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Art Collectors as Venture Capitalists

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Abstract

Employing the art-collection records of Burton and Emily Hall Tremaine, we consider whether early-stage art investors can be understood as venture capitalists. Because the Tremaines bought artists' work very close to an artwork's creation, with 69% of works in our study purchased within one year of the year when they were made, their collecting practice can best be framed as venture-capital investment in art. The Tremaines also illustrate art collecting as social-impact investment, owing to their combined strategy of art sales and museum donations for which the collectors received a tax credit under US rules. Because the Tremaines' museum donations took place at a time that U.S. marginal tax rates from 70% to 91%, the near "donation parity" with markets, creating a parallel to ESG investment in the management of multiple forms of value.

Keywords: Art investment, venture capital, social impact, portfolio management, tax arbitrage

JEL Codes: G11, L31, D31, Z11

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I. Introduction

In measuring the returns on art investment, the focus of the literature has been primarily on understanding art as an asset class, that is, whether art is a good investment. These analyses, which are generally focused on secondary market auction sales, have largely employed methods of repeat sales (Anderson 1974; Baumol 1986; Goetzmann 1993; Mei and Moses 2002, 2005) and hedonic regression or hybrid methods (cf. Spaenjers et al. 2015; Korteweg et al. 2016). Instead of considering art as an asset class, we consider whether some art collectors can be understood as venture capitalists.

From an art collector's point of view, art investment is an exercise in portfolio management. The investment management of artworks both follows and creates exception to portfolio theory. In their reinterprentation of Markowitz's (1952) portfolio theory, Mao and Särndal (1966) modeled portfolio decisions as a set of probability determinations through which investors adjust expectations of future gains, using a Bayesian model of adjustments given prior information. With notable advances in decision analysis (Dyer and Smith 2021), art markets still present difficulties in applying these probabilistic models given significant idiosyncratic and private value to art as an asset (Goetzmann et al. 2021) and heterogeneity and volatility of returns (Burton and Jacobsen 1999), especially in the most expensive price brackets (Renneboog and Spaenjers 2013). Additional complexity arrises from the illiquidity of art as an asset (Ang et al. 2014), the differing motivations of collectors (Lovo and Spaenjers 2018), and the possibility of bubbles in art markets (Pénasse and Renneboog 2021).

In considering art asset management from the collector's point of view, two unique questions arise: The first question is whether we can understand art collectors as investors in early-stage entrepreneurial activity. The hallmark of such collectors is taking relatively great risk and making collecting decisions early in the artist's career. That these decisions are understood later to have been successful underscores this framing. The second question is whether art collectors, especially those whose tax domicile is the United States, have additional portfolio strategies made possible by the tax donation of artworks to U.S. nonprofit museums. This second question brings art market analysis into conversation with ESG (Environments, Social, and Governance) frameworks of measuring not only profit or investment return but also impact on larger systems of value (Whelan et al. 2021). The twin concerns for financial and environmental value in ESG investing run parallel to the paired consideration of the value of art—to the collector and to the larger society—and the financial return on art as an investment.

The role of museum donations in art investment strategy is not especially well studied, although larger questions of charitable donations of art and changes in tax policy have received attention (cf. Robson 2020; Clotfelter 1990). In the United States, collectors donating to art museums typically receive a tax benefit equal to the appraised value of the artwork multiplied by their personal tax rate. Collectors making optimization decisions in the 1970s, when the highest marginal tax rate was as high as 91%, would be able to include tax donation as part of their portfolio strategy, particularly in cases where the valuation of the work had a high degree of uncertainty or a high transaction cost, creating close *donation parity*, that is, positive portfolio strategy of donation relative to risks of sale.

The increasingly common fractionalization of art into securitized shares adds further complexity to this question of donation- and sales-related portfolio strategy. Companies such as Maecenas or Masterworks (Matley 2021) purchase whole artworks and then sell shares to the public. In addition, the resale royalties that are becoming increasingly common on blockchain-based platforms for non-fungible tokens (NFTs) create more options for fractionalization (van Haaften-Schick and Whitaker 2021), not based on the divisible collectible object but the artist's share in the artwork (Whitaker and Kräussl 2020). While access to fractional ownership can help collectors to diversify their portfolios, fractionalization also leads to the new possibility of many minority shareholders in works of art when it is sold or donated. In such cases, the strategy of museum donation has consequences to these shareholders.

If a work is donated to a museum, the minority shareholders could face the risk of *asset value truncation*. If the majority owner of the artwork decides to donate a work of art under U.S. tax law, then the value of the minority shares in the artwork is discounted to the owner's tax rate. We use here a simplified model of taxation in which museums, which generally operate as public rather than private charities (Rhodes 2003) are able to accept works of art with appraisal that meets the IRS standard. For example, if an artist owns 10% of a $1,000 work that is donated, the artist's $100 share is truncated to the artist's tax rate, e.g., 33% of $100 or $33.) In the case where a collector has purchased a work cheaply and then resells at a substantial profit—as in the case with early collectors such as thre Tremaines—there may also be cancellation of capital gains, which enhances the value of the donation (Clotfelter 1990).

This is a non-trivial risk, given the large number of works—sometimes 50% (Whitaker and Kräussl 2020)—in major collections that are donated to museums before reaching auction. This phenomenon is not well observed because it is not reflected within auction data. Museums' reliance on donations is longstanding; according to the founding director of the Museum of Modern Art, in the first decade of the museum's existence (1930-1940), the value of donated artworks was ten times the value of purchased works (Barr 1977). In the 1950s, the ratio of donated works to purchased works was still 2:1 (Robson 2019).

We consider the Tremaines' donations and sales of their collection as a novel case of investment management of an art collection, spanning tax donation versus sales revenue parity across different kinds of holdings, ranging from masterpieces to lesser know works that are difficult to value. Especially because institutional value—conferred by museums and critics—can influence commercial value—conferred by galleries and auction houses—(Velthuis 2005, p. 12), the donations and sales to museums may also have benefited the portfolio overall. The value of donations is two-fold: First, writing off works that did not go up in financial value by donating them for tax benefit and, second, securing the institutional imprimatur of the artworks and of the art collectors, with museum credentializing having an effect on the artworks' commercial value (Velthuis 2005, p. 18). One can think here of museums as analogous to ratings agencies of the art market, i.e., donating to a museum can anchor value of other works by the artist.[1]

We analyze the Tremaine collection in three different regards. First, we consider the venture capital question by considering how early in artwork's life the Tremaines were collecting. We look at the elapsed time from artwork creation to purchase. Second, we look at a proxy for the "quality" of the venture capital investment. We would expect to find some "home runs" but also a variety of performance of work. We consider this question by comparing the Tremaine collection to Galenson's (2001, p. 17) study of the peak value of U.S. artists' work. We analyze the overlap of Tremaine collection artists with this list and the artwork creation date and Tremaine purchase date in relation to year in which Galenson found an artist's peak value. Third, we look at the Tremaine's auction and donation patterns. The mix of high return found at market and strategic tax donation of both higher and lower returning works constitutes the "social impact" portion of the Tremaine's approach.

Overall, our analysis contributes novel and generalizable insights into the ways in which institutional relationships with museums affect the value of the collection and inform the portfolio management strategy of the collection as well. As new asset classes form around NFTs, our study of art collecting as venture capital investing and this consideration of non-profit and for-profit or "hybrid practice" simultaneously has implications for fractional ownership, holistic portfolio management as in the case of social impact investing, and complex problem-solving around systemic issues. This study also builds links between art markets and the broader study of entrepreneurship, venture capital, and environmentally aware (ESG) investing.

[1] As O'Doherty wrote (1986, p. 109) in the afterword to his 1976 essays defining the "white cube" of the gallery space, there is an "academic apparatus that stabilizes 'history' – certifying, much as banks do, the holdings of its major repository, the museum. History in art is, ultimately, worth money."

II. Data and Approach

We approach this larger framing of art investment as venture capital, within the parallels to ESG and social-impact definitions of value by observing collecting and donation practices in a unique data set on the preeminent art collection of Burton and Emily Hall Tremaine, 20th-century collectors of primarily American and European art. As Table 1 shows, the 770 catalogued works in the Tremaine collection include many first-rate modern and contemporary artworks by artists such as Piet Mondrian, Barnett Newman, Jackson Pollock, Robert Rauschenberg, and Jasper Johns, interspersed with works by artists whose auction markets are less developed. A signal work in the collection, Piet Mondrian's *Victory Boogie Woogie* (1944), which Mrs. Tremaine had purchased in 1944 for $8,000 was sold after her death to S.I. Newhouse for $11 million in 1988 (Housley 2001). Other standout works that were in the collection include *Three Flags* (1958) by Jasper Johns and *Premier Disque* (1912) by Robert Delaunay. The collection cost an estimated $500,000, nominally, to acquire and was valued at $84 million when Mrs. Tremaine died in 1987 (Housley 2001, p. 5).

