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# Art as an Asset: Evidence from Keynes the Collector

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The risk-return characteristics of art as an asset have been previously studied through aggregate price indexes. By contrast, we examine the long-run buy-and-hold performance of an actual portfolio, namely, the collection of John Maynard Keynes. We find that its performance has substantially exceeded existing estimates of art market returns. Our analysis of the collection identifies general attributes of art portfolios crucial in explaining why investor returns can substantially diverge from market returns: transaction-specific risk, buyer heterogeneity, return skewness, and portfolio concentration. Furthermore, our findings highlight the limitations of art price indexes as a guide to asset allocation or performance benchmarking. (*JEL* B26, C43, G11, G12, G14, Z11)

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A significant portion of the assets of wealthy households is invested in art. Around the world, there are nearly 200,000 ultra-high-net-worth individuals with a net worth exceeding $30 million. These individuals on average allocate about 4% of their portfolio to art and other luxury collectibles (Knight Frank 2019). Given its dual nature as a consumption and an investment good, financial considerations are likely to be relevant for most collectors, even those who primarily buy art for personal pleasure. Prior studies constructing art price indexes from auction results have estimated an excess return that is positive but substantially less than the equity risk premium (e.g., Goetzmann 1993; Mei and Moses 2002; Renneboog and Spaenjers 2013; Korteweg, Kräussl, and Verwijmeren 2016). However, nobody ever invests in an art index or realizes its exact returns. This paper therefore assesses the risk-return characteristics of art by tracking a particular collection over time, not through an aggregate price index. We would like to study more art portfolios, but while there are aggregated data sets of auction prices, there is no equivalent data set of art portfolios and their constituents. The existence of such data is critically dependent on investors releasing records of time-dated transactions and valuations. Until such information is generally available, we fall back on a clinical study of a single art collector-investor.

Despite obvious limitations in the study of a single portfolio, we believe such a focus can illustrate certain key investment attributes likely to be representative of art portfolios in general. In addition, our approach to studying art as an asset has two important methodological advantages over relying on art market indexes. First, we can follow all artworks after the initial investment. One concern with transaction-based price indexes is that sale decisions and reservation prices can be endogenous to recent price appreciation (Goetzmann 1996; Korteweg, Kräussl, and Verwijmeren 2016; Lovo and Spaenjers 2018), as is also the case for other illiquid assets like real estate and venture capital (Cochrane 2005; Goetzmann and Peng 2006; Korteweg and Sorensen 2010, 2016). Indexes might suffer from longer-run survivorship bias as well, 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 selection bias in observed transaction prices (Korteweg, Kräussl, and Verwijmeren 2016). In this paper, we analyze the performance of an invested—not a hypothetical—art portfolio held for the long term. There is no relationship between the likelihood of observing a valuation and the prior return, and, consequently, an econometric model of sample selection is not needed.

Second, by considering the performance of a complete collection, we address the related problem of the different channels through which art can be

[1] It is not clear to what extent artists really disappear from the market. 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 should be unbiased (Lovo and Spaenjers 2018).

acquired. Traditional art price indexes are based solely on auction sales, even though private transactions through dealers and galleries make up about half of the art market's total turnover (McAndrew 2016). Furthermore, there can be a systematic difference between returns realized on purchases in the secondary (or resale) market relative to those in the primary market (when an artwork first comes up for sale, typically through a gallery or the artist's studio). Prices in the primary market do not necessarily reflect the marginal buyer's willingness to pay (Velthuis 2005).

The art portfolio that we study is that of the economist John Maynard Keynes (1883–1946). Keynes was an active investor in financial assets, as documented by Moggridge (1982), Fantacci, Marcuzzo, and Sanfilippo (2010), Chambers and Dimson (2013), Chambers, Dimson, and Foo (2015), Accominotti and Chambers (2016), and Chambers and Saleuddin (2019). Less well known is that he became an enthusiastic and avid collector of art, books, and manuscripts. Keynes purchased artworks through various channels between 1917 and 1945 and bequeathed his entire art collection to King's College, Cambridge, upon his death the following year. This collection consists of over a hundred pieces by both modern masters (e.g., Braque, Cezanne, Matisse) and friends and acquaintances of Keynes (e.g., Duncan Grant, Vanessa Bell). The collection has remained intact to the present day, with the pictures being hung at the College and at the Fitzwilliam Museum in Cambridge.

Importantly, Keynes was interested in art as an investment. He carefully and extensively documented his transactions and these records, held at the archives of King's College, are the main data sources employed in this study. The records contain a detailed list of all the pictures acquired by Keynes. For most of the works, we locate purchase prices and dates from original invoices and correspondence together with a few prices from alternative art historical sources. The archival records also contain multiple valuations and auction estimates postdating Keynes' death. We also procure expert appraisals of market value for the important works in the collection at the end of 2013 and in early 2019.[2]

We use our hand-collected data to compute the total expenditures by Keynes on his collection over the period 1917−1945, and to estimate overall valuations for the years 1946, 1959, 1981, 1988, 2000, 2013, and 2019. The collection appreciated strongly over time: while Keynes' total expenditures amounted to less than 13,000 British pounds, the collection had an estimated market value of more than 76 million pounds in early 2019. This translates

[2] The data set that we construct in this paper is almost unique. The only other research on returns realized from an actual art portfolio is Landes' (2000) study of the collection of Victor and Sally Ganz. The Ganz collection was selected with hindsight for research because of its extraordinary financial value at the time of resale (Vogel 1997). In contrast, the Keynes collection is less exposed to the criticism of ex post selection, because Keynes' claim to fame is unrelated to his activities as an art collector. A different perspective on the historical profitability of art investments is offered by David, Huemer, and Oosterlinck (2019), who study the transactions of a major dealer.

into a nominal internal rate of return (IRR) of 10.4% (6.1% in real terms). The year 2019 value of the art collection is only 16% lower than what it would have been if Keynes had instead invested his outlays in U.K. equities, reinvesting dividends (costlessly) back into the portfolio; the annualized underperformance relative to the equity market is just 0.2%. The collection performed especially well shortly after purchase, suggesting that Keynes was able to buy art at attractive prices. Yet, even over the last six decades the collection continued to appreciate at an annualized real rate of 4.8%. After procuring additional valuations for the collection's most important works in both 2013 and 2019, we conclude that our estimate of its performance is robust to averaging across idiosyncratic elements in the valuation of individual artworks.

Art price indexes constructed in earlier research typically show significant long-term underperformance compared to the equity market. In contrast, the Keynes collection appreciated at a rate rivaling that of equities. How is this possible? An in-depth analysis of the history of the Keynes collection highlights the role of four drivers of cross-sectional variation in portfolio returns. First, the combination of illiquidity and investor heterogeneity implies the existence of idiosyncratic transaction-specific risk—a time-independent random component in each purchase and sale price. We show that even appraisals—subjective estimates of *expected* transaction prices—exhibit substantial disparity between valuers.[3] Second, the presence of buyers with heterogeneous tastes (and information sets) in an illiquid market also implies systematic cross-sectional variation in acquisition patterns and prices and thus post-acquisition returns. Keynes appears to have recognized several profitable investment opportunities, especially at auction, but not every art buyer is equally sophisticated (or well connected). Third, there is positive skewness in the cross-section of artwork returns. An important element in the long-term growth of the value of the Keynes collection is the stellar performance of one item. Extreme idiosyncratic positive returns—or the absence thereof—will matter a whole lot for the total return of any art portfolio. Fourth, a conspicuous feature of the Keynes collection is its high concentration: the ten most expensive purchases represent 80% of his aggregate expenditure on art. Using unique data on other collections, we provide evidence that the concentration of the Keynes art collection is a characteristic shared with other art portfolios. Portfolio concentration amplifies the importance of idiosyncratic return components. Yet some investors may find concentrated investment portfolios attractive, especially in an asset market where individual returns are positively skewed.

[3] Although the average predictive power of preauction price estimates has been studied previously (e.g., Louargand and McDaniel 1991; Bauwens and Ginsburgh 2000; Ashenfelter and Graddy 2003), nobody has hitherto looked at differences of opinion across experts for the same artworks.

