The Keynes Collection and Art Appraisal

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Abstract: Using archived and contemporary expert appraisals, we estimate long-run returns for an invested art portfolio: the John Maynard Keynes collection. Informed investors can profit by identifying particularly attractive purchase prices. Consistent with this, Keynes’ art investments beat the stock market immediately following purchase; after the 1950s the collection continued to appreciate in real terms. Portfolio returns over the last half-century resemble estimates based on auction data. Variation across constituents illustrates three issues with auction-based price indexes: post-auction returns can differ systematically from other types of acquisition; portfolio concentration distorts equally-weighted index returns; and return skewness implies that the art investor typically underperforms the asset class.

Keywords: alternative investments; arbitrage; art; portfolio concentration; price indexes; skewness.

JEL codes: B26, C43, G11, G12, G14, Z11.

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I. Introduction

A substantial and growing literature examines the risk-return properties of art as an asset class (e.g., Stein (1977), Baumol (1986), Goetzmann (1993), Mei and Moses (2002), Renneboog and Spaenjers (2013), Korteweg, Kräussl, and Verwijmeren (2015)). Such studies typically construct price indexes for the art market based on publicly available information from auction transactions—either through hedonic regressions that track quality-adjusted price levels over time, or through repeated-sales regression methods that estimate average price changes in the market based on returns on objects trading more than once within the sample period. However, this literature has yet to fully answer two important questions. First, are changes in transactions-based price indexes representative of the returns realized by the average collector-investor, or do previously published indexes instead give a biased view on the historical profitability of art investments? Second, is there scope for skilled or well-connected investors to do better than the index?

The issue of representativeness mainly arises from the fact that sale decisions and reservation prices can be endogenous to recent price appreciation (Goetzmann (1996), Korteweg, Kräussl, and Verwijmeren (2015)), as is the case for other illiquid assets like real estate and venture capital (e.g., Goetzmann and Peng (2006), Korteweg and Sorensen (2010, 2014)). Indexes might also suffer from longer-run survivorship bias, if artists that have fallen out of fashion never (re-)enter the art market.¹ One way to deal with the fact that at any point in time most art values remain invisible to the econometrician is to model the nature of the selection bias in observed transaction prices. Korteweg, Kräussl, and Verwijmeren (2015) correct for sample selection bias in observed auction transactions using a dynamic

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¹ It is not clear to what extent artists really disappear from the market. Graddy (2013) finds that a 300-year-old quality ranking of artists has held up well over time—taste, she argues, “endures”. Goetzmann (1996) shows that the rate of obsolescence in the auction market is not very large. Deaths and liquidity shocks may make all artworks (re)trade at some point, in which case long-term return estimates will be unbiased (Lovo and Spaenjers (2014)).
Heckman model,\textsuperscript{2} and find repeated-sales return estimates that are significantly lower than the uncorrected ones. In this paper, we take a different approach: we analyze the performance of an actual invested buy-and-hold art portfolio. The approach of tracking the value of one particular collection over time has the important advantage that we can follow all artworks after the initial investment. There is thus no correlation between the likelihood of observing a valuation and prior value change.

Another related problem that we can address by considering the performance of a complete collection concerns the different ways in which art can be acquired. For other collectible assets, there can be persistent differences between dealer prices and auction prices, as can be seen, for example, in the market for investment-quality wine (Dimson, Rousseau, and Spaenjers (2015)). Traditional art price indexes are based on auction sales only, even though private transactions through dealers and galleries make up about half of the art market’s total turnover (McAndrew, 2012). Whether auction prices and private transaction values are aligned in the secondary market may depend on whether negotiated prices between dealers and collectors anchor on auction results. Moreover, there can be a systematic difference between returns realized on purchases in the primary market relative to those in the secondary market. In this paper, we will be able to compare returns to auction purchases to those realized on other acquisitions.

Finally, in contrast to indexes that only capture average market trends, our empirical method may help to provide evidence on the drivers of the performance of actual art investors. It is an open question whether Swensen (2009)’s general claim that illiquid asset markets contain profitable speculation opportunities for skilled investors is applicable to art. Art investment funds are likely to prefer purchases that are relatively more marketable, and hence they might be expected to forego at least some of any illiquidity premium that might be attainable within this asset class. On the other hand, the funds typically claim that they are in a good position to exploit market inefficiencies and inside information (Horowitz, 2011). However, little evidence exists in relation to this assertion.

\textsuperscript{2} Such a strategy is close in spirit to recent research on the risk and return of venture capital and private equity (e.g., Cochrane (2005), Korteweg and Sorensen (2010), Ang et al. (2014)).
The art portfolio that we study is that of the economist John Maynard Keynes. It is well known that Keynes (1883–1946) was an active investor in financial assets (e.g., Moggridge (1982), Fantacci, Marcuzzo, and Sanfilippo (2010), Accominotti and Chambers (2015), Chambers, Dimson, and Foo (2015)). Less well-known is that Keynes became an enthusiastic and avid collector of art, books, and manuscripts. Keynes accumulated artworks through various purchase channels between 1917 and 1945, and bequeathed his entire art collection to King’s College in Cambridge upon his death the following year. This collection consists of over a hundred pieces by various artists, including Modern Masters such as Braque, Cezanne, Matisse, Picasso, and Seurat, but also friends and acquaintances of Keynes such as Spencer Gore, Duncan Grant, and William Roberts. It has remained intact to the present day, with the pictures being hung at the College and at the Fitzwilliam Museum in Cambridge.

Our main data sources in this study are an extensive set of records held at the archives of King’s College. The records contain a detailed list of all the pictures acquired by Keynes. For a majority of the works, we are able to determine the purchase price and date, often based on invoices or correspondence kept by Keynes himself. A few purchase prices come from alternative art historical sources. The archival records of King’s College also contain multiple insurance valuations and auction estimates post-dating Keynes’ death. Moreover, we are able to procure expert appraisals for the important works in the collection at the end of 2013.

We use our hand-collected data to compute the total expenditures by Keynes on his collection over the period 1917–1946, and to estimate overall valuations as of the years 1959, 1981, 1988, and 2013. The collection appreciated strongly prior to 1959: the purchase-price-weighted average annualized return across artworks equals 6.6% in real sterling pound terms. Over this first period, the Keynes collection strongly outperformed the equity market. Returns were particularly high on works by artists that Keynes

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3 To our knowledge, Landes (2000) is the only other study to examine the returns to an existing art portfolio, namely the collection put together by collectors Victor and Sally Ganz. The financial success of the collection was not driven by a few purchases only, suggesting the existence of skill. However, the collection was given a high-profile sale at Christie’s precisely because it had become so valuable. We believe this ex-post selection issue to be much less relevant in our case: Keynes’ claim to fame is unrelated to his activities as a collector, and we do not study his collection because of an increase in value.
acquired through auctions and internationally-established dealerships—mostly (Post-)Impressionist art from Continental Europe. We observe lower returns on works by locally-operating artists whom Keynes knew personally.