Table 1 shows summary statistics on the collections data. The majority of the collection was sold or donated in the Tremaines' lifetimes or shortly after their deaths. Forty-one of the very strongest works were sold across the famous 1988 and 1991 auctions that followed their deaths. Many other works were sold privately. Records show that 281 of the 770 works were donated to museums.

Please insert Table 1 around here

Table 2 presents the top ten artists in the Tremaine collection, by number of works, with their corresponding rank via ArtPrice and ArtFacts. All of the top ten artists appear in the ArtPrice Top 500 list of artists globally, with an average rank of 134 as of December 2021. The top ranked artist, Pablo Picasso is ranked number 1, while the lowest ranked artist in the Tremaine top ten is Jean Arp at number 425. The Tremaine collection also includes numerous artists with no auction history at all as well as works by unnamed artisans.

Please insert Table 2 around here

Our data come from the Tremaine Foundation directly and from the Archives of American Art, which houses both the Burton and Emily Hall Tremaine Papers and those of the Tremaines' preferred dealer, Leo Castelli.[2] The Tremaine data are unusually robust. Records of the collection exist in multiple related copies including Mrs' Tremaines' personal binders of the collection and index cards of each artwork, and various detailed records related to the ongoing appraisal and insurance of the collection. In addition, the authorized biography of Mrs. Tremaine by Housley (2001) complements these records.

The Tremaine collection provides a unique ground for study in numerous regards. First, the Tremaines were unusually pioneering collectors. The major works they sold later they had bought from the primary market or even in some cases from the artists themselves. They bought works so close to creation date—a median time lapse from creation to purchase of only one year, and with 48% of works in the collection purchased within the same year that they were created—that they took on an unusually high risk of uncertainty in the value of artworks. Second, their work unusually crossed over the lines of museums and markets—that is, institutional and commercial constructions of value, including a US-touring exhibition sponsored by the Tremaine family business. The 1947 exhibition *Painting Toward Architecture,* was curated by the Yale professor Vincent Scully yet sponsored by the Tremaine's firm, Miller Company, and received attention from art critics in major national newspapers such as the *New York Times, ArtNews,* the *New Yorker,* and the *Herald Tribune*. The Tremaine collection also received an eponymous 1984 exhibition at the Wadsworth Atheneum, as the museum was courting a bequest or purchase of the collection (Housley 2001, p. 138). In addition to numerous donations and sales to museums, the Tremaines' collection was sold at Christie's in two separate sets of auctions which took place in 1988 and 1991, after the deaths of Mrs. and Mr. Tremaine, respectively.[3]

The Tremaines' museum donation and sales strategy came about in relation to U.S. tax policy, which is worth detailing here for the analysis in this paper. Because the Tremaines had bought works so early, they realized they would leave their heirs a substantial tax burden upon their deaths. Their first attempt to structure around this tax burden failed: In the 1960s, they conceived of the International Art Foundation, a "national lending library of artwork" (Housley 2001, p. 193), loaning their works to regional museums without substantial first-rate holdings.[4] However, the Tax

[2] We hold the required permissions from the Tremaine family. The Castelli (circa 1880-2000) and Tremaine (circa 1890-2004) papers are open to researchers.
[3] A number of museums had tried to cultivate relationships with the Tremaines to donate the lionshare of their collection to museums. These overtures failed to such an extent that the then director of the Metropolitan Museum of Art, Thomas Hoving, called the Tremaines "will danglers" (Housley 2001, p. 198).
[4] The Tremaines imagined the Wadsworth Atheneum as administrators of the foundation, with the Tremaines giving money to the Wadsworth to cover the costs of administration.

Act of 1969 required foundations to disperse money each year, making the Tremaines' plan to circulate artworks rather than to grant funds ineligible for nonprofit tax status.

Instead, the Tremaines attempted to achieve this "lending library" idea indirectly via a donation of works to the National Gallery of Art in Washington, D.C., on a handshake deal.[5] This second attempt generally failed as well. The Tremaines had hoped that the National Gallery would run an internal lending library to other museums but this plan proved difficult because of both idiosyracies of the governmental approproations process and a sense that the Tremaines, in testing out the idea, had given the museum second-tier artworks.[6] This experience is credited for Mrs' Tremaine's belief that if museums paid for artworks they would show them more; the higher the price a museum paid, the more it confirmed Mrs. Tremaine's presciently good taste (Housley 2001, p. 192). Sales to museums included the landmark acquisition of Jasper Johns' *Three Flags* (1958) by the Whitney Museum for $1 million in 1980 (Glueck 1984) and also of Andy Warhol's *Marilyn Monroe Diptych* (1962) to the Tate Gallery that same year.

With 41 major works sold via Christie's New York in 1988 and 1991, the Tremaines still donated over 281 works to museums and universities including the National Gallery of Art, the Museum of Modern Art, and to Yale University. Of the donated works, 49 went to Principia College, a Christian Science institution of higher education in Elsah, Illinois; 98 went to the Wadsworth Atheneum; and 76 went to the National Gallery of Art in Washington, D.C., in the aftermath of the Tremaines' attempt to create the International Art Foundation (see Table 1).

While some donations records are incomplete, we use a 1979 insurance appraisal for the collection overall. We isolate for in-depth study the 30 works that were donated after this 1979 appraisal.[7] We, separately, use the 1979 appraisal for the works that went to auction in 1988 and 1991 to identify rates of return from 1979 to auction sale.

We cross-reference the Tremaine auction sales to a database of over 6 million sales worldwide. Our auction data comes from the Blouin Art Sales Index (BASI), an independent database on artworks sold at over 1,380 auction houses worldwide, including the two major players Christie's and Sotheby's. BASI sources its data from Hislop's Art Sales Index, the primary source of price information in the world of fine art, supplemented with catalogue data from auction houses (both electronic and hard copy). BASI presently contains roughly 6.1 million art transactions

[5] Prior to the National Gallery arrangement, the Tremaines tried and failed to secure an arrangement with the Museum of Modern Art under the directorship of Rene d'Harnoncourt (Housley 2001, p. 195).
[6] The National Gallery director, J. Carter Brown, made this statement about second-tier artworks which, he felt, were harder to lend (Housley 2001, pp. 194-196).
[7] We have 34 records, then exclude four records for which we have incomplete primary-market acquisition data.

(almost half of which are for paintings) by more than 500,000 individual artists since 1922. For each sold painting in our data set, we have detailed information about the painting, the artist, and the auction it got sold. We know the painting's title, artist, year of creation, size, whether it was signed or stamped by the artist, and its medium (e.g., "oil on canvas", or "oil on board"). For each artist, we observe their name, nationality, year of birth, and year of death (where applicable). We also know the date of the auction, and the auction house and its location at which the painting was brought up for sale.

We employ these auction prices with primary-market prices which we have sourced from the archival records. This pairing of auction and primary-market records is unusual, with some exceptions including Chambers et al. (2020) study of the collection of John Maynard Keynes, the Graddy (2013) study of artworks favored by the critic Roger de Piles, Greenwald's (2021) economic analysis of art historical records, and the consideration of fractional equity in art as held by artists (Whitaker and Kräussl 2020). The approach has results in smaller data sets but new information from the inclusion of primary markets.

We first first test our idea that the Tremaines are venture capitalists by calculating the length of time between their purchase of an artwork and the artwork's creation date. We isolate the works that the Tremaines purchased after their 1945 marriage and for which we have complete creation and acquisition data. Of the 770 catalogued works, we are able to study artwork creation date to Tremaine purchase date for 390 works.[8] We find that the average elapsed time from artwork creation to acquisition is 4.49 years with a standard deviation of 10.29 years. It is more telling that the median rather than average elapsed time is one year, with 69% percent of artworks purchased within one year of creation date.[9] Of the 390 works, 189 works were purchased in the year that they were made and a further 81 were purchased within the year following creation (see Table 3). The largest lapsed time from creation to purchase is 67 years for Pablo Picasso's *Le Repast Frugal* (1904). Figure 1 shows that the vast majority of works were purchased extraordinarily close to the artwork creation date. In addition, while the Tremaines purchased other blue chip artworks with longer lag from creation to purchase (e.g., Alberto Giacometti's *Spoon Woman* (1926) in 1971, that was still before the more recent stratospheric returns for that artist. These blue chip works were purchased works alongside works by far less known artists with comparable lags from creation to

[8] We exclude 380 works, including: 13 works purchased before their marriage, 159 works for which we do not have the artwork creation date (including some Indigenous works), 197 works for which we do not have the purchase date (not found in the Tremaine papers), and 11 works for which archival data is internally inconsistent (e.g., the listed acquisition date is twenty years before the artwork creation date).
[9] Our data is annualized. Within one year means 1959 creation and 1960 purchase.

purchase, for instance two works by Dino Abedine from 1913 that were purchased in 1958. Figure 1 shows the distribution of the lapsed time from artwork creation to purchase by the Tremaines.