At the same time, our results yield insights on the limitations of art price indexes as both a guide to asset allocation and a performance benchmarking tool. In contrast to financial asset indexes, art indexes are not investable and no implementable strategy can replicate index returns. Transaction-based indexes are typically based on auction prices only, weigh each transaction equally, and measure geometric average price trends. As a result, they will not accurately capture the investment experience of most art buyers. The noise in transaction prices, positive skewness in returns (combined with long holding periods), and concentration of art collections amplify the problem.

Our paper is similar in spirit to some recent studies that focus on individual investors in other asset markets. Temin and Voth (2004) look at the trading behavior of a single investor in the South Sea Bubble in 1720, showing how historical evidence can shed light on competing theories of stock market bubbles. Robinson and Sensoy (2016) explore the private equity investments of a large institutional limited partner in order to learn more about the liquidity properties of private equity cash flows. Chambers, Spaenjers, and Steiner (2019) use micro-level data on historical property investments of four Oxbridge colleges to assess the long-run performance of real estate. Chambers, Dimson, and Foo (2015) evaluate Keynes' strategy as a stock market investor, spotlighting the challenges for investors who wish to replicate the approaches of leading Ivy League endowments. Frazzini, Kabiller, and Pedersen (2018) analyze the determinants of Warren Buffett's stock market success and connect to a debate on the "implementability" of academic factors. Finally, Dimson, Karakaş, and Li (2015) study the performance of the only investor for whom point-in-time records of their strategy over a long period as a responsible investor exist. These papers illustrate the value of examining a single portfolio when limitations arise with index data.

## 1. Keynes, the Collector

Keynes unquestionably built up a very fine collection over his life. Following his death and that of his wife Lydia the artworks passed to Cambridge University's King's College, with the major items housed at the Fitzwilliam Museum in Cambridge. As with 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 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 revealed his early interest in fine art. In a 1905 paper entitled "A Theory of Beauty," the 22-year old wrote: "A fit object is one the contemplation of which *ought* to give rise to a state of mind which is good" (Skidelsky 2005). In the same year, while in Paris, Keynes visited the Louvre five times, as well as the modern collections at the Palais du Luxembourg (Dostaler 2007). His first small art purchases

followed quickly; Scrase and Croft (1983) write that these acquisitions were "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 continued his self-education in the visual arts, and in 1911 became a member of the Contemporary Arts Society (Scrase and Croft 1983), for which he would later act as a buyer.

Keynes also had a prominent role in the Bloomsbury Group whereby he maintained a close association with the British painters Duncan Grant and Vanessa Bell, among others, as well as Roger Fry, the influential art critic and inventor of the term "Postimpressionism." These three friends gave 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 Postimpressionist artworks at knockdown prices for the British Treasury, while also buying some for his personal collection (Munro 2003). Keynes made his first major purchases, namely, a Cezanne and a Delacroix, at the sale. For his Bloomsbury friends, Cezanne's *Apples* soon became an "object of pilgrimage" (Dostaler 2007). In the following 6 years, he made significant additional acquisitions of paintings by Matisse, Seurat (a study for *La Grande Jatte*), Renoir, and Cezanne and drawings by Degas, Modigliani, and Picasso. In many cases, his artist friends again seem to have played a key role by "inducing" him to buy (Shone and Grant 1975). Nonetheless, they were not always impressed by his personal tastes, and Keynes "attempted to speak and pronounce upon painting on occasion with an authority that was ill-founded" (Shone and Grant 1975). Clive Bell "found his judgment of painters and works of art lamentable," and when Keynes bought a painting on his own initiative in 1924, his friends remarked that it was "the worst picture that Cezanne ever painted" (Skidelsky 2005).

His second wave of major acquisitions followed in the years 1935 and 1937, when Keynes purchased works by Renoir, Picasso, Braque, and Cezanne. Some were bought at the auction houses Sotheby's and Christie's, whereas others were purchased through art dealers, such as Agnew, Wildenstein, and Reid & Lefevre. The Cezanne picture *L'Enlèvement*, bought in 1935 for £3,500, was the most expensive acquisition Keynes ever made, equivalent to about 25% of the aggregate lifetime cost of his art purchases. Either side of this later period, Keynes did not make major foreign acquisitions. During the second half of the 1920s and the early 1930s, Keynes concentrated on becoming a patron of British art 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 bought 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 limited 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 2005). 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 there being no evidence of a sale taking place, his correspondence shows that he considered selling certain artworks, so he definitely had a sense of his reservation prices.

## 2. 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. This includes how we obtained multiple valuations (at the same valuation date) for selected works in the collection.

### 2.1 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. 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, and items by Impressionist and Postimpressionist artists, such as Braque, Cezanne, Degas, and Picasso.[4] Table 1 also shows whether the artist was included in the first edition of Helen Gardner's influential art history textbook *Art Through the Ages*, published in 1926, and in the second, revised edition, published 10 years later. By then it had become clear that many of the Continental European artists bought by Keynes were destined to remain internationally renowned.

[4] The Courbet painting 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."

**Table 1**
**Artists in the Keynes collection**

| Artist | No. of items | No. of prices | Referenced 1926 | Referenced 1936 |
|---|---|---|---|---|
| Atkin | 2 | 0 | — | — |
| Baynes | 2 | 0 | — | — |
| Bell | 6 | 2 | — | — |
| Braque | 2 | 2 | — | Yes |
| Brzeska | 1 | 0 | — | — |
| Bussy | 1 | 1 | — | — |
| Calligan | 3 | 0 | — | — |
| Cezanne | 4 | 4 | Yes | Yes |
| Courbet | 1 | 1 | Yes | Yes |
| Coxon | 3 | 2 | — | — |
| Daumier | 2 | 0 | Yes | Yes |
| Davidson | 1 | 1 | — | — |
| Degas | 4 | 4 | — | Yes |
| Delacroix | 3 | 3 | Yes | Yes |
| Derain | 3 | 2 | — | Yes |
| Dobson | 1 | 1 | — | Yes |
| Friesz | 1 | 1 | — | Yes |
| Fry | 2 | 2 | — | Yes |
| Gore | 2 | 2 | — | — |
| Grant | 27 | 8 | — | — |
| Hall | 1 | 0 | — | — |
| Hitchens | 3 | 1 | — | — |
| Ingres | 1 | 1 | Yes | Yes |
| Knight | 1 | 1 | — | — |
| Lhote | 1 | 1 | — | — |
| Lurcat | 1 | 1 | — | — |
| Malkine | 1 | 0 | — | — |
| Marchand | 1 | 1 | — | — |
| Matisse | 1 | 1 | Yes | Yes |
| Modigliani | 2 | 2 | — | Yes |
| Moore | 3 | 0 | — | — |
| Picasso | 4 | 3 | Yes | Yes |
| Pitchforth | 2 | 1 | — | — |
| Porter | 4 | 1 | — | — |
| Renoir | 2 | 2 | Yes | Yes |
| Roberts | 14 | 13 | — | — |
| Seurat | 1 | 1 | — | Yes |
| Sickert | 4 | 3 | — | — |
| Signac | 1 | 1 | — | Yes |
| Smith | 1 | 0 | — | — |
| Swanwick | 1 | 0 | — | — |
| Taylor | 1 | 0 | — | — |
| Wiertz | 1 | 0 | — | — |
| Woolfe | 1 | 0 | — | — |
| Unknown/NA | 11 | 3 | — | — |
| Total artists | 45 | 32 | 8 | 17 |
| Total items | 135 | 73 | 18 | 35 |

This table reports on the composition of the art collection bequeathed by John Maynard Keynes upon his death in 1946. It shows the number of items acquired by Keynes and the number of purchase prices recorded for each artist. The final columns indicate whether the artist was referenced in the art history textbook *Art Through the Ages* by Gardner (1926, 1936).

In 1983, the Fitzwilliam Museum organized the exhibition *Maynard Keynes: Collector of Pictures, Books and Manuscripts* displaying 85 of the 135 works in the Keynes collection. The exhibition catalog (Scrase and Croft 1983) provides detailed background information on each of these works.

