The comparatively poor performance of traditional asset classes in recent years has driven the search for greater returns via alternative asset classes. The idea of reaping higher risk-adjusted returns from diversification into assets that offer low and even negative correlation with equities and bonds is extremely attractive. There has been significant growth in the traditional alternative investments such as real estate, commodity futures, private equity, and hedge fund investments. Additionally, a number of funds specializing in art have recently emerged. These 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 article, the author takes a close look at art as an alternative asset and examines how this new alternative asset is expected to perform. The author focuses on bear markets, when the benefits of diversification are most needed. The author looks at the risk and return characteristics of art using art market indices and analyzes the prospects for portfolio diversification in the art market by using a variety of data across art market sectors, including the Old Master, European Impressionist, Modern, and Contemporary art markets. Because of the low correlation of art with other asset classes, the author finds opportunities for portfolio diversification across art markets and across asset classes. The results hold, even allowing for the high transaction costs that are encountered when trading art when spread over a longer time horizon.

The possibility of investing in art has recently generated much interest among investors worldwide. Direct investment in art is, of course, not new. However, structured solutions offered by art funds and a number of boutique funds offer investors the possibility of investing in a diversified art portfolio which actively trades in art purely for financial gain. The most established is The Fine Art Fund, launched in 2003 in London, and since then ARTESTATE, Société General Asset Management, and, more recently, the Art Trading Fund have all raised sufficient capital to provide investors with indirect investments in the art market. There is also a move towards more specialized funds that focus on one or two markets, such as Indian Art, Chinese art, or Contemporary artists. The majority of these funds actively trade their artworks, ARTESTATE being the current exception (it aims to hold a limited number of artworks for the duration of the closed end fund). ARTESTATE also has a low entry level at €2500, whereas many other funds are focused more toward wealthy investors. These funds use a wide variety of trading strategies, similar to both private equity and hedge funds, trading on the inefficiencies currently present in the art market, which is typically characterized by low
liquidity. Of course, in some cases, hedge fund managers access the art market indirectly.

The interest in investing in art has received an enormous boost from the availability of art price data. 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 to today. This article will focus on the use of available indices for various art markets to assess art's performance in a diversified portfolio. These indices provide a reliable estimate of the historical risk-return profile, and serve as benchmarks that art funds aim to outperform. Obviously, the more speculative trading strategies of some art fund managers will aim to outperform the market to a considerable extent, and the recent performance of the more established funds has generally shown this to be the case. This article will examine return patterns that an art investment portfolio would have provided, taking a more conservative approach to examining the financial gains that artworks have generated historically. This study also includes transaction costs, which can be considerable in the art market, although, in practice, art funds typically are able to negotiate on these costs.

In the following sections, the author reviews the current literature and discusses current data on art indices and the associated methodologies. The author explores the risk and return characteristics of fine art markets and analyzes art as an alternative asset class in an international diversified portfolio. The author accounts for the high transaction costs encountered when auctioning fine artworks as well as the implications of smoothed returns, which occur for assets that are appraisal based. Because of the moderate returns found for art investments in the last 30 years and the low correlation with other asset classes that art appears to exhibit, the author finds a case for holding a small percentage of the investment portfolio in art. Currently, it is inconceivable to hold an index tracking fund; however, there are a number of alternative ways to hold a diversified art portfolio as part of an overall wealth management strategy.

ART INDICES

Only a limited number of studies have attempted to construct art price indices. The first significant study was by Stein [1977], who looked at average prices. More prominent studies using repeat-sales regression followed: Baumol [1986]; Goetzmann [1993], and Pesando [1993]. Stein [1977] pointed out the selection bias derived from looking only at repeat sales on auction house data; however, average prices also suffer from serious biases in a highly heterogeneous market. Repeat-sales regressions require artworks to be offered for sale at auction more than once to be included as a repeat sale. The annual art return index provided by Goetzmann is fairly extensive dating from 1715 to 1986, with art market returns since 1850 providing a higher return than stocks or bonds, albeit with a much higher standard deviation. Pesando provided a semiannual index for the shorter 1977–1992 period, which includes the collapse in prices at the end of the 1980s, not covered in the Goetzmann index, and gives returns for art well below both the equity and bond markets, while the variance of these returns is similar to equity markets. The most recent index is the Mei and Moses [2002] index using U.S. data.