Please insert Table 3 around here

Please insert Figure 1 around here

As a second check on the Tremaines as venture capitalists, we consider not only the early timing of their art collecting but the potential ex-post determination of quality of their investments. To look at this "quality" of investment measure, we examine the artists studied by Galenson, specifically those U.S. artists with peak value pegged to a year (table 2.2 for U.S. artists, p. 17). First we identify the overlap of Tremaine artists with this cohort. We isolate these 57 artists from Galenson's study and compare them to the 305 artists in the Tremaine collection. We find that 32 artists (56%) from Galenson's study are represented in the Tremaine collection. This inclusion indicates the presence of "winners," in investment parlance, given Galenson's larger focus on the study of artistic mastery and genius. At the same time, the Tremaine collection also holds works by many other artists. Those 32 artists only represent 10% of the 305 artists in the Tremain collecton, indicating what we would expect to see in a venture-capital portfolio with concentration of gains but risks taken early stage enough to include a much broader array of returns.

Please insert Table 4 around here

Still using this group of works (Galenson 2001, p. 17), we find the calendar year associated with each artist's peak value and compare that year to both the creation date of works in the Tremaine collection and the year in which the Tremaines first collected that work (see Table 4).[10] Of the 770 works in the Tremaine collection, 169 (21.95%) works are by artists who appear in the

[10] We do not use Galenson's table of French artists. Although some of these artists (e.g., Matisse) are in the Tremaine collection, overall, we exclude them for two reasons. First, so many of the artists were working in the late 19th and early 20th century, their peak occurs well before the Tremaines' 1945 marriage. Second, the Tremaines hold some of these artists as single lithographies.

Galenson cohort. When we look at the year of peak value relative to artwork creation and purchase date. Table 4 shows the year of artwork creation for the first artwork the Tremaines collected by a given artist, and also the first year of purchase. We compare these dates to Galenson's year of peak value in order to understand how far ahead of, or behind, peak value the Tremaines are collecting. We reason that if they are collecting before peak value, then they have a venture-capital-like role in early risk-taking and support of the artist's capacity to make work. We find that, in many cases, the artists are collecting well ahead of peak value. For example, the artist Ad Reinhardt's peak value year is 1956; the Tremaines collected work from 1947, acquiring the work in 1947. Figure 2 shows the relationship between peak value and earliest artwork creation date for artists in the Tremaine collection. Figure 3 shows year of earliest acquisition of work relative to peak value year. In an extreme example, the artist Robert Motherwell's peak value year is 1987; the Tremaines collected works made as early as 1953 and acquired those works as early as 1957. We find that on average, the Tremaines purchased works 1.54 years before year of peak value—but with a standard deviation of 11.18, and that they bought works, on average, from as early as 5 years before peak value year (with a standard deviation of 9.79).

Please insert Figure 2 around here

Please insert Figure 3 around here

We note that peak value sometimes occurs early in an artist's career, at a stage of either very early artistic experimentation or economic precarity, or both. In the case of Sol LeWitt, the peak value year is 1960, eight years before the artist's first Wall Drawing. In the case of Robert Rauschenberg, the peak year is 1956, two years before the artist's first solo exhibition at the Leo Castelli Gallery. This timing underscores the importance of the risk early art collectors took in the work. This risk seems to have happened in the context of the collectors' personal relationships with a number of these artists, as indicated in the archival data by the presence if gifts to the collector, close to the year of first acquisition.

Lastly, in order to consider their overall portfolio management, we consider the artworks that were donated or sold by separating out those two groups of works. For the auction sales, we have complete data for thirty-four of the forty-one auction results. For the thirty-four sales, we find the annualized ROI from the original purchase by the Tremaines to the auction result (see Table 5).[11] These works, selected for auction, represent some of the strongest works in the collection.[12] The average annual ROI was 21.56%, with an average holding period of 29.57 years. The maximum ROI was 35.65% annually for Roy Lichtenstein's *I Can See the Whole Room and There's Nobody in It* (1961), which was held for 27 years. The minimum was 10.9%, for George Braque's *The Black Rose* (1927), which was acquired in 1936 and then held for 55 years. Table 6 shows the comparison of ROI and holding period for the auctioned and donated groups of works.

Please insert Table 5 around here

Please insert Table 6 around here

We repeat the analysis of "returns" for the donated works. We consider the thirty works donated after the 1979 appraisal and for which we have full information. We define the return as the annualized ROI from purchase price to the 1979 appraisal value truncated to the highest income tax rate of the time. (See Appendix C for a table of highest marginal U.S. income tax rate for the period of 1958 to 1991.) Table 7 shows the donated works with 1979 appraisal value, donation date, receiving institution (e.g., Wadsworth Atheneum), and annualized ROI based on the purchase price to the appraisal at which the works were donated.

Please insert Table 7 around here

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[11] Because artworks are not "marked to market" or regularly and externally priced in the manner of public equities or other more liquid assets, we use auction sales and then infer an annual rate of return over the intervening years. We simplify and impute a linear return at a constant compounding rate over the period of time between the first sale and the auction date. Our model also assumes that all primary sales took place on July 1 of each year.

[12] We note that there are more high value works than were auctioned, with noteworthy private sales, many arranged by Larry Gagosian in the 1980s and for which we generally do not have pricing information. We also note that we are considering roughly thirty of over 280 donated works. We anticipate that the other donated works—those donated before the 1979 appraisal—could have similar characteristics of shorter holding period and lower returns, indicating the likelihood of a disciplined deaccessioning strategy of collectors toward museums rather than, more typically of deaccessioning, from museums to other collectors.

Table 7 shows the wide variety of ROI that the donated works would have achieved at market, if sold at the 1979 appraisal value. We see some works which were donated in years just before a drop in the marginal income tax rate (e.g., in 1981, just before the tax rate fell from 70% to 50%). We also see some donations with little donation benefit, for instance Gerald Laing's *Small Arc* (1967), which was purchased in 1968—one year after creation date—for $113 and valued in 1979 at $120. The donation—to Mrs. Tremaine's alma mater, Principia College, brought as high as an $84 tax benefit, but also deaccessioned an artwork with 0.55% annualized ROI at an appraisal value similar to the nominal purchase price more than a decade earlier.

We consider the donations in the context of U.S. income tax policy which allows a tax deduction based on the appraisal value of the work and the collector's tax rate. For example, if an artwork is valued at $100 and a collector has a 35% personal income tax rate, the donation decreases the collector's larger taxes owed by $35. Our data on U.S. tax rates comes from Tax Foundation (2021), a U.S. nonprofit policy organization. Over the time of the Tremaines' donations from the 1960s to the 1980s, U.S. tax rates for the highest income bracket ranged from 91% in 1964 to 70% for much of the 1970s, and to 50% as of 1986, in response to governmental tax-cut initiatives (see Appendix C). We reason that, although the Tremaines may have had substantial wealth rather than income, we model the maximum tax benefit that they could have received from donating works, as represented by the 1979 appraisal multiplied by the upper marginal income tax rate during the year of donation. The tax benefit may also have offset the capital gains from the sale of works they had bought very early.

III. Discussion of Results

First, we confirm our hypothesis that the Tremaines were venture capital investors in art, as shown by the notably early acquisition of artworks relative to creation date and the demonstration of early-risk-taking, as shown in how early they collected works relative to the artists' peak value. If we imagine peak value to be analogous to a blue-chip equity, the fact that the Tremaines were purchasing artworks substantially before peak value year indicates their activity at a market stage comparable to that of a venture capitalist. In addition, they were supporting artists at early stages in which the risk-taking arguably served the effect of seeding the artist's career or providing economic stability. Even in cases in which the peak value year is early, for instance Jasper Johns' year of 1960, the Tremaines were collecting within one year (1961); and that year of peak value represented, in that case, Johns' first exhibition at Leo Castelli Gallery.

