

Art Investment: An Empirical Inquiry*

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I. A Popular Activity

Investment in art and especially in paintings by the masters is often considered to be highly profitable. Particularly in the United States, but also in the richer European nations, there is an even larger number of investors who believe that buying works of art is not only fun but also a good investment from a purely financial point of view. American banks have recently strengthened this trend toward "art as an investment" by employing "art investment counselors," thus suggesting that it is a financially rewarding activity to engage in, and also suggesting that superior knowledge helps to improve financial success in this market.

Buying and selling art has in fact become an increasingly popular activity since the end of World War II. The auction houses report record turnovers and record prices are paid in increasingly rapid sequence. In April 1987 van Gogh's "Sunflowers" was sold at Christie's London for \$39.9 million, only to be surpassed in November 1987 by van Gogh's "Irises", sold by Sotheby's New York for \$53.9 million (including the auction house's 10 percent commission). This last painting had been bought by the seller's mother in 1947 for \$84,000, less than \$0.5 million in today's money, which gives a real rate of return of about 12 percent per year.

These enormous prices that are paid today for some masterpieces create a widespread belief that the rate of return on such investments is in general and on average very high. Books devoted to the subject [40, 385; 27, 24; 12, 215 et seq.] seem to confirm that the rate of return from investment in paintings, at least during the 1950s and 1960s, was far greater than the rate obtainable from comparable risky assets in financial markets. That the financial profitability in the 1970s and 1980s is believed to be, if anything, even larger than before is confirmed by many articles in financial and investment newspapers and journals.

Up to now only very few scientific studies of the subject exist, but they also have serious limitations. The most recent one by Baumol [5] covers a period of over 300 years but ends in 1960. Two other studies by Anderson [1] and Stein [42] extend up to the end of the 1960s but do not go any further. All three studies are practically limited to transactions by Anglo-Saxon auction

*The authors are grateful for research assistance by Marina Börkey, Cornelia Haist, Antonia Simon, Angel Serna, Elisabeth Tester, Kai Fürtratt and Alexander Schrader and for helpful comments by George Bittingwayer, Beat Gygi, Carl-Ludwig Holtfrerich, Jan P. Krahnert, Barbara Krug, Bernd Niquet and Anselm Römer.

houses, i.e., up to about 1920 meaning sales at Christie's and Sotheby's London. Most of the French and German market is thus excluded.

This paper seeks to overcome the limitations and shortcomings of these three studies by (1) covering a period up to 1987, and spanning 350 years; (2) including more countries; (3) taking into account the transaction costs (which may be substantial) involved in buying and selling paintings at auctions, and (4) by checking more carefully the identity and price statements of the paintings bought and sold in different periods. A final, and important purpose is (5) to inquire whether financial profitability of investment in paintings has changed between the periods before and after the last World War.

Section II discusses the peculiarities of calculating a rate of return and risk for investments in paintings. The results are presented in section III, and concluding remarks are offered in section IV.

II. Profitability in the Market for Paintings

In principle, the rate of return and the risk inherent in buying and holding paintings is, of course, calculated in the same way as for investments in financial markets. However, paintings differ significantly from financial assets in various respects.

Prices of paintings bought and sold are not generally available ahead of time; information is restricted to auctions. However, auction prices play an important role in art markets because collectors and professional art dealers take these prices as guideposts.¹

Returns

We analyze the price development of paintings done by the nearly 800 "best known painters of the world" (only deceased artists), as selected by Reitlinger [37; 38], of whom 305 had at least one painting bought and sold at the well known auction houses Christie's and Sotheby's, as well as at many others in both Europe and North America.² Paintings traded in flea markets and the like are excluded because they are not relevant for purely financially oriented investors. The prices chosen for this study refer to paintings of "auctionable quality" only. In addition, paintings with unclear price (e.g., "it is said to have probably been paid," "it is reported to have exceeded . . .") are excluded. As the rate of return is calculated by taking the compound rate of interest resulting from the difference between (gross) buying price and (net) selling price it is important to identify each painting unmistakably. Whenever there is any doubt, e.g., because the same artist has given the same title to various paintings of equal size, the relevant work has been excluded. This reduced the initial sample of 2070 observations by 133 to 1937 buy/sell transactions.

The rate of return calculated is net of all cost connected with buying and selling a painting in an auction. These transaction costs vary between countries, periods, and prices of the paintings traded, but they are usually substantial. A typical auction fee would amount to more than 10% of the value reached for both buyer and seller. In 1985, the sales commission (including indirect

1. A more extensive discussion of auction prices is made by Stein [42, 1023-4]. In the meantime, his statement that "very expensive paintings are relatively unlikely to be auctioned" [42, 1024] seems to have been proved untrue as the examples given at the beginning of this paper demonstrate.