Between 1959 and 2013, the collection appreciated at an annualized real rate of 4.2%. Although this return is substantially lower than in the first decades following Keynes’ purchases, the annualized underperformance relative to the equity market amounts to only 1.8%. After procuring four additional valuations for the collection’s most important works in 2013, we can conclude that our estimate of its performance is robust to averaging idiosyncratic elements in the valuation of individual art works. Interestingly, our estimate of the return to the Keynes collection after 1959 is also close to previous auctions-based estimates of the performance of the art market.

Our findings regarding the performance of the Keynes collection yield a number of new insights regarding price indexes as a measure of the returns realized by art investors. First, there is evidence of arbitrage opportunities in the art market and of the potential for their exploitation. Before 1959, the strong performance of the collection was mainly driven by Keynes’ purchases of works by rising international artists. We show that Keynes was often acting on the advice of artist friends. These findings suggest that well-connected investors may be able to realize positive returns in excess of the market. However, we also document systematic differences in realized performance between purchase channels, with the highest average returns observed on works acquired at auction. The implication is that price indexes based solely on auction transactions may not always accurately capture the average collector’s realized returns.

Second, a striking feature of the Keynes collection is its high concentration. For example, the ten most expensive purchases sum to 79.6% of his aggregate expenditure on art. Changes in the total value of the collection have thus largely been driven by price variation in the big-ticket items. In additional analysis,

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4 While previous literature has studied the average predictive power of estimates in art auction markets (e.g., Louargand and McDaniel (1991), Bauwens and Ginsburgh (2000), Ashenfelter and Graddy (2002)), our study is the first one to look at differences of opinion across experts for the same artworks. We find substantial disparity in individual valuations—highlighting the need for sellers to seek multiple opinions—but importantly valuations for the complete collection are relatively close to each other.
we document the high concentration of the art market more generally. We show suggestive evidence that (contemporary) artist capitalizations follow a power law, implying that the art market may be “granular” (Gabaix (2011)), and that the returns to art as an asset class are largely driven by the price evolution of the most valuable artists. An index focusing on the price levels of superstar artists may therefore rather accurately capture the evolution of the market portfolio. However, the high concentration of the art market also highlights the importance of constructing value-weighted rather than equally-weighted indexes.

Third, and closely related to the previous point, an important element in the growth of the value of the Keynes collection over time is the stellar performance of one item. An analysis of returns on resales in the global art market over the last quarter century shows that art investment more generally has lottery-like features, i.e., positive skewness and excess kurtosis.

Taken together, the last two findings suggest that collector-investors wanting to realize a return close to the performance of the (auction) market necessarily have to construct a broad, diversified portfolio of relatively valuable works. A problem, of course, is that this is only feasible for very wealthy individuals. Moreover, the positive skewness in artwork returns implies that there is always a risk of missing out on the winning lottery tickets. At the same time, however, a preference for positive skewness may make underdiversification attractive to certain investors, and even partially explain the relatively low risk-adjusted returns to art on average (Barberis and Huang (2008)).

The remainder of this paper is structured as follows. Section II gives a short biography of Keynes the collector. Section III describes our data collection. Section IV analyzes the investment performance of the collection. Section V draws lessons for investors and academics. Section VI concludes.

II. Keynes the art collector-investor

There is no question that Keynes built up a very fine collection over his life. Following his death and that of his wife, Lydia, the collection passed to King’s College with the major items housed at the Fitzwilliam Museum in Cambridge. A crucial question is what drove Keynes to collect as he did. As
with so many other buyers, a mixture of motives for acquiring art seems to have been at play. Keynes had an innate love of the arts, enjoyed the company of artists, and was greatly influenced as to his tastes by the other members of the Bloomsbury Group—a collective of British intellectuals and artists. In addition, he was interested in art as an investment.

Keynes’ time as a student in Cambridge demonstrates his early interest in fine art. In a 1905 paper entitled ‘A Theory of Beauty’, the 22-year old writes: “A fit object is one the contemplation of which ought to give rise to a state of mind which is good” (Skidelsky (2003)). In the same year, while in Paris, Keynes visits the Louvre five times, as well as the modern collections at the Palais du Luxembourg (Dostaler, 2007). His first small art purchases follow quickly; Scrase and Croft (1983) write that these acquisitions are “inspired either by personal acquaintance with the artist or by the example set by the behavior of his family and friends”. During this time he continues his self-education in the visual arts, and in 1911 becomes a member of the Contemporary Arts Society (Scrase and Croft (1983)), for which he would later act as a buyer. Keynes also plays a prominent role in the Bloomsbury Group through which he maintains close associations with such British painters as Duncan Grant and Vanessa Bell as well as Roger Fry, the influential art critic and inventor of the term “Post-Impressionism”. Indeed, it is these three friends who give him the idea of attending the first sale of the private collection of Edgar Degas in Paris in 1918, with a view to acquiring Impressionist and Post-Impressionist artworks at knock-down prices for the British Treasury, but also to buy some for his personal collection (Munro (2003)).

When we look at the evolution of Keynes’ collection, his significant purchases are clustered in two periods, 1918–24 and 1935–37. The 1918 Degas sale where he makes his first major purchases, namely a Cezanne and a Delacroix, is the starting point. Cezanne’s ‘Apples’ soon becomes an “object of pilgrimage” (Dostaler (2007)) for his Bloomsbury friends. In the following two years, he makes significant additional acquisitions of paintings by Matisse, Seurat (a study for ‘La Grande Jatte’), and Renoir, and drawings by Degas, Modigliani, and Picasso. Again, his artist friends seem to have played a
key role in “inducing” Keynes to buy (Shone and [Duncan] Grant (1975)). His second wave of major acquisitions follows in the years 1935 and 1937, when Keynes purchases works by Renoir, Picasso, Braque, and Cezanne. Some are bought at the auction houses Sotheby’s and Christie’s, while others are purchased through art dealers such as Agnew, Wildenstein, and Reid & Lefevre. The Cezanne picture ‘L’Enlevement’, bought for £3,500 in 1935, is the most expensive acquisition Keynes ever makes, equivalent to 30 percent of the aggregate lifetime cost of his art purchases.