The Tremaines also had strong personal relationships with artists, and even in cases in which they purchased work via the artist's dealer, they would, for instance, invite artists to their home for meals and parties. (Housley 2001, p. 181). As mentioned above, the collectors received gifts from artists, sometimes very early on, as in the case of a 1959 gift from the artist Frank Stella (peak year: 1960, first Tremaine acquisition: 1960), or a 1962 gift from the artist Jim Dine (peak year: 1977, first Tremaine acquisition: 1962).

This venture capital label to the Tremaines is further reinforced by these close relationships with artists and dealers. The position of their longtime dealer, Leo Castelli, is analogous to that of accelerators such as Y-Combinator, that cull a short list of projects, some of which would, in turn, receive venture capital attention.[13] In addition to Mrs. Tremaines' visits to artists' studios, she introduced those artists to others; the collector Agnes Gund, who would go on to board president of the Museum of Modern Art, recalled Mrs. Tremaine taking her to artists studios when she first moved to New York (Housley 2001, p. 126.[14]

With venture-capital stage investing, we reason that one would also need a strategy for artfully exiting from both high-return and lower return artworks. We thus turn to consider how museum donation strategy expands the Tremaines' scope of a potential exit strategy for works they have collected. For the donated works, we see some patterns of "low value" donations and "high value" donations, as well as some marquee sales of artworks to museums. The donation of high value works would create a strong tax benefit, reputational capital, and philanthropic enjoyment, while the donation of the low value works would form a structural deaccessioning practice. The shorter holding period of donated works (14.33 years instead of 29.56 years for auctioned works) further supports this idea that some museum donations effectively wrote off lower performing works. That is not to take away from a collector's enjoyment of art so much as to underscore the social-impact parallels to conjoined management of both financial and otherwise defined value.

While the donation of high value works can generate substantial tax benefit, reputational capital, and philanthropic activity, from a portfolio management standpoint, it is the donation of low value works that forms the more notable impact on portfolio management. To sell a low value work takes considerable effort relative to the realized gains, incurs higher percentage transaction costs, and holds more risk of unreliable valuation. The donation of low value works, that is, the

[13] The art market at the time was not disintermediated by technology; needing a gallery in order to buy an artwork was arguably as customary as requiring a literary agent to submit a book proposal.
[14] In 1968, Gund visited the Tremaines' home and admired a painting by Mark Rothko (1903-1970), to which Mrs. Tremaine responded, "Let's go to Rothko's studio," where Gund purchased a work (Housley 2001, p. 126). At the time, Rothko was not yet represented by Marlborough Gallery, further underscoring the Tremaines' parallel to venture capitalists as early risk-takers and also introducers to artists. Gund, who had not yet moved from Cleveland to New York, said of Mrs. Tremaine, "She really did care and know the artists. I think I would have never had the richness of my life without her example" (Housley 2001, p. 126).

donating of losing positions, is a notable form of holistic portfolio management illustrated by an art collection.

The donation strategy may create *donation parity* which we define as a form of tax arbitrage, especially in writing off low value works as museum donations or benefitting especially from high value works for which the collector had a very low cost basis (Clotfelter 1990). Donation parity is the point at which a market sale and tax donation are financially equivalent for the collector given the high tax rate, the riskiness of the valuation of the asset to be sold, and the transaction costs of a market sale, particularly at auction (Ashenfelter and Graddy 2003). For instance, for a $500 purchase price and a $600 museum donation appraisal, if the work is donated at a 90% tax rate, the collectors achieve $540 in tax benefit. If the artwork sells for less than the appraised value or has a transaction cost greater than 10%, then the donation is financially better for the portfolio. The tax consequence is substantially dependent on the appraisal values (McNulty 2013).

Our findings support the hypothesis that the Tremaines may have been using tax policy to optimize their portfolio, selling off the highest performing equity to rebalance portfolio weighting, donating lower performing works, and incorporating tax strategy strongly into the portfolio management of their collection.[15] These observations of collectors' donation practice also have significance for research in museum management on institutions' reliance on philanthropic gifts which can potentially leave museums vulnerable to receiving lesser works or bundles of works of which one or two are the museum's preferred choices.

An interesting complication arises as to the situation in which an artwork that is held as an investment is donated to a museum. If an artist holds ten percent equity in his or her own work at the time the work is donated, then according to U.S. tax regulations, that artist can receive a tax benefit equal to that person's rate of personal income tax. If the artist donates the work directly, the artist can only claim the cost of the materials without labor, not the appraised market value of the work. Thus, the artist donating the 10% share—effectively a security—would have their investment truncated to the tax rate. Yet if that artist donated the entire work, they would only be credited for the proverbial paint and brushes. In the case of artists who retained 10% equity in their work, the fact that they are better served by donating a security (i.e., shares in their own work) whose value is truncated to their tax rate than donating the work outright—only being credited for cost of materials—could motivate a change in this part of the tax code.

[15] That is not to say the donations were unimportant to the institutions. Principia College, for example, may have experienced substantial marginal gains in their collection even from what, for the Tremaines' larger body of exceptional work, would have been third tier objects.

IV. Conclusion

Framing art collectors as venture capitalists highlights the risk-taking that is inherent in collecting art, and the partnership between collectors as venture capitalists and artists as entrepreneurs. While early-stage investment can include speculation, the Tremaines' story seems to arise as well from an ongoing interest in art. While one may conclude that the Tremaines were investors rather than speculators in Lovo and Spaenjers' (2018) typology, this venture-capital framing contributes to our understanding of the landscape of the arts ecosystem and the parallels, and lack thereof, to traditional investing. If art collectors are venture capitalists, it follows that artists are entrepreneurs, a conclusion that has been explored by numerous scholars in cultural economics (Woronkowicz and Noonan 2019) and sociology (Gerber 2017).

The Tremaines' navigation of the overlapping domains of market and nonprofit structures and early collecting have implications to longstanding management questions in the intersections of markets and regulation and of early-stage investing in creative work. With the Tremaines' motivations to collect art encompassing artists' support, philanthropy, and market returns, their approach has affinities to social impact investing and calculus of value beyond markets. In fact, they used the market-clearing mechanism of auctions to generate proceeds to underwrite the Emily Hall Tremaine Foundation. That foundation is a noted funder of the business education of artists.

While the Tremaines singularly navigated the overlapping domains of institutional and commercial art venues—in their landmark museum exhibitions and in their donation and market strategies—they also experienced the complexity of parsing value both artistically and financially. In the portfolio management of their collection the distinct holding periods and rates of return for donated and sold works indicates portfolio-management savvy and investment discipline in selling out of weaker positions.

In some regards, the analysis of the Tremaine collection brings to the surface the unintended consequences—and sometimes collateral damage—of tax policy design. Had it not been for the passage of the Tax Act of 1969, it is likely that the Tremaines would have started the International Art Foundation's art lending program so that their artworks could circulate among museums, creating broader access to great works of art while exerting their personal control over keeping those works from languishing in museum storage. And, had the Tremaines been able to start the foundation, they would have themselves been in charge of deciding which artwork to loan and to whom. Thus, they would have been less likely to rely on second-tier works as they arguably may have done in their initial attempts to collaborate with the National Gallery of Art as the administrator of the art lending program, avoiding an adverse selection problem (Akerlof 1970).

While the development of the 1969 tax policy may have been determinative, the Tremaines went on to support the arts in a different way. Instead of by loaning works to museums, they used the proceeds of the sale to seed the Emily Hall Tremaine Foundation, which is a leading supporter of business education for artists. The legacy of the Tremaines—in their intricate navigation of tax law, museum practice, and art investment—has implications beyond the arts given their risk-taking and remarkably early acquisition of works, well before many of the artists had established their reputations. Forms of equity or stock options that are commonly used to align governance structures can be adopted by recognizing collectors as venture capitalists and artists as entrepreneurs. Resale royalties and fractional equity in art can structurally reflect the early-stage risk artists take on. They can also be theoretically extended to collectors taking on risk.

Especially as deaccessioning standards have changed, even temporarily and mainly in the U.S., during the coronavirus pandemic (Jandl and Gold 2020), it is possible that museum collections may become more directly connected to art markets, or even financialized through fractional ownership structures. These developments have serious potential consequences for museum endowment management (Yermack 2017). In tandem, as markets for NFTs further develop, artists, collectors, and gallerists may continue to construct equity-based structures in which cooperative strategies allow groups of people to jointly own collections on par with that of the Tremaines. This larger phenomenon of donation to museums also has an impact on the future art market in that it creates a significant scarcity in the number of works by top-tier artists, causing especially strong superstar effects (Rosen, 1981) when works do go to auction, an arena in which museums are often priced out of participating. Within the arts, further study may shed light on better design of tax policy, on cultural policy, and on market-based strategies for supporting artists through the purchase of their works within an increasingly financialized and securitized art market.