2. See the appendix for a more detailed description of the selected sample and the data sources used.

Table I. Real Rates of Return on Paintings, 1635-1987 (in Percent per Year)

mean	1.5
median	1.8
minimum	-19
maximum	+26
standard deviation	5.0
number of buy/sell transactions	1198

taxes) for both sides of the market were at least 18 percent in the United States, 25 percent in the United Kingdom and Switzerland, up to 32 percent in France and about 35 percent in Germany.

In the short run, picture prices exhibit strong ups and downs. As the purpose of our analysis is not short run speculation,³ we follow the procedure chosen by Baumol [5], that is, we consider only holding periods of 20 years or more. This reduces the sample by 739 to 1198 buy/sell transactions. The reported prices (all expressed in pounds sterling by applying, if necessary, the exchange rate at that time) are then deflated by a price index to transform them into prices of constant purchasing power.

Risks

An investment in the arts market is subject to various kinds of risk beyond the uncertainty of future prices. First, despite all efforts to establish clarity, the attribution problem sometimes remains tricky. An example is Rubens's "Daniel in the Lions' Den," which was auctioned in 1882 for 1,680 pounds by Christie's London, then resold in 1885 for 2,520 pounds. In 1963, having been attributed in the meantime to Jacob Jordaens, it was auctioned for a mere 500 pounds; but in 1965, now acknowledged as a school piece by Rubens, it was acquired by the Metropolitan Museum of Art in New York for 178,600 pounds. Although the attributions of such pictures had changed over time, in all these cases the corresponding transactions nevertheless remained in the sample, because any change in attribution is part of the risk to be taken by the buyer and the seller.

There is a similar problem with fakes and forgeries. Even art experts cannot guarantee that a painting is original. While the technical means for detection continue to improve, the forgers also steadily employ the newest technologies for their purpose. So it has been claimed that there are 8,000 paintings by Camille Corot in the United States alone. This is an astonishing number considering that there are only 3,000 authentic works by that master [17]. The situation is similar for various other painters, in particular for pictures by van Dyck and Utrillo [9; 14]. For the same reason as in the case of a change in attribution, transactions involving fakes and forgeries remained in the sample.

In addition to the financial risks arising from price uncertainty, to changing attributions and fakes and forgery, there is as well a purely material risk: the painting may be destroyed by fire, damaged by war, or stolen. Although during the last two centuries at least most English and American collectors were spared the risk caused by wars and revolutions, art thefts have increased over time as auction prices have risen. Of course, paintings may be insured against some of these material risks; the annual cost of insurance against fire and theft presently amounts to 0.5

3. Short run speculation is considered to be financially unprofitable, partly because of the high commission fees and other transaction costs connected with auctions. Therefore Sotheby's recommends strongly that "works of art (be) held for a minimum of 7-10 years to sustain value" [11, 107].

The distribution of the real rates of return on paintings, 1635-1987
 N = 1198; mean 1.5%; median 1.8%

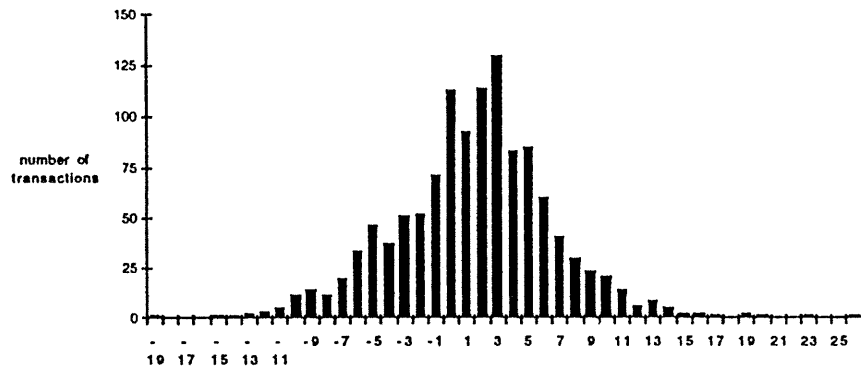


Figure 1. Real Rate of Return on Paintings; Middle of Interval (Percent per Year)

percent of the painting's appraised value on average, with a range between 0.2 percent and 1.0 percent [42, 1028-9; 47], but for earlier periods insurance costs are unknown. Also ignored are the maintenance and restoration costs of paintings, which again are substantial. Nevertheless, although the calculated rates of return on investments in paintings may be biased in the upward direction when the material risk is neglected, in what follows only financial risks are considered.

