THE MONETARY APPRECIATION OF PAINTINGS : FROM REALISM TO MAGRITTE.

Luc Renneboog[*] and Tom Van Houtte[**]

Abstract

This study investigates how investments in painted arts compare to those in stocks in terms of risk-return trade off using Sharpe and Treynor ratios and Markowitz efficient frontiers. A large database was analysed consisting of more than 10500 auction prices of Belgian painted art over the period 1970-1997. Hedonic art returns are influenced by auction location and auction house, current of art, painters' reputation, medium, signature and painting size. Surrealism and luminism were the most popular currents of art (in monetary terms), while expressionism and symbolism gained (financial) esteem. This study concludes that art investments underperform equity market investments due to high riskiness, transaction costs, capital gains, resale rights, and insurance premia. In addition, the Markowitz efficient frontier shows limited diversification potential for art.

Key words : Investing in art, Hedonic regression.

JEL Codes : G1, Z1

[*] *Department of Finance and CentER, Tilburg University.*

[**] *PricewaterhouseCoopers.*

Acknowledgements : We thank a.o. Victor Ginshburgh, W. Goetzman, Foort Hamelinck, Uli Hege, Marc Goergen, Colin Mayer, Simon Hough. Rafel Crespi, and Joe McCahery for their recommendations and suggestions. We are most grateful to Mr. Hislop of Art Sales Index ltd. for allowing us to use his Art Quest database containing a large set of auction data. The paper has benefited from his help and encouragement, and from the advice from the participants of the finance seminar at the Universities of Oxford, Tilburg and Ghent. The usual disclaimer applies.

Corresponding author : Luc Renneboog, Tilburg University, Department of Finance and CentER, Warandelaan 2, 5000 LE Tilburg, Netherlands.

Email : Luc.Renneboog@kub.nl, fax : 00 31 13 466 2875

1. **Introduction.**

In September 1998, *Les valeurs personnelles*, a painting from 1952 by the Belgian artist Magritte was sold for $7.1 million by Christie's (New York office). Although this price is still lagging substantially behind that of the self-portrait by Van Gogh which was sold for $71.5 million on the same auction day, it is still a record price for a surrealist canvas. In addition, three more Magrittes were auctioned for prices of more than $5 million each. From these spectacular prices which are highlighted in the media, one may spontaneously infer that returns on art investments are exorbitant. But, are the returns on diversified art portfolios as high? In other words, is the return to an uninformed art investor competitive in relation to an investment in financial securities? In its answer to these questions, this paper focuses on the return-risk trade-off of different currents or art and on their diversification potential.

In making the selection of the period and currents of art for this study, a buoyant artistic period was sought during which several new ideas, techniques and schools arose. Furthermore, the requirement of sufficient liquidity on the markets of auctioned art imposes the need to chose a relatively recent period. Hence, painted art in Belgium over the period 1850s to 1950s was selected. Within this time period, there was a large artistic output and about 12 currents of art - from realism and impressionism to surrealism- gained esteem. In addition, Belgian avant-gard art has received increasing attention by international exhibitions (a.o. the 'Belgian Avant-garde' exhibition at the Royal Academy of Art in 1995 in London and the exhibition 'Paris-Bruxelles' in Paris and Ghent in 1997) and in large overview exhibitions the oeuvres of individual artists were highlighted (e.g. Claus in Ostend in 1997, Magritte in Brussels in 1998 and Permeke in Paris in 1999).

The main artistic boom period of the Belgian region (the Low Countries) started in the 14th century with the Flemish Primitives, like the brothers Van Eyck, Memling or Bosch. This artistically buoyant period continued in the 16th century with a.o. the Breughel family and extended into the baroque period of 17th century with Rubens, Jordaens and many others. Although this influential period might be an obvious choice to study, the supply of old masters on the art market is low. After the Antwerp baroque school, there is one and a half century of silence. However, since the 1850s, the quality of painting in Belgium experienced an important revival. In the middle of the 19th century the dominant art was (social) realism, soon followed by a new current of art initiated near Paris: impressionism. Based on impressionism, luminism and pointillism arose, which in turn provoked reactions in the form of expressionism and symbolism. More abstract paradigms, like futurism, fauvism and constructivism, had some adepts in Belgium, but never became as successful as surrealism which in a few decades attracted high auction prices on the international art market.

Over the period 1970 to 1997, the market of auctioned art has grown exponentially from $150 million to over $1.8 billion with a sharp peak in 1989 both in terms of auction prices and supply of art. Two countries dominate the international art markets: the US and the UK with respectively 44% and 29% of the total auction turnover of paintings. The supply and turnover of Belgian art (since 1850) closely followed the international trends with average auction prices of $5,000 in 1970, $30,000 in 1989 and about $20,000 in 1997.

There is conflicting evidence about the profitability of art investments. Baumol (1986) investigated the return of art over 4 centuries concludes that the average annual real return on art is a mere 0.55%, substantially below the long term government bond return (of 2%). These findings are confirmed by Frey and Pommerehne (1989) who find a real return of 1.5% for a larger sample over the period 1635-1987. However, Chanel, Gerard-Varet and Ginsburgh (1991) and Buelens and Ginsburgh (1993), amend these findings and conclude, using Baumol's database, that the low return is caused by inferior returns on the English art schools and by depressions in the art market (like the war periods). Dutch painting schools for example, yield an annual real return of 13.7%.

For a large dataset of prices over the period 1961-1991, Docclo, de la Barre and Ginsburgh (1994) find an annual nominal return of 12% which is caused by substantial price increases in the eighties attributable to speculative trading of art dealers (the market subsequently collapsed with a decrease of 47%). Several studies investigate the relation between stock and art markets and conclude that booms in stock markets create booms in art markets but never vice versa (see e.g. Goetzman (1993), Chanel (1995), Chanel, Gerard-Varet and Ginsburgh (1991)). This paper compares art return calculation via naïve indices with that via the hedonic regression and contributes to the economics of art-literature by adopting different risk-return evaluation methods from portfolio theory (Sharpe and Treynor ratios, Markowitz efficient frontiers).

Section 2 explains the selection procedure of schools and painters and discusses the data sources. Section 3 compares the hedonic return methodology with some naïve art indices. While section 4 details nominal returns on art, section 5 investigates whether art returns are an inflation hedge and compares the art investment to alternative investments in financial securities, taking investment risk and transaction costs into account. Section 6 concludes.

2. Data sources and selection procedure.

For each current of art, the most representative painters were selected (see appendix 1). Several leading art history books on art (Palmer (1994), Robert-Jones (1969), Stubbe (1953) and Vanbeselare (1976)) were consulted as well as the catalogues issued by the Museum for Fine Art Ghent (1997) and the Museum for Modern Art Ostend (1997) at the occasion of large overview exhibitions of the period 1850s-1950s. The selected painters' oeuvre was to be discussed extensively in at least three of the art history books and considered of international artistic (historical) relevance. As a result, 74 representative artists over 12 currents of art were withheld.[1]

Auction prices, physical characteristics of paintings (like technique, size, presence of signature,…), auction location, name of painter and day of sale were collected from the database ArtQuest (Art Sales Index ltd.) for the period 1970-97. This database is constructed from catalogues from most auction houses worldwide and includes small local auction houses as well as unique auctions, the so-called 'castle sales'. The database is complete from 1980 onwards and consists of most of the auctions in 1970-1979[2]. Auction prices are given in £, $ or local currency and were translated into £ using the exchange rate (from Global Financial Data) of the auction date.

For the 71 painters, 10598 sales were collected over the period 1970-1997. These paintings were auctioned in 197 auction houses in 101 cities of 20 countries. One of the problems is the allotment of a painter to a school as few painters remain lifelong faithful to one art paradigm. Categorisation of a painter into one school is preferred because a painter is generally known as a representative of one school. For example, Permeke is considered as the figure-head of expressionism, but early impressionist oeuvre is sold as a result of Permeke's expressionist reputation. Four painters, Ensor, Evenepoel, Vaes and Opsomer cannot possibly be categorised into one of the mainstream art paradigms and are put in 'other currents'.

Inflation and short term interest rates are from the IMF statistical database, while value-weighted stock market indices (S&P500, World index, European index, country indices) are drawn from the Global Financial Data-database.

3. Art return calculation : methodology.

One of the differences between paintings, by e.g. Magritte, and financial assets is the fact that Magritte's paintings are neither identical nor interchangeable. Usually, auctioned paintings are not frequently returning to the auction market because high transaction costs discourage frequent

trading and reduce sales liquidity of works of art. As our dataset only contains a small number of repeat sales over the period 1970-97, we resort to return calculation based on naïve indices and on a hedonic price model. This section briefly reviews the methodologies and their (dis)advantages.

a. Naïve art indices based on mean and median prices and on a basket of art.

By current of art and for Belgian art in general, yearly price indices are constructed using the averaged and median auction prices. These indices assume that the distribution of quality of the paintings is relatively stable over time. The index based on median prices is less influenced by outliers and thin trading. A third naïve method of return calculation is similar to a Consumer Price Index. A basket of representative paintings is selected and the price of constituting paintings which are not sold in the subsequent period are periodically re-evaluated by experts.[3] An alternative to this method consists of replacing the originally selected canvasses of the basket which are not auctioned year after year, by close substitutes (see also Fase and van Tol (1994)). A painting of the same artist and of the same quality and size is preferred as a substitute. Obviously, subjectivity in determining substitutes is the Achilles' heel of this method, although the ex ante selection of substitutes can alleviate this problem.

b. The hedonic price regression.

The hedonic method was pioneered by Court who rejected in 1938 the US Bureau of Labor Statistics' conjecture that the car index for the GM brands had increased (by 45%). With this technique Court eliminated that part of the price increase which was due to quality improvements. It was shown that – making abstraction of quality price increases - the real car price had actually substantially decreased (by 55%) (see e.g. Griliches (1971)). Similarly, we use the hedonic regression method to strip observable 'qualities' from the paintings to retain an index reflecting the price of a 'standard' painting of Belgian art and of the different currents of art. Thus, we subtract from the auction price the implicit prices (α_i) attached to specific artistic characteristics, like the current of art or painter, the presence of a signature, the country of auction location or reputation of auction house and the painting's size (see also Chanel, Gerard-Varet and Ginsburgh (1994)) or Gerard-Valet (1995)).

