.35%	14.27%	4.53%	19.38%	6.99%	6.75%	12.89%	7.79%	7.54%
Average		0.006	0.009	0.007	0.007	0.006	0.005	0.008	0.010	0.009	-0.001
St Dev		0.040	0.041	0.041	0.013	0.056	0.020	0.019	0.037	0.022	0.022
Skew		-0.827	-0.589	-0.491	-0.376	0.247	-0.444	-0.076	-0.669	-0.035	-1.459
Kurt		1.277	0.935	0.623	0.590	0.910	0.829	0.631	2.123	2.367	4.751

5 Years		World	US	UK	US	Commod	US10Y	UK10Y			
C. 2000-2006		Equity	Equity	Equity	Corporate	Futures	Govt Bonds	Govt Bonds	NAREIT	Hedge	Art
					Bonds					Funds	
Annual Av Return		0.06%	-1.28%	0.93%	7.18%	13.11%	6.19%	6.35%	19.10%	7.53%	3.56%
Annual St Dev		14.23%	15.29%	14.14%	4.20%	22.55%	7.64%	4.62%	14.06%	5.09%	5.17%
Average		0.000	-0.001	0.001	0.006	0.011	0.005	0.005	0.016	0.006	0.0030
St Dev		0.041	0.044	0.041	0.012	0.065	0.022	0.013	0.041	0.015	0.0149
Skew		-0.596	-0.274	-0.896	-0.967	-0.188	-0.773	-0.338	-1.488	0.204	1.3833
Kurt		3.885	3.381	5.480	42.897	1.190	1.274	1.413	2.823	2.367	4.9021