Within economic research on art markets, the establishment of some art collectors as venture capitalists introduces an analysis of market stage in the arts. These categorizations of risk-taking by art investors—from early stage ventural capital positions to late-stage portfolio diversification of buying shares in artworks—may inform existing areas of research in new ways. For example, market staging may clarify some contested ideas in whether artwork prices are price elastic. Bhanterngansa and Graddy (2011) found no evidence of price sensitivity in the introduction of resale royalties legislation in the United Kingdom. Yet, perhaps price elasticity can be shown to be very different at the venture capital and more established stages of art markets.

Beyond the arts, there are numerous consequences for managers, investors, and entrepreneurs. This same presence of uncertainty and error in estimating value into the future is addressed in the venture capital industry in ownership and governance terms, with investors applying substantial discount rates to early-stage ventures. In addition, as social impact, ESG, and public benefit corporation forms develop, we can learn from cases in the arts regarding how to navigate managerial problems where many different forms of value exist—some quantifiable and others not. Recognizing limitations of political processes, there are renewed opportunities to incentivize behavior with tax policies.

More broadly than in museums, other nonprofit orgaizations including hospitals and universities with strong technology development programs, and nonprofit organizations including museums and churches, may more creatively consider tax, leading to both management strategy and opportunities for creative and effectual policy design. Longstanding initiatives for melding people and profit, or triple bottom line accounting to encompass the environment and human rights, may grow into more holistic forms of management to address large-scale, systemic problems such as climate or vaccine roll-out where the solutions that work for the individual manager would create a tragedy of the commons (Hardin 1961) if all managers engaged in them. This hybrid practice of managing for profit across for-profit and non-profit structures may lead paradoxically to critiques of market activity within charitable spheres and to the capacity for collaboration and complex problem-solving that create fiduciary flexibility to build important shared solutions to challenging global problems, thinking across national borders and other divided spheres of management.

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Table 1. Summary Statistics

This table gives a snapshot of the catalogued works of the Tremaine Collection. Of the 770 works in the collection, 281 works were donated, including 49 works to Principia College, 98 works to the Wadsworth Atheneum, and 76 works to the National Gallery of Art. Approximately 40% of the collection (296 works) appear in the 1979 insurance appraisal, providing 1979 valuation as well as, in most cases, its purchase price. The auctions of 1988 and 1991 included 41 works.

Number of works in the collection	770
Works donated to Principia College	49
Works donated to the Wadsworth Atheneum	98
Works donated to the National Gallery of Art	76
Total Number of works donated	281
Works appraised in 1979	296
Works sold in 1988 and 1991 auctions	41

Table 2. Top 10 Artists of the Tremaine Collection

This table shows the top ten artists in the Tremaine Collection, defined by number of artworks. We present also the rankings of these artists in both ArtPrice and ArtFacts. This table demonstrates that the Tremaines were holding works by first-rate artists while also simultaneously, as shown elsewhere in median time lapse from creation to purchase, collecting works very early on. The combined data indicate the Tremaines' role as early stage investors and successful ones.

Ranking	Artist	Number of Works	ArtPrice Ranking 2021	ArtFacts Ranking 2021
1	Roy Lichtenstein (1923-1997)	33	16	40
2	Andy Warhol (1928-1987)	23	3	1
3	Pablo Picasso (1881-1973)	16	1	2
4	Robert Rauschenberg (1925-2008)	15	100	13
5	Jean Arp (1886-1986)	12	425	189
6	Jasper Johns (1930-)	12	133	90
7	Tom Wesselmann (1931-2004)	10	139	317
8	Paul Klee (1879-1940)	9	194	51
9	Frank Stella (1936-)	9	88	128
10	Robert Irwin (1928-)	8	246	1,764

Table 3. Elapsed Time from Artwork Creation to Tremaine Purchase

This table shows the amount of time that passed from the year of creation of an artwork to the year in which the Tremaines purchased the work. Our data are annualized. Thus, "same year" means an artwork with a 1959 creation date was listed as purchased by the Tremaines in 1959. Theoretically, that work could have been made in Janaury of 1959 and purchased in December 1959. For works for which we estimated time frame (e.g., created 1956-1957 and computed as 1956.5), we rounded up, so that a work purchased 1.5 years of creation date is listed under 2 years in this table. These figures are based on the 390 works purchased by the Tremaines during their marriage and for which we have full and consistent data for artwork creation and Tremaine purchase.

Period of time	**Number of works**	**Percentage**
Same year	189	48%
1 year	81	21%
2 years	26	7%
3 years	16	4%
4 years	7	2%
5-10 years	20	5%
11-15 years	12	3%
15-30 years	20	5%
More than 30 years	19	5%

Table 4. Comparison of Tremaine Artists and Year of Peak Value

This table shows the 32 Tremaine artists who also appear in Galenson's (2001, p. 17) table of U.S. artists by peak value. The table shows the creation date of the earliest artwork by that artist in the Tremaine collection and also the earliest year at which the Tremaines purchased that work. Those dates are compared with the year of peak value to show how far ahead or after this peak value year the Tremaines purchased the work.

Artist	Year of birth	Peak age	Galenson year of peak work	Number of the artist's works in Tremaine collection	Creation date of first work purchased by Tremaines	Earliest Tremaine purchase date
Davis	1892	68	1960	3	1934	1942
de Kooning	1904	43	1947	2	1952	1956
Dine	1935	42	1977	5	1961	1962
Frances	1923	31	1954	1	1959	1961
Johns	1930	27	1957	12	1955	1958
Kline	1910	51	1961	6	1950	1957
LeWitt	1928	32	1960	3	1967	1967
Lichtenstein	1923	35	1958	33	1961	1961
Mangold	1937	50	1987	2	1974	1974
Marin	1870	54	1924	1	1928	1948
Martin	1912	52	1964	4	1967	1970
Moskowitz	1935	48	1983	4	1960	1961
Motherwell	1915	71	1986	3	1953	1958
Newman	1905	40	1945	7	1947	1958
Pollock	1912	38	1950	2	1950	1956
Poons	1937	27	1964	3	1963	1963
Porter	1907	68	1975	2	1969	1969
Rauschenberg	1925	31	1956	15	1958	1958
Reinhardt	1913	43	1956	5	1947	1947
Rosenquist	1933	29	1962	2	1961	1961
Rothko	1903	54	1957	3	1950	1953
Stella (F.)	1936	24	1960	8	1959	1960
Tobey	1890	61	1951	1	1944	1947
Warhol	1928	33	1961	23	1962	1962
Wesselman	1931	28	1959	10	1960	1961

Table 5. Tremaine Auctions: Return on Investment of Artworks Sold at Auction

This table shows the 33 works across the 1988 and 1991 auctions for which we have detailed purchase information. It shows the purchase date, the purchase price in USD, the auction date, the hammer price at auction in USD, and the annualized return on investment (ROI).