III. Results

Overall Period 1635-1987

The art auction market does not provide the continuity of data and transactions that would be necessary for an application of sophisticated techniques of analysis.⁴ However, a study of less refined aspects is possible, such as an examination of the rates of return on investment in art.

Table I shows a set of measures of central tendency of the rates of return on auctioned paintings with a holding period of 20 years or more at *constant prices* (of 1900).

The mean real rate of return is 1.5 percent per year, and the median rate of return is 1.8 percent. The standard deviation is 5.0. Neglecting transaction costs, the mean rate of return would rise by 0.4 percentage points.

This rate of return seems to be quite low in view of the huge sums that have been paid for paintings. Part of the explanation lies in the representation bias of our memory [26] which leads to too much weight being given to paintings that reach prices that are newsworthy, while the other prices (which most people do not know anyway) receive inadequate weight in an intuitive evaluation. Part of the explanation may also lie simply in the fact that the effects of compound interest and inflation tend to be underrated.

4. Such as a test of the so called "diagonal" or "market model" by Jensen [25] and the measurement of the "performance" and the "efficiency" of the market for paintings.

Compared with investment in financial markets the calculated real rate of return on paintings of 1.5 percent per year is rather low. Considering the period from the mid 17th century (due to the twenty year holding period the first resale of pictures occurred after 1650) up to 1987 an investment into best credits, in particular government securities, would have yielded a long term nominal rate of return of 5 percent per year.⁵ The rate of price inflation of consumables over the same period is somewhat above 2 percent per year,⁶ so that the long term *real* rate of return on financial investment is 3 percent per year. Thus, investing into paintings instead of financial assets implies a (real) opportunity loss of 1.5 percentage points per year for the holder of paintings.⁷ This is a sizeable amount: the real rate of return on paintings is half the real return that one could get by buying public securities.

Figure 1 indicates that the financial rates of return on paintings show a large variance: the maximum real rate of return on a painting is as high as 26% per year, which means that the initial value doubles in about two and a half years in real terms. The minimum real return is -19% per year. Of the 1198 buy/sell transactions, 724 or 61 percent yielded a positive real rate of return, 113 or 9 percent nil, and 361 or 30 percent yielded a negative real rate of return. Readers may be interested to know which paintings are among the big winners and losers. The highest real rate of return (26.3 percent per year) in our sample of almost 1,200 transactions was reached by Frans Hal's "Man in Black" which in 1885 was auctioned for a little more than 5 pounds at Christie's London, and in 1913 reached 9,000 pounds at Sotheby's London. There are other pictures by this painter which in this and the last century achieved rates of return of around 10 percent per year. The same applies to paintings by Cézanne, Gauguin, van Gogh, Manet, Matisse, Monet and Renoir, all painters who for obvious reasons are well known to art lovers. It should, however, be noted that in the case of nearly all these painters, there also were transactions with a rather low, and sometimes even negative, real rate of return.

The largest loser in financial terms in our sample with a real rate of return of -19.3 percent

5. For the subperiod 1650-1949 the *minimum* nominal rate of return on best credits, including the famous "consols" (with no redemption date), has been calculated from Homer [19, Table 1, 500]. In order to allow a comparison with the activities on the market for paintings the mean rate of return has been compiled as follows: In addition to the United Kingdom and France, from the 18th century Germany has been added, and from the 19th century the United States. The mean minimum rate of return over this period and countries amounts to 3.7 percent per year.

6. For the more recent period 1950-87 the long run nominal rate of return has been calculated on the basis of data included in *International Financial Statistics* [22, series 61]. The nominal rate amounts to about 7.5 percent per year.

7. For the overall period 1650-1987, the average long run nominal rate of return on government securities (best credits) is calculated to be 5 percent per year.

6. Based on data collected by Phelps-Brown and Hopkins [35] the average price increase on consumables in the United Kingdom for the period 1635-1949 was a little less than 0.5 percent (0.44 percent) per year in the United Kingdom. The rate of inflation for the period 1950-87 is calculated as an average of the consumer price indices for the four countries, United Kingdom, United States, Germany and France by IMF [23]. The average rate of price increase is 5.1 percent per year. Though these two indices do not conform totally, they allow a feasible deflation procedure. For the overall period 1650-1987 the average rate of price inflation weighted by the share of transactions in each period as before turns out to be 2.1 percent per year.