Either side of these two periods, Keynes does not make major foreign acquisitions. During the second half of the 1920s and the early 1930s, Keynes concentrates on his policy of patronage of British artists, largely through the London Artists’ Association, an organization established in 1926 whose mission was to provide promising artists with a guaranteed income. In these years, he buys works from friends and acquaintances he admired, such as Duncan Grant, Vanessa Bell, William Roberts, Raymond Coxon, and Walter Sickert. After 1937, and until his death in 1946, Keynes again limits his purchases to a few works by British artists.

Keynes certainly loved the arts, but there is more to his art collecting than an insistence that “wealth should not be hoarded but spent on civilized living” (Skidelsky (2003)). Indeed, Skidelsky questions “how much he really enjoyed pictures, as opposed to the idea of owning them, and supporting those who painted them”. Hence, it is no surprise to find that Keynes “was also motivated in his purchases by the idea of art as an investment” (Scrase and Croft (1983)). Accordingly, he wrote that there is “a slight mystery about the prices” of paintings and that “the element of investment may not be entirely absent after all” (Dostaler (2007)). Furthermore, despite no evidence of a sale taking place, his correspondence shows that he did consider selling certain artworks, so he definitely had a sense of his reservation prices.

Nonetheless, Keynes’ friends are not always impressed by his personal tastes. Shone and Grant (1975) write that Keynes “attempted to speak and pronounce upon painting on occasion with an authority that was ill-founded”. Clive Bell “found his judgment of painters and works of art lamentable”, and when Keynes buys a painting upon his own initiative in 1924, his friends remark that it is “the worst picture that Cezanne ever painted” (Skidelsky (2003)).
III. Data

In this section we describe the composition of the Keynes Collection, explain how we compiled a record of the acquisition cost for each item in the collection, and provide information on the appraised values for the artworks at various dates since Keynes died and at the end of 2013.

III.1. The Keynes collection

The departure point for our data collection is the 1959 memorandum on the Keynes collection prepared by Richard Kahn, who succeeded Keynes as the bursar of King’s College in 1946. This document provides information on the artist, title, and size for all 135 pieces in the collection (Keynes Picture Bequest, pp. 4–13). The memorandum groups together artworks according to their year-1959 location. It includes 26 pictures held at King’s College, 23 works on loan to the Fitzwilliam Museum, 85 in the Fitzwilliam picture reserve, and a portrait of Keynes by Duncan Grant on loan to Milo Keynes. Table 1 summarizes the distribution of artworks by artist. In keeping with Keynes’ career as a collector described in the previous section, it is not surprising that the collection contains many works by Bloomsbury artists and friends such as Grant, Bell, and Roberts on the one hand, and by Impressionist and Post-Impressionist artists such as Braque, Cezanne, Degas, and Picasso on the other.6

In 1983, the Fitzwilliam Museum organized the exhibition ‘Maynard Keynes: Collector of Pictures, Books and Manuscripts’ displaying 85 out of the 135 works in the Keynes collection. The exhibition catalogue (Scrase and Croft (1983)), the cover of which is shown in Figure 1, provides detailed background information on each of these works.

6 The Courbet on the 1959 list was later attributed to Thomas Couture. The drawing attributed to Ingres was later attributed to “after Degas” and then to “Degas, after Ingres”.
III.2. Purchase prices

Having established the artworks in the collection, we search for the prices Keynes paid for its different constituents. Our main source of information are the invoices, correspondence, and other documents in Keynes’ personal archive (Personal Papers—Papers Regarding Paintings and Sculpture). From this source, we match his recorded purchases with the artworks in the collection by comparing artist name, title, and year of creation. Further purchase prices are discovered from other sources. We consult the relevant sales catalogues in the archives of Christie’s and the National Art Library in London in the case of the three purchases made at Christie’s and Sotheby’s where we only have the sale date, lot number, and price from the auction house invoice. In addition, the prices paid by Keynes for his seven purchases at the Degas sales in March and April 1918 are recorded in his personal collection of sales catalogues (Personal Papers—Picture Sale and Exhibition Catalogues). Finally, five price matches were made through the following sources: the accounts book of the London Artists’ Association (Personal Papers—London Artists’ Association Account Books); a catalogue accompanying an exhibition of works of William Roberts (Reid & Lefevre (1935));⁷ and our personal correspondence with David Scrase of the Fitzwilliam Museum.⁸

We make two comments on the determination of purchase prices. First, five of the purchases took place in French francs. In these instances, we convert the price to British pounds using either the exchange rate used by Keynes, or a historical exchange rate from Mitchell (1988). Second, sometimes the disclosed purchase price covered the acquisition of more than one work. To determine the price of the individual items, we either use the breakdown mentioned in Keynes’ correspondence, or otherwise divide the total price in equal parts.

In total, we are able to identify purchase prices for 73 out of the 135 works. Table 1 summarizes the number of prices that we find for each artist. Many of the items for which we do not have a purchase

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⁷ Three works by Roberts went to Keynes after the show to liquidate the artist’s outstanding debt (Roberts (1990)). We use the exhibition prices of these paintings.

⁸ One of the remarkable items in the collection is a cubist still life by Georges Braque. David Scrase, who curated the Fitzwilliam exhibition of the Keynes collection, recalled that the Braque was bought by Duncan Grant in a bookshop in Berlin in the early 1920s for 30 shillings. Shone and Grant (1975) confirm the location of the purchase but not the price.
price are by artists that were in Keynes’ social circle. There are, for example, 19 works by Duncan Grant and four by Vanessa Bell without any documentation on their purchase; at least a handful of these items were gifts (Scrase and Croft (1983)). Other works without a purchase price have always had virtually no financial value, such as two photographs of frescoes by Signorelli, a map of the county of Sussex, and a number of anonymous oil paintings.

A focus on the artworks for which we identified purchase prices should thus permit an accurate estimation of the evolution of the collection’s overall value. This view is reinforced by the observation that the items for which we have purchase prices accounted for more than 95% of the total value of the collection in 1981 (when the most extensive appraisal of the collection took place), and include all 23 works that were already lent out to the Fitzwilliam Museum shortly after Keynes’ death. In any case, the availability of transaction information in Keynes’ correspondence should be uncorrelated to subsequent price appreciation, mitigating worries about selection bias in our return estimates.