Artist	Artwork	Purchase Date	Purchase Price (in USD)	Auction Date	Auction Price (Hammer in USD)	Annualized ROI (in %)
Josef Albers	*Homage to the Square (Arrival Series)* (1963)	1964	5,000	November 9, 1988	150,000	14.97
Richard Artschwager	*Relief I* (1965)	1966	275	November 9, 1988	42,000	25.20
John Chamberlain	*Arch Brown* (1962)	1962	2,000	November 9, 1988	130,000	17.15
Christo	*Double Store Front* (196x)	1964	350	November 9, 1988	140,000	27.86
Walter De Maria	*Bronze Steel Shaft*	1966	2,000	November 9, 1988	55,000	15.96
Walter De Maria	*Elle*	1966	1,500	November 9, 1988	55,000	17.47
Willem De Kooning	*Yellow Woman* (1952)	1956	450	November 9, 1988	650,000	25.19
Jim Dine	*The Hammer Acts* (1962)	1962	900	November 9, 1988	60,000	17.26
Jim Dine	*The Small Black Screwdriver* (1962)	1962	180	November 9, 1988	45,000	23.28
Raoul Hague	*Swamp Pepperwoo*d (1956)	1956	1,200	November 9, 1988	55,000	12.54
Jasper Johns	*White Flag* (1955-58)	1958	1,350	November 9, 1988	6,400,000	32.13
Franz Kline	*Lehigh* (1956)	1958	4,000	November 9, 1988	2,100,000	22.90
Franz Kline	*Untitled* (1950)	1961	2,400	November 9, 1988	200,000	17.53
Roy Lichtenstein	*Ceramic Sculpture #7* (1966)	1966	495	November 9, 1988	100,000	26.77
Roy Lichtenstein	*I Can See the Whole Room and There's Nobody in It* (1961)	1961	450	November 9, 1988	1,900,000	35.65
Piero Manzoni	*Petit Subject* (1958)	1958	38	November 9, 1988	200,000	32.59
Barnett Newman	*The Moment* (1969)	1978	270,000	November 9, 1988	900,000	12.32
Claes Oldenberg	*Studies for Store Objects - Pie, 7-Up, Flag, Oranges, Fifteen Cents* (1961)	1961	75	November 9, 1988	80,000	29.00

Jackson Pollock	*Frieze* (1953-55)	1956	2,000	November 9, 1988	5,200,000	27.49
Robert Rauschenberg	*Combine Drawing on White Paper (Cup)* (1958)	1960	810	November 9, 1988	130,000	19.60
Robert Rauschenberg	*Construction (Untitled)* (1958)	1958	270	November 9, 1988	150,000	23.13
James Rosenquist	*Mask (Come Play with Me/Hey, Let's Go For a Ride)* (1961)	1961	350	November 9, 1988	400,000	29.33
Mark Rothko	*No. 8* (1952)	1953	1,350	November 9, 1988	2,400,000	23.55
Lucas Samaras	*One Work Box #51* (1966)	1966	1,800	November 9, 1988	55,000	16.51
Richard Tuttle	*Mist* (1965)	1965	350	November 9, 1988	40,000	22.47
Andy Warhol	*S & H Green Stamps*	1962	150	November 9, 1988	130,000	29.24
George Braque	*The Black Rose* (1927)	1936	3,250	November 5, 1991	1,000,000	10.90
Robert Delaunay	*Premier Disque* (1912)	1953	3,276	November 5, 1991	4,700,000	20.85
Juan Gris	*Still Life with Pears (Poires et Raisins sur une Table)* (1913)	1947	6,500	November 5, 1991	3,000,000	14.82
Paul Klee	*Scheinbar Bescheiden (Seemingly Modest)* (1937)	1953	700	November 5, 1991	150,000	15.01
Le Corbusier	*Still Life* (1925)	1948	2,500	November 5, 1991	290,000	11.58
Fernand Leger	*Le Petit Dejeuner* (1921)	1957	2,500	November 5, 1991	7,000,000	25.98
Ben Nicholson	*Still Life* (1949)	1949	350	November 5, 1991	150,000	15.38

Table 6. Average Returns and Holding Period

This table shows the average returns and holding period for the sample of auctioned works versus the sample of donated works. The auctioned works were, overall, held for longer and also had higher per year ROIs. The donated works were held for shorter periods, also with lower annualized ROIs.

Auction Works	
Average Annualized ROI (%)	21.56
Average Holding Period (Years)	29.57
Donated Works	
Average Annualized ROI (%)	16.14
Average Holding Period (Years)	14.33

Table 7. Tremaine Donations: Return on Investment of Artworks Donated to Museums

This table shows the 30 artworks for which our records show donations to museums or other cultural institutions. We show the general information such as the artist's name, the title of the artwork and its creation year, the purchase date and the purchase price in USD, as well as the 1979 appraisal value in USD, the donation date and the museum the artwork was donated to, and calculate the implied annualized return on investment (ROI) for those works from their purchase to appraisal.

Artist	Artwork	Purchase Date	Purchase Price (in USD)	Appraisal Value (in USD)	Donation Date	Marginal Tax Rate in Donation Year	Nominal Value of Tax Donation	Annualized ROI Purchase to Appraisal (in %)
Enrico Baj	*Personage with Colored Glass* (1960)	1961	80	240	1979	70%	168	6.29
Stuart Davis	*For Internal Use Only* (1945)	1945	2,000	50,000	1982	50%	25,000	9.92
Porfirio DiDonna	*Untitled* (1976)	1976	650	780	1979	70%	546	6.26
Guy Dill	*Fourteen Hands* (1973)	1974	4,000	4,800	1981	70%	3,360	3.71
Mark DiSuvero	*Meracuater Projector* (1963)	1964	547	36,000	1981	70%	25,200	32.18
Jean DuBuffet	*Texte Historie* (1964)	1966	540	3,000	1979	70%	2,100	14.09
Richard Francisco	*Constructed Painting* (1976)	1978	300	360	1986	50%	180	20.00
Richard Francisco	*Man in the Rock* (1973)	1973	225	780	1986	50%	390	23.01
Richard Francisco	*Reminding Stones II* (1973)	1973	375	780	1986	50%	390	12.98
Michael Heizer	*Untitled II* (1976)	1976	3,500	20,400	1981	70%	14,280	79.96
Norbert Kricke	Title Not Given	1959	240	2,400	1979	70%	1,680	12.19
Gerald Laing	*Small Arc* (1967)	1968	113	120	1979	70%	84	0.55
Roy Lichtenstein	*Head with a Blue Shadow* (1966)	1966	1,080	25,000	1986	50%	12,500	27.32

Roy Lichtenstein	*Placid Sea* (1965)	1965	450	2,500	1979	70%	1,750	13.02
Paul Mogenson	*Untitled* (1968)	1974	3,000	3,600	1981	70%	2,520	3.71
Robert Newman	*Arrow Series* (1970)	1970	800	2,400	1981	70%	1,680	12.97
Georges Noel	*Blue Composition* (xxxx)	1972	141	6,000	1979	70%	4,200	70.85
Georges Noel	*Untitled* (1973)	1973	5,000	5,400	1981	70%	3,780	1.29
Geoffrey Norfolk	*Untitled* (1970)	1971	800	960	1981	70%	672	2.30
Michelangelo Pistoletto	*Tavoline con Biccieri* (1964)	1965	600	1,800	1979	70%	1,260	8.16
Man Ray	*Triangle of Pythagoras* (1965)	1965	675	5,400	1979	70%	3,780	16.00
Omar Rayo	*6 Intaglio Prints* (xxxx)	1965	180	240	1979	70%	168	2.07
James Rosenquist	*Zone* (1961)	1961	900	35,000	1982	50%	17,500	22.54
Michael Suphor	*Composition with Circles* (1957)	1959	225	1,440	1979	70%	1,008	9.72
Richard Stankiewicz	*Untitled* (1961)	1961	4,050	7,800	1986	50%	3,900	3.71
Frank Stella	*Sinjerli Variation IV* (1968)	1970	40,000	50,000	1982	50%	25,000	2.51
Leslie Thornton	*Men at Arms* (1957)	1960	441	2,500	1979	70%	1,750	9.56
Ernest Trova	*Falling Man Series: The Maze* (1966)	1966	3,400	21,600	1981	70%	15,120	15.27
Neil Williams	*Moki Meteor*	1964	650	12,000	1981	70%	8,400	21.44
Neil Williams	*Paradise Mesa Strip*	1964	500	8,400	1981	70%	5,880	20.68

Figure 1. Years from Creation to Purchase Date

This figure shows the number of works, from the 390 we isolated, which sold within each time frame. For example, 189 works were sold in the same year of creation (i.e., 1959 creation date and 1959 purchase date).