7. The correct size of the opportunity loss is presumably even larger. In contrast to the calculated rate of return of paintings which tends to be biased in the upward direction, the apparent rate of return on public securities may be considerably biased in the downward direction. One reason is that we apply a conservative long run nominal rate of return for the overall period (see footnote 5). Another, and possibly even more important reason, is that most computations of the rate of return on financial investments—partly those given in Homer, but especially those reported in the *International Financial Statistics*—ignore reinvested yields, whereas such an accounting is implied in the calculation of the continuously compounded rates of return on investment in paintings. Ignoring the interest or dividend yields, as is done, for instance, in Rush [40] and Keen [27], obviously produces an overestimation of the return to paintings relative to the return to government securities.

Table II. Real Rates of Return on Paintings: Levels and Distributions According to Holding Periods, 1635–1987

Holding period (years)	number of buy/sell transactions	rate of return (in percent)				standard deviation
		mean	median	min.	max.	
20–39	493	1.7	2.1	-19	+26	6.3
40–59	286	1.1	1.3	-12	+13	5.0
60–79	165	1.1	1.4	-9	+12	4.4
80–99	121	1.9	1.9	-5	+8	2.8
100–119	66	1.7	2.0	-3	+6	2.4
120–139	28	2.2	2.6	-1	+5	1.6
140–159	15	1.8	2.2	-2	+4	1.9
160–179	19	1.1	0.8	0	+4	1.3
180–199	2	—	1.5	+1	+2	—
200–219	2	—	2.0	+1	+3	—
265	1	—	—	+2	+2	—
Average	1198	1.5	1.8	-19	+26	5.0

per year is John Singer Sargent's oil sketch "San Virgilio" which in 1925 was sold for 7,350 pounds at the Sargent executor sale but in 1952 was auctioned for only 105 pounds at Christie's London. The list of other painters, some of whose works resulted in large real losses, include Sir Lawrence Alma-Tadema, Rosa Bonheur, Carlo Crivelli, William Etty, John Hoppner, William H. Hunt, Joseph Israel, Sir Edwin Landseer, Frederick Lord Leighton, John Martin, Sir John Millais, Jean Marc Nattier, Sir Henry Raeburn, Sir Joshua Reynolds, David Roberts and Constantin Troyon. Most of these are not generally known among art lovers today because they have gone out of fashion. However, this does not mean that there are none among them who have met with increasing interest in the most recent years, resulting in positive real rates of return.

Table II exhibits the real rates of return according to holding periods. It may be seen that large gains and large losses are experienced by those investors with a short holding period. Those keeping a painting between 20 and 39 years, for example, had returns between -19 percent and +26 percent per year, and a standard deviation of 6.3. If, on the other hand, a picture is held for say between 100 and 119 years, the real rates of return are within a much smaller band (-3 to +6 percent), and the standard deviation shrinks to 2.4. The range of earnings narrows as the holding period increases, and approaches around 2 percent per annum.

The empirical evidence presented suggests that for the period 1635–1987 investments in (auctioned) paintings are *not* financially profitable: the real rate of return is clearly lower than a corresponding investment in a financial market. Moreover, the financial risk of investments in paintings, as measured by the standard deviation of the real rate of return (s.d.), is higher than that of investments in financial assets; s.d. is 5.0 for paintings, and 1.7 for best credits (consols). The lower real rate of return of paintings is thus not attributable to a lower risk premium, on the contrary. Our evidence thus suggests that, contrary to what is often claimed, auctionable paintings are not a particularly good financial investment. Rather, consumption benefits of owning a picture which may consist in pure aesthetic pleasure or in the prestige gained, must play a significant role.

The finding that investments in paintings are not financially profitable seems to contradict the observation that *collections* of paintings, such as the one of Thyssen-Bornemisza (near Lugano), have gained enormously in value. However, the sample of collections that one normally knows

of is seriously biased: only (financially) successful collections survive while the (financially) unsuccessful ones do not exist any more and are mostly forgotten.⁸ These collections are dissipated as the owners or their heirs go bankrupt or are forced to sell. If *all* collections were considered, the successful *and* the unsuccessful ones, it would again show that the monetary rate of return is low, and the financial risk high.

A further factor that tends to bias upwards the rates of return of auctioned paintings is that auction houses have an interest in high turnovers and, for reasons of publicity, in record prices. They are therefore gladly willing to accept works that promise to sell well. On the other hand, they are reluctant to auction paintings whose selling prospects are weak (among other reasons, because the minimum price fixed by the owner is considered to be too high).