Based on his known expenditures, Keynes invested a total of almost £13,000 in his art collection. Figure 2 shows the annual time series of his expenditures between 1917 and his death in 1946. Consistent with our description of the evolution of the Keynes’ collection in section II, the figure depicts two main bursts of buying: the years immediately following the end of the First World War and, especially, the mid-1930s. Both periods coincide with years in which Keynes’ wealth grew strongly. Scrase and Croft (1983) argue that Keynes’ year-1919 purchases were paid for out of profits from the sales of the French edition of the ‘Economic Consequences of the Peace’. Skidelsky (2003) writes that, in 1919, Keynes “earmarked some of his first profits from currency speculation for buying pictures”, and that by 1935 Keynes was again making profits on the stock market. In Figure 2, we also graph Keynes’ annual art expenditure against his net assets in the previous year based on data from Keynes’ personal papers and from Moggridge (1982). There exists a statistically significant correlation of 0.45 ($p$-value of 0.01) between lagged changes in Keynes’ assets and his art purchases.
III.3. Valuations subsequent to Keynes’ death

On Keynes’ death in 1946, a probate estimate of the value of the art collection was £31,419. There is no additional information on this aggregate valuation in the King’s College archives (Keynes Picture Bequest, p. 273). Fortunately, however, this probate valuation, which is by Turner (1946), has very recently (March 2015) come to light through the cooperation of a member of the Keynes family, and we now have access to the underlying data. At the time of writing, this disaggregated data has not yet been analyzed.

The 1959 memorandum referred to above only incorporates the year-1946 valuation for a handful of works that were not valued in 1959 (ibid., pp. 4–13). The collection was valued for insurance purposes at multiple points in time after 1946. The analysis below will refer to the following five valuations. In 1959, the reputable London art dealer Agnew & Sons valued 105 items in the collection (ibid., pp. 119–129). In 1981, Agnew carried out a near-complete valuation of the collection—131 out of 135 artworks (ibid., pp. 155–162). The year after, Sotheby’s provided auction estimates for a subset of 13 of the most valuable artworks (ibid., pp. 175–176). Finally, there are insurance valuations under the Government Indemnity Scheme from 1988 (ibid., pp. 387–390) and from 2013 (provided to us by King’s College) covering the 41 and 43 works respectively lent by King’s College to the Fitzwilliam Museum.

III.4. Market valuations at end-2013

In order to obtain an estimate of the contemporary (market) value of the Keynes collection, we commissioned a valuation from the art advisory and valuation firm Gurr Johns. We were provided with valuations for 27 important works from the collection. We also procured four more independent open market valuations from the art market research firm ArtTactic, the art advisory firm and valuer Dickinson, and each of the leading auction houses Christie’s and Sotheby’s, for the 15 works with the highest 1988 insurance valuations accounting for at least 90% of the collection’s total value. We provided each of the valuers with a copy of the 1983 exhibition catalogue, but we did not give them
access to prior appraisals. We did not inform them of our strategy of seeking multiple estimates for the same works, but we did not indicate that we were limiting ourselves to just one appraisal.

IV. The Investment Performance of the Keynes Collection

We now examine the value of the entire art collection, decomposing it into estimates for individual artworks. We also investigate the extent to which expert valuers agree or disagree in their appraisals at a common point in time.

IV.1. Entire collection

In this section, we look at the growth in the value of the Keynes collection over time, starting from the 73 works for which we have purchase prices. For these objects, we compute Keynes’ aggregate nominal expenditure over the period 1917–1946, and the aggregate year-1959, year-1981, year-1988, and year-2013 valuations as follows.

For all but one of these 73 works, we have year-1981 valuations that we can use. For the other item—a Jean Marchand painting bought for less than £24 (i.e., less than 0.2% of Keynes’ total expenditures)—we do not have any post-1946 valuation. We update the value of this work at different points in time by indexing its year-1946 value using inflation data from Dimson, Marsh, and Staunton (2002, 2014).

In 1959, we have valuations for 62 items; we use the median 1959-to-1981 valuation ratio of those objects to impute the ten missing year-1959 valuations. In 1988, we have Government Indemnity Scheme (GIS) valuations for 37 works; we use the median 1988-to-1981 valuation ratio of those objects to impute the missing year-1988 valuations. In 2013, we have valuations by Gurr Johns for 27 items. We use GIS valuations for 15 other items, and impute 30 more valuations by using the median 2013-to-1981

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9 The estimated aggregate value of those works valued both by Agnew in 1981 and by Sotheby’s in the following year are close to each other. The year-1982 Sotheby’s valuation is only 4% above the year-1981 Agnew valuation. This suggests that the valuations by Agnew, even if they were primarily for insurance purposes, reflect estimated market values. Nowadays insurance valuations typically reflect the cost of immediately replacing the artwork with a comparable object, and therefore tend to be higher than open market (i.e., auction) valuations.
valuation ratio (using the GIS valuations for 2013). Crucially, the items for which we directly observe valuations (and thus do not have to impute them) account for more than 99% of the total estimated value of the collection in 1959, 1988, and 2013. The valuation of the collection is therefore robust to reasonable changes in the method of imputing missing values.

The growth in the value of the Keynes collection over time is graphed in Figure 3. Keynes spent £12,847 on the 73 artworks considered here between 1917 and 1945. In 1959, the collection was worth £383,119, implying a very strong appreciation in its value over a short time period. The median annualized return across artworks over this first period equals 8.2% (5.1% in real terms), while the purchase-price-weighted average is 9.9% (6.6% real). After 1959, the estimated total value of the collection grew to £4,002,231 in 1981, £11,202,875 in 1988, and then to £70,632,861 in 2013. Between 1959 and 2013, the collection thus appreciated at an annualized rate of 10.1% (4.2% in real terms). The median annualized return over this second period equals 8.1% (2.2% real), while the 1959-valuation-weighted average return is 8.5% (2.6% real). The discrepancy between the performance of the collection’s total value on the one hand and the median and average individual artwork return on the other hand lies in the strong value appreciation of one important item in the collection. We examine the distribution of returns to individual artworks over both periods in more detail in the next section.

We next compare the value of the collection to two different benchmarks in 1959, 1981, 1988, and 2013. First, we compute the real value of Keynes’ art expenditures in each of these years by utilizing the U.K. inflation series from Dimson, Marsh, and Staunton (2002, 2014). Second, we estimate the total values assuming Keynes had invested in U.K. equities instead of art, by mimicking the amounts and timing of his actual expenditures. For this exercise, we use data on equity returns including reinvested dividends.