For every current of art, the following OLS model is estimated:

$$\ln p_{kt} = \sum_i a_{i0} x_{ikt} + \sum_t b_t z_t + u_{kt} \qquad (1)$$

with $\ln p_{kt}$ = the natural logarithm of the price of painting k sold in year t

x_{ikt} = characteristic i of painting k at time t,

Objective characteristics of the paintings included in equation (1) are:

- painter's name (dummy variable)

- auction house or sales room (dummy variable)
- paintings' size (height, width and surface)
- medium (dummy variable for oil, water colours, study)
- signature (dummy variable, yes=1)

α_i= parameter estimate: implicit prices of art characteristics,

u_{kt} = disturbance,

β_t = parameter estimate: $e^{\beta t}$ gives the hedonic index,

z_t = dummy-variable when equals 1 when a painting is sold in year t.

Although the implicit prices assigned to art characteristics can evolve across time since tastes evolve over the centuries, it is fair to presume that these implicit prices remain constant over the relatively short time period 1970-97. The parameter estimates, β, of the time dummy variables in the hedonic regression (eq. (1)) are used to create a price index.[4] This price index enables us to calculate yearly returns of a 'standard' painting.

For the mean, median, art basket and hedonic indices, buy-and-hold returns are calculated: $I_b = I_a(1+i)^t$ where I_a and I_b are price-indices at times a and b, and t is the number of periods between times a and b. This is equivalent to a geometric return $[(1+i_1)*((1+i_2)*(1+i_3)*\ldots]^{1/t}$-1 where t is the number of periods, and i_k is the rate of return of the k^{th} period. Geometric returns represent good estimates of the investors' expected return over the long term as individual paintings are not frequently brought to the art market.

4. Empirical results on the rates of return of art investments.

a. Buy-and-hold returns of naïve art indices.

Given the lack of repeat sales, returns based on averaged, median and art basket indices are as close as we can get to 'raw' returns of diversified art portfolios. An uninformed investor who invested in 1970 in a well-diversified art portfolio consisting of the 12 currents of art discussed above, would have gained an average annual nominal return of 7.6% over the following 28 years when liquidating the portfolio in 1997 (see table 1). A preference for a diversified portfolio of oil paintings over a portfolio of all paintings (oil, water colours and etchings), would have yielded a 2.2% return increase to an annual nominal return of 9.8%. Table 1 also reveals that the returns based on averaged auction prices are clearly influenced by well performing outliers as the median annual return on oils amounts to only 5.5%. The buy-and-hold return of an investment in the stock markets (in a value weighted index covering the equity markets of, respectively, the world, US and Europe) outperforms an investment in a paintings portfolio which is well diversified across 12 currents of

art. Only a portfolio consisting of oil paintings, does slight better than a stock market investment (for a discussion of the risk-return trade off: see section 5).

INSERT ABOUT HERE TABLE 1

The art market peaked in 1989, and a lucky or informed art investor who sold a diversified portfolio of Belgian oil paintings at the end of that year would have made an annual geometric return of 16.8% and would have beaten stock market investments. The difference in averaged and median based rates of return reveals that skills in picking high quality paintings pay off. Likewise, skills to select currents of art likely to be in vogue on the international art markets can also yield superior returns. For instance, surrealist oil paintings (mainly by Magritte and Delvaux) have proven to yield good buy-and-hold returns of 15% annually over the period 1970-97. However, the median buy-and-hold return of surrealism paintings is negative (-2.17%). This is largely due to the fact some art collectors have tried to jump on the band wagon in art boom periods and have flooded the market with studies, drawings, gouaches, sketches, etchings, water colours and paintings, often of lesser quality. For example, while there were only 40 paintings by Magritte and Delvaux sold in 1986, the supply of sales increased to 140 in 1989, following substantial price increases in 1987. This has resulted in lower level median rates of return. Apart from surrealism, realism and luminism have also yielded high returns.

An art basket consisting of 17 paintings drawn randomly, from the oeuvre of 17 painters who are representative for the currents of art.[5] If some of the 17 paintings were not sold the following year, paintings with a size similar to the original paintings (by painter) were chosen so as to obtain a more homogenous index. If more candidate paintings were available, a random selection was performed. This method gives a buy-and-hold return of 8.6% for the period 1980-1997, which is close to the rate of return of 9.0%, obtained via the geometric return calculation using the average price of all oil paintings.[6]

Figures 1 and 2 a-f show the linear trend lines for an index based on the median prices of all Belgian paintings and of the different schools of art. The graphs exhibit the low growth in art prices in the 1970s, the boom in the art markets in the second half of the 1980s and the decline as of 1992. In spite of the downward price correction of 1989, art prices for all currents of art (apart from surrealism) were at least two and a half times as high in 1997 than in the beginning of the 1980s.

INSERT ABOUT HERE FIGURES 1 AND 2

b. Determination of implicit prices and of hedonic art returns.

The regressions yields implicit prices for the characteristics of the paintings, or, in other words, that part of the price attributable to the characteristics of the paintings themselves (the α's). These implicit prices are determined for all 10598 paintings (oil paintings, water colours, etchings) over the period 1970-1997, and for oil and water colours separately (respectively 4691 and 3808 auctioned paintings). The dependent variable is the natural logarithm of the auction prices in pounds sterling and local currencies have been translated into £ using the £/local currency exchange rate of the transaction day. The independent variables of the global regression consist of: technique, size, signature, date, current of art, auction country and time dummies.

Signature and size.

Table 2 shows that the presence of signature on the paintings is financially rewarded by a higher auction price. It may be that the probability that the authenticity of a signed painting is questioned, is smaller.[7] The paintings' size (height, width and surface) was also included. Table 2 reveals that the wider (for all paintings, oils and water colours) and the higher (water colours only) the paintings, the higher the auction price is. However, the negative surface variable indicates that the price does not grow linearly with width or height (see also Mertens and Ginsburgh 1994). There is clearly an optimal size for a painting since private collectors refrain from purchasing museum-size paintings. Including a dummy variable for the technique (oil, water colours or etching) in the all paintings-model confirms that a premium is paid for oil paintings. An analysis using a hedonic regression by current of art (not shown), shows that a standardised expressionist oil painting is priced 20% higher than a water colours painting. Symbolist, surrealist, luminist, pointillist oil paintings all receive substantial premiums compared to the average water colours of the respective currents of art; the mark-ups amount to respectively 80%, 97%, 123% and 127%. Expectedly, both oil paintings and water colours receive a price premium with regard to etchings.

INSERT ABOUT HERE TABLE 2

Relative importance of currents of art and of painter's reputation.

A second set of independent variables in the global regression consists of dummy variables capturing the 12 different currents of art - from realism to surrealism - and is a compact alternative for the inclusion of dummy variables for the 71 painters. These dummy variables are used to calculate a hedonic index with 'Other' (paintings by Ensor, Evenpoel, Vaes and Opsomer) chosen as benchmark. Table 3 shows that especially Ensor's and Evenpoel's paintings have obtained high auction prices on the international art markets: the hedonic price level of their oil paintings is only surpassed by that of luminism, pointillism and, especially surrealism which has an index of almost

4.5 times the benchmark. The art market seems to discount realism and impressionism as well as the more abstract currents of art, like constructivism, abstractism and fauvism, which lag behind with indices below 67.

INSERT ABOUT HERE TABLE 3

In an expanded regression (appendix 2), the current of art-dummies are replaced by the 71 painters. Taking De Weert as benchmark (index=100), we find that the oil paintings of the following painters were most appreciated in monetary terms over the period 1970-97: the surrealists Magritte (index 662) and Delvaux (index 481), the expressionist Khnopff (index 472), Ensor (index 443), the expressionist Spilliaert (index 435), the luminist E. Claus (index 304), the pointillist Van Rysselberghe (index 301) and the fauvist Wouters (index 297). Running the global hedonic model for the subperiods 1970-80, 1981-89 and 1990-97 reveals that the financial interest in painters (and currents of art) evolves through time, but the sustained popularity of surrealists Magritte and Delvaux across the three decades is striking. The table also reveals the discovery of symbolism (with Khnopff) and expressionism (Permeke, G. De Smet and Van de Berghe) in the 1980s. The increasing popularity of the luminist paradigm is to a large extent due to Emile Claus. This table confirms that there is little monetary appreciation for realism (see e.g. Leys) and abstractism (with the exception of Michaud).

The relative importance of auction houses and location.

Pesando (1993) studied auction prices of etchings, which are in fact almost identical products as usually several prints are made of one copper of stone engraving, and showed that transaction costs limit the possibility of arbitrage between the international etchings markets of London and NY.[8] Since we focus on paintings, each of which is different, a similar arbitrage study cannot be performed. Still, we can determine at which auction houses or in which countries the highest hammer prices are obtained and correct the hedonic return for location. Table 4 reveals the relative importance of auction countries with the US as benchmark. Not surprisingly, we find that art is receiving the highest prices in the US. In terms of average auction prices, the UK is the second best location with prices lagging at 72% of the US-level. The relative price discount of art sold in Belgium is substantial; at a level of 22% of the US.

INSERT ABOUT HERE TABLE 4

A more detailed analysis, where individual auction houses are substituted for the countries, is presented in appendix 3. Within the 5% statistical significance level, it is Christie's (New York office) followed by Sotheby's (New York office) where the highest prices were reached. The London subsidiaries of the same auction houses lag behind their American counterparts but still

obtain (statistically) superior results compared to Continental European ones. Ginsburgh and Mertens (1995) confirm that Belgian art of the highest quality is drawn to the international auction houses in New York and London like Christie's and Sotheby's whose reputation and marketing power attracts an international art purchasers.

Price evolution of a standard painting.