Breakdown into Periods

It is often argued that basic conditions on the art market have changed since the last World War because a new type of buyer and collector has entered the market. In order to test whether this proposition holds, the overall period had been broken down into a period of sales and purchases before 1950 (1635–1949), and another period thereafter (1950–1987), wherein the sales at least were affected.⁹

The Period 1635–1949. For the earlier period up to World War II, the average real rate of return on investments in paintings is 1.4 percent per year (the median is 1.7 percent) and the long term nominal rate of interest on best credits (government securities) amounts to about 3.7 percent per year. Since the yearly rate of inflation was about 0.4 percent over this period, an investor in financial assets could have reached an average long run real rate of return of 3.3 percent per year (see footnotes 5 and 6). The opportunity loss of investing into paintings instead of financial assets was 1.9 percentage points per year.

According to the chi-square test, the distribution of the real rates of return on paintings does not correspond to a normal distribution (the empirical $q = 69.3 > q^*(4) = 9.5$, for a confidence level of 95%). The real rates of return on paintings thus do not seem to follow a pure random process,¹⁰ a result which differs from Baumol's finding [5] of a normal distribution for a somewhat different sample over a somewhat different period (1652–1961). Thus, it seems that up to World War II, superior knowledge of art, in particular expert knowledge of paintings, could have helped to achieve a higher return than someone who picked auctioned paintings simply by

8. An example is the collection by William Randolph Hearst who, beginning as a young man, spent at least \$1 million each year for that purpose. By the end of the thirties, it is estimated that he had spent at least \$50 million on his collection. When he was forced to sell a large part of it in November 1938, New York's Parrish-Watson Galleries held an auction which was a failure. The same happened when an auction was held by Marshall Field's in Chicago; less than \$200,000 was raised, and considerably more was spent in advertising, salaries and expenses. Finally, the art treasures were offered by the department store Gimbel's in New York, and by the end of 1941 the sales had amounted to \$11 million. The objects were offered at large discounts, the most spectacular example being a Spanish Cistercian monastery, built in 1114 by Alphonso VII, King of Castile, for which Hearst payed considerably more than \$1 million and which was transported *in toto* to the United States. It was sold for \$50,000. For all of this, see the lively account in Hammer [16, ch. 15].

9. A more rigorous test would be to differentiate between the sales and purchases (effected) *before* and *after* 1950. However, with this procedure a substantial proportion of the observations for the later period would drop out owing to the criterion of the minimal holding period of 20 years. The method chosen here is nevertheless meaningful, since in the course of the whole period, there has been a tendency for the average holding period to diminish and for the number of auction sales to increase.

10. The same holds for the overall period 1635–1987 ($q = 48.3 > q^*(4) = 9.5$) and for the period after 1950 ($q = 25.2 > q^*(3) = 7.8$), according to the chi-square test.

chance. However, picture prices are partly influenced by fashions, which cannot be predicted on the basis of an art historian's expertise. Examples of such fashionable painters are El Greco, Vermeer and Turner, who were important in their time but then were practically forgotten, to be rediscovered later and who now would probably be able to reach staggering prices if they were offered for sale. Turner paintings have actually been put up for sale and reached record prices. In 1980, "Juliet and her Nurse" reached \$6.4 million at Parke-Bernet's in New York, and in 1984, the "Seascape at Folkestone" was sold for \$9.8 million at Sotheby's London. Another example is Jacques Louis David whose group portraits reached huge prices at the beginning of this century but then were largely forgotten. Recently David has met with great interest again. His "Les adieux de Télémaques et Eucharis" painted in 1818 was sold in the mid 1980s for 2.6 million pounds sterling. Examples for receding fashions are artists who were previously highly esteemed but whose work has met with little interest in recent times. Among them are Jean Dominique Ingres, Sir John Everett Millais, William Mulready, Sir William Quiller Orchardson, Adriaen and Isaac van Ostade, Dante Gabriel Rossetti and Frederick William Watts. While such fashions cannot be predicted on the basis of art historians' expertise, they are certainly able to explain *in retrospect* why a certain painter or school of painters wins or loses in appreciation.

