Working Papers - Economics

A Century of Art Dealing in New York

Federico Etro and Elena Stepanova

Working Paper N. 21/2024

DISEI, Università degli Studi di Firenze
Via delle Pandette 9, 50127 Firenze (Italia) www.disei.unifi.it

A Century of Art Dealing in New York

Federico Etro* and Elena Stepanova**

* University of Florence
** European Commission, Joint Research Centre

October 2024[1]

Abstract

We study art trade in New York between 1870 and 1970, analyzing returns on investment by the renowned Knoedler gallery to shed light on the evolution of the American art market. A generalist art gallery should allocate investments to equalize their expected returns, with differences in effective returns depending on purchase prices, number of traded works per artists, search costs and shocks. We confirm these principles and find that the returns were higher in booms, after the death of artists or solo exhibitions at the gallery, and lower for artworks in stock for a longer time. A main interest in the story of the leading gallery of New York is in its intertwining with the history of American art over a century. We find that the returns on European old masters follow an inverse-U shape with a peak during WWI and a subsequent decline, while the returns on American modern artists keep increasing for the entire century: this is consistent with a shift in demand toward American art that was instrumental to promote the development of the New York school.

Keywords: Art dealing, Art collectors, American art

JEL Classification: Z11

[1] We are extremely grateful to David Galenson for important suggestions and to seminar participants at the University of Florence for comments. Correspondence: Federico Etro, Università degli Studi di Firenze, DISEI, Via delle Pandette 32, 50127, Firenze, Italia. Email: federico.etro@unifi.it; Elena Stepanova, European Commission, Joint Research Centre (JRC), Via E. Fermi 2749, 21027, Ispra (VA), Italy, elena.stepanova@ec.europa.eu.

1. Introduction

When art trade started to became a transatlantic phenomenon at the end of the XIX century, a few international dealers played a key role in intermediating artworks between Europe and the U.S. (Feigenbaum *et al*., 2024). This period started with an increasing demand of traditional European art by American collectors and ended after a century with the leadership of New York in the supply of innovative American art. We explore this evolution through one of the most important dealers of this period, the Knoedler gallery, born as the American branch of the Goupil gallery of Paris and grown into the leading generalist (i.e. active in all art sectors) gallery of New York, which played a key role in dealership of European and American artworks across the U.S. (Ekelund *et al*., 2017; Jensen, 2023).[2] While art galleries are often short-lived and their records are usually secret, Knoedler has been active for more than a century and its accounting records between 1870 and 1970 have been recently made available by the Getty Research Institute, providing a unique and consistent documentation on purchase and sale prices. We use these data to analyze the determinants of the returns on artworks and shed light on the evolution of the art market and American art over a century.

The direct analysis of trade by a generalist gallery can provide important insights on the evolution of art sectors. However, the artworks traded in a gallery may not necessarily constitute a representative sample of the art market, because the allocation of investment is driven by the expected returns of the gallery. For this reason, as in recent work on art dealing by David *et al*. (2023), our investigation focuses on returns rates rather than purchase or sale prices, and is based on a theoretical analysis of the determinants of returns for an art dealer, emphasizing unexpected components due to shocks at the aggregate, sector and artist level. On this basis we explore the relative perfomance of American art in the century that led to its global leadership, and try to verify whether and when there was a shift to collecting American art that could have stimulated its artistic development.

Art dealing is an intermediation activity based on investments in different artists and sectors. The acquisitions of a gallery are distributed to maximize the expected sale revenues net of purchase costs and of search and marketing costs. The main implication is that the expected returns should be equalized across different types of investments, and follow real interest rates with deviations due to differences in purchase prices and search costs. Of course, what we observe in the data are not the expected returns, but the effective returns on sold works, therefore, additional deviations should be due to unexpected variations in demand and supply conditions: for instance, above normal returns may reveal an increase in demand or a reduction in supply. In line with these general principles, we find that the returns of Knoedler were correlated with short term interest rates, inversely related to the purchase price of artworks, positively related to the number of artworks per artist, and they were higher during boom periods (positive demand shocks at the aggregate level) and after the death of artists (negative supply shocks at the artist level). Moreover, consistently with common marketing strategies by art dealers (Cellini and Cuccia, 2014; David *et al*., 2023), we find that the returns were