They are the major items—in terms of both artistic significance and monetary value—in the collection.

### 2.2 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 is the invoices, correspondence, and other documents in *The Papers of John Maynard Keynes* at the King's College Archive, Cambridge (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 catalogs 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 the archived invoice fails to mention the artist or title of the work. In addition, the prices paid for his seven personal purchases at the Degas sales in March and April 1918 are recorded in catalogs filed in his personal papers. One price match was made through the accounts book of the London Artists' Association found in his personal papers. Three matches were estimated through Reid & Lefevre's (1935) catalog accompanying an exhibition of William Roberts' work, for which we use the exhibition price of the works acquired by Keynes to liquidate the artist's debt (Roberts 1990). Finally, David Scrase (2013) recalled that the cubist still life by Georges Braque was bought by Duncan Grant in a bookshop in Berlin in the early 1920s for 30 shillings, a purchase confirmed by Shone and Grant (1975) who do not record the price. In total, we are able to identify purchase prices for 73 of the 135 works.[5]

Table 1 reports the number of purchase prices that we find for each artist. Many of the items for which we do not have a price are by artists in Keynes' social circle. There are, for example, 19 works by Duncan Grant and 4 by Vanessa Bell without any documentation on their purchase; Scrase and Croft (1983) state that at least a handful of these items were gifts. 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 items for which we have purchase prices accounted for more than 95% of the probate valuation of the collection in 1946 (cf. infra), and include all 23 works that were on view at the Fitzwilliam Museum shortly

[5] We make two comments on the determination of purchase prices. First, five of Keynes' purchases were made 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.

after Keynes' death. Furthermore, we have no reason to suppose that the availability of transaction information in Keynes' correspondence might be correlated with subsequent price appreciation, a fact that mitigates concerns about selection bias in our return estimates.

Table 2 shows the annual time series of his expenditures between 1917 and his last known purchase in 1945 and also lists the most expensive purchase in each year. Consistent with the description of the evolution of the Keynes' collection, the table 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 French edition of *The Economic Consequences of the Peace*. Skidelsky (2005) 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.

### 3.3 Valuations subsequent to Keynes' death

After Keynes died in 1946, Percy Moore Turner undertook a detailed probate valuation. This document, provided to us by Professor Simon Keynes, grandnephew of John Maynard, includes valuations for 112 of the 135 artworks in the collection. Following his death, large parts of the collection were valued multiple times. The reputable London art dealer Agnew & Sons (1959) valued 105 items in the collection for insurance purposes, and subsequently Agnew & Sons (1981) carried out a near-complete valuation, covering 131 of the 135 artworks. An insurance valuation under the Government Indemnity Scheme (1988) covered the works lent by King's College to the Fitzwilliam Museum. The auction house Sotheby's (2000) carried out a new valuation for insurance purposes of 44 works, to which we were given access by King's College and the Fitzwilliam Museum.

We commissioned a first open-market valuation from the art advisory and valuation firm Gurr Johns at the end of 2013, and a second even more comprehensive one in early 2019. This resulted in valuation estimates for 27 important works in 2013 and 39 works in 2019. In addition, for the 15 works with the highest 1988 insurance valuations, representing more than 90% of the total estimated value in that year (cf. infra), we procured four more independent open market valuations from the art market research firm ArtTactic, the art advisory firm and valuer Dickinson, and the two leading auction houses Christie's and Sotheby's. We provided each of the valuers with a copy of the 1983 exhibition catalog, but we did not give them access to prior appraisals; nor did we inform them that we were seeking multiple estimates for the same pictures in 2013. In 2019, we asked one of these valuers and The Fine Art Group for an updated valuation of the same 15 works.

**Table 2**
**Keynes' annual art purchases**

| Year | No. of items | Cost (£) | Most expensive acquisition, its cost, and purchase channel |
|---|---|---|---|
| 1917 | 1 | 10.0 | Duncan Grant, *The Kitchen*, £10, Omega Workshops |
| 1918 | 2 | 448.7 | Cezanne, *Still Life with Apples*, £370.5, first Degas sale |
| 1919 | Keynes publishes *The Economic Consequences of the Peace* | | |
| 1919 | 12 | 776.3 | Seurat, *Study for La Grande Jatte*, £400, Chelsea Book Club |
| 1920 | 6 | 510.1 | Renoir, *A Young Boy*, £285.9, Galerie Vildrac |
| 1921 | 0 | — | |
| 1922 | 4 | 253.3 | Sickert, *The Bar Parlour*, £125, London Group |
| 1923 | 0 | — | |
| 1924 | Keynes becomes First Bursar of King's College, Cambridge | | |
| 1924 | 5 | 846.6 | Cezanne, *Uncle Dominique*, £600, Goupil Gallery |
| 1925 | Keynes marries Lydia Lopokova | | |
| 1925 | 0 | — | |
| 1926 | 2 | 11.6 | Dobson, *Nude Back View*, £8.4, London Artists' Association |
| 1927 | 3 | 84.0 | Duncan Grant, *Still Life, Flower and Jug*, £63, London Artists' Association |
| 1928 | 4 | 170.4 | William Roberts, *Labourers*, £100, London Artists' Association |
| 1929 | 0 | — | |
| 1930 | 2 | 42.0 | Raymond Coxon, *Village Street*, £31.5, London Artists' Association |
| 1931 | 8 | 46.6 | William Roberts, *Boy Wearing a Sun-Hat*, £15.8, London Artists' Association |
| 1932 | 2 | 55.3 | William Roberts, *Lord and Lady Keynes*, £50, commissioned |
| 1933 | 0 | — | |
| 1934 | 3 | 282.5 | Vanessa Bell, *Interior with Figures*, £157.5, Reid & Lefevre |
| 1935 | 5 | 4,003.6 | Cezanne, *L'Enlèvement*, £3,500, Reid & Lefevre |
| 1936 | Keynes publishes *The General Theory of Employment, Interest and Money* | | |
| 1936 | 1 | 22.0 | Lurcat, *Still Life, Flowers in Vase with Sea in Background*, £22, Reid & Lefevre |
| 1937 | 8 | 4,953.7 | Cezanne, *Undergrowth*, £3,000, Wildenstein |
| 1938 | 3 | 157.5 | Three works by William Roberts, £52.5 each, Reid & Lefevre |
| 1939 | 0 | — | |
| 1940 | 0 | — | |
| 1941 | 0 | — | |
| 1942 | 0 | — | |
| 1943 | 1 | 78.8 | Spencer Gore, *The Toilet*, £78.8, Redfern Gallery |
| 1944 | 0 | — | |
| 1945 | 1 | 94.5 | Duncan Grant, *Cattle in a Shed*, £94.5, Ernest Brown & Phillips |
| 1946 | Keynes dies at the age of 62 | | |

This table shows the number of purchases (for which we have price data) by John Maynard Keynes between 1917 and 1945. It also shows Keynes' expenditures, in nominal British pounds, and his most expensive acquisition for each year. Finally, the table shows some key events in Keynes' life.

## 3. Long-Term Investment Performance of the Keynes Collection

Starting with the 73 works for which we have purchase prices, we compute Keynes' aggregate nominal expenditure over the period 1917–1945—the "book value" of the collection. We also estimate the aggregate year 1946, year 1959, year 1981, year 1988, year 2000, year 2013, and year 2019 valuations for the same set of works. For 2013 and 2019, our primary data sources are the valuations prepared by Gurr Johns. For a number of artworks, typically those of lesser value, where we do not have valuations for every time period, we impute valuations. The appendix provides details on this procedure.