Nevertheless, it may be possible to systematically make profits. Those with inside knowledge not available to the general public may have an advantage, similar to those in a normal financial market. Yet this knowledge must especially refer to the future behavior of all other (private and public) potential buyers and sellers, thus going much beyond knowledge about such topics as the quality and scarcity of the works of art involved. Moreover, if a particular investor's expectations with respect to the future behavior of others become important in the market, the equilibrating mechanism in the security but especially in the art market is likely to be very feeble owing to imperfect substitutability, infrequent resales and the monopoly position of the owner (see Henry [18] for a theoretical exposition). Other systematic winners are those who might be able to influence tastes, and thereby create fashions. But so far little or nothing is known of who is in such a position (which may *not* be imitated by other potential investors).¹¹

The Period 1950–1987. In the more recent period after World War II, the average real rate of return of investments in paintings (bought before or after 1950) turns out to be 1.6 percent per year (the median is 2.0 percent). A typical investor in the United Kingdom, the United States, Germany or France could get a nominal rate of return on financial assets of about 7.5 percent per year. The average yearly rate of inflation was 5.1 percent, so a financial investor could reap a real return on financial investments of 2.4 percent per year (see again footnotes 5 and 6). The financial opportunity loss in real terms is considerably lower than in the period before 1950, it amounts to 0.7 percentage points per year. (In the period 1650–1949 it was nearly 2 percentage points per year.)

The main reason why investments in paintings have become *relatively* more attractive since World War II presumably does not lie in the fact that paintings would now yield a much higher financial real rate of return: profitability has increased very little, from 1.4 to 1.6 percent per year. The decisive reason why paintings have become a relatively more attractive investment option lies in the fact that the increasing rate of inflation (from 0.5 percent before 1950 to over 5 percent

11. This also holds for the argument that art dealers create among themselves a monopolistic sector by forming a dealer ring. By colluding they would then be able to systematically influence auction prices. However, such collusion is unlikely to be effective. First, incentives exist to break out of a cartel. Second, the owners as well as the auction houses may react by establishing "reserve price" or "buy back" strategies. It is therefore not surprising that no empirical evidence exists for successful collusions and persisting monopolistic positions in the long run.

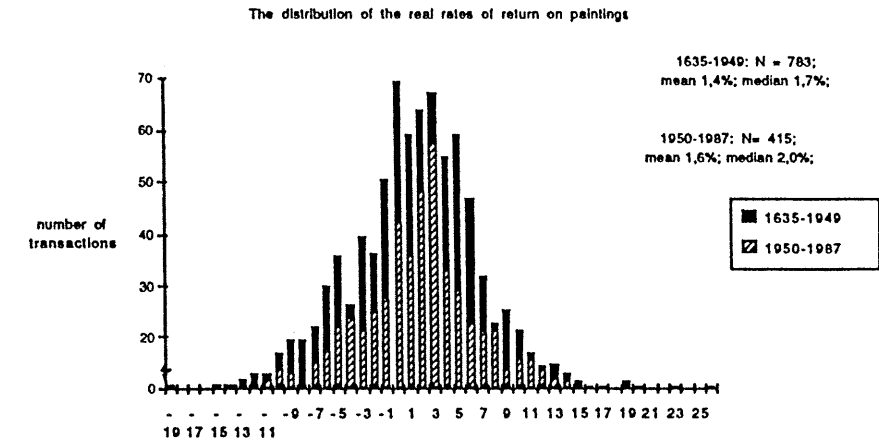


Figure 2. Real Rate of Return on Paintings; Middle of Interval (Percent per Year)

per year after 1950) has not been accompanied by a corresponding increase in nominal rates of interest on long term credits,¹² with the result that such investments have become less attractive (the real return fell from 3.3 to 2.4 percent per year).

Comparison between the Two Periods. Figure 2 compares the distribution of real returns in the two periods. According to the chi-square test (at a confidence level of 95%), the two distributions belong to the same basic distribution (the empirical $q = 9.5 < q^*(6) = 12.6$). This suggests that the profitability of investing in paintings has not *significantly* changed from the pre-war to the post-war period.

Table III indicates in greater detail that conditions in the period since 1950 were indeed somewhat more favorable from the financial point of view. Not only is the real rate of return a little higher (by 0.3 percentage points) but the standard deviation is also smaller. However, the maximum losses were larger, and the maximum gains were smaller, than before 1950. A somewhat larger share of transactions (63 compared to 59 percent) yielded a positive return.

These findings confirm that it is unwarranted to speak of a sizeable rise in the financial profitability of investments into paintings in more recent times, compared with the long run trend. The real rate of return of 1.6 percent per year is slightly higher than before 1950 (and financial risk is not substantially lower), but this return still lies considerably below the return of a corresponding investment in the financial market.