[2] At the retrospective exhibition for the 150th anniversary of the gallery, art historian Sam Hunter has emphasized its crucial role in the allocation of artworks across American collectors and ultimately across the American museums to which they have been donated. “The gallery was instrumental in placing more than 150 works by Cézanne in American collections, as well as seven of the twelve Vermeer paintings now in American museums. Works of art sold by Knoedler became essential to the collections of such major institutions as The Metropolitan Museum of Art, the National Gallery of Art, the Philadelphia Museum of Art, the Sterling and Francine Clark Art Institute, and The Frick Collection, which traces more than half of its collection to the gallery.” (Knoedler, 1996).

lower for artworks in stock for a longer time, by new and illiquid artists and in case of joint purchases by multiple dealers and for multiple works, while they were higher for artists for which the gallery had invested in a *solo* exhibition or for larger works and for genres that were harder to sell.

The main interest in the small story of art dealing by Knoedler relies on the intertwining with the big story of the evolution of the American art market, that initially featured an increasing demand of European old masters and then gradually shifted its attention toward American artists, fostering the development of a modernist school and the leadership of New York as the main international art center. Our analysis allows us to distinguish predicted returns from unexpected changes in the willingness to pay for works of different art sectors over time. These unexpected returns followed an inverse-U shape for European old masters, increasing until the inset of WWI and then declining, while they increased gradually over the entire period for American artists, starting below average, reaching the average during WWI, and ending well above average in the post-WWII period. As suggested by Ekelund *et al*. (2017), "the real shift to collecting American art occurred in the 1920s": it was the beginning of a diversion of demand from foreign to domestic art, which was supported during the 1930s by museums and public programs, and fostered the emergence of experimental innovators that competed for the post-WWII market and created a novel form of abstract art (Galenson, 2009). The differential pattern emerging in the data appears consistent with the gradual shift of demand toward American art which started in the 1920s and contributed to foster the innovations of the abstract expressionists and other American artists.

Our work is related to the cultural economics literature on the history of art markets (Montias, 2002; De Marchi and Van Miegroet, 2006; Etro, 2018, 2024; Radermecker, 2021; Borowiecki and Greenwald, 2018; Borowiecki, 2022; Piano, 2022; Piano and Hardy, 2022; Piano and Piano, 2023; Oosterlinck *et al*., 2024) and in particular the literature focused on modern art (Galenson, 2009, 2025; Hellmanzik, 2010; Oosterlinck, 2017; Greenwald, 2021; Greenwald and Oosterlinck, 2022; David *et al*., 2023, 2024; Dupin de Beyssat *et al*., 2023). Few works have explored the economics of art dealing in theory (Shubik, 2003; Cellini and Cuccia, 2014) and with reference to specific art dealers (Penot, 2017; Jensen, 2018; Reist, 2020; David *et al*., 2023; Feigenbaum *et al*., 2024). Data from international art dealers, including Knoedler, have been used by Etro *et al*. (2020) to find evidence of the effects of art liberalization in Paris on the market recognition of the Impressionists, by Jensen (2023) to study the evolution of the prices of living artists and by Feigenbaum *et al*. (2024) for art historical purposes. Etro and Stepanova (2021) have explored return rates on various investments including American art, but their analysis was based on current auction data and not on historical data from art dealership.[3]

The most related work is the one by David *et al*. (2023) on the strategies of the Goupil gallery from 1860 to 1914. The maison Goupil was founded in Paris by Jean-Baptiste Adolphe Goupil (1806-1893) and was initially specialized in printing and selling engravings and lithographs. By the mid XIX century it was largely involved in the trade of paintings by established French artists, selling also outside of Europe. As a consequence, Goupil opened various galleries abroad, and the one of New York, initialy created to export prints, was destined to become the Knoedler Gallery. In 1884

[3] General overviews of American art can be found in Saarinen (1958) and Saltzman (2008) on art collectors, Watson (1992), Goldstein (2000) and Ekelund *et al*. (2017) on art dealing, and Wilmerding (1976), Craven (1994) and Bjelajac (2005) on art history.