Apart from the variables discussed above, the global model also contains year dummies for the period 1970-97. From the parameter estimates of these time dummies, a yearly price index is calculated in table 5. The average painting (or a diversified portfolio consisting of Belgian art) yielded a hedonic return of 5.6% (see table 6) with oil paintings outperforming water colours (respectively 7.6% versus 3.2%). Perfect foresight would have led to selling in 1989 with an overall annual return of 8.4% and returns on oil paintings of 10.2% and on water colours of 6.5%. The hedonic returns are smaller than the buy-and-hold (geometric) returns of table 1 (5.6% versus 7.6% for all paintings, and 7.6% versus 9.8% for oil paintings), since abstraction is made of not only physical features like size, but also the auction location and the reputation of the current of art or of the painter.

INSERT ABOUT HERE TABLE 5 AND 6

Using a similar methodology for each current of art yields annual hedonic rates of return for each school of art (table 6): 6.9% for expressionism, 6.8% for luminism, 7.3% for 'other painters' (Ensor, Evenepoel), 6.3% for realism, 1.9% for surrealism, 2.0% for impressionism and 4.4% for symbolism. Selling a standard painting in 1989 would have yielded hedonic rates of return of 2 to 5% higher.

5. Investing in art and equity markets.

a. Art and inflation.

The buy-and-hold returns on the naïve (averaged, median and art basket) and hedonic art indices of previous section are computed in nominal terms. Over the period 1970-97, Belgian and US inflation amounted to respectively 5.2% and 5.5%. Figure 3a (appendix 4) depicts the averaged price index of art (all currents) versus the Belgian Consumer Price Index. Only in the period 1982-85, inflation exceeds nominal art returns. Since 1985, significantly positive real returns on art portfolios in the 12 currents of art were obtained. Expressionist and luminist paintings even yielded positive real returns for the whole period since 1970 (see Figures 3 b-f in appendix 4). Table 7 shows that art is not a good inflation hedge as the correlations between the naïve and hedonic returns on art (taken as all

paintings, oil paintings, water colours, and the different schools) and conditional inflation (innovations in CPI) are low and statistically indistinguishable from zero.

INSERT ABOUT HERE TABLE 7

b. Risk of art investments and portfolio diversification potential.

Figure 4 portrays the evolution of the art index and the value-weighted stock market index for the US, Europe and the world. The Pearson correlations between the hedonic art returns and the returns on the value-weighted World, European and US stock indices are quantified in table 7: they are low at 0.019 (with US index), 0.249 (with World index) and 0.223 (with European index). Consequently, adding art investments to a portfolio of financial assets (like equity and bonds) may have some benefits in reducing total portfolio risk.

INSERT ABOUT HERE FIGURE 4

The volatility of equity index returns is less than 21% which is consistently lower than the volatility of naïve art indices over the period 1970-97 and similar (in case of the European index) or lower than the hedonic volatilities (table 8). The Sharpe ratios, the returns in excess of the riskfree rate by unit of total risk, show that the stock market presents a superior return-risk trade off in comparison with art investments. All hedonic Sharpe ratios are lower than those of the equity indices with the exception of the Sharpe ratio of a group of painters including Ensor and Evenpoel.

INSERT ABOUT HERE TABLE 8

The Treynor ratio (excess return by unit of systematic risk) might be a better benchmark because it is a fair assumption that investors in art do not uniquely invest in art but rather consider the diversification potential of art. Therefore, the systematic risk, β, is calculated for the Belgian art portfolio and for portfolios of specific currents of art with regard to value weighted World, European and US stock market indices: $b = \frac{\mathrm{cov}(R_{art}, R_{market})}{s^2(R_{market})}$. Specific currents of art like impressionism and luminism are strongly negatively correlated to market returns and have large negative betas (-3.7 and –2.9 w.r.t. the world stock index). Expressionism has a beta of 0.8, whereas the correlation of the other art paradigms to the market index are close to zero.

Adding art to the set of investment opportunities may shift the Markowitz efficient frontier of equity investments upwards if the low correlation of art with equity lowers total portfolio riskiness. The dotted line in Figure 5 shows the efficient frontier for the investor with an investment universe consisting of equity indices of the main world stock markets (S&P500, FTSA, DAX, CAC, Nikkei,…) and no short selling is allowed.[9] When the investment universe is broadened with

portfolios of impressionsist, luminist, pointillist, surrealist, expressionist, symbolist and other (Ensor et al.) art, the efficient frontier shifts upward but not in a parallel way. Only the upper part of the line moves upward (and hence favourably), but this signifies that only those investors willing to incur a substantial amount of risk (more than 45%) may benefit from art as an investment alternative. The investor desiring to limit his risk to range to 20-30% only holds a well diversified equity portfolio and avoids art investments.

INSERT ABOUT HERE FIGURE 5

From this analysis, we must conclude that art investments are – in a mean-variance framework – defeated by equity investments. Furthermore, the advantages of adding art to a diversified portfolio of financial assets are small. It should be noted that the market indices used above only capture capital gains, which means that equity returns need to be adjusted upwards by the dividend yield, further reducing the relative financial attractiveness of art. The verdict against investing in art is even stronger in the next section where transaction costs, VAT and resale duties are discussed.

c. Transaction costs and art taxation.

The art returns presented above need to be substantially adjusted downwards as art transactions induce additional costs. First, whereas stock transactions for an individual investor amount to around 1-1.5% (brokerage fees and, in some countries, local stock exchange taxes) for domestic shares and to around (maximally) 2.5% for shares traded in foreign stock exchanges, art transaction costs amount to more than 25%. The art buyer typically pays 15% of the auction price, while the seller pays 10-12%.[10] Consequently, if the painting is sold after one year, it should earn a return of at least than 25% merely to recuperate the transaction costs. Still, in the mean time, increasing competition among auction houses is driving commissions down especially for the oeuvre of famous artists as media attention resulting from the prestige of famous works of art is invaluable to an auction house. Second, resale rights are due, which vary from country to country.[11] Third, VAT on the commission to the auction house has to be paid.[12] A fourth factor reducing the financial attractiveness of art is the yearly insurance premium against damage or theft which typically is at 0.5% of the estimated value. All these costs combined with the fact that the art market for paintings is less liquid (auctions take place in the spring or autumn and are usually organised around a specific current of art or theme), lead to a significant reduction in the annualised art return. Consequently, the risk-return trade-off for art is worse than the one presented in table 8. Therefore, one must conclude that the uninformed individual’s decision to invest in a diversified art portfolio is predominantly motivated by non-monetary reasons.

6. Conclusion.

Both on the art and stock markets, transactions can lead to mind-boggling returns. This is usually due to either speculative luck or superior private information. This study has investigated whether diversified investments in visual arts – more specifically in the niche art market of Belgian currents of art from realism to surrealism (1850s-1950s) – can lead to returns which could be competitive in comparison to equity returns. In this study, a large database, consisting of more than 10500 art sales prices from auction houses from all over the world for the period 1970-1997 was compiled and analysed.

In setting the art price, technique or medium plays an important role: oil paintings yielded higher prices and returns than water colours or etchings. A signature on a canvas is rewarded with a premium. Although larger paintings received higher prices, there is a clear limit to size as the market for museum size paintings is smaller. In internationally renown auction houses, like Christie's and Sotheby's, the highest auction prices were hammered. Surrealism and luminism were the most popular currents of art, while expressionism and symbolism gained esteem over the period 1970-97.

As there are relatively few repeat sales, the problem of return calculation was solved by calculating a hedonic art index. The latter was calculated by correcting auction prices with the implicit prices of the painting technique, current of art, auction location, and physical paintings' characteristics. We find that risk adjusted buy-and-hold art returns generally underperform stock market returns. However, when considering the risk-return trade-off, the Sharpe ratios of art investments were below those of the equity market. The Markowitz efficient frontier shifts upwards when including art to the investment opportunity set, but only for high levels of risk, suggesting that the diversification potential of art is limited.

Finally, there are substantial drawbacks to art investment compared to investments in financial securities. Not only is the art market less liquid, but art returns are further reduced by the high transaction costs, which can amount to more than 25% of the transaction price. In addition, VAT as well as resale rights are due and a yearly insurance premium further adds to the total cost picture. Incorporating all these additional costs and considering the riskiness and the poor diversification potential makes an art investment risk a poor alternative to equity investments. All in all, only if the uninformed art lover believes that owning a thing of beauty is joy forever, the non-monetary value of an art investment will compensate for the lack of monetary compensation.

Bibliography :

