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Author(s): William N. Goetzmann, Luc Renneboog and Christophe Spaenjers
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Art and Money

By William N. Goetzmann, Luc Renneboog, and Christophe Spaenjers*

> *Beauty is commonly a gratification of our sense of costliness masquerading under the name of beauty.*
>
> —Thorstein Veblen

Unless cast in platinum and covered with diamonds, as in the case of a 2007 Damien Hirst sculpture, a work of art has little intrinsic value. Nevertheless, works of art have from time to time fetched shockingly high prices, at least from the perspective of ordinary wage earners. The highest amounts have been paid for creations of deceased artists, but also living artists—Hirst being the exemplar—have commanded multimillion dollar or pound sums for their work. It is still largely a puzzle what determines these prices and their pattern over time.

Yet it is clear that the price of an art object is limited only by the amount that collectors are willing and able to pay for it. Given the interest of many high net worth individuals in art, we analyze the impact on art prices of time variation in how much money the wealthiest members of society can spend.

One way to measure changes in wealthy individuals' buying power is to look at stock market returns. Equities are typically held more widely among the most affluent. A number of studies have indeed looked at the relation between stock market and art market trends.[1] In this paper, we extend this work over a much longer time frame, starting our study in the first half of the nineteenth century.

A complementary approach to proxying for collectors' ability to purchase art consists of studying the evolution of top incomes over time, especially if the highest incomes also go to the wealthiest individuals. We therefore empirically investigate the link between the income distribution on the one hand and art prices on the other, a relationship which has not been analyzed before.[2]

I. Data

In this section, we first construct a long-run art price index. Since the index is largely based on London sales and is expressed in British pounds (GBP), we also collect equity market and income data for Great Britain. Insofar as it was mostly British individuals who bought the considered artists at British auctions over our time frame, this procedure seems justified.

A. *Art Prices*

We start by building a long-term art price index. To do so, we go back to the auction sales data collected by Gerard Reitlinger (1961), who investigated the history of the British paintings and drawings market. Despite the

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* Goetzmann: Yale School of Management, 135 Prospect Street, New Haven, CT 06511 (e-mail: william.goetzmann@yale.edu); Renneboog: CentER, Tilburg University, P.O. Box 90153, Tilburg, 5000 LE, the Netherlands (e-mail: luc.renneboog@uvt.nl); Spaenjers: CentER, Tilburg University, P.O. Box 90153, Tilburg, 5000 LE, the Netherlands (e-mail: c.spaenjers@uvt.nl). The authors would like to thank Anthony Atkinson, Fabio Braggion, Elroy Dimson, Marc Goergen, Richard Grossman, Benjamin Mandel, Kim Oosterlinck, Emmanuel Saez, Darius Spieth, Radomir Todorov, John Turner, and seminar participants at Cardiff Business School, Erasmus University Rotterdam, Queen's University of Belfast, Tilburg University, and the Financial History Workshop at the University of Antwerp for helpful comments and data. Spaenjers thanks the Netherlands Organisation for Scientific Research (NWO) for financial support. Part of this paper was written while Spaenjers was visiting Columbia University, whose hospitality is appreciated.

[1] For example, William N. Goetzmann (1993) documents a lagged relationship between art prices and the stock market. Olivier Chanel (1995) presents evidence that stock markets Granger-cause art prices. Takato Hiraki et al. (2009) show that positive wealth shocks to Japanese investors affected their art purchases in the 1980s, lifting the price level in the global art market. While the latter authors treat art as a luxury consumption good, Benjamin R. Mandel (2009) constructs a model in which a positive correlation between equity returns and art returns is induced by the use of art as a savings asset.

[2] In contrast, in the real estate literature, Joseph Gyourko, Christopher Mayer, and Todd Sinai (2006) and Stijn Van Nieuwerburgh and Pierre-Olivier Weill (2010) have recently acknowledged the importance of the distribution of income in determining housing price levels.

well-documented selection issues with the Reitlinger data (Guido Guerzoni 1995), they still constitute a unique historical overview of auction sales since the eighteenth century. The artists whose sales are listed in this source mostly conform to English standards of taste. All transaction prices are expressed in GBP.

Reitlinger's data have previously been used to estimate the returns on art by, among others, William J. Baumol (1986) and Goetzmann (1993). In line with these studies, we identify all repeated sales within Reitlinger's book. This gives us a dataset of 1,096 sales pairs until 1961, excluding buy-ins (i.e., items for which the reserve price has not been met).