The estimate for 1988 should probably be considered as a lower bound on the true market value of the collection then. First, it is only based on government insurance valuations, which are probably conservative estimates of market values. (For example, in 2013, the estimates by Gurr Johns exceeded the GIS valuations in a large proportion of cases, and often very substantially.) Second, GIS valuations may lag market movements, and prices in many segments of the art market went up dramatically in the second half of the 1980s.
from Dimson, Marsh, and Staunton (2002, 2014). Also these results are graphed in Figure 3. The estimated total value of the collection in 1959, 1981 and 1988 exceeds both benchmarks.

The figure also shows that the Keynes collection strongly outperformed the equity market—which was itself already doing very well over this period—in the decade and a half following his death. In fact, the performance of the collection prior to 1959 is especially impressive relative to the 1959-2013 period. Although the collection keeps appreciating substantially in real terms after 1959, the collection slightly underperforms the equity market, by an annualized 1.8% in real terms over 1959-2013. As a result, at the end of 2013, the value of the collection matches the total return from an equivalent investment in British equities (£74.6 million).

**IV.2. Variation in performance across artworks**

To understand better the performance of the portfolio, we examine in more depth the cross-sectional distribution of returns before and after 1959, the date of the first disaggregated valuation of the collection. Panel A of Figure 4 shows the histogram of annualized real returns between purchase and 1959. The figure displays a large variation in investment performance across items. A large majority of works realized annualized real returns of between –5% and 15%, but some works did particularly well: eight works show an annualized return that exceeds 15%.

[Insert Figure 4 about here]

Another perspective is offered by Panel A of Figure 5, which graphs for each of the 73 artworks the 1959 valuation on the horizontal axis and the 1959 real value of each purchase price on the vertical axis. The least (most) expensive purchases—in real terms—are located near the bottom (top) of the graph. The least (most) valuable items in 1959 are located to the left (right) of the graph. Observations to the right (left) of the 45-degree line represent artworks that realized a positive (negative) real return between purchase and 1959. All of the more expensive purchases substantially outperformed the inflation index—driving the overall returns to the collection—but some of the highest returns are observed on less expensive purchases.
What might explain the cross-sectional variation in returns? In Panel A of Table 2, we partition the collection in three ways: by the channel of purchase; by whether or not Keynes was socially connected with the artist (potentially through the London Artists’ Association);\textsuperscript{11} and by above and below the median real purchase price. Keynes clearly realized the highest returns on art bought through leading auction houses (Christie’s, Sotheby’s, Georges Petit) and internationally established dealers (e.g., Goupil, Wildenstein). Most of this was art by (Post-)Impressionist artists from continental Europe, such as Braque, Cezanne, Degas, Picasso, Renoir, and Signac (and predecessors like Courbet and Delacroix). We generally observe the lowest returns on works by locally-recognized artists that he knew personally and/or supported through the London Artists’ Association.\textsuperscript{12} The implication is that Keynes was able to buy the art of rising Modern artists at relatively attractive prices through prominent art market players. Acquisitions of works by lesser-known artists that were friends and acquaintances turned out to be financially less profitable, but Keynes probably did not think only of the financial performance when making these investments.\textsuperscript{13}

\textsuperscript{11} We consider the following artists as part of Keynes’ social circle: Bell, Coxon, Davidson, Derain, Dobson, Fry, Grant, Hitchens, Picasso, Pitchforth, Porter, Roberts, and Sickert. Keynes met Derain and Picasso at a party that he co-hosted (with Clive Bell and Duncan Grant) in 1919, when the artists were in London with the Ballets Russes, for whom they designed sets and costumes. (Picasso would also draw Lydia Lopokova, dancer at the Ballets and later Mrs. Keynes, on multiple occasions.) Yet, Picasso and Derain were arguably much less close to Keynes than the others in the list above, and classifying them outside of Keynes’ social circle would magnify the return difference documented in Table 2.

\textsuperscript{12} When classifying the purchases based on purchase channel, we drop two works from our analysis: one was commissioned by Keynes, and another one was bought in a bookshop in Germany. A regression of annualized real returns on dummy variables based on the purchase channel shows significantly lower returns when the work was bought through a local art market player or from the London Artists’ Association. The result is robust to controlling for five-year period dummies that control for variation in the average price level in the art market at the time of acquisition.

\textsuperscript{13} Keynes’ activity in organizations like the London Artists’ Association showcase the importance he attached to supporting artists. Skidelsky (2003) notes that also his personal purchases were often made “out of loyalty” to his friends. In 1940, Keynes would comment on three purchases as Sotheby’s as follows: “I was supporting the market for three old friends whom I endeavoured to keep going over a period of years at very large cost to my own income” (Personal Papers—Papers Regarding Paintings and Sculpture).
We now turn to a description of the artworks’ performance between 1959 and 2013. Over this period, the median real return equals 2.2%, which is substantially below the investment performance prior to 1959. Panels B of Figure 4 and Figure 5 shows that there is also less variation in returns. Nevertheless, a few artworks have done exceptionally well; the three highest annualized real returns equal 10.7%, 9.3%, and 7.7%. Panel B of Table 2 indicates that, as expected, the method of purchase or the social connection between Keynes and the artist no longer help to explain the variation in returns.

IV.3. Robustness to alternative valuations

Our findings reported so far were largely based on end-2013 appraisals received from one expert. However, art is unlike seasoned securities for which there is a publicly quoted price that can be used for valuation purposes, and more like securities issued for the first time at IPO which rely upon the opinions of expert investors to reach a valuation. In this subsection, we examine the extent of disagreement between experts in valuing individual works. By doing so, we can also evaluate the robustness of our estimate of the collection’s performance to averaging idiosyncratic elements in the valuation of individual art works. We asked another four experts to value the collection’s 15 most important pictures based on their 1988 valuation (when taken together they accounted for more than 90% of the collection’s total value).

Panel A of Figure 6 shows the spread (i.e., highest minus lowest) of valuations for each of these artworks. There is considerable disparity: the average spread-to-mean ratio is above one. However, when aggregating across the 15 selected artworks, the relative dispersion in valuations is much smaller, as shown in Panel B of Figure 6. Replacing the single valuations used before with the average valuations across the five different valuers does not materially change our estimate of the long-term performance of the collection. The annualized nominal return since 1959 would be lowered by only 0.3%.

Panel A of Figure 6 shows the spread (i.e., highest minus lowest) of valuations for each of these artworks. There is considerable disparity: the average spread-to-mean ratio is above one. However, when aggregating across the 15 selected artworks, the relative dispersion in valuations is much smaller, as shown in Panel B of Figure 6. Replacing the single valuations used before with the average valuations across the five different valuers does not materially change our estimate of the long-term performance of the collection. The annualized nominal return since 1959 would be lowered by only 0.3%.