- Baumol, W.J., 1986. Unnatural value : Or art investment as floating crap game, *The American Economic Review* 76 , Papers and Proceedings, 10-14.
- Buelens, N., Ginsburgh, V.,1993. Revisiting Baumol's 'Art as floating crap game', *European Economic Review* 37, 1351-1371.
- Chanel, O., 1995. Is art market behaviour predictable ?, *European Economic Review* 39, 519-527.
- Chanel, O., Gerard-Varet, L.A., Ginsburgh, V., 1991. Is art such a bad investment *?, Centre d'Economie Mathematique et d'Econométrie*, June, discussion paper 9003.
- Chanel, O., Gerard-Varet, L.A. and Ginsburgh,V., 1994. Prices and returns on paintings : An exercise on how to price the priceless, *The Geneva Papers on Risk and Insurance Theory* 19, 7-21.
- Claeys Bouuaert, I., 1997. Le grand marché d'art européen, *Arts, Antiques and Auctions*, November, No. 286, 132-134.
- Docclo, S., de la Barre, M., Ginsburgh, V., 1994. Returns of impressionist, modern and contemporary European paintings 1962-1991, *Annales d'économie et de statistique* 35, 34 p.
- Fase, M.M.G., van Tol, M. 1994. Het monetaire rendement van beleggen in schilderijen, *Economische Statistische Berichten*, 1994, p 684-689.
- Frey, B.S., Pommerehne, W.W., 1989. Art investment : An empirical inquiry, *Southern Economic Journal*, October, 396-407.
- Gerard-Varet, L.A., 1995. On pricing the priceless : Comments on the economics of the visual art market, *European Economic Review* 39, 509-518.
- Ginsburgh, V. and S. Mertens (1994) La peinture belge moderne et contemporaine. Evolution des prix dans les ventes internationales, 1962-1992, *Revue du Crédit Communal* 190, p. 57-80.
- Ginsburgh, V. and S. Mertens (1995) La peinture belge et la situation des salles de ventes belges face à la concurrence internationale, *Reflets et Perspectives de la Vie Economique* 34, p. 176-208.
- Goetzmann, W.N., 1993. Accounting for taste : Art and the financial markets over three centuries, *The American Economic Review* 83, 1370-1376.
- Griliches, Z., 1971. *Hedonic price indexes for automobiles: an econometric analysis of quality change, in Price indexes and quality change : studies in new methods of measurement*, Cambridge, Mass., Harvard University Press.
- Museum of Fine Arts Ghent, 1997. '*Paris-Bruxelles, Brussel-Parijs*' : Catalogue of the exhibition 6/9/97-14/12/97, Museum voor Schone Kunsten Gent and Mercatorfonds.
- Museum of Modern Art Ostend, 1997. '*Van Ensor tot Delvaux*': Catalogue of the exhibition 5/10/96-2/2/97, Museum voor Moderne Kunst Oostende and Mercatorfonds.
- Palmer, M., 1994. *Van Ensor tot Magritte: Belgische kunst 1880-1940*, Lannoo Tielt, pp. 230.
- Pesando, J.E., 1993. Art as an investment: The market for modern prints, *The American Economic Review* 83, 1075-1089.
- Renneboog, L., Van Houtte, T., 1998. From realism to surrealism, mimeo, Tilburg University, pp. 26.
- Robert-Jones, P., 1969. *Van realisme tot surrealisme, de schilderkunst in België van Jozef Stevens* tot Paul Delvaux, Laconti N.V., Brussel, pp. 290.
- Stubbe, A., 1953. *Vlaamse schilderkunst van Van Eyck tot Permeke*, Elsevier, Brussel-Amsterdam, pp. 350.
- Vanbeselaere, J., 1976. De Vlaamse schilderkunst van 1850 tot 1950 : Van Leys tot Permeke, Arcade Brussel, pp. 315.

Figure 1 : Linear trendlines over 1970-97 and the evolution of annual median based indices of Belgian paintings of the period 1850s-1950s.

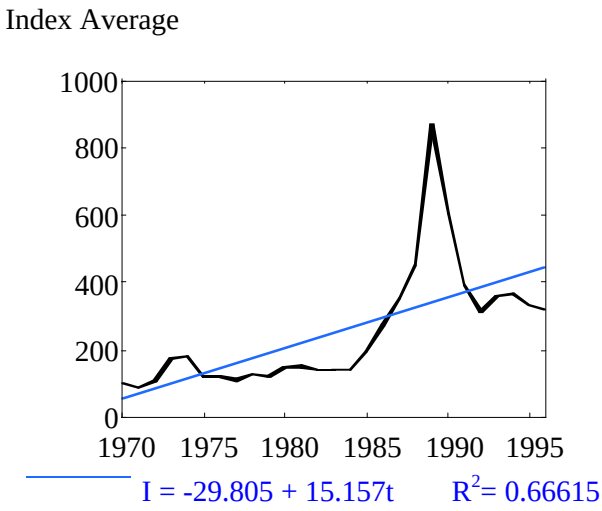


Table 1 : Returns on investments in paintings and in the stock market.

This table shows the geometric and arithmetic returns (based on yearly returns based on the averaged and median prices of paintings sold in the respective years) for all paintings (oils, water colours, etchings etc) and for oil paintings separately. Returns for all schools between 1850-1950 collectively are calculated as well as returns for each current of art separately, over the periods 1970-97 and 1970-89. The returns on the stock indices are calculated with value weighted stock indices for the world, European and US stock indices from Global Financial Data.

		All paintings (oil,w.c.,etch.)		**Oil paintings**	
		Averaged index	Median index	Averaged index	Median index
Geometric mean (1970-97) (buy and hold):		7.6%	4.5%	9.8%	5.5%
Standard deviation of annual returns :		36.6%	29.4%	46.5%	30.9%
Buy and hold return 1970-89 :		13.7%	12.1%	16.8%	12.6%
	Return and risk 1970-97 :				
Impressionism	Geometric mean	6.3%	3.8%	6.5%	3.8%
	Stand. dev. of ann. returns	71.8%	38.8%	70.9%	40.3%
Realism	Geometric mean	13.0%	6.0%	13.1%	6.0%
	Stand.dev. of ann. returns	99.0%	32.6%	108.2%	36.3%
Expressionism	Geometric mean	4.6%	4.8%	4.6%	5.0%
	Stand.dev. of ann. returns	35.8%	40.7%	39.3%	40.2%
Luminism	Geometric mean	9.2%	8.9%	10.4%	9.9%
	Stand. dev. of ann. returns	63.3%	84.7%	64.8%	77.7%
Symbolism	Geometric mean	7.2%	4.2%	9.1%	8.6%
	Stand.dev. of ann. returns	62.5%	79.4%	104.4%	97.0%
Pointillism	Geometric mean	4.8%	4.6%	6.0%	6.9%
	Stand.dev. of ann. returns	70.0%	76.0%	68.9%	55.9%
Surrealism	Geometric mean	9.3%	-2.2%	15.0%	13.4%
	Stand.dev. of ann. returns	61.2%	126.9%	48.6%	101.1%
Other (Ensor, Evenepoel)	Geometric mean	6.2%	-1.0%	7.7%	1.1%
	Stand.dev. of ann. returns	135.1%	97.4%	105.0%	225.7%

		1970-97	**1970-89**
World Stock Index	Geometric mean	8.7%	9.9%
S&P 500	Geometric mean	8.3%	7.3%
Europ. Stock Index	Geometric mean	9.2%	9.8%

Source : Own calculations based on ArtQuest. Note : Fauvism, constructivism, abstractism and futurism are not included in the table because of the low number of transactions. The returns and standard deviation of Ensor's and Evenepoel's paintings (school = 'other') also suffer from thin trading.

Figures 2 a to f : Linear trendlines over 1970-97 and the evolution of annual median based indices of expressionism, impressionism, luminism, pointillism, realism and surrealism of the period 1850s-1950s

Figure 2a

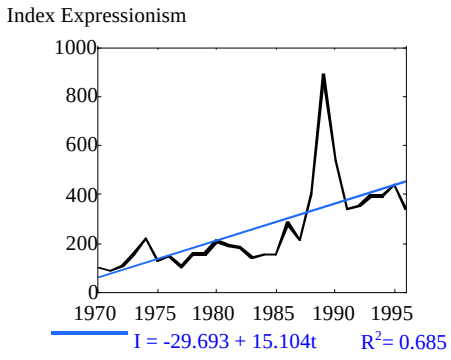


Figure 2b

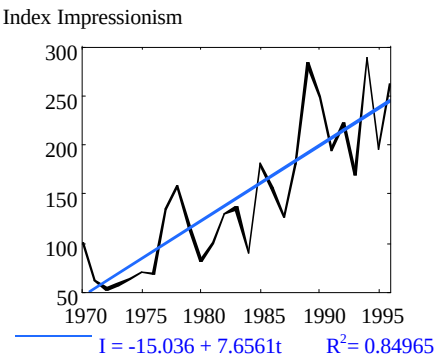


Figure 2c :

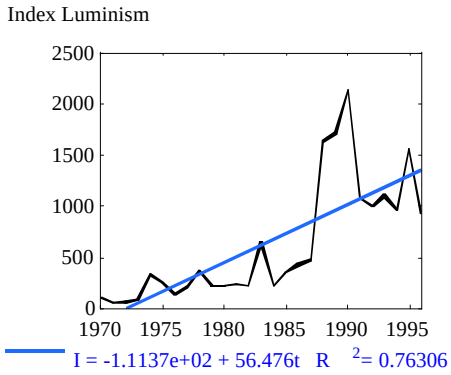


Figure 2d :

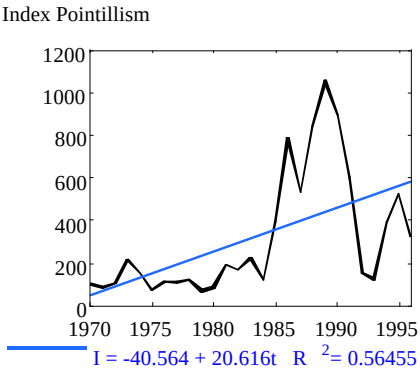


Figure 2e :

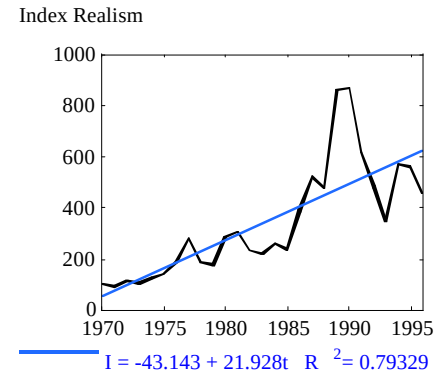
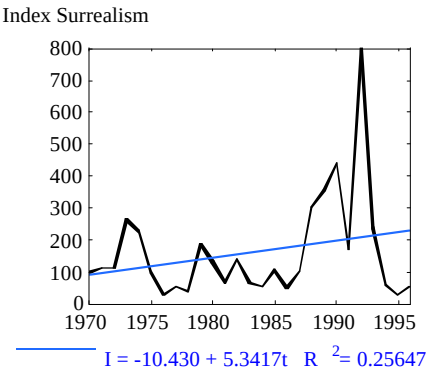


Figure 2f :



Source : Own calculations based on ArtQuest.

Table 2: Implicit prices of objectively observable characteristics of paintings (partial results of global regression).

These parameter estimates result from a global hedonic regression over the period 1970-1997 with the logarithm of the auction price as dependent variable. This table only shows physical characteristics of the painting, like the presence of a signature on the painting, the paintings' size (height, width and surface). Other independent variables included in the model are: currents of art, year dummies over the period 1970-97 and the auction country (all presented in tables 3-6)

On the bottom of the table the R^2 is of this regression is also given as is the number of observations of each of the three regressions. The regression with 'all paintings' consists of oil and water colour paintings, etchings, gouache, studies etc. Between brackets, the standard deviation of each parameter estimate is given.