**Table 3**
**Valuations and investment performance of the Keynes collection**

| Year | Valuation | Value (£'000) | % obs. directly | Inflated BV (£'000) | Nominal IRR (%) | Real IRR (%) |
|---|---|---|---|---|---|---|
| 1917–1945 | BV | 13 | 100.0 | | | |
| 1946 | PV | 31 | 95.9 | 16 | 6.2 | 5.1 |
| 1959 | IV | 382 | 99.4 | 28 | 12.2 | 9.8 |
| 1981 | IV | 4,002 | 100.0 | 160 | 11.8 | 6.8 |
| 1988 | IV | 11,312 | 95.8 | 215 | 12.3 | 7.3 |
| 2000 | IV | 41,194 | 97.0 | 311 | 12.1 | 7.4 |
| 2013 | OMV | 71,486 | 97.6 | 423 | 10.9 | 6.5 |
| 2019 | OMV | 76,241 | 99.7 | 455 | 10.4 | 6.1 |

This table shows Keynes' expenditures over the 1917–1945 period (the book value, BV, of the art collection); the 1946 probate valuation (PV); estimates based on insurance valuations (IV); and the open market valuations (OMV) of 2013 and 2019. "% obs. directly" is the proportion of the valuation based on explicit price estimates for individual works. "Inflated BV" refers to the book value uplifted by movements in U.K. inflation from the date of purchase onward. The last two columns report the nominal and real IRR measured from initial purchase.

Table 3 shows the resultant evolution of the value of the Keynes collection. Based on his known expenditures, Keynes invested a total of £12,847 in his art portfolio. The collection subsequently grew in value to an estimated open market value by the beginning of 2019 of £76.2 million. The long-term returns from the Keynes collection are substantial. The collection performed especially well shortly after purchase—with an inflation-adjusted IRR of 9.8% between purchase and 1959—suggesting that Keynes was able to buy art at attractive prices. Over the last six decades, the collection continued to appreciate at an annualized real rate of 4.8%. The IRR between acquisition and the start of 2019 is 6.1% in real terms (10.4% in nominal terms). If Keynes' artworks had merely kept pace with inflation, his collection would have been worth less than £0.5 million at the beginning of 2019.

Table 3 also makes clear that the items for which we directly observe valuations—and thus do not rely on imputed numbers—account for more than 95% of the total estimated value of the collection at all valuation moments, and for 99.7% at the end of the data set. The valuation of the collection, especially from inception to final valuation, is therefore robust to alternative methods for dealing with missing values.

Table 4 documents the relative performance of the collection over time with respect to three benchmarks. We estimate the total portfolio value that would have accumulated if, instead of buying his artworks, Keynes had invested in U.K. equities. Following Kaplan and Schoar (2005), we compute for each year the public market equivalent (PME) ratio of the value of Keynes' art investments to the value of the equivalent investment in the equity market index of Dimson, Marsh, and Staunton (2002, 2019). We assume the investment in the equity index mimics the timing and magnitude of Keynes' actual art expenditures. If Keynes had put his funds into common stocks, the value of his investments by the beginning of 2019 would have been £90.2 million instead of £76.2 million from artworks, which implies a PME of

**Table 4**
**Relative performance measurement**

| | Performance vs. equities | | Performance vs. bonds | | Performance vs. art index | |
|---|---|---|---|---|---|---|
| Year | PME | Alpha (%) | PME | Alpha (%) | PME | Alpha (%) |
| 1946 | 0.96 | –0.2 | 1.02 | 0.1 | 1.69 | 4.2 |
| 1959 | 2.43 | 3.2 | 13.17 | 8.5 | 7.17 | 8.0 |
| 1981 | 2.11 | 1.6 | 41.48 | 7.4 | 3.42 | 2.9 |
| 1988 | 1.48 | 0.7 | 37.91 | 6.5 | 3.27 | 2.4 |
| 2000 | 1.04 | 0.1 | 35.25 | 5.3 | 7.55 | 3.3 |
| 2013 | 0.96 | –0.1 | 30.88 | 4.3 | 8.14 | 2.9 |
| 2019 | 0.84 | –0.2 | 22.36 | 3.7 | 9.17 | 2.8 |

This table presents public market equivalents (PME) of the Keynes collection. Following Kaplan and Schoar (2005), PME is defined as the ratio of the value of the art collection to the value of an investment in an index, where the timing and magnitude of the index investments match the timing and magnitude of Keynes' expenditures. Performance is first evaluated relative to U.K. equity and bond indexes of Dimson, Marsh, and Staunton (2019), and then relative to the updated art index of Goetzmann, Renneboog, and Spaenjers (2011). For each benchmark, the table reports the PME and alpha (the constant to be added to the benchmark return to make the PME equal to one).

0.84. By how much has the Keynes collection underperformed on an annual basis? The alpha—sometimes called the "excess IRR"—is the constant to be added to the benchmark return to make the PME equal to one (Phalippou and Gottschalg 2009).[6] At the foot of the third column, we see that the annualized alpha of the Keynes collection, measured relative to the equity index, is -0.2% per year. The next two columns of Table 4 compare the investment returns from the Keynes collection with another alternative strategy that was investable, namely, U.K. government bonds, again using data from Dimson, Marsh, and Staunton (2019). Keynes' art investments did strikingly better than this benchmark. We can see that the Keynes collection has grown to a value more than 20 times as large as if the commitment had been to bonds (an alpha of 3.7% per year). Finally, we compare the performance of the Keynes collection to a measure of the overall art market. We use the index developed by Goetzmann, Renneboog, and Spaenjers (2011) updated using the U.K. art index of Artprice.com (2019). Of course, this index is not investable; the goal is to understand how differently the Keynes collection performed as compared to (an imperfect proxy for) the overall art market. By early 2019, the Keynes collection had appreciated to a value that was 9.17 times as large as if the investments had been made in the constituents of the art index (an alpha of 2.8% per year).

Figure 1 graphically illustrates our findings. Panel A plots Keynes' total expenditures, the valuations of the collections at different points in time between 1946 and 2019, and the (counterfactual) values of investments in the equity, bond, and art indexes used to compute the PMEs in Table 4. The

[6] This measure of performance can be interpreted as a traditional asset-pricing alpha if we assume that portfolio returns are generated by the capital asset pricing model with the benchmark representing the market, with a beta of one, and a constant alpha (Phalippou and Gottschalg 2009). Korteweg and Nagel (2016) and Sorensen and Jagannathan (2015) discuss methodological issues in using the PME criterion.

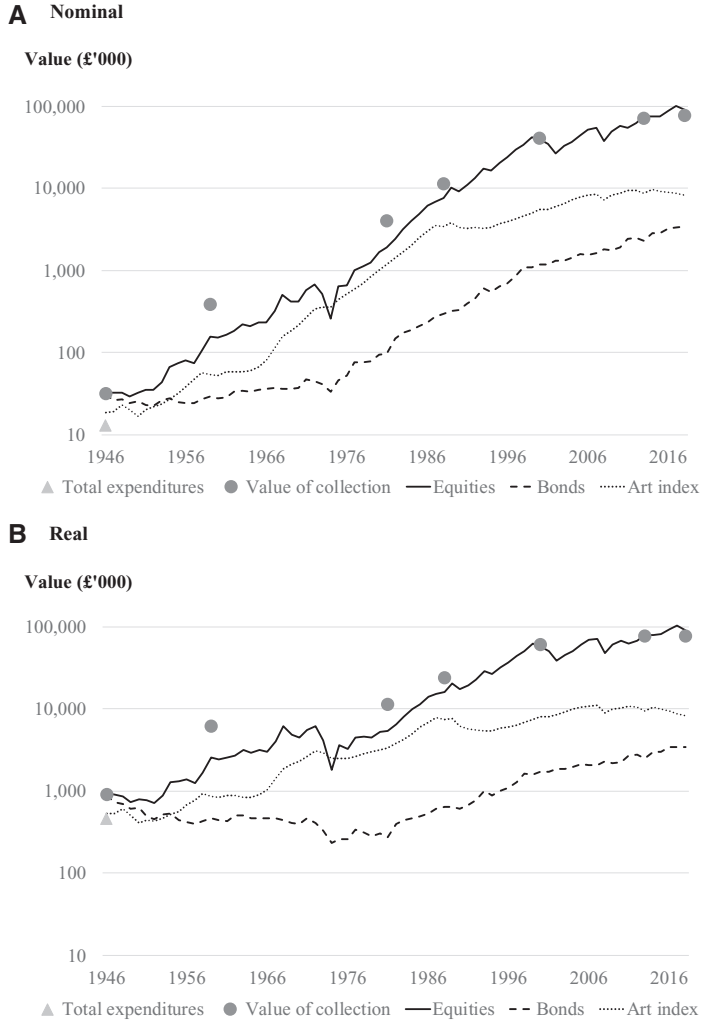


**Figure 1**
**Long-term performance of the Keynes collection**
Panel A compares the value of Keynes' expenditures and the different valuations of the collection to the value of investments in different indexes, where the timing and magnitude of the index investments match the timing and magnitude of Keynes' expenditures. The benchmarks are the equity and bond indexes of Dimson, Marsh, and Staunton (2019) and the updated art index of Goetzmann, Renneboog, and Spaenjers (2011). All values are in nominal British pounds. Panel B repeats the exercise but adjusts for U.K. inflation, so that values are expressed in real (early 2019) British pounds.