One of the valuers also provided us with a list of recent auctions of “comparable” works for each of the selected items in the Keynes collection. However, we do not find evidence of a negative correlation between the availability of price information and dispersion in valuations.
V. Discussion: The Keynes Collection and Measurement of Art Returns

In this section, we link our findings on the Keynes collection to the existing knowledge on art investment and the measurement of returns in the art markets. This allows us to draw lessons for investors and academics studying the market for artworks and other collectibles.

V.1. Arbitrage opportunities and the importance of the purchase channel

Prior to 1959, the value of the Keynes collection grew strongly; the average return on the collection’s items far exceeds previous estimates of the returns in the art market over the same period. For example, between purchase and 1959, the median annualized outperformance relative to the art index of Goetzmann, Renneboog, and Spaenjers (2011), mimicking the timing of Keynes’ purchases, equals 2.8%. By contrast, the collection did very similarly to the same art index (linked to the U.K. art market index of Artprice (2014a)) between 1959 and 2013; both show an annualized nominal return of 10.1%.

Panel A of Table 2 made clear that the outperformance in the early years and decades was driven by the purchases of artworks by Modern artists bought through auction houses and international dealerships—and with whom Keynes was for the most part not personally acquainted. Keynes was of course well-connected, and often acted on the advice of friends as to what and when to buy. For example, it was artists like Duncan Grant and Vanessa Bell who convinced Keynes to attend the auction of the Degas collection in Paris in 1918, advised him to buy a Matisse and a Seurat when they were for sale in London in 1919, and bought a Braque for Keynes in Berlin in 1924. These acquisitions all turned out to be among Keynes’ best-performing art investments, which suggests that market insiders may be able to outperform the average art investor—as art funds and other professional investors tend to claim.

However, our findings also point to a potential difficulty with measuring the returns to art investments. It is clear from Panel A of Table 2 that the returns realized on purchases at auction (or through established dealerships) may differ in a systematic way from the returns realized on acquisitions through
other channels. Therefore, indexes solely based on auction transactions may not accurately capture the average collector’s realized returns.

V.2. Concentration in the art market

Keynes’ art portfolio is highly concentrated. In 2013, two works account for more than half of the value of the 73-work collection, while the ten most valuable items make up 91.0% of the total value. This implies that changes in the total value of the collection will to a large extent be driven by price variation in the big-ticket items. Conversely, what happens to all the lesser-known artists—for example, whether they disappear from the secondary market completely or not—is not an important driver of returns.

Is the concentration of the Keynes collection reflecting a feature of art as an investment more generally? One approach to evaluate the concentration in the “market portfolio” of art would be to examine the value composition of a larger sample of collections, but such data are generally not available. However, the recent financial woes of the city of Detroit led to a number of appraisals of the art owned by the Detroit Institute of Art (DIA)—a first-class collection worth billions of dollars. When auction house Christie’s valued the 2,773 artworks purchased by the City of Detroit for the DIA, it estimated that just 11 works (fewer than one-half of one percent of the total) accounted for 75 per cent of the overall appraised value (Christie’s, 2013). Another valuer looked at the other constituents of the DIA collection (e.g., gifts) and concluded that out of a total of 57,604 works, 350 items (just over one-half of one percent of the total) accounted for about two thirds of their overall value (Artvest, 2014).

An alternative approach to evaluating the concentration in art as an asset class is to consider the concentration of sales across contemporary artists. The output of contemporary artists is typically still being traded very actively at auction, and the concentration in transactions may therefore give us an estimate of the concentration in total value. Artprice (2014b) reports that in the contemporary art auction market, three artists accounted for 22% of market turnover in 2013. The average price for these top three artists—Basquiat, Koons, and Wool—is over one million euros, even though 66% of all contemporary lots in the world sell for less than 5,000 euros. Based on the data for the 500 best-selling contemporary
artists, Figure 7 shows the (log) turnover-based rank of each artist against his or her (log) turnover at auction. We see a near-linear relationship between the two variables, which is confirmed by the results of an OLS regression of log rank on log turnover: the slope coefficient is equal to \(-0.85\), and the R-squared equals 0.99.

Such an inverse proportional relation between log rank and log turnover indicates the existence of a power law—an empirical regularity found before in city and firm sizes, and in other economic and financial measures (Gabaix (2014)). If the distribution of artist capitalizations indeed follows a power law as well, then the (contemporary) art market portfolio is extremely skewed and poorly diversified.\(^\text{15}\) The art market thus appears to be “granular” (Gabaix (2011)): it may have the same level of diversification as an equally-weighted portfolio of only a few dozen artists—just in the same way that a supposedly well-diversified market portfolio of 8,000 stocks may be equivalent to an equally-weighted portfolio of not more than 20 firms (Malevergne, Santa-Clara, and Sornette (2009)).

To sum up, variation in the value of the Keynes collection over time is largely driven by changes in the market value of a few superstar artists, such as Braque, Cezanne, Matisse, Picasso, and Seurat. This finding appears to be representative of the art market portfolio as a whole which may in large part be driven by what happens to a relatively small set of such superstar artists. A price index that tracks the works of those artists can thus be expected to capture accurately the evolution of the market portfolio—and also of (the few) collections containing a large number of superstar artists, especially because the demand for the most expensive art contains a systematic component linked to wealth and income inequality and the demand for luxury consumption (Goetzmann, Renneboog, and Spaenjers (2011)).

One issue, however, is that most recent art price indexes are at the same time considering a wide range of art price levels, and constructing an equally-weighted instead of a value-weighted index. The more concentrated the asset category, the larger the potential for a discrepancy between the returns as

\(^\text{15}\) The (contemporary) art market may be even less diversified than the equity market portfolio. Previous studies (e.g., Axtell (2001)) have found that firm market capitalizations follow a Zipf distribution, which is a special case of the power law with an exponent of 1. A lower power law exponent indicates a higher degree of inequality in the distribution.
estimated by an equally-weighted index and the returns to the “market portfolio”. To illustrate the potential for such discrepancy, we use data on more than 8,000 resales of identical artworks from Renneboog and Spaenjers (2013) and Lovo and Spaenjers (2014) between 1982 and 2007,\textsuperscript{16} and estimate both an equally-weighted and value-weighted arithmetic repeat-sales regression (Shiller, 1991) in deflated U.S. dollar terms. Figure 8 shows the results. The average of the absolute annual return differences equals 11.3%. (Shiller (1991) notes that the value-weighted repeat-sales estimator is noisier than the equally-weighted one.) Over the full sample period the annualized real equally-weighted return is 1.3% above its value-weighted equivalent.\textsuperscript{17}

\[\text{Insert Figure 8 about here}\]

V.3. Skewness in art returns

A close study of the Keynes collection also points to the importance of recognizing the role of positive outliers in driving overall performance. The reason why the median and average returns between 1959 and 2013 reported in Panel B Table 2 substantially lagged the 4.1% annualized increase in the aggregate value of the collection between 1959 and 2013 is that one item rose in value from 8,000 to 20 million pounds—an annualized performance of 15.6% in nominal terms and 9.3% in real terms. The 1959 valuation of this work was already substantially above the average and median value across all works, so the high performance is not due to a very low starting value.