Dep. var.= ln (price in £)	**All paintings**	**Oil**	**Water colours**
Signed (yes=1)	0.334*	0.121*	0.398*
	(0.039)	(0.061)	(0.049)
Height	0.001	-0.003*	0.009*
	(0.001)	(0.001)	(0.002)
Width	0.007*	0.004*	0.014*
	(0.001)	(0.001)	(0.002)
Surface	-0.001*	0.001	-0.001*
	(0.001)	(0.001)	(0.001)
R^2	0.415	0.494	0.395
N	10598	4691	3808

* Significance at 5% level (p-value in brackets).

Source : Own calculations based on ArtQuest.

Table 3 : Relative ranking of the currents of art

(partial results of global regression)

This table shows the parameter estimates and indices of the 12 schools of art in a global hedonic regression with the natural logarithm of the auction prices in pounds as dependent variable and with signature, size, currents of art, year dummies and auction country as independent variables. The regression with 'all paintings' consists of oil and water colour paintings, etchings, gouache, studies etc. Between brackets, the standard deviation of each parameter estimate is given. The index was calculated by taking the parameter coefficient as exponent of e. Number of paintings in the regressions for the period 1970-1997 is 10598 (all), 4691 (oil) and 3808 (water colours). The R^2s in the three regressions vary between 40% and 50%. Other parameter estimates of the global model are presented in tables 2, 4 and 5.

Dep. var.= ln (price in £)	**All paintings** Par. Estimate	Index	**Oil** Par. Estimate	Index	**Water colour** Par. Estimate	Index
Impressionism	-0.831	44	-0.665*	51	-0.839*	43
	(0.112)		(0.094)		(0.288)	
Realism	-0.786*	46	-0.631*	53	-0.604*	55
	(0.080)		(0.091)		(0.170)	
Expressionism	-0.192*	83	-0.118	89	-0.338*	71
	(0.064)		(0.084)		(0.093)	
Luminism	-0.005	100	0.321*	138	-0.919*	40
	(0.085)		(0.102)		(0.169)	
Symbolism	-0.256*	77	-0.095	91	-0.521*	59
	(0.719)		(0.108)		(0.095)	
Fauvism	-0.463*	63	-0.425*	65	-0.737*	48
	(0.091)		(0.145)		(0.118)	
Constructivism	-0.906*	40	-0.959*	38	-0.803*	45
	(0.152)		(0.203)		(0.213)	
Pointillism	-0.197*	82	0.244*	128	-0.892*	41
	(0.074)		(0.098)		(0.108)	
Abstractism	-0.246*	78	-0.399*	67	-0.352*	70
	(0.089)		(0.137)		(0.119)	
Surrealism	0.406*	150	1.500*	448	0.011	101
	(0.080)		(0.133)		(0.101)	
Futurism	-1.401*	25	-1.642*	19	-1.259*	28
	(0.384)		(0.536)		(0.514)	
Other (Ensor,…)	0.000	100	0.000	100	0.000	100
	(-)		(-)		(-)	

* Significant at 5% level. (standard deviation between brackets).

Source : Own calculations based on ArtQuest.

Table 4 : Relative importance of auction location

(results of global regression)

This table shows the parameter estimates and relative indices of the main countries where the auction took place, from the global hedonic regression with the natural logarithm of the auction prices in pounds as dependent variable and with signature, size, currents of art, auction location (country) and year dummies as independent variables. The regression with 'all paintings' consists of oil and water colour paintings, etchings, gouache, studies etc. Between brackets, the standard deviation of each parameter estimate is given. The index was calculated by taking the parameter coefficient as exponent of e. Number of paintings in the regressions for the period 1970-1997 is 10598 (all), 4691 (oil) and 3808 (water colours). The R^2s in the three regressions vary between 40% and 50%. The parameter estimates of all other paintings are shown in tables 2, 3 and 5.

Dep. Var.= ln	**All paintings**		**Oil**		**Water colours**	
(price in £)	Par. Estimate	Index	Par. Estimate	Index	Par. Estimate	Index
Belgium	-1.513*	22	-1.528*	22	-1.121*	33
	(0.059)		(0.078)		(0.086)	
Netherlands	-1.100*	33	-1.046*	35	-0.805*	45
	(0.074)		(0.094)		(0.116)	
France	-1.237*	29	-1.229*	29	-0.931*	39
	(0.068)		(0.097)		(0.093)	
Germany	-1.842*	16	-1.872*	15	-1.427*	24
	(0.087)		(0.177)		(0.122)	
Switzerland	-1.155*	32	-1.083*	34	-0.937*	39
	(0.117)		(0.153)		(0.171)	
U.K.	-0.480*	62	-0.328*	72	-0.360*	70
	(0.061)		(0.082)		(0.086)	
U.S.A.	0.000	100	0.000	100	0.000	100
	(-)		(-)		(-)	

* Significant at 5% level. (standard deviation between brackets).

Source : Own calculations based on ArtQuest.

Table 5 : Index of a standard painting

(results of global regression).

This table shows the parameter estimates and relative indices of the time dummies, from the global hedonic regression with the natural logarithm of the auction prices in £ as dependent variable and with signature, size, currents of art, auction location (country) and year dummies as independent variables. The regression with 'all paintings' consists of oil and water colour paintings, etchings, gouache, studies etc. Between brackets, the standard deviation of each parameter estimate is given. The index was calculated by taking the parameter coefficient as exponent of e. Number of paintings in the regressions for the period 1970-1997 is 10598 (all), 4691 (oil) and 3808 (water colours). The R^2s in the three regressions vary between 40% and 50%. The parameter estimates of the other independent variables are presented in tables 2-4. *Source : Own calculations based on ArtQuest.*

Dep. var.= ln	**All paintings**		**Oil**		**Water colours**	
(price in £)	Par. Estimate	Index	Par. Estimate	Index	Par. Estimate	Index
1970	-1.479* (0.195)	23	-1.956* (0.289)	14	-0.855* (0.250)	43
1971	-1.262* (0.150)	28	-1.810* (0.216)	16	-0.702* (0.196)	50
1972	-1.043* (0.146)	35	-1.441* (0.222)	24	-0.666* (0.185)	51
1973	-1.042* (0.168)	35	-1.587* (0.227)	20	-0.380 (0.233)	68
1974	-0.821* (0.145)	44	-1.131* (0.200)	32	-0.293 (0.197)	74
1975	-0.922* (0.157)	40	-1.302* (0.224)	27	-0.549* (0.206)	57
1976	-0.767* (0.107)	46	-0.708* (0.145)	49	-0.755* (0.147)	47
1977	-0.958* (0.114)	38	-1.151* (0.154)	32	-0.670* (0.159)	51
1978	-0.812* (0.099)	44	-0.751* (0.133)	47	-0.748* (0.138)	47
1979	-0.777* (0.107)	46	-0.932* (0.144)	39	-0.533* (0.149)	59
1980	-0.840* (0.099)	43	-0.998* (0.132)	37	-0.557* (0.139)	57
1981	-0.664* (0.100)	51	-0.834* (0.134)	43	-0.416* (0.140)	66
1982	-0.769* (0.108)	46	-0.884* (0.145)	41	-0.666* (0.150)	51
1983	-0.747* (0.102)	47	-0.663* (0.137)	52	-0.769* (0.142)	46
1984	-0.669* (0.093)	51	-0.770* (0.128)	46	-0.513* (0.127)	60
1985	-0.396* (0.096)	67	-0.422* (0.130)	66	-0.263* (0.134)	77
1986	-0.196* (0.094)	82	-0.160 (0.126)	85	-0.171 (0.132)	84
1987	-0.028 (0.088)	97	0.059 (0.119)	106	-0.001 (0.123)	100
1988	0.266* (0.089)	130	0.221 (0.118)	125	0.411* (0.126)	151
1989	0.724* (0.086)	206	0.646* (0.112)	191	0.848* (0.124)	234
1990	0.546* (0.090)	173	0.493* (0.118)	164	0.598* (0.130)	182
1991	0.285* (0.099)	133	0.217 (0.129)	124	0.447* (0.142)	156
1992	0.118 (0.092)	113	0.023 (0.119)	102	0.344* (0.135)	141
1993	0.191* (0.093)	121	0.161 (0.123)	117	0.281* (0.132)	132
1994	0.120 (0.089)	113	0.216 (0.117)	124	-0.008 (0.128)	99
1995	0.018 (0.088)	102	0.154 (0.118)	117	-0.062 (0.125)	94
1996	-0.023 (0.086)	98	0.063 (0.116)	106	-0.039 (0.120)	96
1997	0.000 (-)	100	0.000 (-)	100	0.000 (-)	100

* Significant at 5% level. (standard deviation between brackets).

Table 6 : Hedonic annual return of a standard painting (by current of art).

This table gives the nominal returns based on a hedonic art index. This hedonic index is constructed via the parameter estimates of the time dummies of a regression with the logarithm of the auction price as dependent variable and as independent variables: physical paintings characteristics (technique, size, presence of signature, …), the current of art (or painters' names) and auction location or houses.

Current of art	**Return of a hedonic standard painting 1970-97.**	**Return of hedonic standard painting 1970-89.**
All paintings	5.6 %	8.4 %
Oil paintings	7.6 %	10.2 %
Water colour paintings	3.2 %	6.5 %
For all paintings by current of art:		
Impressionism	3.5 %	5.4 %
Realism	6.3 %	11.2 %
Expressionism	6.9 %	9.1 %
Luminism	6.8 %	11.3 %
Symbolism	4.4 %	7.0 %
Surrealism	1.9 %	3.2 %
Other (Ensor,…)	7.6 %	9.2 %

Source : Own calculations based on data from the ArtQuest.

Figure 4. Art and Stock market indices 1970-97.

This figure shows the art index based and the value-weighted stock market indices of the US, Europe and the World. Art index results from own calculations, the stock market indices are from Global Financial Data.