EXHIBIT 14: Risk and Return Trade Off for Financial Asset Classes 1980-2006

Risk- Return Trade Off
Jan 1980 - Feb 2006

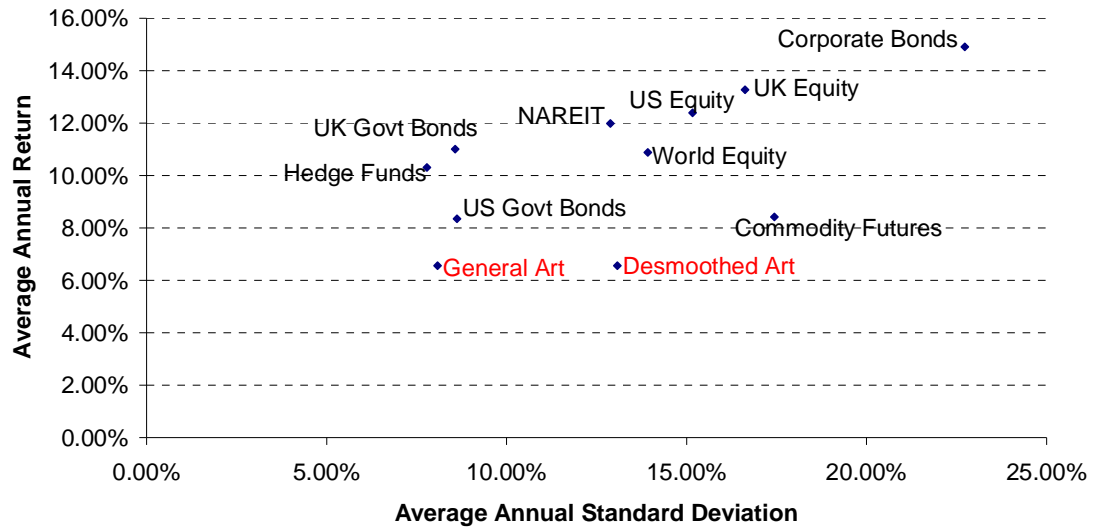


EXHIBIT 15: Correlation Statistics for Fine Art and Financial Markets 1980-2006

<i>1980-2006</i>	MSCI WRLD	MSCI USA	MSCI UK	US CORP BOND	GSCI	US 10 YEAR GOVT. BOND	UK 10 YEAR GOVT. BOND	REIT	HEDGE FUND	GEN ART	OLD MAST	EUR IMP	MOD	CON
MSCI WORLD	100.0%													
MSCI USA	89.5%	100.0%												
MSCI UK	78.6%	70.9%	100.0%											
US CORPORATE BOND	9.2%	14.4%	3.2%	100.0%										
GSCI	2.7%	0.5%	2.4%	-0.4%	100.0%									
US 10 YEAR GOVT. BOND	5.9%	14.9%	3.4%	71.1%	-1.6%	100.0%								
UK 10 YEAR GOVT. BOND	17.4%	16.2%	29.1%	22.9%	3.0%	39.1%	100.0%							
NAREIT	47.7%	49.1%	41.0%	19.4%	1.3%	18.5%	13.2%	100.0%						
HEDGE FUND	55.1%	48.6%	40.9%	20.0%	16.7%	11.0%	19.7%	24.9%	100.0%					
GENERAL ART	4.7%	-3.2%	3.2%	-1.3%	9.1%	-3.0%	-6.3%	-7.5%	-5.3%	100.0%				
OLD MASTERS EUROPEAN IMPRESSIONISTS	6.2%	3.3%	0.3%	4.3%	9.2%	6.7%	-10.4%	-2.2%	7.7%	43.0%	100.0%			
MODERN	6.9%	0.1%	4.6%	-5.8%	8.2%	-6.7%	-8.4%	-0.2%	0.3%	74.0%	33.8%	100.0%		
CONTEMPORARY	1.3%	-3.6%	-0.7%	-0.4%	4.9%	-4.5%	-8.8%	-6.7%	3.6%	76.1%	29.9%	61.1%	100.0%	
	3.2%	2.3%	1.5%	1.3%	3.9%	-1.4%	-8.8%	-12.1%	-0.8%	53.4%	27.9%	34.6%	53.0%	100.0%

**EXHIBIT 16: Correlation Statistics for Fine Art and Financial Markets:
5-ear, 15-ear, 25-ear**

GENERAL ART	MSCI WRLD	MSCI USA	MSCI UK	US CORP BOND	GSCI	US 10 YEAR GOVT. BOND	UK 10 YEAR GOVT. BOND	REIT	HEDGE FUND	GEN ART
1980-2006	4.7%	-3.2%	3.2%	-1.3%	9.1%	-3.0%	-6.3%	-7.5%	-5.3%	100.0%
1990-2006	2.0%	-4.2%	-0.7%	-11.8%	7.1%	-5.4%	-6.7%	-7.0%	-5.3%	100.0%
2000-2006	-6.1%	-5.0%	-2.9%	-2.5%	10.1%	3.8%	11.5%	4.4%	-8.9%	100.0%