Anderson [1974], and later Beulens and Ginsburgh [1992] used hedonic pricing models that also analyze the specific characteristics of the artworks, such as size, artist, and art style. More recently, there has been a move to incorporate hedonic pricing within a repeat sales framework. Zanola [2007] provided indices that more accurately establish the price determinants in art valuation.

Data and Methodology

The Mei Moses and Art Market Research art indices are the two most widely quoted indicators of art market performance. Both rely on data from sales at the main auction houses. However, auction results alone provide an incomplete picture of the market performance because they represent only a subset of the whole market. The dealer market is largely ignored because of an absence of obtainable data. There is some disagreement as to what percentage of the market is composed of dealers. Figures from two recent studies range from a 50–50 split between auction houses and dealers to a 70–30 split in favor 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 on the rate of return reflected by the indices. This is because dealers may buy at lower prices but sell at prices with higher transaction costs, thereby reducing the art investors' rate of return. It is likely that art funds, which act more like private dealers.
than auction houses, adopt a similar strategy by using their insider knowledge and expertise to exploit inefficiencies in the market. This is likely to produce art market returns much larger than the benchmarks used here.

Four primary methodologies are used to construct art price indices: geometric means, average prices, repeat-sales regressions (RSR), and hedonic regressions. Chanel, Gerard-Varet, and Ginsburgh's [1996] study indicated that over long periods, the respective methodologies are closely correlated. Issues regarding the various index pricing methodologies were documented by Ginsburgh, Mei, and Moses [2006], which specifically compared hedonic to repeat sales regression. Ashenfelter and Graddy [2003] provided a survey of average returns estimated from art price data, currently in the academic literature. Exhibit 1 gives the estimated art market performance found by these and a few additional studies.

For the purpose of this comparison, this article will focus on the data from Art Market Research because it provides a wider and more frequent source of information. The author also provides some comparisons with the Mei Moses All Art index. These indices show that historically, average real returns for art are moderate. Returns are above inflation and tend to be greater than government bonds but less than equities. There has been a general upward trend in art prices in the market.

The survey of art pricing methodologies in Exhibit 1 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] provided RSR and hedonic price indices for the periods 1780–1970 and 1780–1960 and Chanel, Gerard-Varet, and Ginsburgh [1996] for the 1855–1969 period. It is of interest to observe the long-run trend in the market and note that there have been periods in which art returns have been substantially higher than average.

To evaluate the various index methodologies, the author uses data from both Art Market Research (AMR) and Mei Moses (MM) All Art Index. AMR data are available monthly but only go back to 1976. The author includes all available data 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 that 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 back to 1875, measured on an annual basis, and to 1965, on a semiannual basis. The MM All Art Index is computed using repeat sales initially sold at auction by Sotheby’s and Christie’s.

Exhibit 2 provides summary statistics for the two price index methodologies. To compare the two series, semiannual data from 1976 to 2002 are used. Using semiannual 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, calculate the return of the market, \( i \), by continuously compounding returns. This is 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 \( p_{i,t} \):

\[
\Delta p_t = \ln \left( \frac{p_{t,i}}{p_{t,i-1}} \right) \times 100 \quad (1)
\]

Exhibit 2 shows that the average return on the MM data series for the 27-year period was 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 is just over 5.25% (8% for U.S. artists and 5% for artists in the U.K.).\(^3\) Stein [1977], Goetzmann [1993], and Ginsburgh [2006] acknowledged the selection bias that occurs from focusing on repeat sales. To be included in the calculation, repeat sales regression requires artworks to be offered for sale at auctions more than once. It is thought that artworks that fall drastically in value tend not to be resold at auctions.\(^4\)

Computing the correlation statistics for the two different index methodologies reveals that the correlation of the AMR index with the MM Index is only 0.2 (see Panel B of Exhibit 2). This is because of 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 U.S. 100 indices, which have a correlation coefficient of 0.86. The larger number of observations used for the moving averages provides higher correlation coefficients (see Panel C in Exhibit 2).