1959, 1981, and 1988 valuations comfortably exceed the equity market benchmark (consistent with the PMEs relative to equities exceeding one in the first column of Table 4). Even the 1946 probate valuation, which may have been underestimated in order to alleviate estate taxes, was close to the value of the hypothetical equity investment—and very substantially above

the value of the hypothetical art index investment. Only over the last 20 years has the benchmark equity portfolio caught up with the value of the Keynes collection. In panel B, we repeat the exercise but express all values in real (early 2019) British pounds. Of course, the conclusions are unchanged.

For the art collection to have performed far better over the period than government bonds, and to have nearly matched the total return on equities, is an extraordinary outcome. The impressive long-term return of the Keynes art portfolio is a sum-of-the-parts estimate, an aggregate of the values attributed to each picture. The estimate incorporates no premium for the fact that it is an important collection both culturally and historically. The relatively high returns are explained not by the reputation of Keynes, but by the acuity (or in retrospect, good luck) of his purchases. His performance was certainly above the level of an art index, and his experience illustrates how actual portfolios can deliver outcomes that are very different from a benchmark.

## 4. Art as an Asset

We argue that at least four factors can lead to the considerable divergence of art portfolio returns from art market returns, both on the upside and the downside: transaction-specific risk, systematic variation in returns between buyers and purchase channels, positive artwork return skewness, and portfolio concentration. We illustrate each of these below in reference to the Keynes collection.

### 4.1 Transaction-specific risk

The most characteristic features of the art market are, first, its illiquidity and, second, the heterogeneity in valuations among potential buyers, which is related to each artwork's relative uniqueness. The price at which an artwork can be bought or sold therefore may be critically dependent on the time and place of the transaction. This has important implications for art buyers. One is that every acquisition is associated with idiosyncratic—and thus potentially diversifiable—transaction-specific risk. Just like real estate prices (e.g., Case and Shiller 1987; Giacoletti 2019; Sagi 2019), art purchase and sale prices will contain a transaction-specific random component that depends on transitory changes in market liquidity and the valuations of the population of buyers and sellers (Lovo and Spaenjers 2018).

In our empirical setting, we can neatly illustrate the existence of transaction-specific risk by exploiting the difference between appraisals which are subjective estimates of *expected* transaction prices and *actual* transaction prices. Appraisals should be less exposed to the randomness that characterizes actual transaction prices in the art market. Panel A of Figure 2 shows for each of the 73 artworks bought by Keynes the 1946 inflation-adjusted value of the purchase price on the horizontal axis and

the 1946 valuation on the vertical axis. The least expensive purchases—in real terms—are located near the left of the scatterplot, and the most expensive are near the right. The least valuable items in 1946 are located toward the bottom of the chart, and the most valuable are near the top. Observations above the diagonal line represent artworks for which the probate valuation in 1946 was above the inflation-adjusted purchase price, and vice versa. Panel B repeats the same exercise post-1946. For both panels, artworks with large percentage returns plot well above the diagonal line.

Comparing these two scatterplots, there is much more variation in estimated returns up to 1946 (panel A) than afterward (panel B), especially for low- and middle-priced purchases. This greater variation appears to be driven by the inclusion of actual transaction prices in panel A. Here is evidence that the initial purchases, all made in the period up to 1946, exposed Keynes to transaction-specific risk that is not present when we consider the post-1946 appraised values.

Complementary insights on transaction-specific risk can be gleaned from valuations made by different appraisers at the same time. As explained earlier, in 2013, we asked five experts to value the 15 pictures that were deemed to be the most important in the Keynes collection based on their historical valuation. The valuers worked to their normal (high) professional standards and carefully considered transactions in comparable items. As noted earlier, to estimate the value of the Keynes collection, the experts followed a sum-of-the-parts approach. The task for each of these practitioners therefore involved estimating a price for each item on the assumption that buyers and sellers could seek expert guidance. Ironically, the valuers could thus be considered as being engaged in their own Keynesian beauty contest and attempting to predict the consensus of other experts (Keynes 1936). One might therefore anticipate that the valuations would fall within a narrow band. That was not, however, the case.

Figure 3 shows the dispersion of the valuations for each of the artworks. We rank the works from least to most valuable according to the median of the five appraisals. The labels on the horizontal axis report each painting's median value in British pounds. On the vertical axis, we plot the range of valuations for each picture expressed as a percentage of this median. Each floating column depicts the highest and lowest of the five estimates; the dots indicate the middle appraisal, which by construction is always equal to 100% of the median. For two-thirds of the paintings, the spread-to-median ratio exceeds 100%.[7] In other words, the disagreement among these independent experts about the value of each artwork typically exceeds their consensus valuation.

[7] As a comparison, the spread between auction houses' low and high presale estimates typically does not exceed the low estimate (see, e.g., Aubry et al. 2019).

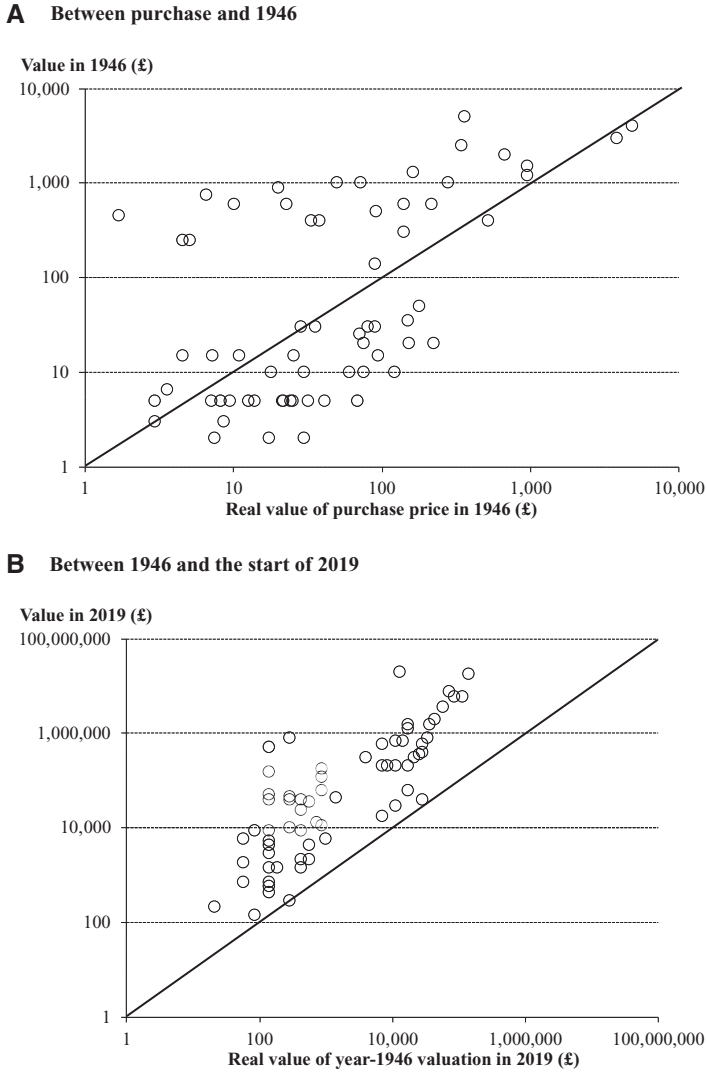


**Figure 2**
**Investment performance of individual artworks in the Keynes collection**
Panel A shows for each artwork in the Keynes collection the real (i.e., year 1946) value of the purchase price, against the horizontal axis, and the year 1946 value, against the vertical axis. Panel B repeats the analysis using year 1946 and the start of 2019 valuations. All values are expressed in British pounds. Observations above the diagonal line have appreciated in real terms over the relevant period. Data on U.K. inflation come from Dimson, Marsh, and Staunton (2019).