EXHIBIT 17: Risk-Return Ratios for Fine Art and Financial Markets 1980-2006

RETURN - RISK RATIO
Based on Monthly Data: Jan 1980 - Feb 2006

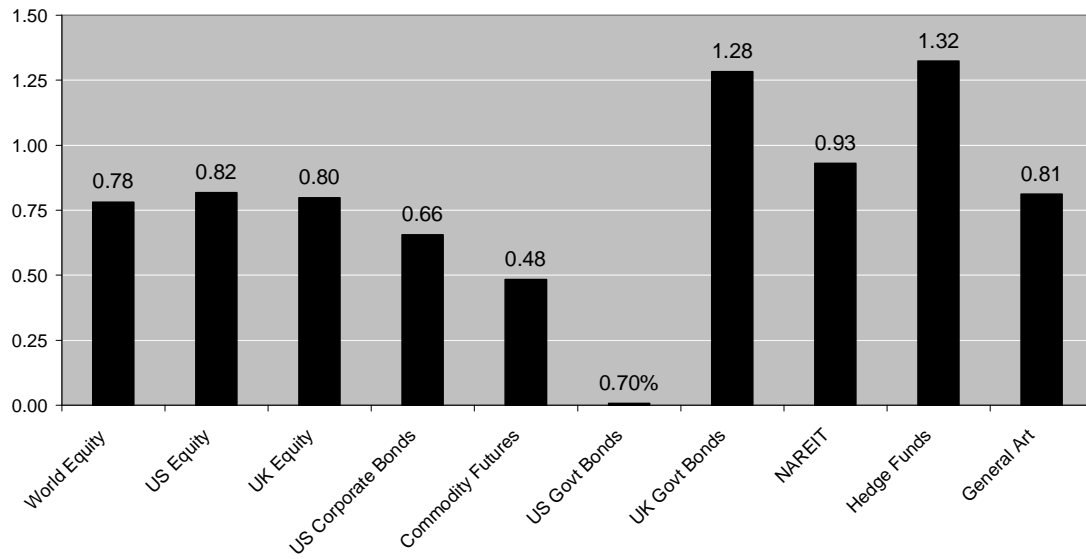


EXHIBIT 18: Fine Art Market Performance during UK Equity Bear Markets 1980-2006

Asset Class Returns during Equity Down Markets
Based on Monthly Data: Jan 1980 - Feb 2006