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

The collection of information from databases is, however, problematic for a number of reasons. Ashenfelter
**EXHIBIT 1**

Estimated Fine Art Market Performance, 17th to 21st century *(as reported by various academic papers, by period of study)*

<table>
<thead>
<tr>
<th>Author</th>
<th>Sample</th>
<th>Period</th>
<th>Method</th>
<th>Nominal Return</th>
<th>Real Return</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baumol [1986]</td>
<td>Paintings in General</td>
<td>1652–1961</td>
<td>RSR</td>
<td>0.60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frey and Pommerehne [1989]</td>
<td>Paintings in General</td>
<td>1635–1949</td>
<td>RSR</td>
<td>1.40%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1653–1987</td>
<td>RSR</td>
<td>1.50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1950–1987</td>
<td>RSR</td>
<td>1.70%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buelens and Ginsburgh [1992]</td>
<td>Paintings in General</td>
<td>1700–1961</td>
<td>Hedonic</td>
<td>0.91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paintings in General</td>
<td>1780–1970</td>
<td>RSR</td>
<td>3.70%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1716–1986</td>
<td>RSR</td>
<td>3.20%</td>
<td>2.00%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1850–1986</td>
<td>RSR</td>
<td>6.20%</td>
<td>3.80%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1900–1986</td>
<td>RSR</td>
<td>17.50%</td>
<td>13.3%</td>
<td></td>
</tr>
<tr>
<td>Anderson [1974]</td>
<td>Paintings in General</td>
<td>1780–1960</td>
<td>Hedonic</td>
<td>3.30%</td>
<td>2.60%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1780–1970</td>
<td>RSR</td>
<td>3.70%</td>
<td>3.00%</td>
<td></td>
</tr>
<tr>
<td>Chanel, Gerard-Varet, and</td>
<td>Paintings in General</td>
<td>1855–1969</td>
<td>Hedonic</td>
<td>4.90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ginsburgh [1996]</td>
<td>American, Impressionist, and Old Masters</td>
<td>1855–1969</td>
<td>RSR</td>
<td>5.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mei and Moses [2002]</td>
<td>Paintings in General</td>
<td>1875–1999</td>
<td>RSR</td>
<td>4.90%</td>
<td>4.28%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1900–1986</td>
<td>RSR</td>
<td>5.20%</td>
<td>3.72%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1900–1999</td>
<td>RSR</td>
<td>5.20%</td>
<td>3.55%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1950–1999</td>
<td>RSR</td>
<td>8.20%</td>
<td>2.13%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1977–1991</td>
<td>RSR</td>
<td>7.80%</td>
<td>2.11%</td>
<td></td>
</tr>
<tr>
<td>Goetzmann [1996]</td>
<td>Paintings in General</td>
<td>1907–1977</td>
<td>RSR</td>
<td>5.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fase [1996]</td>
<td>19th Century</td>
<td>1946–1966</td>
<td>Average</td>
<td>11.00%</td>
<td>7.50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1972–1992</td>
<td>Geometric Mean</td>
<td>10.60%</td>
<td>1.10%</td>
<td></td>
</tr>
<tr>
<td>Barre, Docelo, and Ginsburgh [1996]</td>
<td>Great Impressionist</td>
<td>1962–1991</td>
<td>Hedonic</td>
<td>12.0%</td>
<td>5.00%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other Impressionist</td>
<td>1962–1991</td>
<td>Hedonic</td>
<td>8.00%</td>
<td>1.00%</td>
<td></td>
</tr>
<tr>
<td>Campbell [2005]</td>
<td>Paintings in General</td>
<td>1976–2004</td>
<td>Average</td>
<td>5.73%</td>
<td>1.44%</td>
<td>8.27%</td>
</tr>
<tr>
<td></td>
<td>US Paintings</td>
<td>1976–2004</td>
<td>Average</td>
<td>7.94%</td>
<td>3.66%</td>
<td>8.73%</td>
</tr>
<tr>
<td>Candela and Scorcuc [1997]</td>
<td>Modern and Contemporary Paintings</td>
<td>1983–1994</td>
<td>Average</td>
<td>3.89%</td>
<td>0.21%</td>
<td></td>
</tr>
</tbody>
</table>

* Real returns estimated additionally by Ashenfelter and Gaddy.
EXHIBIT 2
Comparison of AMR Average Price data and MM Repeat Sales Indices, 1976–2002