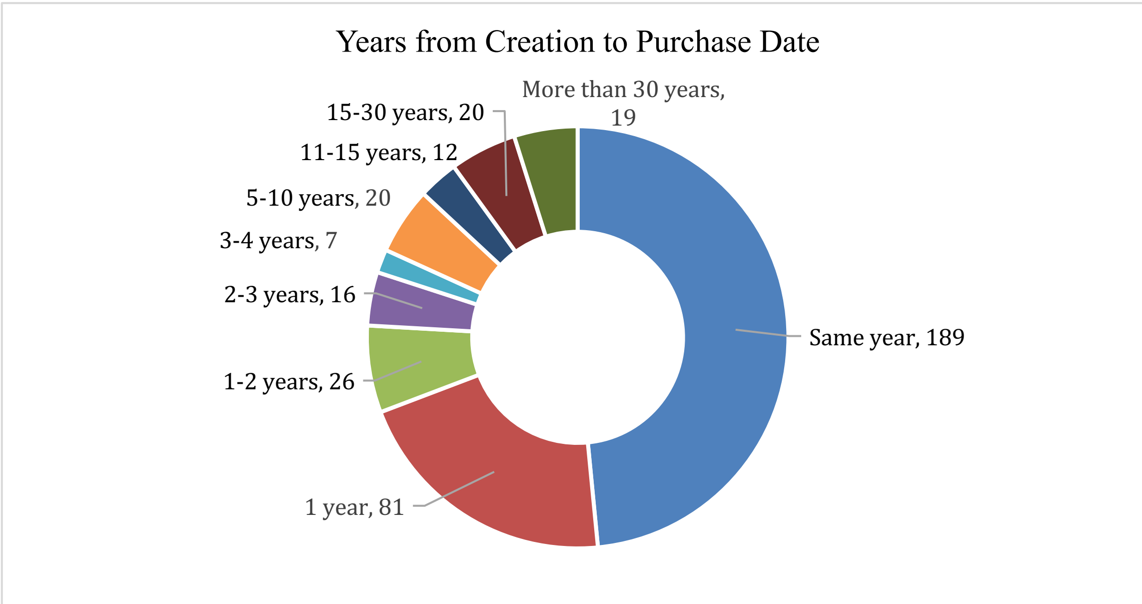


Figure 2. Years from Creation to Purchase Date

This figure shows the number of years between the creation date of the earliest artwork in the Tremaine collection and the peak value date in Galenson's study (2001, p. 17) of U.S. artists. For example, Motherwell's peak value year is 1987, and the Tremaines collected work by Motherwell made as early as 1953.

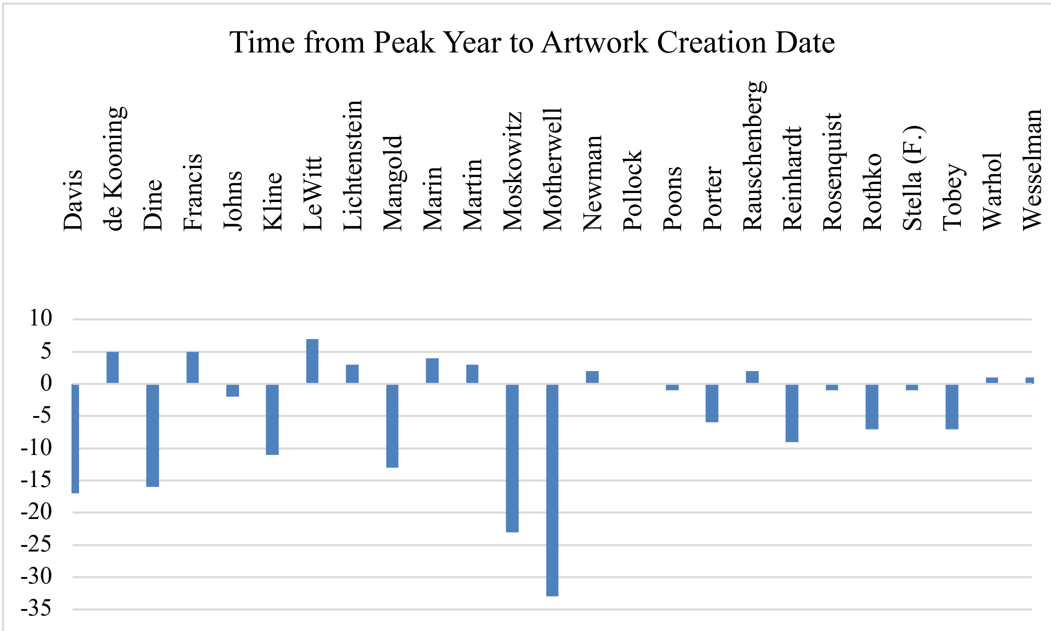
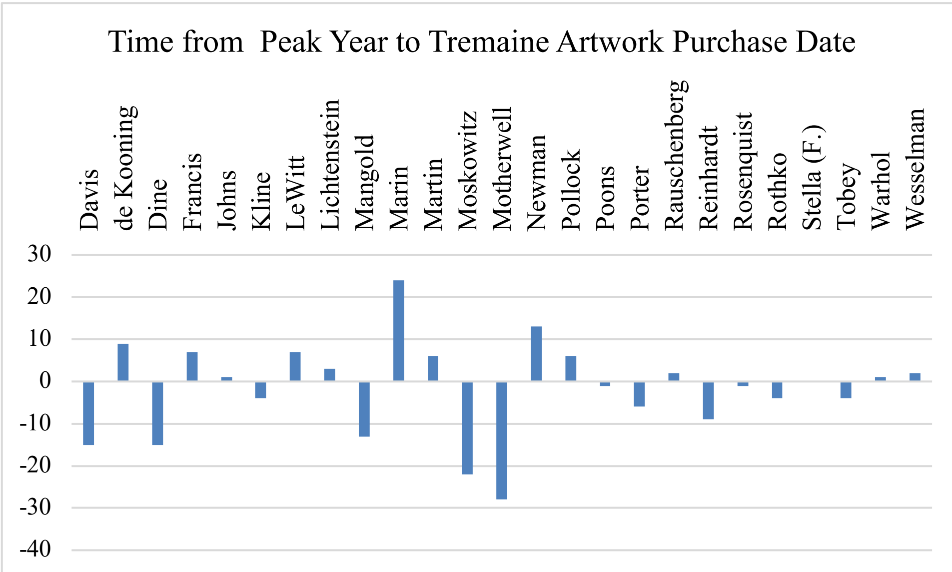


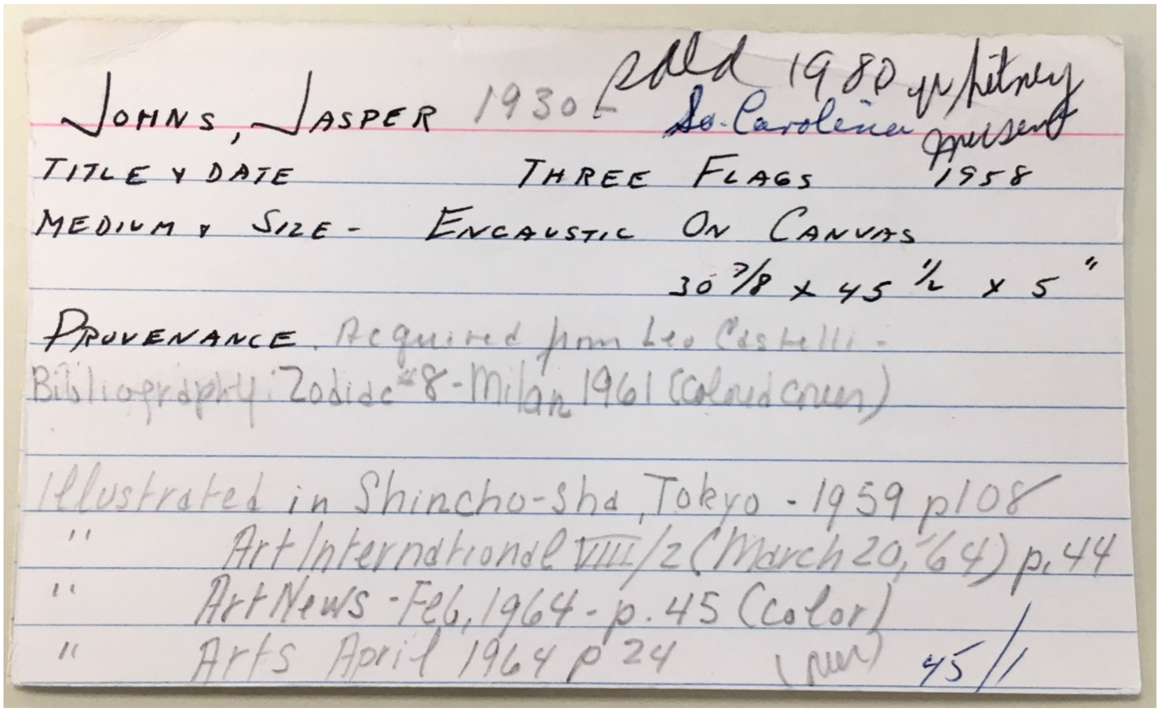
Figure 3. Years from Creation to Purchase Date

This figure shows the number of years between the creation date of the earliest artwork in the Tremaine collection and the peak value date in Galenson's study (2001, p. 17) of U.S. artists. For example, Motherwell's peak value year is 1987, and the Tremaines collected work by Motherwell as early as 1958.