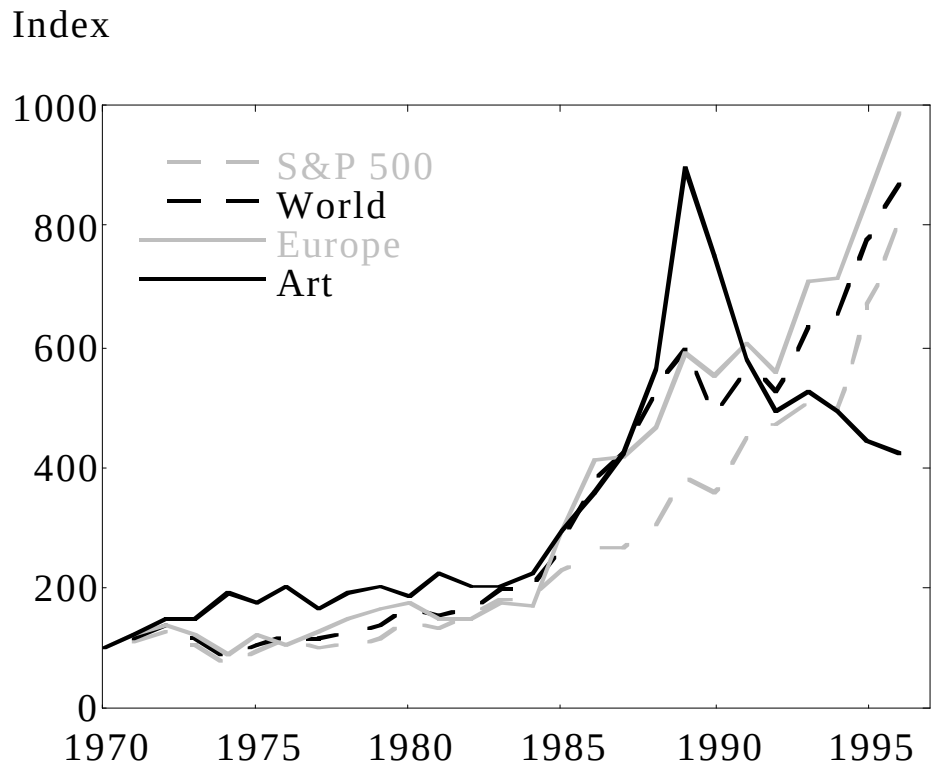


Table 7: Pearson correlations for share indices, inflation and art returns based on averaged and median art prices and on the hedonic model (1970-97).

This table shows the Pearson correlations between the returns on the S&P500, World and European share indices, ΔConsumer Price Indices (in US, UK and Belgium) and returns on investment for all, oil or water colour paintings or for all and separate currents of art. The art indices are the result of art indices resulting from hedonic indices or from indices based on averaged or median prices.

	Ret. S&P500	Return. World index	Ret. Europ. Index	ΔCPI UK	ΔCPI US	ΔCPI Belgium	Hedon. art ret. (all)	Hedon. art ret. (oil)	Hedonic art ret. (aqu.)	Average art ret. (all)	Average art ret. (oil)	Median art ret. (all)	Median art ret. (oil)	Hedonic art ret. (impr.)	Hedonic art ret. (real.)	Hedonic art ret. (expr.)	Hedonic art ret. (lumin.)	Hedonic art ret. (symb.)	Hedonic art ret. (surr.)
Returns S&P500	1																		
Returns World share index	0.808*	1																	
Returns Europ. share index	0.620*	0.834*	1																
ΔCPI UK	0.101	-0.006	-0.012	1															
ΔCPI US	-0.023	-0.219	-0.03	0.401*	1														
ΔCPI Belgium	-0.012	-0.129	-0.119	0.434*	0.312*	1													
Hedonic art return (all)	0.019	0.249	0.223	0.120	-0.032	-0.084	1												
Hedonic art return (oil)	0.021	0.192	0.060	0.106	-0.218	0.222	0.764*	1											
Hedonic art return (aqu.)	-0.098	0.047	0.142	-0.019	0.179	-0.104	0.698*	0.157	1										
Average art return (all)	-0.210	-0.063	0.004	-0.018	0.021	-0.223	0.444*	0.091	0.714*	1									
Average art return (oil)	-0.297	-0.253	-0.304	0.137	0.200	0.034	0.577*	0.616*	0.405*	0.430*	1								
Median art return (all)	-0.035	0.184	0.199	-0.182	0.031	-0.078	0.707*	0.446*	0.665*	0.535*	0.345*	1							
Median art return (oil)	0.033	0.264	0.340*	-0.065	-0.001	-0.136	0.691*	0.530*	0.535*	0.521*	0.315*	0.906*	1						
Hedonic art return (impres)	-0.460*	-0.403*	-0.34*	0.342	0.012	0.320	0.302*	0.531*	0.021	-0.105	0.727*	0.043	0.050	1					
Hedonic art return (real.)	0.083	0.179	0.195	0.001	-0.067	-0.023	0.544*	0.304	0.453*	0.290	0.116	0.570*	0.380*	-0.079	1				
Hedonic art return (expres)	0.389*	0.477*	0.486*	0.113	-0.103	0.128	0.597*	0.418*	0.311	-0.027	-0.049	0.437*	0.420*	-0.081	0.598*	1			
Hedonic art return (lumin.)	-0.503*	-0.423*	-0.224	0.221	0.276	0.342	0.207	0.242	0.242	0.245	0.655*	0.102	0.114	0.799*	-0.061	-0.189	1		
Hedonic art return (symb.)	0.137	0.162	-0.102	0.021	0.034	-0.012	0.290	0.343*	0.132	0.346*	0.422*	0.032	0.083	0.057	0.085	0.029	0.097	1	
Hedonic art return (surr.l.)	-0.178	-0.045	0.024	-0.000	-0.000	-0.030	0.219	0.083	0.288	0.524*	0.026	0.292	0.421*	-0.226	-0.035	0.103	0.029	0.119	1
Hedonic art return (other)	-0.154	0.000	-0.017	0.032	-0.099	0.187	0.333*	0.425*	0.054	-0.069	0.396	0.014*	0.008*	0.468*	-0.010	-0.073	0.297	-0.020	-0.344*

Source : Own calculations with share price data from Global Financial Data, CPIs from IMF, and art returns from hedonic model. * signifies a correlation significantly different from 0 (5% level).

Table 8 : Riskiness of art investments and Sharpe ratios (1970-97).

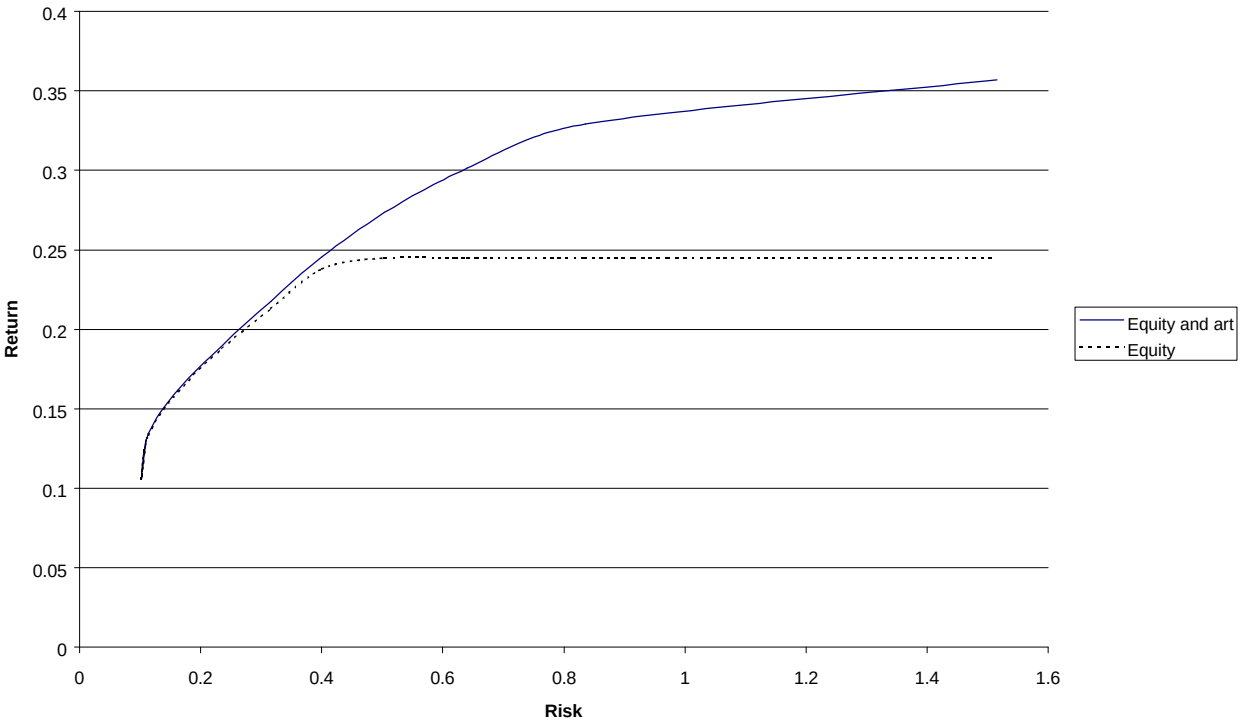
This table shows the volatility of art and equity returns. The Sharpe ratio is calculated by dividing the annual returns in excess of the riskfree rate, by the standard deviations of returns. For a discussion of the methodology to calculate naïve and hedonic art indices: see section 3.