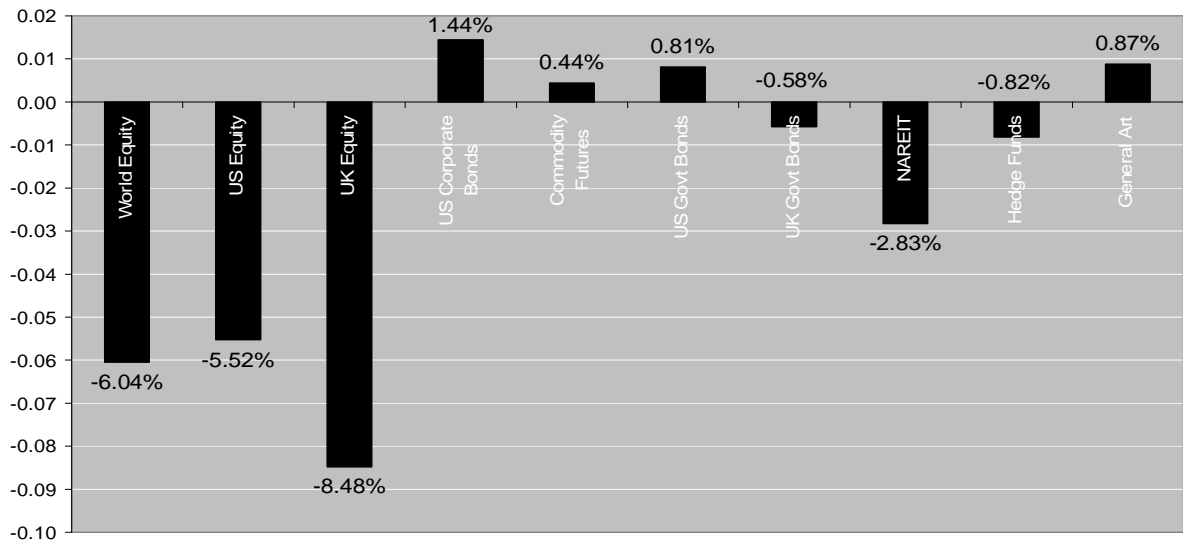


EXHIBIT 19: Risk-Return Trade Off - Optimal Portfolio Allocation 1980-2006

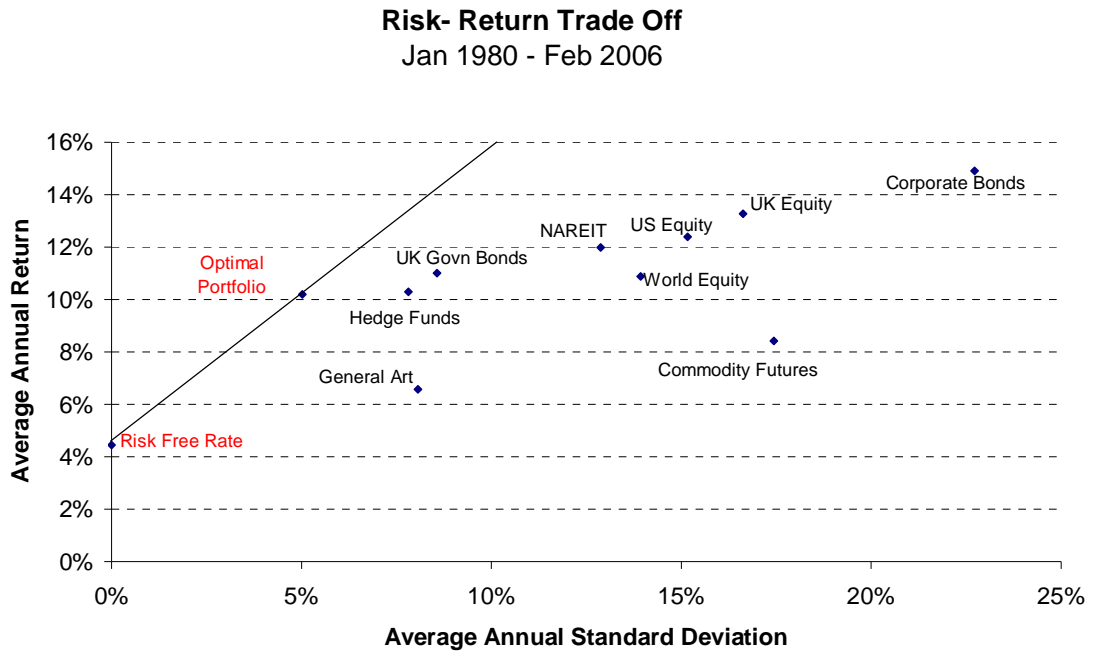


EXHIBIT 20: Optimal Portfolio Allocation Excluding Art: 1980 - 2006

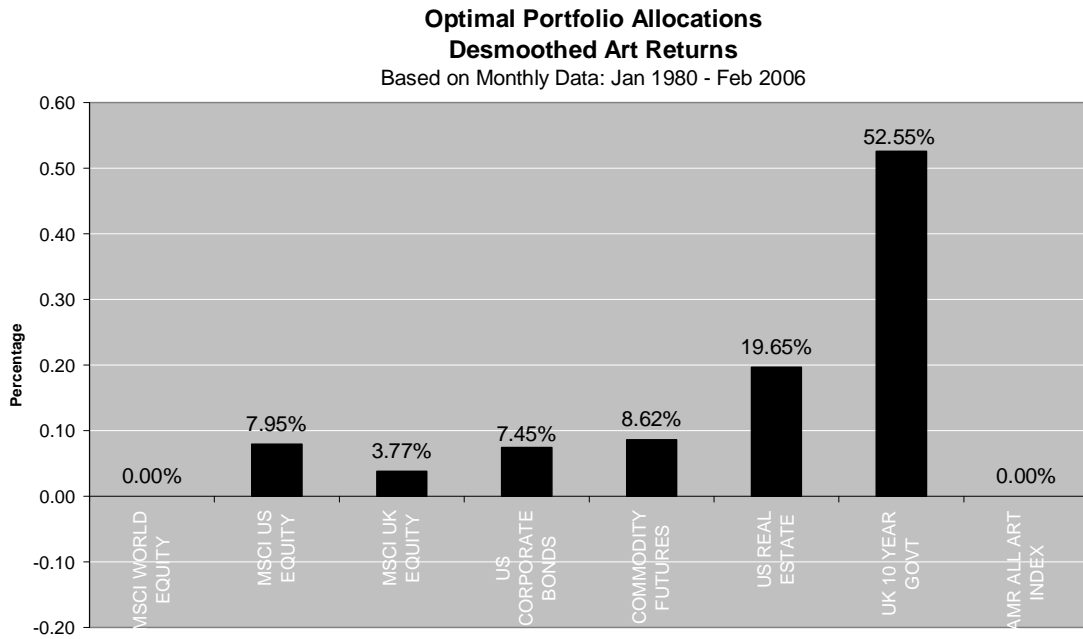


EXHIBIT 21: Optimal Portfolio Allocation Including Art: 1980-2006