Goupil left the management of the gallery to his partners and the company changed name into Boussod, Valadon & Cie for the next thirty years of activity (opening again a branch in New York between 1887 and 1902). David *et al*. (2023) have explored the determinants of the returns on artworks traded by Goupil, on average around 61% in 1860-1914. They have found that these returns were lower for works sold after a longer period, for artists under exclusivity agreements with Goupil,[4] and for sales to small dealers. However, they were higher for artists with more works in Goupil's inventory and for buyers who were frequent customers or noble. These results support the idea that the Goupil gallery was taking in consideration the size and composition of its inventory and its long run relations with customers when it was determining its marketing and pricing strategies. The wider and longer activity of the Knoedler gallery allows us to confirm some of these insights and test a variety of additional predictions. Most of all, it makes possible to shed light on the evolution of the art market in New York along a crucial century for the development of American art.

The rest of the work is organized as follows. Section 2 describes the business of Knoedler and the evolution of the American art market during the century under consideration. Section 3 derives testable predictions on return rates differentials for a generalist gallery. Section 4 presents the empirical analysis focused on the returns on transactions managed by Knoedler. Section 5 concludes. Additional empirical details are in the Appendix.

2. Knoedler in the American art market

Michael Knoedler (1823-1878) started working for Goupil in Paris and was sent to New York in 1846 to open the American branch of the gallery. He quickly became a pioneer in the trade of both European and American art together with few other dealers based in New York (Schaus), Boston (Vose) and Philadephia (Haseltine). At that time, in spite of an emerging primary market for paintings (Wilmerding, 1976; Prown, 2001) and the efforts of the American Art-Union and the National Academy of Design to educate the public to art, the secondary market was largely underdeveloped. The ability of Knoedler was to gradually expand it and attract the interest of new collectors from New York and beyond. According to Goldstein (2000) "at 289 Broadway, Knoedler established a free gallery, following the American Art-Union's innovation, where the curious could enter and examine the merchandise without the costly nuisance of having to part with 25 cents for the privilege, and that too was an aid to business… Proudly, but with an odd inability to understand the dynamic that he himself was creating in the trade, he wrote back to Paris in 1856 that he had sold a work for $300, 'the highest price that will ever be paid for a painting in America'." In 1854 the gallery moved to 366 Broadway and in 1857 Knoedler purchased Goupil's interest, relocating a couple of years later to larger premises in 722 Broadway. Nevertheless, Goupil kept sending works to Knoedler, mostly contemporary French paintings, and kept sharing the profits and the risk of this trade for the next thirty years. Meanwhile Knoedler began dealing with American art, mainly purchasing directly from the artists. It will take decades to expand the trade of Knoedler to the pioneers of the colonial period, and those of the federal period (the Peale family of artists, Thomas Sully, Samuel Morse or the sculptor Hiram Powers), but the local demand quickly appreciated works by William S. Mount,

[4] It should be remarked that Goupil had introduced contracts of exclusivity with artists, operating as a wholesaler, and contracts of first refusal, negotiating prices with "artists in residence" and sharing profits with them (Jensen, 2018, Feigenbaum *et al*., 2024).

George C. Bingham, Frederic E. Church, Jasper F. Cropsey and many local landscapists traded by Knoedler (Knoedler, 1996; Ekelund *et al*., 2017).

2.1. The gilded age

After the Civil War, new industrial fortunes and dynastic families were under creation in the U.S., and they contributed to generate a new demand for the decoration of mansions on the East Coast. The Metropolitan Museum of Art (MET) of New York and other major museums were founded during the 1870s. The new building of the MET on Fifth Avenue was accumulating European art under the lead of the collector and philantropist Henry G. Marquand (see Saltzman, 2008, Ch. 1), and through the intermediation of art dealers such as Samuel P. Avery. Knoedler and Goupil were in the ideal position to expand their business in front of the increasing demand of European art.[5] In 1869 the gallery moved to 170 Fifth Avenue (on the corner with 22nd Street), closer to what was becoming the residential area of its target customers. The next decades were those of the so-called *gilded age*, and the imports of paintings flourished, except for a slow down following the tariff law of 1883, which increased the custom duty on artworks from 10% to 30%, limiting the returns on international trade. Under the pressure of the free art movement, the tariff was eliminated in 1894 but then restored at 20% in 1897, with an exception for works by American artists residing abroad (May, 2010). At the time, ordinary buyers were mainly interested in landscapes and fashionable subjects, but the leading customers of Knoedler featured financiers and businessmen from the main trusts (including those of oil, steel, sugar and more), who were interested not only in Barbizon landscapes and British portraits (for collectors in search of imaginary "ancestors"), but also in first rate old master paintings (Jensen, 2018).[6]