	Stand. Dev. of an. return.	**Sharpe Ratio**
World share index	16.3%	0.302
European share index	20.6%	0.289
S&P500	16.0%	0.285

	Based on index with averaged art prices		**Based on index with median prices**		**Based on art index from hedonic model**	
	Stand. Dev. of an. return.	Sharpe Ratio	Stand. Dev. of an. return.	Sharpe Ratio	Stand. Dev. of an. return.	Sharpe Ratio
All schools (oil, aq., etch.)	36.6%	0.236	29.4%	0.105	19.4%	0.122
All schools (oil paintings)	46.5%	0.289	30.9%	0.151	30.1%	0.227
All schools (water colours)	38.0%	-0.132	31.0%	-0.161	22.4%	0.015
Impressionism						
All paintings	71.8%	0.214	38.8%	0.122	151.6%	0.203
Oil	70.9%	0.209	40.3%	0.125	142.0%	0.170
Realism						
All paintings	99.0%	0.327	32.6%	0.162	55.8%	0.267
Oil	108.2%	0.321	36.3%	0.165	62.0%	0.274
Expressionism						
All paintings	35.8%	0.137	40.7%	0.152	27.5%	0.185
Oil	39.3%	0.165	40.2%	0.174	29.0%	-0.172
Luminism						
All paintings	63.3%	0.285	84.7%	0.287	112.4%	0.263
Oil	64.8%	0.309	77.7%	0.296	101.0%	0.257
Symbolism						
all paintings	62.5%	0.305	79.4%	0.242	40.7%	0.153
oil	104.4%	0.358	97.0%	0.371	59.0%	0.142
Pointillism						
all paintings	70.0%	0.237	76.0%	0.244	73.0%	0.071
oil	68.9%	0.238	55.9%	0.247	61.0%	0.098
Surrealism						
all paintings	61.2%	0.290	126.9%	0.273	52.8%	0.137
oil	48.2%	0.396	101.1%	0.374	47.0%	0.155
Other (Ensor, Evenepoel)						
all paintings	135.1%	0.327	97.4%	0.219	81.8%	0.310
oil	105.0%	0.305	225.7%	0.336	76.0%	0.382

Source : own calculations with data from ArtQuest and Global Financial Data.

Figure 5
Efficient frontier:
Equity markets and auctioned art



Appendix 1 : Most representative painters by current of art (1850s-1950s).

This table presents the main currents of art and their most representative painters who were included in this study. For each school, the painters are given by number of sales of their oeuvre over the period 1980-97.

		Year Birth	Year Death	Number of sales 1980-97
Realism				
Stevens	Alfred	1823	1906	363
Laermans	Eugene	1864	1940	162
Meunier	Constant.	1831	1905	132
De Cock	Cesar	1823	1904	79
Leys	Henry	1815	1869	70
Verlat	Karel	1824	1890	59
Baron	Theodore	1840	1899	35
De Cock	Xaveer	1819	1896	30
Stevens	Jozef	1816	1892	16
De Groux	Charles	1825	1870	14
Asselbergs	Alfons	1839	1899	11
Impressionisme				
Verheyden	Isidore	1846	1905	135
Heymans	Adrien	1839	1921	99
Artan	Louis	1837	1890	91
De Braekeleer	Henri	1840	1888	74
Vogels	Guillaume	1836	1896	67
Verwee	Alfred	1838	1895	42
Boulenger	Hyppolyte	1837	1874	41
Stobbaerts	Jan	1838	1914	34
Boch	Anna	1848	1933	16
Dubois	Louis	1830	1880	16
Verstraete	Theodoor	1851	1907	14
Luminisme				
De Smet	Leon	1881	1966	218
Claus	Emile	1849	1924	160
Morren	Georges	1868	1941	30
De Weert	Anna	1867	1950	18
Pointillisme				
Van Rysselberghe	Theodoor	1862	1926	346
Lemmen	Georges	1865	1916	326
Finch	Alfred	1854	1930	35
Van de Velde	Henri	1863	1957	26
Symbolisme				
Rops	Felicien	1833	1898	195
Smits	Jacob	1856	1928	165
Khnopff	Fernand	1858	1921	162
Minne	George	1866	1941	117
Sauer	Walter	1889	1927	108
Degouve de Nuncques	William	1867	1935	63
De Saedeleer	Valerius	1867	1941	49
Mellery	Xavier	1845	1921	48
De Groux	Henri	1867	1930	33
Delville	Jean	1867	1953	31
Van de Woestijne	Gustave	1881	1947	20

		Year Birth	Year Death	Number of sales 1980-97
Other (not belonging to one particular school)				
Ensor	James	1860	1949	312
Vaes	Walter	1882	1958	82
Opsomer	Isidoor	1878	1967	50
Evenepoel	Henri	1872	1899	9
Fauvism and futurism				
Schirren	Ferdinand	1872	1944	147
Wouters	Rik	1882	1916	113
De Troyer	Prosper	1880	1961	89
Oleffe	Auguste	1876	1931	24
Schmalzigaug	Jules	1882	1917	24
Expressionism				
Jespers	Floris	1889	1965	570
Spilliaert	Leon	1881	1946	460
Masereel	Frans	1889	1971	447
Permeke	Constant	1886	1952	293
Saverijs	Albert	1886	1964	230
De Smet	Gustave	1877	1943	194
Tijtgat	Edgar	1879	1957	115
Servaes	Albert	1883	1966	110
Brusselmans	Jan	1884	1952	91
Van den Berghe	Frits	1883	1939	77
Jespers	Oscar	1887	1970	66
Thevenet	Louis	1874	1930	66
Daeye	Hippolyte	1873	1952	17
Constructivism				
Servranckx	Victor	1897	1965	43
Donas	Marthe	1885	1967	23
Peeters	Jozef	1895	1960	16
Vantongerloo	Georges	1886	1965	11
Abstractism				
Michaux	Henri	1899	1984	300
Lacasse	Joseph	1894	1975	99
Surrealism				
Magritte	Rene	1898	1967	734
Delvaux	Paul	1897	1994	415

Appendix 2 : Evolution of monetary appreciation of selected painters over three decades.

This table gives the output of a hedonic regression with the logarithm of the auction price and with as independent variables : technique, painting size, year dummy variables, auction houses and painter names (dummies). The model was run over the periods 1970-80, 1981-90 and 1991-97. Standard deviations of parameter estimates are given within parentheses. * indicate a significant parameter at 5% level.

Painters	Current of Art	1970-1980 Parameter Estimate	Index	1981-1990 Parameter Estimate	Index	1991-1997 Parameter Estimate	Index
Claus	luminism	-	-	1.452* (0.660)	427	1.524* (0.788)	459
Delvaux	Surrealism	0.920 (0.519)	251	2.185* (0.655)	889	1.974* (0.786)	719
De Saedeleer	symbolism	0.073 (0.564)	108	1.007 (0.689)	274	2.065* (0.833)	789
De Smet G.	Expressionism	0.636 (0.509)	189	1.584* (0.557)	487	1.867* (066)	647
De Smet L.	luminism	0.058 (0.511)	106	1.422* (0.576)	415	1.470 (0.371)	435
Ensor	other	0.961* (0.504)	261	1.905* (0.656)	672	2.090* (0.785)	808
Finch	pointillism	-1.458* (0.562)	23	-0.738 (0.739)	48	2.209* (0.917)	911
Khnopff	symbolism	0.161 (0.530)	117	2.541* (0.662)	1269	2.280* (0.795)	978
Leys	realism	0.369 (0.523)	145	0.293 (0.700)	134	-0.322 (0.850)	72
Magritte	surrealism	1.789* (0.509)	598	2.384* (0.656)	1084	2.110* (0.789)	825
Michaux	abstractism	-0.815 (0.526)	44	1.407* (0.658)	408	1.656* (0.785)	524
Minne	symbolism	-1.249* (0.536)	29	0.998 (0.698)	271	1.804* (0.844)	607
Permeke	expressionism	0.862 (0.502)	237	1.251* (0.657)	349	1.552* (0.784)	472
Rops	symbolism	-0.602 (0.505)	55	1.391* (0.663)	402	1.655* (0.803)	523
Sauer	symbolism	-1.604* (0.543)	20	1.009 (0.665)	274	1.551* (0.808)	472
Spilliaert	expressionism	0.676 (0.501)	197	1.974* (0.653)	720	2.075* (0.781)	796
Van den Berghe	expressionism	0.360 (0.529)	143	1.394* (0.675)	403	1.871* (0.816)	649
Van Rysselberghe	pointillism	0.427 (0.498)	153	1.695* (0.653)	545	1.469 (0.787)	434
Wouters	fauvism	-0.218 (0.526)	80	1.742* (0.678)	571	2.233* (0.812)	933
De Weert	luminism	0.000*	100	0.000*	100	0.000*	100

Source : Own calculations based on ArtQuest.

Appendix 3 : Results of global hedonic regression : relation between auction location (auction houses) and auction price.

This table shows the parameter estimates of a selected number of auction houses. These variables are part of a hedonic regression which comprises as dependent variable, the logarithm of the auction price and as independent variables, technique, size of painting, signature (dummy variable), painters' names (dummy variables), auction houses and year dummy variables. Between parenthesis, the standard deviation of the parameter estimates is given. Other French Auction houses are taken as benchmark.

Auction House	Loc	Parameter Estim. (Std)	Index
Christie's	New York	1.572* (0.240)	482
Sotheby's	New York	1.318* (0.234)	374
Sotheby's	Munchen	1.332 (1.114)	379
Christie's	London	1.052* (0.230)	286
Sotheby's	London	0.773* (0.229)	217
Sotheby's	Tel Aviv	0.664 (1.111)	194
Galerie Koller	Zurich	0.629* (0.301)	188
Germann	Zurich	0.561 (0.447)	175
Christie's	Rome	0.485 (0.802)	162
Binoche et Godeau	Paris	0.449 (0.388)	157
Galerie Kornfeld	Bern	0.376 (0.356)	146
Sotheby's	Amsterdam	0.306 (0.235)	136
Francis Briest	Paris	0.303 (0.245)	135
Christie's	Geneva	0.249 (0.283)	128
Lenormand	Paris	0.224 (0.398)	125
Christie's	Amsterdam	0.111 (0.237)	112
Ader Picard & Tajan	Paris	0.073 (0.283)	108
Christie's	Brussels	0.043 (0.590)	104
Palais des Beaux Arts	Brussels	0.024 (0.239)	102
Kunstgalerij De Vuyst	Lokeren	-0.087 (0.228)	92
Campo	Antwerp	-0.106 (0.226)	90
Galerie Fischer	Luzern	-0.120 (0.362)	89
Galerie Dobiaschofsky	San Francisco	-0.117 (0.386)	89
Labat	Paris	-0.337 (0.287)	71
Sotheby's	Belgium	-0.503 (0.502)	60
Galerie Moderne	Brussels	-0.592* (0.241)	55
Other French Auction Houses	-	0.000*	100

Bron : Own calculations with Art Sales data.