Optimal Portfolio Allocations
Based on Monthly Data: Jan 1980 - Feb 2006

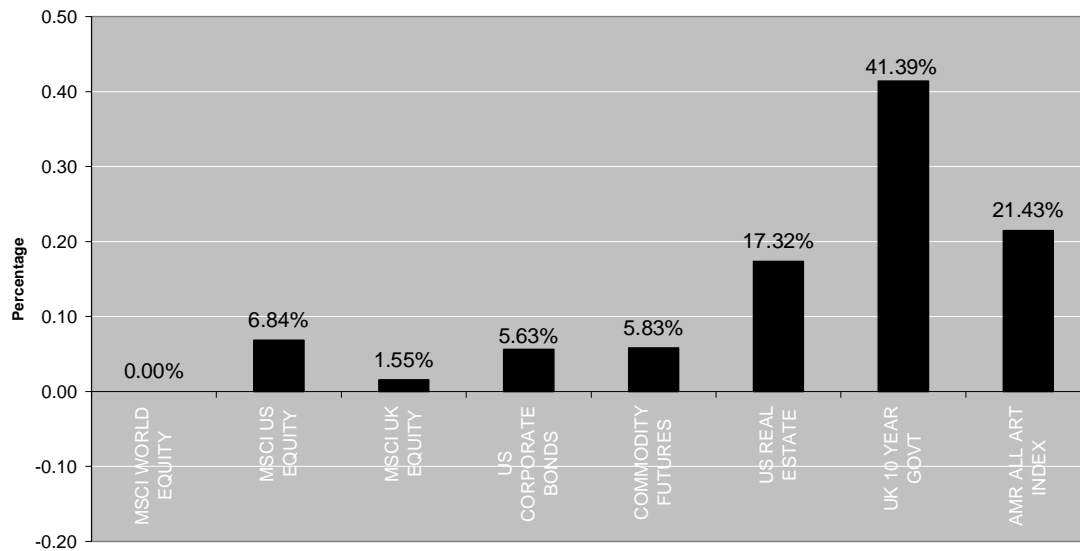


EXHIBIT 22: Optimal Portfolio using Desmoothed Art Returns: 1980 - 2006

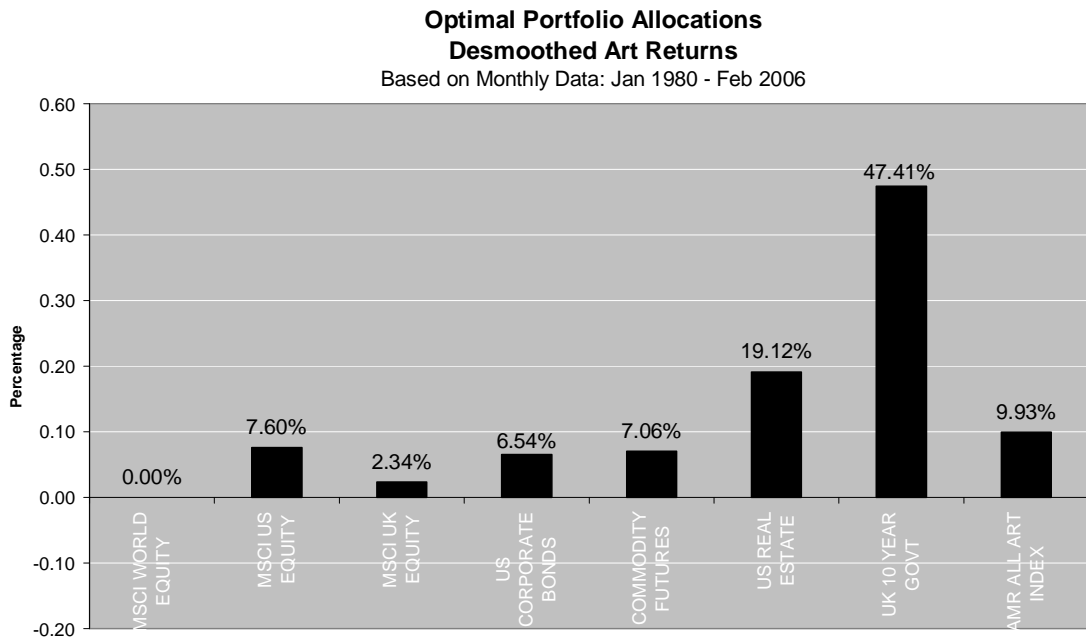


EXHIBIT 23: Optimal Portfolio using Desmoothed Art Returns & Transaction Costs: 1980 - 2006