Roland Knoedler (1856-1932), son of Michael, took charge of the family business at the death of the father for the next fifty years, since 1894 in collaboration with Charles S. Carstairs (1865-1928), who was responsible for expanding the scale of activity in the more profitable sector of old masters, which was replacing the sector of living artists in the interest of major collectors. This required further investments to procure expensive works from Europe and search for appropriate buyers in the U.S., complicating aspects involving finance and logistics. On the one hand the gallery relied on loans for large purchases: according to Saltzman (2008) "M. Knoedler & Co., like many galleries, was

[5] The account of an early historian of American art is interesting (Tuckerman, Henry, 1867, *Book of the Artists*, p.21): "For several years two foreign houses in New York have been largely engaged in the importation and sale of modern European pictures … during the past year, 1866-7, Goupil & Co. disposed of pictures by such artists as Auchenbah, Bouguereau, Frere, Fichel, Gerome, Meissonier, Merle, Troyon, Willens, etc., amounting in the aggregate to three hundred thousand dollars."

[6] On early collectors from Brooklyn see Paolo Serafini in Feigenbaum *et al*. (2024). Even the lawyer of many trusts, John G. Johnson, was a major art collector of Philadelphia, constantly in search of good deals on the market (see Saarinen, 1958). Common clients of Knoedler included magnates such as Henry Hilton and Andrew Carnegie (New York), Frederic Ames (Boston), William Walters (Baltimore), Alexander M. Byers (Pittsburgh), Charles Yerkes (Chicago), Charles L. Freer (Detroit), James Hill (St. Paul), and so on. As recalled by Charles Henschel in *A Personal History of Knoedler*, written for the 100th anniversary of the gallery "William H. Vanderbilt purchased a Messonier for the then record price of $16,000, and other names which appear on the books are those of Cornelius Vanderbilt, W.W. Astor and John Jacob Astor, Henry Flager of Standard Oil … William Rockefeller, and California's Governor Leland Stanford. Other prominent names are those of John A. Harper, the publisher, and F.W. Roebling, the builder of the Brooklyn Bridge. Jay Gould bought twenty-two pictures within two days, an indication that collectors then had very different attitude from those of today … the sales books show that waves of buying would suddenly occur in a given locality and, presumably, one collector would start others buying" (see Knoedler, 1996).

undercapitalized and struggled against a chronic shortage of liquid assets. The dealers sold most of their paintings in the summer 'principally to Americans' and delivered the pictures in the fall, when they were paid. 'The nature of our business, owing to the character of our clients, is such that we cannot ask for money owed us, neither can we force sales', Knoedler explained to a banker. The dealers constantly searched for sources of capital and periodically went into debt." On the other side, the gallery opened a new branch in Pittsburgh to reach new buyers, and relocated uptown along Fifth Avenue at 355 (on the corner of 34th Street) in 1896 and then at 556 (on the corner of 46th Street) in 1910, purchasing an imposing Renaissance style building designed by Carrère & Hastings to launch its exhibitions. Meanwhile, it opened foreign branches in Paris (Place Vendôme) and London (Bond Street), mainly to access artworks from European collections through local auctions and dealers, such as Lawrie & Co. and then Colnaghi.[7] In a period in which sales of old master paintings were still weak at auctions, information was uncertain and slow to circulate, and the new demand was coming from the U.S., Knoedler started to organize joint account transactions with other dealers to share expenses and diversify risk (see Feigenmbaum *et al*., 2024), and quickly became one of the most influential multinational galleries for old master paintings. It was mainly challenged by the British dealer Joseph Duveen (1869-1939), whose uncle and partner Henry had moved to New York in the 1870s. Duveen dominated the segment of high prices, employing famous *connoisseurs* to certify authorship, such as Wilhelm von Bode in Berlin and Bernard Berenson in Florence.[8] Next will be the main dynasties of French dealers, namely Seligmann, Gimpel and Wildenstein, all of which were also active in New York since the beginning of the XX century. These and few other dealers were fiercely competing in the risky market for the masterpieces that were crossing the Atlantic.[9]