Appendix A. Mrs. Tremaine's Index Card for Jasper Johns *Three Flags* (1958)

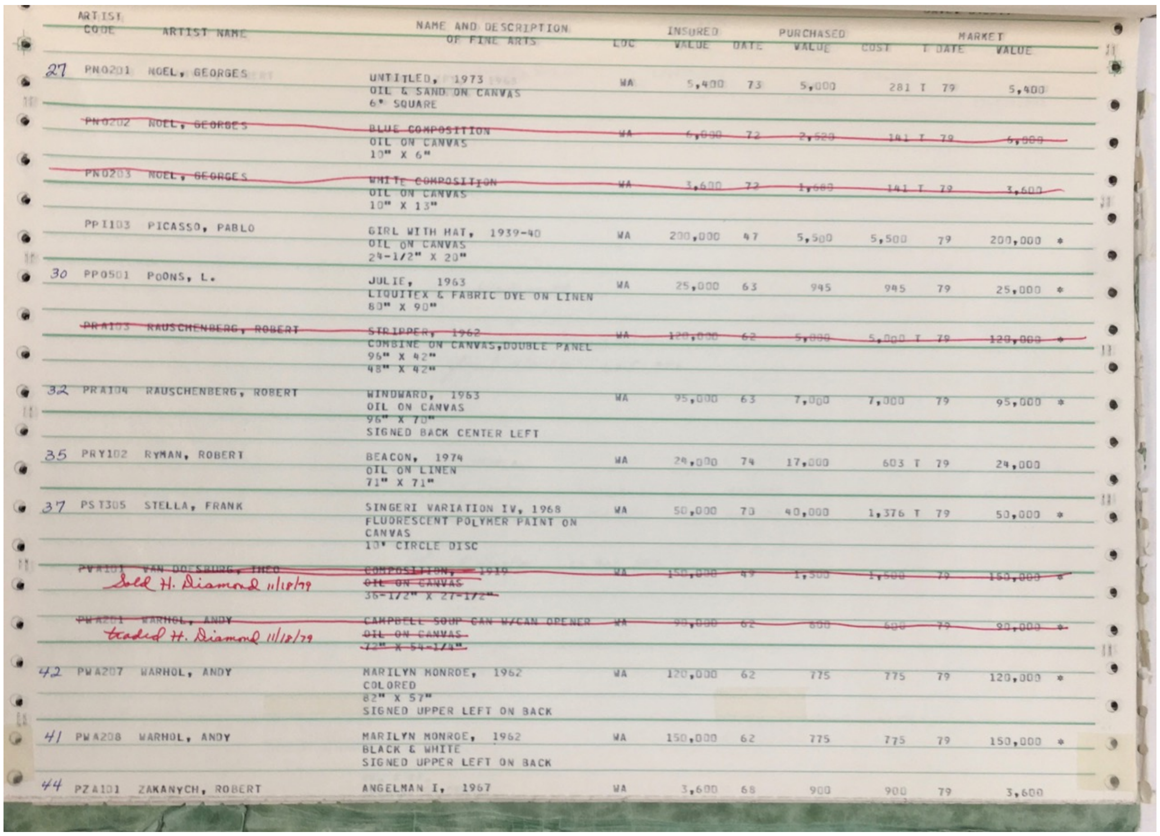
Appendix A shows one of several of Mrs. Tremaines' methods of cataloging the collection. A set of index cards lists artworks along with provenance information such as source of acquisition and inclusion in exhibitions or catalogue materials. Notes of sale are added, here to the upper right corner. (The work was sold to the Whitney Museum in 1980.) Many of the index cards list purchase price on the reverse side. Comparable records exist in two binders as well.



sold 1980 Whitney museum
JOHNS, JASPER 1930- So. Carolina
TITLE & DATE THREE FLAGS 1958
MEDIUM & SIZE - ENCAUSTIC ON CANVAS
30 7/8 x 45 1/2 x 5"
PROVENANCE. Acquired from Leo Castelli -
Bibliography: Zodiac #8 - Milan 1961 (colored cover)
Illustrated in Shincho-Sha, Tokyo - 1959 p108
" Art International VIII/2 (March 20, '64) p.44
" ArtNews - Feb, 1964 - p.45 (color)
" Arts April 1964 p 24 (cover) 45

Appendix B. Page from the Tremaine 1979 Insurance Appraisal

Appendix B shows the 1979 insurance appraisal of the full collection. This record is especially helpful as it shows the purchase price for the works as well as an estimate of the 1979 market price.



	ARTIST CODE	ARTIST NAME	NAME AND DESCRIPTION OF FINE ARTS	LOC	INSURED VALUE	DATE	PURCHASED VALUE	COST	T	MARKET DATE	MARKET VALUE	
27	PN0201	NOEL, GEORGES	UNTITLED, 1973 OIL & SAND ON CANVAS 6' SQUARE	WA	5,400	73	5,000	281	T	79	5,400	
	~~PN0202~~	~~NOEL, GEORGES~~	~~BLUE COMPOSITION~~ OIL ON CANVAS 10" X 6"	~~WA~~	~~6,000~~	~~72~~	~~2,620~~	~~141~~	~~T~~	~~79~~	~~6,000~~	
	~~PN0203~~	~~NOEL, GEORGES~~	~~WHITE COMPOSITION~~ OIL ON CANVAS 10" X 13"	~~WA~~	~~3,600~~	~~72~~	~~1,680~~	~~141~~	~~T~~	~~79~~	~~3,600~~	
	PPI103	PICASSO, PABLO	GIRL WITH HAT, 1939-40 OIL ON CANVAS 24-1/2" X 20"	WA	200,000	47	5,500	5,500		79	200,000	*
30	PP0501	POONS, L.	JULIE, 1963 LIQUITEX & FABRIC DYE ON LINEN 80" X 90"	WA	25,000	63	945	945		79	25,000	*
	~~PRA103~~	~~RAUSCHENBERG, ROBERT~~	~~STRIPPER, 1962~~ COMBINE ON CANVAS,DOUBLE PANEL 96" X 42" 48" X 42"	~~WA~~	~~120,000~~	~~62~~	~~5,000~~	~~5,000~~	~~T~~	~~79~~	~~120,000~~	~~*~~
32	PRA104	RAUSCHENBERG, ROBERT	WINDWARD, 1963 OIL ON CANVAS 96" X 70" SIGNED BACK CENTER LEFT	WA	95,000	63	7,000	7,000		79	95,000	*
35	PRY102	RYMAN, ROBERT	BEACON, 1974 OIL ON LINEN 71" X 71"	WA	24,000	74	17,000	603	T	79	24,000	
37	PST305	STELLA, FRANK	SINGERI VARIATION IV, 1968 FLUORESCENT POLYMER PAINT ON CANVAS 10' CIRCLE DISC	WA	50,000	70	40,000	1,376	T	79	50,000	*
	~~PVA101~~	~~VAN DOESBURG, THEO~~ Sold H. Diamond 11/18/79	~~COMPOSITION, 1919~~ ~~OIL ON CANVAS~~ ~~36-1/2" X 27-1/2"~~	~~WA~~	~~150,000~~	~~49~~	~~1,500~~	~~1,500~~		~~79~~	~~150,000~~	~~*~~
	~~PWA201~~	~~WARHOL, ANDY~~ traded H. Diamond 11/18/79	~~CAMPBELL SOUP CAN W/CAN OPENER~~ ~~OIL ON CANVAS~~ ~~72" X 54-1/4"~~	~~WA~~	~~90,000~~	~~62~~	~~600~~	~~600~~		~~79~~	~~90,000~~	~~*~~
42	PWA207	WARHOL, ANDY	MARILYN MONROE, 1962 COLORED 82" X 57" SIGNED UPPER LEFT ON BACK	WA	120,000	62	775	775		79	120,000	*
41	PWA208	WARHOL, ANDY	MARILYN MONROE, 1962 BLACK & WHITE SIGNED UPPER LEFT ON BACK	WA	150,000	62	775	775		79	150,000	*
44	PZA101	ZAKANYCH, ROBERT	ANGELMAN I, 1967	WA	3,600	68	900	900		79	3,600	

Appendix C. U.S. Marginal Income Tax Rates (1958-1991)
Appendix C shows the highest marginal tax rate in the United States by year. We show the rates from the Tremaines started actively collecting through the 1988 and 1991 auctions following their respective deaths.

Year	Upper Marginal Income Tax Rate
1958-1963	91%
1964	77%
1965-1981	70%
1982-1986	50%
1987	38.5%
1988-1990	28%
1991	31%

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