Does art investment more generally display lottery-like features? Figure 9 shows a histogram of the annualized real returns based on the data of repeated transactions of artworks between 1982 and 2007

\textsuperscript{16} Lovo and Spaenjers (2014) create a subset of the database compiled by Renneboog and Spaenjers (2013), focusing on the transaction pairs with the best matches. We excluded annualized returns below the 1st and above the 99th percentile, to mitigate the risk of misclassifications. The results are very similar when not dropping these observations.

\textsuperscript{17} The substantially higher annualized return of the equally-weighted index is driven by its outperformance relative to the value-weighted index after 2000. This result is somewhat surprising given the recent findings that the price distribution seems to have become more unequal (Renneboog and Spaenjers (2013)) and the artists with the highest turnover have shown higher price appreciation (Korteweg, Kräussl, and Verwijmeren (2015)) over the last decades. We leave a detailed study of this issue for further research. Our point here is mainly to show that the choice of a value-weighted versus equally-weighted index is not innocuous.
(Renneboog and Spaenjers, 2013; Lovo and Spaenjers, 2014), where we limit our analysis to real purchase prices above the 90th percentile, in order to focus on the works that drive the art market as a whole. In this sample, skewness equals 0.85 (while kurtosis exceeds 6).

V.4. Prices, portfolios, and indexes

The findings reported in this section suggest that value-weighted auctions-based price indexes are unlikely to wildly overestimate average long-term returns to diversified portfolios—at least of works purchased at auction—that include a range of (near-)established artists. Such a portfolio is of course out of reach for all but the most wealthy of individuals. Moreover, the positive skewness in artwork returns implies that there is always a risk of missing out on the winning lottery tickets. However, it should also be recognized that positive skewness may have the effect of making underdiversification attractive to certain investors (Goetzmann and Kumar (2008)). Preference for positive skewness on the part of investors may even be seen as a reason for the low returns to art on average (Barberis and Huang (2008))—just like it might partially explain the low returns to private equity (Moskowitz and Vissing-Jørgensen (2002)).

VI. Conclusion

This paper examines the long-run performance of an actual invested art portfolio, namely the collection of John Maynard Keynes. We view the method of analyzing an actual portfolio—and exploiting rich time-dated purchase price and expert valuation data—as complementary to the traditional approach of estimating price indexes using auction prices only, yielding additional insights into the historical returns.

18 The results are similar without this filter. In the analysis shown here we also dropped three works with an annualized return above 100%. It is not entirely impossible that these are misclassifications, and we want to avoid biasing the results in favor of finding positive skewness. Positive skewness and excess kurtosis is also found in the distribution of annualized real returns in the (smaller but much longer-term) sample of resales of Goetzmann, Renneboog, and Spaenjers (2011).
realized by art collector-investors. We find that, in the first years following Keynes’ purchases, his art portfolio strongly outperformed the equity market. Our results suggest that informed art investors can do well in the art market by identifying particularly attractive entry prices. After the late 1950s, the collection continued to appreciate in real terms, even if it did not do as well as equities. Our estimate of the Keynes collection’s performance over the last half century is similar to previous art market return estimates based on auction sales data. At the same time, however, the variation in returns across the constituents of Keynes’ portfolio illustrates a number of potential issues with auctions-based price indexes: (i) the returns to purchases at auction which form the basis of previous art market return estimates can differ from the returns to other types of acquisitions; (ii) because of the high concentration in the art market, an equally-weighted index may provide a biased view of art’s performance; (iii) the positive skewness in returns implies that the typical (underdiversified) art investor underperforms the market.
References


Table 1. Artists in the Keynes collection

This table shows the composition of the art collection bequeathed by John Maynard Keynes upon his death in 1946. It also shows the distribution of purchase price data points across artists. More information on our data collection procedure can be found in Section III of this paper.

<table>
<thead>
<tr>
<th>Artist name</th>
<th>No. of items</th>
<th>No. of purchase prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atkin</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Baynes</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bell</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Braque</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Brzeska</td>
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<td>0</td>
</tr>
<tr>
<td>Bussy</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Calligan</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Cezanne</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Courbet</td>
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<td>1</td>
</tr>
<tr>
<td>Coxon</td>
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<td>2</td>
</tr>
<tr>
<td>Daumier</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Davidson</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Degas</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Delacroix</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Derain</td>
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<td>2</td>
</tr>
<tr>
<td>Dobson</td>
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<td>1</td>
</tr>
<tr>
<td>Follower of John Crome</td>
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<td>1</td>
</tr>
<tr>
<td>Friesz</td>
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<tr>
<td>Gore</td>
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<tr>
<td>Grant</td>
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<tr>
<td>Hall</td>
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<tr>
<td>Hitchens</td>
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<td>Ingres</td>
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<table>
<thead>
<tr>
<th>Artist name</th>
<th>No. of items</th>
<th>No. of purchase prices</th>
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<tr>
<td>Knight</td>
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</tr>
<tr>
<td>Lhote</td>
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</tr>
<tr>
<td>Lurcat</td>
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<tr>
<td>Malkine</td>
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<tr>
<td>Marchand</td>
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<td>1</td>
</tr>
<tr>
<td>Matisse</td>
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<td>1</td>
</tr>
<tr>
<td>Modigliani</td>
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<td>2</td>
</tr>
<tr>
<td>Moore</td>
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<td>Picasso</td>
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<tr>
<td>Pitchforth</td>
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<td>Roberts</td>
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<td>Seurat</td>
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<tr>
<td>Unknown / N.A.</td>
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**TOTAL**             | **135**       | **73**                   |
Table 2. Comparison of annualized real returns in real GBP

This table shows the median and average annualized returns, $r$, in real British pound terms, between purchase and 1959 (Panel A) and between 1959 and 2013 (Panel B), for the Keynes collection as a whole and for different subsamples. More information on our data collection procedure can be found in Section III of this paper. Data on U.K. inflation come from Dimson, Marsh, and Staunton (2002, 2014).