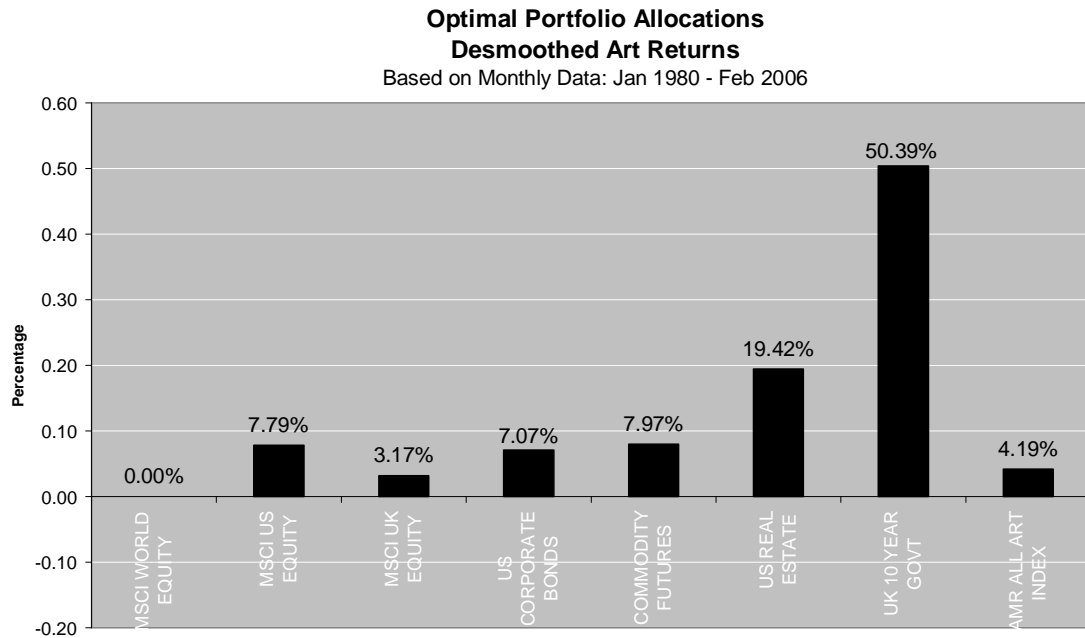


EXHIBIT 24: Optimal Portfolio Allocation Including Hedge Funds: 1980-2006

PORTFOLIO	MSCI US EQUITY	MSCI UK EQUITY	US CORP BONDS	COMMOD FUTURES	US REAL ESTATE	UK 10 YEAR GOVT	AMR ALL ART INDEX	HEDGE FUNDS
NO ART	0.00%	0.00%	2.96%	3.04%	10.20%	42.55%	-	41.25%
WITH ART DESMOOTHED	0.00%	0.00%	2.47%	1.92%	9.89%	35.60%	15.91%	34.21%
ART DESMOOTHED	0.00%	0.00%	2.67%	2.34%	10.84%	39.17%	7.04%	37.94%
ART & TRANS COSTS	0.00%	0.00%	2.80%	2.74%	10.74%	41.04%	2.82%	39.87%

Endnotes

ⁱ Frey and Eichenberger (1995).

ⁱⁱ O Chanel, Gerard-Varet and Ginsburgh (1996).

ⁱⁱⁱ Data is only available until December 2002 on the All Art Index.

^{iv} A description of the artists included in the various indices are given in the appendix.

^v Similar survivorship bias is also apparent in other financial indices.

^{vi} See Ashenfelter and Graddy, (2003).

^{vii} The MSCI indices are extremely highly correlated with the national stock market indices, for example the S&P 500 and the FTSE 100. Data on the MSCI indices are available on a monthly basis for the whole sample.

^{viii} See Orkunev & White (2003) for greater detail on the conditions which the autocorrelation function must fulfill, and on the application to remove higher orders of autocorrelation.

^{ix} See Campbell (2005) for a detailed analysis on desmoothing art series data.