By the end of the XIX century three art collections were associated with the role of tastemakers for the American market. The first was the one of Harry and Luisine Havemeyer who purchased both old master paintings and contemporary French art, through the dealers Knoedler and Durand-Ruel, as well as through direct trips to Europe (see Havemeyer, 1961). Purchases from Knoedler (almost twenty in our dataset) included a landscape by Millet paid $3,800 in 1881, other landscapes by Corot paid between $400 and $2,500 in the next decade, an arab horseman by Delacroix paid $7,000 in 1882 and a genre painting by Diaz de la Pena paid $12,500 in 1881. The collection was displayed in the New York building at the corner of 66th Street and Fifth Avenue, and a large part of it was then left to the MET. The second collection was the one of Bertha Honorè and her husband Potter Palmer, and was largely focused on modern French paintings, some of which (more than thirty in our dataset) had been intermediated by Knoedler. They included two landscapes by Corot and Daubigny purchased in 1889 for $5,500 each, and a number of works by Monet purchased between 1891 and 1892, including poppy fields paid $850 and $950, various haystacks paid between $950 and $1,000, a view of Bordighera paid $1,000 and haycocks paid $1,250. The collection was displayed in the Chicago mansion on Lake Shore Drive (see Kalmbach, 2009), and part of it was later destined to the

[7] See Feigenbaum *et al*. (2024), and in particular Léa Saint-Raymond on the role of Knoedler in the auction market of Paris and Sandra van Ginhoven and Edward Sterrett on the role of Knoedler in joint stocks with other dealers of London.
[8] Berenson was a paid advisor for major American collectors on Renaissance art, but also signed a secret profit-sharing contract with Duveen (Simpson, 1987). As a dealer once told him, this had a clear implication: 'Between you and me there's no difference; I'm an intellectual dealer and you're a dealing intellectual" (Gimpel, 1966).
[9] On Duveen see Secrest (2005). For biographical accounts of the French dealers see Seligman (1961), Gimpel (1966) and Wildenstein and Stavridès (2001). Competition was so fierce to involve bribing custom officers to evade tariffs (Knoedler testified on this in court against Duveen) and controlling cable and phone comunications (Wildenstein's New York branch was convicted of tapping Knoedler's telephones; see Simpson, 1987).

Art Institute of Chicago. The third collection was the one of Isabella Stewart Gardner, vidow of Jack Gardner, mostly focused on old master paintings and largely created through the intermediation of Berenson and Colnaghi (see Saltzman, 2008, Ch. 2), though our dataset includes also the purchase from Knoedler of a *Portrait of a lady* by Tintoretto, bought for $40,000 in 1903. The collection was displayed in the Venetian style mansion of Fenway Court in Boston, which then became a museum of old master paintings.

An early major sale by Knoedler of an old master painting was the *Don Balthazar and his dwarf* by Velasquez, sold in 1901 to the Museum of Fine Arts (MFA) of Boston for $80,000, but few years later the gallery managed to obtain seven van Dyck portraits from the Cattaneo family of Genoa, sold for record prices to private collectors such as Henry C. Frick and Peter A.B. Widener. [10] Frick's mansion in New York, which later became the Frick Museum, hosted paintings purchased mostly through his friends Knoedler and Carstairs (more than a hundred and fifty in our dataset), as the two masterpieces of Vermeer, *Girl Interrupted at her Music* purchased in 1901 for $26,000 and *Officer and Laughing Girl* purchased in 1911 for $225,000, or the Ilchester self-portrait of Rembrandt purchased in 1907 for the same price. The Widener collection was going to enrich the National Gallery of Art of Washington D.C, with many works intermediated by Knoedler, such as the *Woman Holding a Balance* by Vermeer, purchased in 1911 for $145,000. Rivalries between these and other leading collectors were driving the market and quickly increasing the prices of works imported from Europe. In 1914 Knoedler purchased paintings (including masterpieces by Boucher) from the Wallace-Bagatelle collection that was liquidated by Jacques Seligmann in Paris, and resold them in the U.S. for record prices. As later noticed by the son Germain Seligman, at the time Paris was the paradise of collectors, but New York was becoming the paradise of dealers: "Upper Fifth Avenue was already strung with Renaissance palaces and Gothic castles, some complete with moat, noble edifices attesting to the fortunes of their owners. Every one of these houses contained works of art and every one of the owners was a collector – if 'collector' be defined as a buyer of rare and costly-non-utilitarian objects for the adornment of his living quarters" (Seligman, 1961, p. 23).