Panel A.
Semiannual log return data 1976/01–2002/12

<table>
<thead>
<tr>
<th></th>
<th>ART 100</th>
<th>US 100</th>
<th>UK 100</th>
<th>ART 100</th>
<th>US 100</th>
<th>UK 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Average Return</td>
<td>5.27%</td>
<td>8.26%</td>
<td>5.12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Average St Deviation</td>
<td>17.11%</td>
<td>15.86%</td>
<td>11.10%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>0.026</td>
<td>0.041</td>
<td>0.026</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.121</td>
<td>0.112</td>
<td>0.078</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.837</td>
<td>-0.817</td>
<td>-0.097</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.694</td>
<td>1.029</td>
<td>-1.083</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Panel B. Correlation Matrix
Semiannual log return data 1976/01–2002/12

<table>
<thead>
<tr>
<th></th>
<th>ART 100</th>
<th>US 100</th>
<th>UK 100</th>
<th>Repeat Sales</th>
<th>All Art Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 100</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 100</td>
<td>0.822</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK 100</td>
<td>0.651</td>
<td>0.565</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Art Index</td>
<td>0.210</td>
<td>0.221</td>
<td>0.250</td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

Panel C. Correlation Matrix
Semiannual log returns—2 period moving averages 1976/01–2002/12

<table>
<thead>
<tr>
<th></th>
<th>ART 100</th>
<th>US 100</th>
<th>UK 100</th>
<th>Repeat Sales</th>
<th>All Art Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art 100</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 100</td>
<td>0.871</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK 100</td>
<td>0.716</td>
<td>0.644</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Art Index</td>
<td>0.857</td>
<td>0.714</td>
<td>0.342</td>
<td></td>
<td>1.000</td>
</tr>
</tbody>
</table>

and Graddy’s [2003] study contended that an empirical discrepancy in one year can materially alter the overall rate of return by up to 5%. Evidence of this phenomenon can be found when the Mei & Moses All Art Index is compared with the General Art Index of Art Market Research for the 1976–2002 period. 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 3, where both indices are plotted together. The repeat sales index does not capture as significant a downturn as the AMR data does.

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. The art investor faces a greater degree of liquidity risk than investors in other financial assets. When artworks fail to reach their reserve prices and are sold, the price indices are affected. 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 repeat-sales regression estimations, which are constructed with fewer observations. It is likely that the price estimation error that occurred after the art market crash in the early 1990s was because of this issue with repeat-sales estimation. Mei and Moses suggested that art does significantly better during wartime, using the example of four U.S. wars (Forbes [2001]). During these periods, art appears to outperform stocks. This finding may also

68 ART AS A FINANCIAL INVESTMENT
E X H I B I T 3
Comparison of Art Price Indices, 1976–2002

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

Repeat Sales vs. Average Price Indices

Semi-annual data

18000
16000
14000
12000
10000
8000
6000
4000
2000
0


be because of 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 databases and indices are becoming more sophisticated and accurate at providing objective information. Comfort can be taken from the fact that the Standard & Poor's index was recently overhauled. If well-established, traditional investment indices are still tweaking their assumptions, art indices should be allowed to refine 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 somewhat robust indication of the general trends in the market. Moreover market anomalies and inefficiencies may lead to much higher realized 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 that can potentially outweigh any financial benefit or loss incurred.

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

Fine Art Market Performance

To analyze the performance of a variety of art markets, this article focuses on the 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. This analysis uses 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.

Exhibit 4 shows that prices over the past 20 years for the various sectors have at times diverged quite substantially, particularly during the period of the 1988–1991 bubble, which affected Impressionist art more than other sectors.

Including contemporary art and rebasing the indices to January 1985, when all series are complete, it can be seen that the contemporary art 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.

---

**Exhibit 4**


<table>
<thead>
<tr>
<th>ART SECTORS</th>
<th>JAN 1985–FEB 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL ART</td>
<td></td>
</tr>
<tr>
<td>OLD MASTERS</td>
<td></td>
</tr>
<tr>
<td>EUROPEAN IMPRESSIONISTS</td>
<td></td>
</tr>
<tr>
<td>MODERN 100</td>
<td></td>
</tr>
<tr>
<td>CONTEMPORARY 100</td>
<td></td>
</tr>
</tbody>
</table>

Note: AMR average price data for the art market sectors using monthly data from January 1976 to February 2006.
RISK AND RETURN

Using data from January 1980 until February 2006 gives 25 years of monthly return data for a variety of sectors. Over this period, the general art index has made an average annual return of 6.5%. More specifically, Old Masters have generated 5.5%; European Impressionists, 6.3%; and Modern, 7.5%. Contemporary (data starts in 1985, so using the slightly shorter 20-year period) have offered the highest returns at 9% on an annual basis. Using a representative, hypothetical fund that holds a composition of 30% Old Masters, 15% European Impressionists, 15% Modern, and 40% Contemporary, the average return using data from the various sectors would have been 7.05%. Again, this is for the 20-year period, because data on Contemporary art starts in 1985.