Appendix 4:

Figures 3 a-f : Hedonic art indices by current of art and Belgian inflation period 1970-97.

These pictures show the hedonic art indices and the Belgian CPI index (smooth line). *Source : own calculations.*

Figure 3a. Hedonic art index of all currents of art and Belgian inflation.

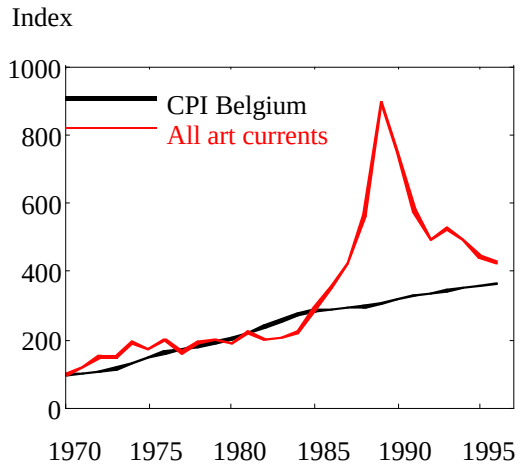


Figure 3b. Hedonic art index of expressionism and Belgian inflation

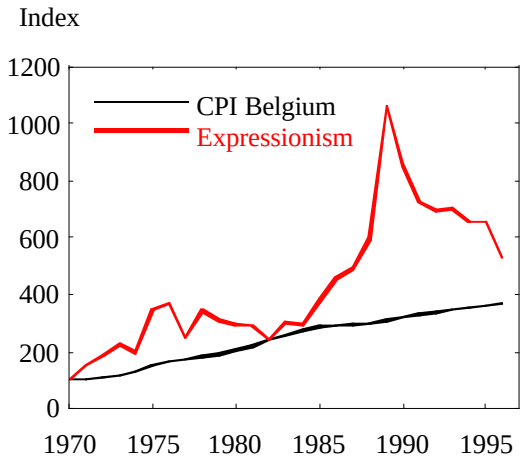


Figure 3c. Hedonic art index of luminism and Belgian inflation.

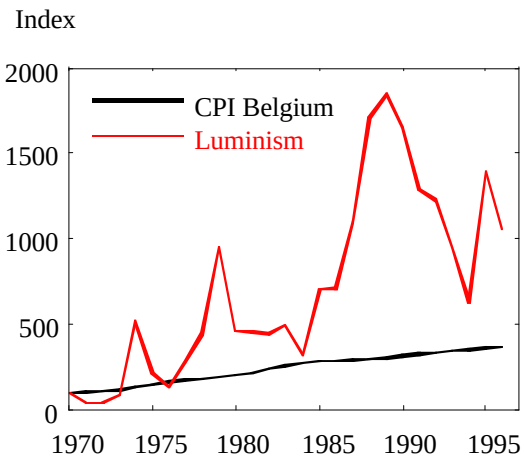


Figure 3d. Hedonic art index of surrealism and Belgian inflation

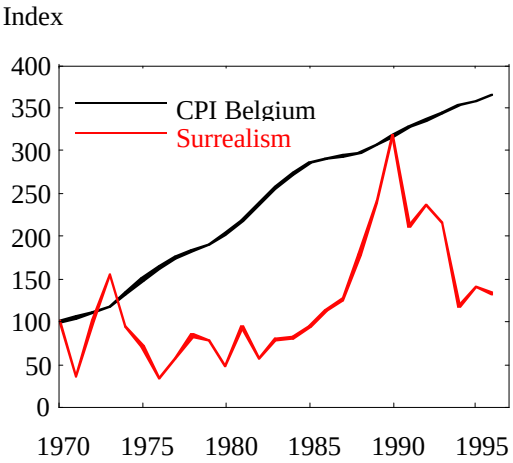


Figure 3c. Hedonic art index of symbolism and Belgian inflation.

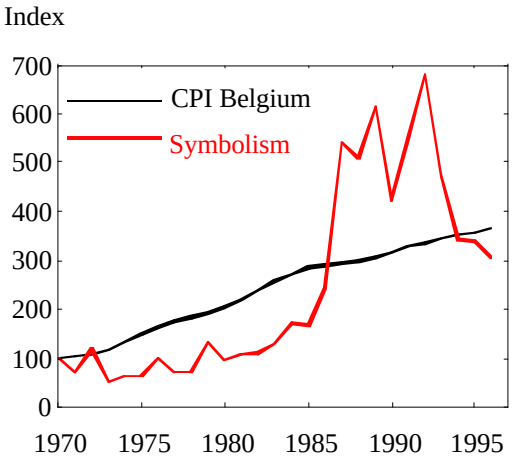
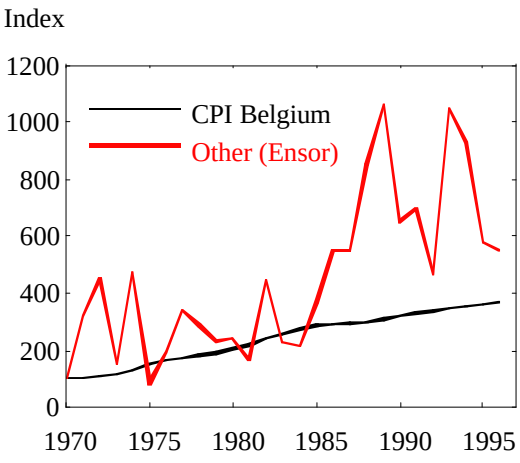


Figure 3d. Hedonic art index of other (Ensor, Evenepoel) and inflation.



[1] The realists Edward Agneesens (1842-1885) and Lieven De Winne (1821-1881) and the symbolist Leon Fredericq (1856-1940) were subsequently excluded because too few price data were available in the ArtQuest database. Also deleted were paintings not attributed with certainty to a painter. Only paintings were selected and not the sculptures of the selected painters(-sculptors). About 97% of our paintings were created in the period 1850s-1950s. Some early realistic work, for example by Leys (born in 1819) is also included. Similarly, we included paintings created after 1960 in our database, like those by the surrealist painters Magritte, who was most prolific in the 1930s but died in 1967, and Delvaux, who died in 1994.

[2] For the 60s and 70s, we collected 2210 observations whereas we found 8427 observations for the 80s en 90s. There are several reasons explaining the discrepancy in the number of observations for the 60s and 70s compared to the number over the subsequent period. Firstly, the art market in 80s has grown considerably compared to the previous decades. Secondly, some currents of Belgian art were rather young and not established in the 60s and 70s. Thirdly, the data suffer to some extent from selection bias in the 60s and 70s: completeness of the database depends on availability of auction catalogues and auction houses' willingness to distribute these. Data for the 1960s were deleted from the database as sales then suffer from thin trading.

[3] This method is used by a.o. Sotheby's.

[4] From equation (1) can be derived that the hedonic price index is equal to e with as exponent the β-parameter coefficient. A more intuitive explanation of hedonic price regression and the price of a standard painting, see Ginsburgh and Mertens (1994), section 2.

[5] For each of these painters there have been sales in every year of the period 1980-1997 such that it was possible to find substitute paintings if the originally selected painting was not sold in each of the subsequent years. 17 painters, taken from all schools were included in the basket : Claus, Delvaux, De Smet L., Ensor, Lemmen, Magritte, Jespers F., Masereel, Permeke, Rops, Michaux, Khnopff, Saverijs, Spilliaert, Stevens A., Van Rysselberghe en Wouters.

[6] As not all currents of art are frequently traded (abstract art, fauvism, abstractism), the return was only calculated since 1980. Selling in 1989 yields an annual basket return of 31.2%, which shows that this method gives more volatile returns than the geometric mean which yields 16%. This illustrates the problem with the Fase and van Tol method: the constellation of the basket (based on subjective choice) can substantially influence the return.

[7] When the signature is lacking, the date on a painting might facilitate attributing the painting to a specific painter (or atelier). Still, the presence of a date on the canvas was not included given the high correlation with the presence of a signature.

[8] Chagall, Miro, Picasso and other artists active in the first few decades of this century, usually made 250 or 500 prints. Consequently, for print of almost each of their etchings, there are sales almost every month. Hence, a time series of (monthly, quarterly) returns of virtually identical products (the prints are usually of comparable quality) can be studied.

[9] Note that in this example, we have restricted the investment universe to equity only. Lower risk-return combinations are possible allowing investments in bond and treasury bill markets.

[10] When the piece of art is withheld, a cost of 1% on the estimated price is charged. It should be noted that competition between auction houses erodes commissions; Christie's and Sotheby's (London offices) use price scales : the buyer pays a commission of 15% on top of the hammer price of paintings sold under £ 30,000, and of 10% on paintings auctioned at a value above £ 30,000. The seller receives 85% to 88% of the auction price.

[11] Resale rights have to be paid to the artist or to his/her heirs if the painter deceased less than 70 years ago (the number of years also differs by country). In Belgium the length of time during which resale rights have to be paid was recently extended from 50 to 70. This means that about 35% of the paintings in our data set are still subject to resale rights of 6% on the net sales price if this price is above BEF 50,000 and sold in Belgium. Tax rates are at 4% for prices between (BEF 20,001-50,000), at 3% for prices between (BEF 10,001-20,000) and at 2% for prices between (BEF 1,000-10,000). Although legally it is the seller who ought to pay the resale right, in practice it is buyer who pays the right (Claeys Bouuart, 1997, p.133).

[12] The change in VAT rate in Belgium to 21% on the commission to the auction house only came into being since 1995. Before 1995, the VAT rate applied to the total purchase price (auction price plus commission and even resale rights) and VAT rates were 6% (in 1972-76), 18% (in 1977), 16% (in 1987-80), 17% (in 1981-83) and 6% (in 1984-1994). Tax competition with VAT rates has been (or is) used by different countries to attract or keep a large market share of the art trade. In April 1999, the UK was called upon by the European Commission to increase its art VAT rate to the European minimal level in order not to distort the fine arts market.