American imports of old master paintings were boosted even more after 1909, when the Payne-Aldrich Tariff Act eliminated the tariff on works of art that had been "in existence more than twenty years prior to the date of their importation", an exception removed in 1913 under the pressure of free art proponents such as Louis Brandeis and the collector John Quinn.[11] New major buyers of old master paintings started purchasing through Knoedler and other international dealers, including John Pierpont Morgan,[12] Benjamin Altman and Philip Lehman, whose main collections were left to the MET, Arabella and Collis Huntington, whose collection created the Huntington Art Gallery near Los Angeles, and Samuel Kress whose works populated the National Gallery of Washington as well as

---

[10] The dealers Carstairs, Gutekunst (for Colnaghi) and Trotti had spent $500,000 on the portraits from Genoa, whose export from Italy was prohibited from a law of 1903. "It was Trotti who had removed the canvases from their frames and rolled them into a tube underneath his car to smuggle them out of Italy. He drove the pictures to Montecarlo and then Le Havre, where Carstairs saw them and then arranged to have a conservator reline them, remove the old varnish and replace it with new" (Saltzman, 2008).

[11] The tariff will be reintroduced at 10% in 1918, doubled at 20% in 1922 and cut again at 5% in 1924 (May, 2010).

[12] J.P. Morgan purchased also from other dealers (as in the case of the Raphael's *Colonna Altarpiece* bought in 1901 for about $400,000 from Sedelmeyer), largely in other fields (such as Renaissance bronzes and medieval objects), and often through the acquisition of entire collections (see Saltzman, 2008, Ch. 3). He shipped his masterpieces from London to New York only when the tariff on art imports was removed.

various regional museums. New record prices were set: in 1911 Frick paid $475,000 to Knoedler for Velazquez's *Portrait of Philip IV* and Widener paid $500,000 for the *Mill* of Rembrandt, in 1913 Duveen sold Raphael's *Small Cowper Madonna* to the son of Widener [13] for $565,000 and Velazquez's *Count-Duke of Olivares* to Arabella Huntington for $650,000, while in 1915 Frick purchased Fragonard's panels of the *Progress of Love* for $1.25 million, again from Duveen who outbid Knoedler in the sale after the death of J.P. Morgan.[14] The inset of WWI reduced imports and trade and signed the end of a unique era for the market of old master paintings.

Besides old masters, Knoedler was allocating its investments across all the main sectors for the ordinary clientele, and was cultivating the expanding market of American art, including landscapes by Thomas Cole, Asher Durand, Martin J. Heade and Albert Bierstadt or realistic paintings by Eastman Johnson, Thomas Eakins, Winslow Homer and a multitude of minor artists of the *gilded age*. As noticed by Goldstein (2000, p. 172), "Knoedler's was never without a stock of American, Barbizon, and French Impressionist art on hand also, along with items from most other schools. In the first two decades of the twentieth century the gallery offered, along with much more, the Pre-Raphaelite paintings of Edward Burne-Jones, pastels by Everett Shinn, sixteenth- and seventeenth-century miniatures, watercolors by John Singer Sargent and John La Farge, the western art of Henry W. Ranger and Frederick Remington, the colorful, idiosyncratic oils of the American *saloniste* Florine Stettheimer". At the same time, the first modernist artists were launched in New York by innovative galleries, such as the Macbeth Gallery or 291 by the photographer Alfred Stieglitz, and by the Armory Show of 1913, which introduced the latest shocking achievements of European art led by Duchamp. This will have a long-lasting effect on the American market, fostering the interest of collectors on modernism, attracting new galleries dedicated to modern art, and intensifying the efforts of local artists to develop an American school that could appeal the new collectors (Cohen-Solal, 2001).