Descriptive statistics are shown in Exhibit 5. 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.

A closer look at the risk and return characteristics of the sectors, focusing specifically on the 25-year period from 1980 to 2006 (this period is chosen because other asset class data is also only available from 1980) shows that 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 0.27 and 0.53 for the four individual art sectors. Modern art and the general art index have a correlation of 0.76.

An examination of the return-risk ratio of the various sectors shows 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. Although the average return is slightly less than for the Modern and Contemporary markets, the risk is alleviated through a well-diversified portfolio in which returns per unit of risk are as high as for Modern art.

The risk-return trade-off can also be depicted graphically, as shown in Exhibit 6. 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 is an underpinning of 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 position 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.

**Asset Class Framework**

The financial markets analyzed represent the major asset classes. The author uses the Morgan Stanley Capital Indices for U.S. equity (MSCI US), U.K. equity (MSCI UK), and world equity (MSCI World), Lehman Brothers Aggregate Corporate Bond Index, and North American Real Estate Investment Trust Index (NAREIT). For the hedge fund data series, the author uses the Credit Suisse/Tremont Hedge Fund data series dating from 1994. S&P GSCI commodity futures data is from Goldman Sachs. The author uses the U.S. and U.K. 10-year Government Bond Indices, and U.K. Government Treasury Bills, which have been available on a monthly basis only from 1980. Data are 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 7.

Exhibit 8 plots the general risk and return trade-offs for the variety of asset classes. Because of the smoothed nature of the art market return series, the exhibit also includes information for the 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

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**Exhibit 6**


![Graph showing risk-return trade-off for fine art markets, 1980-2006.](image)

*Data from 1985.

market. This desmoothing process is common in the finance literature for real estate and hedge funds. This desmoothed data is also used in the analysis on optimal portfolio allocation.

Exhibit 9 gives correlation statistics for the 25-year horizon. Art has a low correlation with other asset classes: the highest being commodity futures with a monthly 0.09 correlation and the most negatively correlated being NAREIT, whose returns are correlated at -0.08. The correlation with domestic real estate and art tends to be higher.

Correlations with other asset classes remain low even after accounting for various time horizons, as shown in Exhibit 10. During the recent bear market for equities, when commodity futures prices, government bond indices, and real estate markets all rose, the correlation between art and other asset classes has been positive, albeit quite low (see Exhibit 11).

Deriving 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; U.K. government

---

**EXHIBIT 7**

Descriptive Statistics for Fine Art and Financial Markets

<table>
<thead>
<tr>
<th></th>
<th>25 Years</th>
<th>15 Years</th>
<th>5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World Equity</td>
<td>US Equity</td>
<td>UK Equity</td>
</tr>
<tr>
<td>Annual Av Return</td>
<td>10.88%</td>
<td>12.39%</td>
<td>13.27%</td>
</tr>
<tr>
<td>Annual St Dev</td>
<td>13.93%</td>
<td>15.16%</td>
<td>16.63%</td>
</tr>
<tr>
<td>Average</td>
<td>0.009</td>
<td>0.010</td>
<td>0.011</td>
</tr>
<tr>
<td>St Dev</td>
<td>0.040</td>
<td>0.044</td>
<td>0.048</td>
</tr>
<tr>
<td>Skew</td>
<td>-1.175</td>
<td>-0.847</td>
<td>-1.270</td>
</tr>
<tr>
<td>Kurt</td>
<td>3.866</td>
<td>3.404</td>
<td>5.755</td>
</tr>
</tbody>
</table>

**Notes:** Equity indices are from Morgan Stanley Capital Indices for U.S. equity (MSCI US), U.K. equity (MSCI UK), and world equity (MSCI World), Lehman Brothers Aggregate Corporate Bond Index (available only for the U.S.) and North American Real Estate Investment Trust Index (NAREIT). For the hedge fund data series, the Credit Suisse/Tremont Hedge Fund data series dating from 1994 is used. The U.S. and U.K. 10-year Government Bond Indices, and U.K. Government Treasury Bills have only been available on a monthly basis from 1980. S&P GSCI commodity future data is available from Goldman Sachs. Other data were collected from Datastream, Global Financial Data, NARBIT, and Credit Suisse/Tremont. All Art Index from Art Market Research. All other data is monthly from January 1980 to February 2006.