Comparison with Previous Studies

It is not possible to directly compare this study with those by Anderson [1] and Stein [42]. Not only do the periods differ, but also the methodological approach. However, the conclusions are the same: both authors find that the real rate of return in paintings is considerably lower than in financial markets. Anderson calculates for the period 1780–1970 that the average nominal rate of return is 3.3 percent per annum which is roughly half as high as the return for financial assets. The

12. Econometric tests of the Fisher-effect confirm this almost unanimously [43; 50; 31; 3]. The same result is reached for a sample of European countries and the post-war period e.g., by Granzio and Schelbert [15].

Table III. Real Rates of Return of Paintings before and after 1950

Period	number of buy/sell transactions	real rate of return (in percent per year)						standard deviation	
		mean	median	positive	zero	negative	min. max.		
Sales and purchases between									
1635 and 1949	783	1.4	1.6	463 (59%)	73 (9%)	247 (32%)	-15	+26	5.3
1950 and 1987	415	1.6	2.0	261 (63%)	40 (10%)	114 (27%)	-19	+16	4.7

Table IV. Comparison of Studies

Authors	period	number of buy/sell transactions	real rate of return (%)			
			mean	median	min.	max.
Baumol	1652-1961	640	0.6	0.8	-19	+27
Present study	1635-1987	1198	1.5	1.8	-19	+26

standard deviation of the rate of return is 56 percent and 12 percent, respectively. Stein estimates a nominal rate of return of 10.5 percent per year for the period 1946-1968 which compares to 14.3 percent in financial assets over the same period. In real terms, a representative investor lost 1.6 percent per year compared to financial assets. He also finds that the prices for paintings exhibit considerably higher fluctuations, suggesting that this form of investment is more risky than in financial markets.

Baumol [5] uses the same approach as that employed here. Table IV compares his results with those derived in this paper.

The real rate of return of 0.6 percent per year computed by Baumol for the shorter period 1652-1961 is roughly one percentage point smaller than the one reached in the present study (both mean and median). The author takes as a representative financial asset the safest securities of the British government with a nominal yearly rate of return of approximately 3.25 percent for the period. The average rate of inflation is taken to be less than 0.7 percent per year. The resulting real rate of return over these 309 years amounts to about 2.5 percent per year. A representative investor in paintings has therefore experienced an opportunity loss of nearly 2 percent per year: this corresponds to our calculations of an opportunity loss of 1.5 percent per year (for the more extended period). It is remarkable that Baumol also finds very similar maximum losses and gains to ours. In his study, 40 percent of the real returns turned out to be negative, while in this study it is 30 percent.

Despite the small deviations in results (which may be due to the differences in periods and countries covered, as well as in the particular paintings included) the results of the four studies come to the same general conclusion: investments in paintings are not financially lucrative. They yield a smaller real rate of return and are exposed to higher financial risk than investments in financial assets.

A unique feature of our study is the result that in recent times it has become relatively more attractive to invest in paintings than in the period before. None of the studies existing up to now

has dealt with the often heard proposition that art investment has become more profitable in the postwar years because, so it is claimed, new groups of buyers have entered the market.

IV. Concluding Remarks

A relatively more risky asset (as paintings) should yield a higher rate of return in order to compensate the owner for risktaking, compared to a less risky asset (financial assets). However, the result reached by all scientific studies undertaken so far (including the present one) shows that the real monetary rate of return of paintings lies *below* that of financial assets. This suggests that paintings yield not only a financial but also a psychic reward, or a consumption benefit.¹³ There are reasons to assume that the low rate of return on investments in paintings may even be biased upwards, not only because of the already mentioned cost of maintenance, restoration and insurance (here left out of account), but also because of the *inherent selection bias*: in general only successful art is repeatedly auctioned.

Our results suggest that investments in paintings have become *relatively* more profitable in the postwar years compared with the period 1650-1949, which is attributed to the damaging effect of inflation on financial assets, and not to any significant increase of the real rate of return of paintings. Provided this relationship continues to hold in the future, a decline in inflation to historical levels should reestablish the long run real financial opportunity loss from holding paintings of about 1.5 percent per year. A fall in inflation should thus make investments in financial assets more attractive compared with paintings from the financial point of view.

Although our main conclusion is that the rate of return of investments in paintings is not nearly as large as is generally believed, we should note that there are several reasons why individuals may rationally choose this form of investment: provided (1) the owner derives a sufficiently high psychic benefit from looking at the objects, investments in paintings are a reasonable endeavor; (2) paintings are legally or *de facto* only partially, or not at all, subject to property tax or death duties; and (3) buying pictures and after some time giving them to public museums may allow a net reduction of the individual's tax burden. These tax aspects differ considerably between countries and periods, so that little can be said in general.