2.2. The interwar period

The interwar period was characterized by declining art prices, but represented an opportunity for an expansion of trade toward ordinary collectors. Visiting the Knoedler gallery in Fifth Avenue, any customer could find something to buy. The diary of a rival dealer (Gimpel, 1966, p. 35-6) gives us a precise (though not unbiased) impression of the Knoedler gallery in 1918: "An immense stone hall with ten employees to take charge of you and direct you to your area of interest, unless you only wanted to see one of the permanent exhibitions in one of the lower galleries. This place is a bazaar. You're looking for an engraving for five dollars that you'd find on the quays for five sous? You'll get it here. It's a Rembrandt etching you fancy, or a very rare eighteenth-century engraving? Five thousand dollars – it's yours! You need to have a glass cleaned, or a painting framed or repaired? At your service. But perhaps you want to buy a picture? Modern, you say. But what school? English, American, Canadian, French, Spanish, Hungarian, Russian? Name it; they'll show you it. An old

[13] Both the sons of Widener purchased through Knoedler, but George died on the Titanic, and it was Joseph who substantially enriched the collection of the father over the following years. In 1923, he purchased from Knoedler a *Young Girl with Flute* by Vermeer. Between other works by the same painter traded by Knoedler, the *Girl with the Red Hat* was sold to Andrew Mellon in 1925.

[14] The record price, however, was set by the Russian czar in 1914, paying approximately $1.5 million for the *Benois Madonna* of Leonardo da Vinci, kept at the Hermitage Museum since then.

master? They're less well provided there; they know less, they are a bit lacking in taste, but don't worry, they'll get you what you think you want. Will you spend one hundred dollars or one hundred thousand? Just say so. Speak, and you'll be taken to the right department." This diversification was the natural strategy for a gallery that could monetize on different sectors and allocated investments across them to maximize profits. Sectors with increasing demand required new investments, and Knoedler expanded the supply of works by American impressionists, often expatriates such as Mary Cassatt, John Sargent, James Whistler, George Innes, William M. Chase, Childe Hassam and other less important artists. At the same time, American art was also becoming the main focus of important New York galleries, such as Babcock, Kraushaar and Graham (see Fahlman, 2007, 2010).

In 1925 the premises of Knoedler were moved to 14 East 57th Street, near Madison Avenue, where all the major galleries began to congregate. After the death of Carstairs and the retirement of Roland Knoedler in 1928, the firm was incorporated and managed by Charles Henschel, grandson of Michael Knoedler. During the roaring twenties the gallery opened a new branch in Chicago (622 South Michigan Avenue) and served Hollywood stars such as Edward G. Robinson,[15] tycoons such as William R. Hearst, Jules Bache, Edward Harkness, Joan Whitney Payson, members of the Rothschild and Guggenheim families, as well as foreign businessmen such as Calouste Gulbenkian and Kojiro Matsukata. The lively market of this period stimulated the creation of galleries in New York and of the American Art Dealers Association, which included officers from Knoedler. Competition with the archrival Duveen became a constant factor at major international auctions,[16] and the rivalry continued behind the scenes. When Andrew W. Mellon, Secretary of the Treasury under three Republican presidents, was secretly buying masterpieces from the Hermitage Museum, many international dealers were contacted by the Soviets, but it was Henschel who went to Russia and purchased for Mellon more than twenty paintings, including the *Annunciation* of van Eyck, the *Adoration of the Magi* of Botticelli, the *Venus with a Mirror* of Titian and the *Alba Madonna* of Raphael, paid more than a million dollars in 1931.[17] The step back of Duveen in this transaction was probably finalized to ingratiate himself with Mellon: according to Simpson (1987, p. 225) "he signed a formal agreement with Carman Messmore of Knoedlers, which is preserved in the Metropolitan archives, that he would stand aside in exchange for a share in their profits." After that, Duveen and the Knoedlers reached an understanding to serve Mellon without interference, contributing to create one of the greatest collections of old master paintings in the U.S. (including at least eighty works in our dataset), and helping him with the later charges for conflict of interest in the Hermitage sale and tax evasion.[18] In 1937, to dismiss these charges, Mellon donated his collection for the foundation of the National Gallery of Washington.