* Hedge Funds are the Tremont Hedge Fund Data.
bonds also showed a good return per unit of risk. NAREIT, art, and equity have also offered 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 while reducing risk. This results in more moderate returns being generated with a lower standard deviation around the expected mean.

For the lowest 10% of returns on the U.K. 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 U.S. corporate bonds. U.K. government bonds also provided good protection with returns close to the average 9% over the same period (see Panel A of Exhibit 7).

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

Determining optimal portfolio allocations requires an assumption about the expected return distribution of asset classes. The best prediction of the future is helped by examining the historical distribution of returns as an estimate of future expected returns. This, of course, depends on the time horizon chosen in the past. This article provides a number of descriptive statistics as well as correlation coefficients for the time horizons of 25 years, 15 years, and 5 years. Data on U.K. government bonds are only available on a monthly basis since 1980. Because government bonds are a crucial element of any well-diversified portfolio, the portfolio is optimized by 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 expense can be minimized by using a long time horizon, such as 25 years.

In Exhibit 12, the risk-return trade-off between the various asset classes is shown along with the optimal portfolio when art is 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.

The optimal portfolio is derived from the perspective of a U.K. investor who has the possibility of investing in the following indices: World, U.S., and U.K. equity, U.S. corporate bonds, Commodity Futures Index,
The portfolio is first optimized excluding an investment in art by using the risk-return profile from the past 25 years; the results are presented in Panel A of Exhibit 13. When including General Art in the portfolio, the low correlation with the other asset classes results in a high allocation to art in the portfolio (more than 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 overemphasize the art allocation.

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 be calculated. In the next section, the desmoothed data results in a more volatile return series that is more in line with the true art market volatility.

Henceforth, this examination will take transaction costs into account, which has the effect of reducing the returns generated on the series, and will look at how these two effects of greater risk and lower return affect the optimal portfolio allocation. Finally, the analysis will include hedge funds in the optimal portfolio allocation.

Desmoothing Returns

At first glance, the art market does not appear to have been very volatile. However, the lower volatility in the art market is likely the result of appraisal-induced biases, which occur during the indexation of the art data. The smoothing of the returns is a result of this as well. This has the effect of generating volatilities that are substantially lower than the true volatility of the market.

Because the data for the art indices are generally appraisal based, the analysis needs to account for this. Although they are a highly valuable source of information regarding behavior of 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 that actually represent the economic opportunity cost to investors, and the statistical properties of 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 be “desmoothed” to eliminate,
## Exhibit 10
Risk-Return and Correlation Statistics for Fine Art and Financial Markets: 5 Years, 15 Years, 25 Years

<table>
<thead>
<tr>
<th></th>
<th>GENERAL ART</th>
<th>MSCI WRLD</th>
<th>MSCI USA</th>
<th>MSCI UK</th>
<th>US CORP BOND</th>
<th>GSCI</th>
<th>US 10 YEAR GOVT. BOND</th>
<th>UK 10 YEAR GOVT. BOND</th>
<th>REIT</th>
<th>HEDGE FUND</th>
<th>GEN ART</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980–2006</td>
<td>4.7%</td>
<td>-3.2%</td>
<td>3.2%</td>
<td>-1.3%</td>
<td>9.1%</td>
<td>-3.0%</td>
<td>-6.3%</td>
<td>-7.5%</td>
<td>-5.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>1990–2006</td>
<td>2.0%</td>
<td>-4.2%</td>
<td>-0.7%</td>
<td>-11.8%</td>
<td>7.1%</td>
<td>-5.4%</td>
<td>-6.7%</td>
<td>-7.0%</td>
<td>-5.3%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>2000–2006</td>
<td>-6.1%</td>
<td>-5.0%</td>
<td>-2.9%</td>
<td>-2.5%</td>
<td>10.1%</td>
<td>3.8%</td>
<td>11.5%</td>
<td>4.4%</td>
<td>-8.9%</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>RETURN/RISK</td>
<td>0.78</td>
<td>0.82</td>
<td>0.8</td>
<td>0.66</td>
<td>0.48</td>
<td>0.70</td>
<td>1.28</td>
<td>0.93</td>
<td>1.32</td>
<td>0.81</td>
<td></td>
</tr>
</tbody>
</table>