**Panel A: Between purchase and 1959**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Median</th>
<th>EW average</th>
<th>VW average</th>
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<tbody>
<tr>
<td>All</td>
<td>73</td>
<td>5.1%</td>
<td>6.1%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Purchase at auction</td>
<td>21</td>
<td>8.6%</td>
<td>9.8%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Purchase through international dealership</td>
<td>11</td>
<td>8.8%</td>
<td>8.6%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Purchase at local gallery, dealer, or exhibition</td>
<td>29</td>
<td>4.7%</td>
<td>3.8%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Purchase through London Artists' Association</td>
<td>10</td>
<td>0.3%</td>
<td>0.8%</td>
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<tr>
<td>Social interactions with artist</td>
<td>38</td>
<td>3.3%</td>
<td>4.1%</td>
<td>4.4%</td>
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<tr>
<td>No social interactions with artist</td>
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<td>9.4%</td>
<td>8.6%</td>
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<tr>
<td>Above-median purchase price</td>
<td>36</td>
<td>6.6%</td>
<td>6.6%</td>
<td>6.8%</td>
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<tr>
<td>Below-median purchase price</td>
<td>37</td>
<td>4.0%</td>
<td>5.7%</td>
<td>3.3%</td>
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**Panel B: Between 1959 and 2013**

<table>
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<th>Median</th>
<th>EW average</th>
<th>VW average</th>
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<tr>
<td>All</td>
<td>73</td>
<td>2.2%</td>
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<tr>
<td>Purchase at auction</td>
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<td>1.7%</td>
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<td>2.3%</td>
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<tr>
<td>Purchase at local gallery, dealer, or exhibition</td>
<td>29</td>
<td>2.7%</td>
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<td>4.7%</td>
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<tr>
<td>Purchase through London Artists' Association</td>
<td>10</td>
<td>1.8%</td>
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<td>3.3%</td>
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<tr>
<td>Social interactions with artist</td>
<td>38</td>
<td>2.6%</td>
<td>3.2%</td>
<td>1.1%</td>
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<tr>
<td>No social interactions with artist</td>
<td>35</td>
<td>2.1%</td>
<td>2.3%</td>
<td>2.9%</td>
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<td>2.7%</td>
<td>3.0%</td>
<td>2.9%</td>
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<tr>
<td>Below-median purchase price</td>
<td>37</td>
<td>1.8%</td>
<td>2.6%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>
Figure 1. Cover of 1983 exhibition catalogue

This figure shows the cover of the catalogue (Scrase and Croft (1983)) accompanying the Fitzwilliam Museum exhibition “Maynard Keynes: Collector of Pictures, Books and Manuscripts”. The artwork on the cover, ‘The Keynes-Keynes’, is by Vanessa Bell.
Figure 2. Keynes’ annual art purchases and net assets in nominal GBP

The columns in this figure show the annual expenditures between 1917 and 1946 by John Maynard Keynes on his art collection, in nominal British pounds, against the left axis. The line shows Keynes’ lagged net asset position, in nominal British pounds, against the right axis. More information on our data collection procedure can be found in Section III of this paper. Data on Keynes’ assets come from his personal papers and from Moggridge (1982).
Figure 3. The value of the Keynes collection over time in nominal GBP

This figure shows the total expenditures by John Maynard Keynes on his art collection over the 1917–1946 time period, and the estimated total value of the collection in 1959, 1981, 1988, and 2013, in nominal British pounds. It also shows for the same years the real value of the total expenditures, and the total value of investments mimicking Keynes’ art purchases in equities. More information on our data collection procedure can be found in Section III of this paper. Data on U.K. inflation and equities come from Dimson, Marsh, and Staunton (2002, 2014).
Figure 5. Histogram of annualized returns in real GBP

Panel A of this figure shows for the distribution of returns for the artworks in the Keynes collection, in real British pound terms, between purchase and 1959. The line shows the normal density fit. Panel B repeats the analysis for the period 1959–2013. More information on our data collection procedure can be found in Section III of this paper. Data on U.K. inflation comes from Dimson, Marsh, and Staunton (2002, 2014).

Panel A: Between purchase and 1959

Panel B: Between 1959 and 2013
Figure 5. Comparison of nominal returns on individual artworks with inflation

Panel A of this figure shows for each artwork in the Keynes collection the year-1959 value, against the horizontal axis, and the real (i.e., year-1959) value of the purchase price, against the vertical axis. Panel B repeats the analysis using year-1959 and year-2013 valuations. All values are in nominal British pounds. Observations to the right of the diagonal line have appreciated in real terms over the relevant period. More information on our data collection procedure can be found in Section III of this paper. Data on U.K. inflation come from Dimson, Marsh, and Staunton (2002, 2014).

Panel A: Between purchase and 1959

Panel B: Between 1959 and 2013
Figure 6. Disagreement between art valuers

Panel A of this figure shows the range of year-2013 valuations (black bars) and the mean valuation (white marker), across five independent art valuers, for 15 artworks in the Keynes collection that were selected according to their year-1988 value. Panel B shows the five valuations aggregated over the selected artworks (columns), together with the sum of the 15 highest valuations and the sum of the 15 lowest valuations (dotted lines). All values are in nominal British pounds. More information on our data collection procedure can be found in Section III of this paper.

Panel A: Range of valuations for selection of artworks

Panel B: Aggregate valuations
Figure 7. Rank-turnover plot for contemporary artists

This figure plots the log rank of turnover at auction against the log of the turnover at auction for the 500 best-selling contemporary artists, using sales data from Artprice (2014b). The line shows the power law fit. The slope coefficient equals –0.85 (with an R-squared of 0.99).
Figure 8. Value-weighted versus equally-weighted art market price index

This figure shows a value-weighted and an equally-weighted art price index for the period 1982–2007, in real U.S. dollar terms. Data on repeated transactions of artworks come from Lovo and Spaenjers (2014), which is a subset of the data compiled by Renneboog and Spaenjers (2013). We follow the arithmetic repeat-sales regression methods described by Shiller (1991).
Figure 9. Histogram of annualized real returns in the art market

This figure shows the distribution of annualized returns in the art market, for the period 1982–2007, in real U.S. dollar terms. Data on repeated transactions of artworks come from Lovo and Spaenjers (2014), which is a subset of the data compiled by Renneboog and Spaenjers (2013). The analysis is limited to the top decile of real purchase prices. The line shows the normal density fit. The skewness of the annualized return distribution equals 0.85.