Appendix: Data Sources

Our analysis is based on the works of "the best known painters of the world" selected by Reitlinger [37; 38] in his compendium of auction sales of art works. He considers deceased artists only, that is, the number of paintings produced in each case is given and quite well known. Therefore, a limited number of intrusions of fakes and forgeries aside, the elasticity of production or supply is zero.¹⁴ These "noted works of noted artists" are the main object of financial investments in paintings.

The selection made by Reitlinger is obviously subjective. There is no way to determine objectively,

13. Stein [42, 1029] takes as an upper-bound estimate of the return from viewing services the rental rates in the art-rental market. According to his information, it averages 11 percent p.a. of the appraised value (net). This very high figure may be biased upwards because the clients of art-rental firms are mostly corporations for which such expenses are tax deductible (while buying is not necessarily so).

14. The situation for less well known or lesser artists is somewhat different. If the popularity of pictures from one of these authors strongly increases, there is an incentive to search for his or her works in attics and cellars with the result that the market supply may be strongly increased.

once and for all, who is a "noted" artist, as such evaluations tend to change over time. Nevertheless, de Piles's [36, 489 et seq.] evaluation of the most important living and dead artists of his—he was the advisor of the art-loving Cardinal Richelieu—time corresponds, in 41 out of 55 cases, with Reitlinger's selection. An even stronger correspondence is found with Vasari's [45] evaluation of the leading Italian painters: all but three of the 35 painters there mentioned are also included in Reitlinger.

Building on a vast amount of material collected by other scholars and an extensive own search of auction results, Reitlinger lists the prices paid for each transaction where available. In most cases they refer to auctions held in London because "until 1920 or thereabouts this means with few exceptions sales at Christie's" [37, 242]. This statement, however, is not quite true. Even in the eighteenth and nineteenth centuries a significant proportion of auctions dealing with paintings took place on the European continent, especially in Paris, but also in the Netherlands and in Germany. Reitlinger's sample has therefore been extended by us to cover the results of several thousand auctions on the Continent which could be drawn from the German and French literature and corresponding listings.¹⁵ The period from the mid 1960s up to the present is based mostly on the *Art Price Annual* [48; 49; 21; 10; 20], where roughly 1000 of the most important auctions the world over are listed for each year.

Among the auction results thus collected all those have been chosen where the same painting has changed hands at least twice over the period of roughly 350 years. The average number of transactions for all paintings is 2.5 over the period as a whole; in particular cases a painting has been auctioned up to eight times. After eliminating inconsistent and doubtful cases, these multiple sales and the corresponding prices are used to calculate the continuous compound rate of return for each painting for the period between successive transactions.¹⁶

The calculation of commission fees and possible (sales) taxes for the seller and/or buyer presented considerable difficulties. For past centuries the literature is rather mute on this question. The few hints have been amended by comparing gross and net sales figures for the buyer and seller in the various countries, for the various auction houses and for the different price levels of the objects traded (which was and still is of particular importance in France). The real rates of return including auction costs and (sales) taxes have been compared with the corresponding rates of return disregarding transaction costs and taxes. It turns out that such additional costs are important for relatively short holding periods of say seven to ten years, but that they are not of much importance for the minimal holding period of 20 years used in our study.

15. Of particular help were Smith's [41] "*Catalogue raisonné*" of Flemish, Dutch and French paintings, Blanc's [6] "*Trésor de la curiosité*", a collection of auction results of Parisian auction houses extending over one century, and Mühsam [33], Fourastié [13] and Rheims [39]. For Germany, Austria and Switzerland in former times, the works by Koch [28], Brieger [7], Mühsam [32], Bröker [8], Wilm [51] and numerous volumes of the "*Klassiker der Kunst*" were useful. For the first part of this century we relied on Manzl [29], Jaquet [24], Wagenführ [46], Müller-Mehlis [34] and Baumeister [4]. Helpful were also the collection of auction results by E. Mayer [30], by Art Trade Press [2], by Van Braan and Romeny [44] and in specialized journals such as *Connoisseur*, *Apollo*, *Burlington's Magazine*, etc.

16. This rate of return has been computed from the standard continuous compounding formula $p_t = p_0 \exp r(t - t_0)$, where p refers to the auction prices, index $t(t_0)$ to the year of selling (buying) the picture, and r being the compounded rate of return to be calculated.

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