Note: See Exhibit 7 notes.

## Exhibit 11

![Asset Class Returns during Equity Down Markets](image)

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

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 and Kat [2001], and Kat and Lu [2002]). Geltner adjusts the return series to eliminate the first-order autocorrelation. Assuming that the observed (smoothed) return on the art index, \( r_i^s \), is a weighted average of the true underlying return at time \( t \), \( r_t \), and the observed (smoothed) return at time \( t - 1 \), \( r_{t-1}^s \):

\[
r_i^s = (1 - \alpha) r_i + \alpha r_{i-1}^s
\]

(2)

Simply rearranging enables the determination of the actual return, which, if assumed to be an AR(1) process, acts to eliminate the first-order autocorrelation.
EXHIBIT 12

Note: See Exhibit 7 notes.

\[
\alpha = \frac{(1+\alpha_{0,2} - 2d_{a_{0,1}}) \pm \sqrt{(1+\alpha_{0,2} - 2d_{a_{0,1}})^2 - 4(a_{0,1} - d_{1})^2}}{2(a_{0,1} - d_{1})}
\]  

where the constant, a, to desmooth the series, is a function of higher orders of autocorrelation. 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 series that are positively autocorrelated, the smoothing has the effect of diminishing the risk apparent in the asset class; hence, it is necessary to correct for the smoothing, resulting in a more volatile desmoothed return series.

Using the more simplified approach of Geltner [1993] 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, 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, the risk increases substantially from 6.5% to 11.5%. Taking a universal 5% increase in the monthly standard deviation for the art series can show how this increase affects the optimal portfolio allocation. It reduces the allocation in art substantially, by roughly half, from over 20% to just under 10%, with the reduction 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 U.S. equity market (in this case, 90%). This finding is seen
in Panel B of Exhibit 13. Art’s high transaction costs spread over 25 years equal 1.5% a year. Despite these costs, art still remains an attractive, although small, portfolio allocation.

Including Hedge Funds

Hedge funds provide an attractive return per unit of risk, meaning that hedge funds also provide substantial risk-return benefits in a diversified portfolio. Including hedge funds in the portfolio allocation analysis results in a much higher allocation to hedge funds and art’s allocation is reduced to only 3%. As shown in Exhibit 9, the correlation of hedge fund returns and mainstream asset classes is higher than between other alternative asset classes. This result is because hedge funds, rather than being an alternative asset class, offer investment strategies for investing in mainstream assets, primarily equities, and fixed income.

Optimizing the portfolio with the inclusion of hedge funds in the four scenarios—1) without art, 2) with art, 3) with desmoothed art, and 4) with desmoothed art and transaction costs—produces the portfolio allocations shown in Panel B of Exhibit 13.

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 analyzed have been the preferred portfolio diversifier.

SUMMARY AND CONCLUSIONS

Faced with underperforming portfolios, investors are continually seeking alternative assets and sophisticated solutions to reap high returns while minimizing risk. This article has taken a close look at the financial implications of including art as an alternative asset class. This previously nontransparent 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, while benefiting from diversification. 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 article show that art's low correlation with other asset classes offers 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 as an attractive, albeit small, addition to their investment strategy.