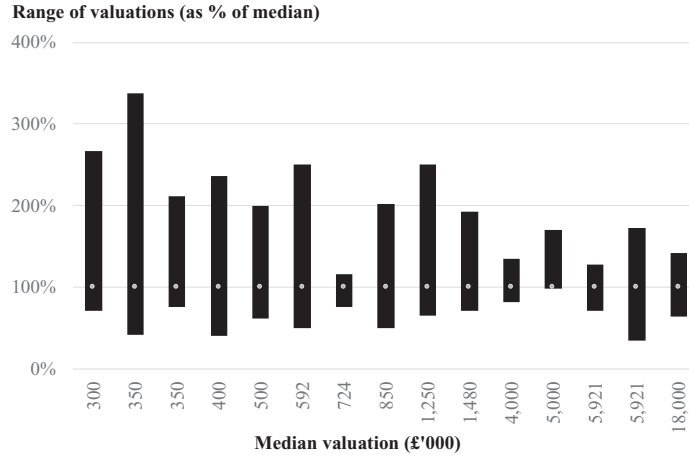


**Figure 3**
**Valuation spreads for selected artworks**
On the horizontal axis of this chart, we rank fifteen major artworks from least to most valuable. The ranking is based on the median for each picture of the valuers' year 2013 estimates. The labels on the horizontal axis report each median value in British pounds. On the vertical axis, we plot the valuations for each picture expressed as a percentage of this median. Each floating column depicts the highest and lowest of the five estimates.

It is thus not just that transaction prices carry a random component. Even estimates of *expected* market values for the same work of art, prepared by renowned experts, vary substantially across valuers. Taken in conjunction with the concentrated nature of the Keynes art portfolio (cf. infra) the lack of concordance in the appraisals of individual experts contributes to the case for focusing attention on—and doing multiple valuations of—big-ticket items.

Across experts, the rank order of valuations is not consistent. A person whose appraisal is below-average for one work may be above-average for another work. Consequently, the dispersion across experts in aggregate valuations of the entire collection is narrower than the dispersion for a typical painting. Consistent with this observation, we find that replacing the Gurr Johns valuations used earlier by the average valuations across the five (three) different valuers in 2013 (2019) for each picture does not materially change our estimate of the long-term performance of the collection. For example, the IRR between purchase and either 2013 or 2019 would be reduced, but only by a small margin (under 0.3% in both cases).

### 4.2 Systematic variation in acquisition prices between buyers

A second implication of the combination of illiquidity and valuation heterogeneity implies that some buyers may systematically pay different prices than others. Cross-sectional variation in investors' willingness-to-pay can generate systematic differences in acquisition patterns. In the auction model of Lovo and Spaenjers (2018), art buyers who derive great pleasure from

ownership—"collectors"—pay high prices and only sell when forced to do so, realizing relatively low returns. By contrast, buyers with low private use values act as "flippers," buying at low prices and reselling at a profit. Outside of the auction market, differences in bargaining power between different types of buyers may also play a role (Harding, Rosenthal, and Sirmans 2003). The variation in transaction prices that results from these influences is evidenced in a micro study by David, Huemer, and Oosterlinck (2019) of the complete books of a leading French gallery.

Relatedly, Lerner, Schoar, and Wang (2008) claim that illiquid asset markets can yield profitable speculation opportunities for informed investors. Keynes appears to have recognized several such opportunities. Keynes was well connected and often acted on the advice of informed artist friends. For example, Duncan Grant and Vanessa Bell convinced him to attend the Degas auction in Paris in 1918 and advised him to buy a Matisse and a Seurat in London in 1919, and Grant bought a Braque for him in Berlin in 1924. These acquisitions were among Keynes' best-performing art investments.

In general, there may be more scope for "arbitrage" at auction, where items can sell at a price substantially below expectations, than in the dealer market (for secondary art) and especially in the gallery market (for primary art), where prices are largely controlled by the intermediary. Like other buyers, Keynes acquired some art through auction houses, such as Christie's and Georges Petit, but he was equally active in the private secondary market through dealers, such as Goupil and Wildenstein, as well as smaller players. He also bought newly created works on the primary market, either at galleries or through the London Artists' Association. An interesting question therefore is whether Keynes' choice of purchase channel affects the cross-section of his individual artwork returns.

In Table 5, panel A, we compare the annualized real returns between purchase and 1946 according to the purchase channel; we then move to a regression setting in panel B.[8] In examining the importance of the purchase channel, we need to take account of two other factors driving systematic differences in returns. First, we study the impact of whether or not Keynes knew the artist personally.[9] Keynes' activity in organizations like the London

[8] Somewhat atypically, a few of the auction acquisitions are not secondary market purchases: at the sale of Degas' collection in Paris in 1919, Keynes also bought works by Degas himself. However, to focus on the sale mechanisms in the art market, we group these acquisitions alongside other auction purchases. A few commercial galleries were active on both the primary and the secondary markets. In cases in which the classification of nonauction purchases is not clear, we assume acquisitions to be secondary market transactions if the work was more than a few years old at the time of purchase or if we have evidence of a nongallery owner prior to Keynes' acquisition.

[9] We consider the following artists to be 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 cohosted 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.) Picasso and Derain were arguably much less close to Keynes than the others in the list above. However, classifying them outside of Keynes' social circle would magnify the return difference documented in panel A of Table 5.

**Table 5**
**Cross-sectional variation in performance**

*A. Comparison of annualized real returns (%)*

| | | From purchase to 1946 | | | From 1946 to 1959 | | |
|---|---|---|---|---|---|---|---|
| Subsample | N | Median | EW avg. | VW avg. | Median | EW avg. | VW avg. |
| All | 73 | –2.4 | –1.9 | –1.3 | 12.3 | 14.0 | 14.1 |
| Auction | 21 | 7.3 | 7.2 | 8.2 | 13.3 | 12.8 | 15.1 |
| Secondary market, ex. auction | 12 | 2.3 | 1.8 | –0.5 | 16.4 | 16.7 | 14.3 |
| Primary market | 40 | –5.9 | –7.8 | –12.1 | 11.9 | 13.8 | 10.1 |
| No social interactions with artist | 33 | 4.5 | 4.2 | 0.0 | 12.0 | 12.9 | 13.8 |
| Social interactions with artist | 40 | –4.8 | –7.0 | –9.9 | 12.8 | 14.9 | 17.2 |
| Artist not in year 1926 textbook | 58 | –4.5 | –4.9 | –7.5 | 12.2 | 13.2 | 13.9 |
| Artist in year 1926 textbook | 15 | 7.3 | 9.7 | 0.1 | 17.9 | 17.2 | 14.2 |

***B. Regression of annualized real returns on purchase channel and other variables***

| | From purchase to 1946 | | From 1946 to 1959 |
|---|---|---|---|
| Secondary market, ex. auction | –0.098 | –0.057 | 0.032 |
| | (0.060) | (0.068) | (0.031) |
| Primary market | –0.103*** | –0.108*** | 0.006 |
| | (0.037) | (0.034) | (0.038) |
| Social interactions with artist | –0.060 | –0.021 | 0.039 |
| | (0.043) | (0.046) | (0.025) |
| Artist in year 1926 textbook | 0.104* | 0.103 | 0.049 |
| | (0.061) | (0.068) | (0.033) |
| 5-year purchase period dummies? | No | Yes | No |
| N | 73 | 73 | 73 |
| $R^2$ | .25 | .66 | .08 |

Panel A shows the median, equally weighted (EW) average, and value-weighted (VW) average annualized return, in real British pounds, between purchase and 1946 and between 1946 and 1959, for the Keynes collection as a whole and for different subsamples. Panel B runs a set of ordinary least squares regressions explaining annualized real returns. Standard errors are clustered at the artist level. *$p < .1$; **$p < .05$; ***$p < .01$.