We then look up all 6,661 works listed in Reitlinger (1961) in the dataset constructed by Luc Renneboog and Christophe Spaenjers (2009), which contains more than one million auction sales until 2007, and try to identify resales of those same works in Great Britain. We treat a transaction as a resale only when there is a unique match of a nonambiguous title, which occurs in 253 cases.[3] In total we thus end up with a dataset containing 1,349 repeated sales. Since the data are very sparse for the first decades covered by Reitlinger, we delete the 13 pairs for which the purchase occurred prior to 1765. This leaves us with 1,336 repeated sales.

To estimate a price index, we follow the Bayesian formulation of a repeat sales regression, which imposes some additional restrictions on the estimation, outlined in Goetzmann (1992, 1993). The Bayes formulation avoids spurious negative autocorrelation in the estimated return series and is particularly useful when the number of observations is relatively small. Prior to applying the regression to our dataset, we deflate all transaction prices to real GBP. More details on our estimation methodology can be found in Goetzmann, Renneboog, and Spaenjers (2010).

We show the time series of the index values since 1830 in Figure 1. The figure suggests a relationship between the real economy and art prices. For example, we see significant price drops during World War I, over the Great Depression in the 1930s, and after the oil crisis in 1973. In contrast, we find strong price appreciations throughout the 1960s, during the art market boom at the end of the 1980s, and in the 2000s (at least until 2007). However, art prices stayed remarkably low for many years in the middle of the twentieth century. In real terms, the price level of 1913 was not reached again until 1968, despite decades of economic growth.

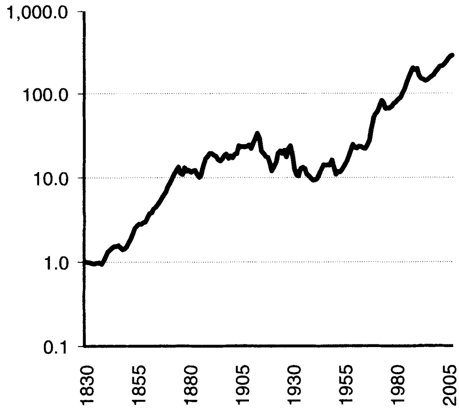

Figure 1. Art Prices in Real GBP 1830–2007

Notes: This figure shows the annual art price index in real GBP for the period 1830–2007, on a logarithmic scale. The index value in 1830 is put equal to 1.

We will henceforward refer to our log price index as *Art*. The first differences of this index constitute our estimates of the log returns on art. A concern with any art index is that survivorship issues can put an upward bias on the estimated returns (Goetzmann 1996). However, since our focus is not on estimating returns but on identifying what determines the variation in art returns, this does not have to be a major problem here.

B. *Equity Returns and Income Data*

We build a history of British stock price returns for the period 1830–2007, based on Richard S. Grossman (2002), Graeme G. Acheson et al. (2009), and Elroy Dimson et al. (2009). We create yearly indices covering total return, capital appreciation, and dividend yield, transformed into real terms. We call the natural log series *Equities*, *Equities* (*cap.*), and *Equities* (*div.*).

A recent literature has investigated the evolution of top incomes over the course of the twentieth century. We use data from A. B. Atkinson and T. Piketty (2010), who themselves rely on tax data, to build a consistent series of the share of total income received by the top 0.1 percent of all income earners in the UK for the period 1908–2005.[4] This series will be referred to as *Inequality*. Interestingly, income inequality generally decreased through the first half of the twentieth century and has increased over the last few decades, which is roughly in line with the pattern observed for art prices. We also construct the series *Income* and *Top income*, which measure the logs of deflated total personal income and deflated income of the top 0.1 percent earners in every year.

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[3] We classify a transaction in Renneboog and Spaenjers (2009) as a match to a sale in Reitlinger's list if we find strong evidence of the existence of only one work with the same title by the same artist. Also, we exclude objects with attribution classifications and with very general titles (or titles that point to a much-used subject of the artist), and objects that went to museums according to Reitlinger.

II. Results

We first present the results of comovement regressions that relate art returns to equity returns and changes in the income distribution. Thereafter, we undertake a cointegration analysis to investigate whether we can identify a long-run driver of art prices.

A. *Comovement Regressions*

In Table 1, we present the results of ordinary least squares (OLS) regressions that relate the log returns on art to equity returns, changes in total personal income, and changes in the income distribution. Below each coefficient, we present the Newey-West standard error that accounts for heteroskedasticity and first-order autocorrelation in the error terms. We also show the number of observations and the R^2 for each regression.

Model (1) regresses the returns on art on equity capital growth rates and dividend yields over the 1830–2007 period. Because of potential nonsynchroneity between our art price index (which aggregates information per calendar year) and equity prices, we also include lagged equity capital returns. Model (2) relates art returns to the growth of personal income and changes in income inequality. Data for these variables are only available over the 1908–2005 time frame. In model (3), we check how the results on the income variables change once we control for equity returns. In this last specification, we exclude the dividend variable, because dividends should already be captured by the personal income variables.