**APPENDIX**

**INDEX CONSTITUENTS**

**General all Art**


**Old Masters**

Osias I BEERT, Nicolaes BERCHEM, Louis Leopold BOILLY, Francois BOUCHER, Jan (elder) BRUEGHEL, Jan (younger) BRUEGHEL, CANALETTO, Annibale CARACCI, John CONSTABLE, Aelbert CUYP, Arthur DEVIS, Carlo DOLCI, Sir Anthony van DYCK, Jean Honore FRAGONARD, Frans I FRANKEN, Thomas GAINSBOROUGH, Theodore GERICAULT, Luca GIORDANO, Jan van GOGH, Jean-Baptiste GREUZE, Francesco GUARDI, Giaccomo GUARDI, Giovanni Francesco GUERCINO, Jan Davidsz de HEEM, Egbert van HEEMSKERK, Meindert HOBEMA, William HOGARTH, Melchior de HONDECOETER, Jean Baptiste HUET, Jacob von 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 MARIJESCHI, Ben MARSHALL, Adam Frans van der MEULEN, Jan Miense MOLENAER, Klaes MOLENAER, Joos de MOMPEN, Peter MONAMY, Jean Baptiste MONNOYER, George MORLAND, Alexander NASMYTH, Charles-Joseph NATORRE, 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, Sebastian RICCI, Hubert ROBERT, George ROMNEY, Salvador 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) VEILDE, Simon VERELST, Nicola van VERENDAEL, Joseph VERNET, Paolo VERONESE, David VINCENT-BOONS, Simon de VLIJDER, Sebastian VRANCX, Jean Antoine WATTIEAU, 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 GUILLEMIN, Albert LEBOURG, Stanislas LEPINE, Max LIEBERMANN, Edouard MANET, Henri -French MAÎTIN, Henri MATISSE, Claude MONET, Berthe MORISOT, Rodenick O'CONOR, Camille PISSARRO, Pierre Auguste RENOIR, Theodore ROUSSEAU, Alred SISLEY, Max SLEVOGT, Joaquim SOROLLA Y BASTIDA.

Modern Artists
Pierre ALECHINSKY, Karel APPEL, Fernandez ARMAN, Edouard ARROYO, Frank AUERBACH, Francis BAÇON, Willi BAUMEISTER, William BAZIOTES, Max BECKMANN, Joseph BEUYS, Max BILL, Jules BISSIER, Fernando BOTERO, Louise BOURGEOIS, Alberto BURRI, Reg BUTLER, Alexander CALDER, Giuseppe CAPOGROSSI, Anthony CARO, Baladaccini 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, Ashile GORKY, Adolph GOTTIEB, Hans HARTUNG, Dame Barbara HEPWORTH, Patrick HERON, Eva HESSE, David HOCKNEY, Hans HOFMANN, Friedrich HUNDERTWASSER, Robert INDIANA, Aser 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 POLOCK, Arnaldo POMODORO, Arnluf RAINER, ARNULF RAINER, Martial RAYSSE, Ad REINHARDT, Germaine RICHER, 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 UECTER, Emilio VEDOVA, Bran 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 BOLTANSKI, Maurizio CATTANEO, 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 FEITLING, Eric FISCHL, P&WEISS FISCHLI, Dan FLAVIN, Gunther FORG, Lucian FREUD, GILBERT and GEORGE, Robert GOBER, Nanne 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 KIPPMENBERGER, 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, PANAMENKGO, A R PENCK, Michelangelo PISTOLETTA, Sigmar POLKE, Richard PRINCE, Robert RAUSCHENBERG, Charles -American RAY, Gerhard RICHTER, Pipilotti RIST, Mimmo ROTELLA, Susan ROTHEBENG, Thomas RUFF, Edward RUSCHA, Niki de SAINT-PHALLE, David SALLE, Antonio SAURA, Jenny SAVILE, Julian SCHNABEL, Thomas SCHUTTE, Sean SCULLY, George SEGAL, Richard -American SERRA, Andres SERRANO, Joel SHAPIRO, Cindy SHERMAN, Jose Maria SICILIA, Frank STELLE, Thomas STRUTH, Donald SULTAN, Rosemarie TROCKEL, Luc TUYMANS, Cy TWOMBLY, Jeff WALL, FranR WEST, Christopher WOOL.

ENDNOTES
1 Frey and Eichenberger [1995].
2 Data are only available until December 2002 on the All Art Index.
3 A description of the artists included in the various indices is in the appendix.
4 Similar survivorship bias is also apparent in other financial indices.
5 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.
6 See Okunev and White [2003] for greater detail on the conditions that the autocorrelation function must fulfill and on the application to remove higher orders of autocorrelation.
7 See Campbell [2005] for a detailed analysis on desmoothing art series data.
REFERENCES


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