Artists' Association showcases the importance he attached to backing artists. In a 1940 letter included in his personal papers, Keynes commented on three purchases at 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." Skidelsky (2005) remarks that his personal purchases were often made "out of loyalty" to his friends. Second, we look at whether the reputation of the artist affected returns. We measure reputation by whether the artist was included in a well-regarded art history textbook (Gardner 1926, 1936) written during Keynes' career as a collector (see Table 1).

We look first at the left-hand side of Table 5. The results in panel A indicate that Keynes realized the highest initial returns on art bought at auction, and to a lesser extent on art bought through dealers. Most of this was art by (Post)impressionist artists from continental Europe, such as Braque, Cezanne, Degas, Picasso, Renoir, and Signac—as well as predecessors like Courbet and Delacroix—some of whom were already sufficiently recognized to be included in an art history textbook. Acquisitions in the primary market

and of works by lesser-known artists that were friends and acquaintances turned out to be much less profitable financially. Our regression results are reported in the left-hand side of panel B. We cluster standard errors on the level of the artist. The first column shows that estimated annualized real returns are strongly significantly lower for purchases in the primary market even when we control for Keynes' social connections and for the reputation of the artist. The second column shows that this result is robust to controlling for 5-year purchase period dummies that capture variation in the average price level in the art market at the time of acquisition.

The right-hand side of both panels in Table 5 repeats the analysis for the period 1946–1959. As expected, we see much less variation in returns, and the purchase channel no longer helps to explain the variation in price appreciation over this later period. Furthermore, the regression's R-squared is lower than before. These results when contrasted with those for the period from purchase to 1946 suggest that informed and attentive art investors can do well in the art market by identifying particularly attractive entry prices.

Our results highlight the systematic differences in investment returns that may exist between different (types of) art buyers. Of course, the typical art collector will derive substantial "emotional dividends" from ownership, and therefore be ready to pay purchase prices that can be expected to lead to relatively low capital gains upon resale on average (Goetzmann and Spiegel 1995; Mandel 2009; Dimson, Rousseau, and Spaenjers 2015; Lovo and Spaenjers 2018). The nonfinancial utility derived from art ownership can take different forms (Spaenjers, Goetzmann, and Mamonova 2015), and may even vary across purchase channels. For example, the typical auction participant may enjoy winning for winning's sake (Goeree and Offerman 2003)—to be the "top dog" of a group of peers (Shogren and Hayes 1997)—which could endogenously lower the average financial returns to purchases at auction.

### 4.3 Skewness in art returns

A close study of the Keynes collection illustrates the important role of positive outliers in driving overall portfolio performance. One item has a year 2019 valuation of £20 million, as compared to a purchase price of £1.50, and realized an annualized real return of 14.8%. Without this single work, the IRR on Keynes' art portfolio since purchase would be lower by 0.4%. We do not discern negative outliers of such magnitude. More generally, if we consider the annualized real returns between purchase and the start of 2019 on the items in the Keynes collection, we find a coefficient of skewness that is equal to 0.34.

The skewed return distribution of Keynes's individual artworks is consistent with prior evidence on art market indexes and individual artworks (Bocart and Hafner 2012; Worthington and Higgs 2014). Extreme

idiosyncratic returns matter a whole lot for total portfolio returns. The positive skewness in individual artwork returns together with the nondivisibility of artworks leads to larger portfolios displaying a higher median return because smaller portfolios suffer an increased probability of missing the winning lottery tickets. Moreover, the impact on lifetime dollar wealth creation of the best-performing item will drive overall portfolio concentration.

However, it also should be recognized that, in a world in which investors exhibit a preference for positively skewed returns (Mitton and Vorkink 2007; Schneider and Spalt 2016), 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 an additional reason for the low returns to art on average, in the same way that it might partially explain the low returns to private equity (Moskowitz and Vissing-Jørgensen 2002; Barberis and Huang 2008). A taste for long-shot investments may in particular influence the pricing and expected return from artworks that have a small chance of an unusually large payoff.

### 4.4 Concentration in the art market

Keynes' art portfolio has always been highly concentrated. The ten most expensive purchases accounted for 80% of his total investments. By early 2019, the ten most valuable items make up as much as 88% of the total value, with two works accounting for nearly half of the value of the entire collection. This implies that, today, changes in the total value of the Keynes collection are driven largely by changes in the market value of a few artists, such as Braque, Cezanne, Matisse, Picasso, and Seurat. Conversely, what happens to all the lesser-known artists is not such an important driver of returns.

In Table 6, we compare the Keynes artworks with several well-known collections, namely, those accumulated by Victor and Sally Ganz, the Detroit Institute of Arts, and the British Rail Pension Fund ("RailPen"). The Ganz estate was a private collection of 20th century art, including artists like Pablo Picasso and Jasper Johns; in 1997 the sale of 114 works raised $207 million, as compared to the original outlay of $764,000 (Landes 2000). The Detroit Institute of Art collection was valued by Christie's (2013) after the city found itself in financial difficulty; Christie's estimated the collection of 2,773 pieces of the then city-owned artwork to be worth between $454 million and $867 million, with one Bruegel the Elder estimated at $100–$200 million. British Rail decided in the 1974 financial crisis to buy art as an inflation hedge, acquiring 2,506 artworks for £41 million during 1974–1980; the final item was sold in 2003 and the collection achieved net proceeds of £170 million with an IRR of 11.3% (3.7% per year in real terms). A list of all works and their costs and realization values was shared with us by the Railways Pension Trustee Company Limited. For all these collections, fewer than 10% of all works account for over 75% of the total value.

**Table 6**
**Concentration of actual portfolios**

| % of portfolio value | Keynes | Ganz | Detroit | RailPen |
|---|---|---|---|---|
| 25 | 1 | 2 | 2 | 11 |
| 50 | 3 | 3 | 3 | 48 |
| 75 | 5 | 8 | 12 | 202 |
| 90 | 12 | 13 | 43 | 539 |
| 95 | 18 | 16 | 81 | 827 |
| 99 | 30 | < 35 | < 1,741 | 1,455 |
| 100 | 73 | 114 | 2,773 | 2,506 |

This table lists the number of artworks that cumulatively represent various proportions of the total value of Keynes collection in 2019; the Victor and Sally Ganz collection in 1997; the Detroit Institute of Art collection in 2013; and the British Rail Pension Fund in 2003. The data are respectively from this paper; Landes (2000); Christie's (2013) and Woodham (2013); and the Railways Pension Trustee Company Limited. The final row in each panel is the total number of artworks that comprise each collection.

Table 6 therefore corroborates the fact that the concentration of the Keynes art collection is a characteristic shared with other art portfolios. The indivisibility and illiquidity of these expensive works of course presents a challenge to any art owner wishing to rebalance, diversify, or partially or wholly liquidate an art collection. Art investments may thus be "granular" (Gabaix 2011), in the sense that most portfolios may have the same level of diversification as an equally weighted portfolio of only a small number of artists.[10]

Portfolio concentration amplifies the importance of idiosyncratic return components, such as transaction-specific risk and cross-sectional—and positively skewed—variation in artist-level price trends. Of course, some investors, in particular those that value social status, may choose to hold a more concentrated portfolio of idiosyncratic assets, in the hope of "getting ahead of the Joneses" (Roussanov 2010) or because one masterpiece generates more conspicuous consumption benefits than a diversified portfolio of minor artworks (Mandel 2009).

## 5. Implications for Art Price Indexes

Prior work on art as an investment has largely focused on constructing price indexes. By contrast, we have studied the characteristics of art through the lens of one particular collection. Our findings on the Keynes art collection yield insights that are relevant for users of art price indexes, which we discuss below under two broad headings. First, we summarize why *any* art index—even (a hypothetical) one that accurately represents the aggregate value movements of the asset class—is unlikely to ever adequately capture the investment experience of most buyers. Second, we discuss a number of problems related to the (lack of) investability, replicability, unbiasedness, and macroconsistency of existing art price indexes.

[10] This is similar to the manner in which a supposedly well-diversified market portfolio of 8,000 stocks may be equivalent in risk to an equally weighted portfolio of not more than 20 firms (Malevergne, Santa-Clara, and Sornette 2009).