TABLE 1—COMOVEMENT REGRESSIONS

	1830 –2007 (1)	1908 –2005 (2)	1908 –2005 (3)
Δ Equities (cap.)	0.13*		0.11
	(0.07)		(0.07)
Δ_{-1} Equities (cap.)	0.21***		0.21***
	(0.05)		(0.06)
Δ Equities (div.)	–0.01		
	(0.21)		
Δ Income		0.14	0.20
		(0.26)	(0.26)
Δ Inequality		14.35***	9.59***
		(4.18)	(4.13)
Observations	176	97	96
R^2	0.13	0.12	0.23

Notes: The returns on art are regressed on a constant and a changing set of independent variables, listed in the first column. All models are estimated using OLS. Newey-West standard errors are in parentheses below the coefficients.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

The results in Table 1 show that equity capital growth, and especially lagged stock price appreciation, has a statistically and economically significant impact on art prices. However, we also find that art prices rise when inequality goes up, even when controlling for equity market trends. The coefficient on *Inequality* in model (3) suggests that a 1 percentage point increase in the share of total personal income earned by the top 0.1 percent triggers an increase in art prices of about 10 percent. The R^2 of this model is substantially higher than when considering the impact of equities or the income distribution separately.

B. *Cointegration Analysis*

The above evidence on comovement between equity markets and income inequality on the one hand and art markets on the other is based on relatively short-term effects. The long-term

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[4] Data on the top 0.1 percent income share are missing for a limited number of years. For the periods 1908–1912 and 1987–1992, we impute the share of the top 0.1 percent, based on the available income shares. For the years 1961 and 1980, we linearly interpolate the top 0.1 percent income share.

TABLE 2—COINTEGRATION TESTS

	Trace	Max. eigenvalue
Equities	5.67	5.66
Equities (cap.)	8.28	8.27
GDP	7.29	7.25
Income	10.18	9.54
Top income	20.27***	17.82**

Notes: This panel shows the results of Johansen's cointegration tests over the period 1908–2005. In each case, the null hypothesis is that of no cointegrating relation with *Art*. No trend is assumed in the cointegrating equation. The test statistics of both the trace and the maximum eigenvalue tests are reported.
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

nature of our data series (and the fact that the series are integrated of order one) allows further exploration of the factors that drive art prices over the long run. If it is really the high-income individuals who determine the price level in the art market, then one would expect *Top income* (but not necessarily *Income*) to be cointegrated with art prices.

Table 2 shows the results of Johansen's cointegration tests applied to our time series since 1908. We report the results of trace and maximum eigenvalue tests, assuming no trend in the cointegrating equation and including one lagged first difference in the model.

We find that the null hypothesis of no cointegration between *Art* and the series in the first column can never be consistently rejected, except in the case of *Top income*.[5] Over the long run, the income of the wealthy, or at least of the highest earners, seems a key factor in the price formation in the art market.

III. Analysis per Subperiod

Profound changes have taken place in the art market since the middle of the previous century. Without doubt, the art market has become more globalized, or at least reached the level of international integration it enjoyed in the late nineteenth century. One may thus expect the relation between our UK art price index on the one hand and the British equity market and income distribution on the other to be weaker after World War II than before. Therefore, we repeat our main analyses, but differentiate between the 1908–1945 and the post-1945 period.

The results of the comovement regressions, which are reported in Goetzmann, Renneboog, and Spaenjers (2010), indicate that lagged British equity capital growth has a similar positive impact on our art price index in both subperiods. In contrast, the previous findings on the impact of income inequality on art prices seem attributable to trends in the early twentieth century, when substantial decreases in inequality eroded the relative buying power of the wealthiest. Our results are consistent with the hypothesis that the income concentration in Great Britain mattered less in the second half of the twentieth century in determining art prices.

Still, even for the postwar period, we can reject the hypothesis that top incomes are not cointegrated with art prices.

IV. Conclusion

This article has investigated how equity returns and personal income—more generally, money—determines the price of art. We are able to confirm and strengthen previous evidence that equity market movements affect art prices, using a newly constructed art price index. We find weaker evidence for the impact of income inequality. Although there is evidence that changes in income inequality had an important effect on British art prices in the first half of the twentieth century, and that this effect is significant for the overall time frame, we do not confirm the result for the postwar period. We conjecture that this may be due to the globalization in the demand for high-quality art in the later era. Arguably more important, however, is that we find cointegrating relationships between top incomes and art prices, both for the complete 1908–2005 period and since 1945. These relationships support the Veblenian view of art as an instrument of social competition among the very rich.

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[5] We find similar results when allowing for a linear trend in the cointegration equation or when including lagged equity capital growth as an exogenous variable.

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