While we focus on indexes for the art market, the implications go beyond this particular setting. Our study offers insights for users of financial market indexes covering a variety of asset classes and based on a diverse selection of computational methods. To put this in context, note that by 2019 the number of stock market indexes published by the major index providers was 3 million (Index Industry Association 2019). This proliferation was not just because of the growth of passive investment. Fuhr (2019) reported that, although there were aggregate assets in the ETF/ETP industry of $5.6 trillion, there were fewer than 8,000 listed ETFs and ETPs worldwide. The index explosion is largely attributable to active managers who wish to undertake investment research and measure relative-to-benchmark performance.

### 5.1 Price indexes versus investor experiences

We have seen that the investment performance of the Keynes collection has rivaled that of equities. But many other (unobservable) portfolios will have realized a substantially worse performance over the same time period. The interplay of concentrated portfolios and heavily idiosyncratic return elements implies that portfolios will exhibit much variation in performance around the returns of any benchmark. Our discussion in the previous section focused on drivers of cross-sectional variation in returns, but our analysis also touched on an implicit temporal dimension that is nonetheless important. While indexes aim to measure how a lump-sum investment would have grown over time, art buyers typically spread their transactions over time, meaning that IRRs—or "dollar-weighted returns"—can be very different depending on the timing of purchases and sales (Dichev 2007). Of course, this issue will be even more important for other private asset markets, such as venture capital and hedge funds, for which net investment exposure shows substantial cyclicality (Dichev and Yu 2011).

It is also relevant to point out that the positive skewness in returns will drive a wedge between market returns and the experience of the "median art investor," as a majority of investors can be expected to do worse than average. There are similarities in respect to skewness and its implications for investors and index users between the art market and public equity market. Recent research suggests that cross-sectional skewness in stock returns far exceeds that predicted by the standard lognormal model of returns (Oh and Wachter 2019). Such positive skewness in the cross-section of individual U.S. stock returns combined with the effects of compounding results in most stocks generating buy-and-hold returns below 1-month U.S. Treasury bills, while a few "home run" stocks are responsible for much of the wealth creation in the stock market historically (Bessembinder 2018). A relevant consideration in this context is that average holding periods in the art market tend to be much longer than in the equity market. While U.S. common stocks have a *maximum* holding period—for a hypothetical investor buying on the

first day of listing and holding until delisting—averaging 7 years (Bessembinder 2018), artworks are often held for decades. Therefore, we can expect a few long-horizon collectors to be extremely fortunate, even while most market participants underperform a comprehensive, value-weighted benchmark of the asset class.

In sum, even perfectly constructed art indexes would fail to capture most investor experiences and to fully illuminate the riskiness of art investments—and therefore be of limited value as a guide to asset allocation.

### 5.2 Investability, replicability, unbiasedness, and macroconsistency

The previous subsection highlighted how art portfolio returns will show substantial cross-sectional variation around *any* measure of art market returns. In this subsection, we argue that existing art price indexes are unlikely to provide a reliable and achievable measure of those same market returns.

Two primary approaches are used to alleviate the fact that art (and other infrequently traded assets) have limited pricing data: repeat-sales and hedonic indexes. Repeat-sales methods estimate aggregate market returns starting from purchase-and-resale price pairs. Items that sell only once (or not at all) within the time span of data collection are thus excluded, meaning that for most categories of artworks observations are sparse. Hedonic models assume that traded assets are defined by a set of characteristics (e.g., artist reputation, medium, size), each of which contributes to the value of the item. A regression model then estimates price movements in the market, controlling for time-series variation in traded artworks' characteristics. To serve its purpose—as a guide to investment strategies or a point of reference for evaluating performance—an index should be investible, but clearly none of these types of art index is.

Moreover, if an index is to be a useful tool for investors, it is desirable that its investment performance can be replicated. What we mean by replicability is that a portfolio that holds constituents in proportion to their weighting in the index should have an expected return (before costs) that is equal to that of the index. Crucially, art indexes are estimated as log prices and therefore measure the equally weighted geometric average of individual artwork returns (Shiller 1992; Goetzmann and Peng 2002). Of course, real-life portfolio returns are determined by value-weighted arithmetic average price changes. Moreover, the more concentrated the asset category—and we have seen that art portfolios indeed tend to be very concentrated—the larger the potential for a discrepancy between the returns as estimated by an equally weighted index and the returns to the market portfolio. Equally weighted indexes have the additional drawback that they are particularly hard to interpret in the context of indivisible assets. Also, note that no ex ante trading strategy can secure for an investor the auction prices that enter index estimation. Repeat-sales estimators suffer from an additional look-ahead bias: the

index value for any given period is estimated using the small (and potentially unrepresentative) fraction of items that (re)sell later (Korteweg, Kräussl, and Verwijmeren 2016). In short, no implementable strategy can replicate the returns on an art index.

The continuous rebalancing to equal weights implicit in the index estimation methods also opens up the possibility of inducing biases into the index returns whenever there is a source of zero-mean noise in pricing (Blume and Stambaugh 1983; Asparouhova, Bessembinder, and Kalcheva 2013). In the previous section, we have identified transaction-specific risk as exactly such a source. Investors in illiquid asset classes need to be cognisant of the dangers of relying on indexes that are rebalanced, even when the rebalancing is not made explicit. If the gains or losses on the index are biased, there will be a misleading impression of performance.

Finally, almost every index of collectibles fails the test of macroconsistency. A macroconsistent index has the property that, if all investors were to select it as their benchmark, then their aggregate holdings would reflect index constituent weightings. While some people may choose to underweight particular constituents, their decisions imply that other market participants must be overweight in those index constituents. Art indexes are typically not macroconsistent because, as noted above, equal weight is usually given to each item that is eligible for the index, and zero weight is by default given to ineligible items. One particular issue highlighted by our analysis of the Keynes collection is that indexes based solely on auction transactions may not accurately capture collectors' realized returns. This is especially pertinent to collectors of very recent art, where the primary market is most important.

These shortcomings are of course shared by indexes of other illiquid asset classes, such as real estate or private-market securities. Perhaps more surprisingly—if not for investment professionals, at least for the individual investor—is that even benchmarks and indexes for public financial markets often fail the criteria of investability and replicability (e.g., Dimson and Marsh 1984; Ritter 1996; Duffie and Stein 2015). Indeed, even when indexes are capitalization-weighted and based on traded securities, they are typically too narrow to be anywhere near macroconsistent (Singer and Terhaar 1997; Sharpe 2007).

## 6. Conclusion

We have examined the long-run investment performance of the art 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 realized by art collector-investors. Keynes' art portfolio outperformed the art market index and almost matched equity market returns.

Our analysis of the Keynes collection highlights a number of attributes of art portfolios—transaction-specific risk, buyer heterogeneity, return skewness, and portfolio concentration—that are crucial in explaining why individual investors' returns can diverge substantially from market returns. Our findings also have implications for the interpretation of art price indexes. Indexes surely increase our understanding of historical price movements and cycles in the art market. However, they suffer from problems related to their (lack of) investability, replicability, unbiasedness, and macroconsistency, and should therefore be employed with great care in asset allocation studies and performance measurement.

## Appendix. Imputation of Missing Values

If we observe both earlier and later valuations, we impute a value by using the median proportion of price appreciation between the two outer dates that is realized by the middle date. For example, among the works for which we have valuations in 1981, 1988 and 2000, a median of 37.5% of the 1981–2000 appreciation is realized by 1988, and we use this to impute a year 1988 value for cases in which we have a year 1981 and a year 2000 valuation. For one work, a change in attribution leads to a reduced valuation, and for that item we use geometric interpolation to impute its intervening value.

If we only have a later valuation, which is the case for a handful of works in 1946 and 1959, we use the observed median price ratio between the earlier and the later date to impute a value. If we only observe an earlier valuation, which is often the case in the later years, we update the last available valuation using inflation data from Dimson, Marsh, and Staunton (2019). We take this conservative approach, because items that are no longer valued may have underperformed the rest of the Keynes collection.

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