---

[15] Knoedler will also handle the sale of the Robinson collection to Stavros Niarchos for $2 million in 1957, the largest private art transaction at the time (see Stourton, 2007).

[16] Secrest (2005) describes famous bidding fights at the 1923 Brownlow sale, the 1926 sales of portraits by Lawrence (*Pinkie*) and Romney (*Mrs Davenport*), and the 1927 Gary sale.

[17] Purchases from the Hermitage by Henschel included also paintings by Degas, Renoir, Cézanne and van Gogh resold to Stephen Clark (Goldstein, 2000).

[18] As recounted by Simpson (1987, p. 252), "Mellon invited Joe and Carman Messmore of Knoedlers for lunch in New York on 29 May 1935. Mellon explained that he was extremely depressed by the allegations, which he was sure were politically motivated by the Democrats. He announced that if he lost the case, he would take himself and his collection out of the country forever. Nevertheless, he assured them both, provided he won, there would be a gallery, and he urged them to continue with the planning. He also urged them to attend his hearing and give evidence on his behalf."

During the 30s, while the Chrysler Building, the Empire State Building and the Rockefeller Center were changing the architecture of New York, modern art was earning increasing attention in the city, attracting specialized dealers (such as Pierre Matisse, Julien Levy and Curt Valentin) as well as buyers. The first major collectors of modernist art appeared in this period, led by women such as Abigail Aldrich Rockefeller and Gertrude Vanderbilt Whitney. The first modern art museums were also developed in New York during this period, with the Museum of Modern Art (MoMA) directed by Alfred Barr, the Whitney Museum entirely dedicated to American art, and what will become the Guggenheim Museum (in the later building of Frank Lloyd Wright). The market demand was mainly for the school of Paris, and even Knoedler provided a constant supply of works by Utrillo, Modigliani, expressionists such as Matisse and Derain and cubists such as Picasso and Braque.[19] But the gallery supplied also works by local artists, such as Robert Henri, John Sloan, Arthur B. Davies, George Bellows, Maurice Prendergast, George Luks and the other components of “The Eight”, a group of artists based in New York to depict the modern American scene.[20]

The earnings of living American artists were slow to take off in a decade of economic stagnation and declining prices. The impact of the Great Depression was heavy on the primary art market, and it took the New Deal of President Roosevelt to hire thousands of artists to decorate public buildings, including young modernist painters such as Jackson Pollock, Mark Tobey, William Baziotes and the foreign-born Arshile Gorky, Willem de Kooning and Mark Rothko, as well as many other future abstract expressionists. The program was later reorganized under the Works Progress Administration (WPA) through the Federal Project Number One, and was immense.[21] Its impact on the evolution of American art was also crucial, not so much to encourage or shape innovations (due to a bias against modernism and in favour of regional realism), but because it connected and preserved in the profession a community of experimental artists who will be ready to compete for the booming market of the post-war period.[22] As emphasized by Galenson (2009), it was in the 30s and 40s that “New York was the scene of the development of the most important experimental art movement of the century, as a large group of painters gradually created a novel form of abstract art”, the first American-born movement to have a worldwide influence.

At the beginning of WWII, trade across the Atlantic was largely frozen. The Nazi occupation of France had dramatic consequences for Europe, but exerted also a profound impact on the art market. This happened directly, by fostering local investment in art as a safe haven (Oosterlink, 2017),[23] and

[19] Our dataset includes also works by surrealists, such as a landscape by Man Ray sold by Knoedler in 1947 for $450, and paintings by Ernst and Chagall, who moved to New York during the war.
[20] The most important heir of this group was Edward Hopper, who will be represented by the Rehn Gallery of New York for all his life.
[21] According to Netzer (1978, p. 55), “Federal One employed 45,000 in June 1936, 37,250 in May 1937; 28,000 in June 1938; and 39,000 in February 1939. Its production was even more impressive. By September 1938, the Art Project had produced 355,126 photographs, 17,000 pieces of sculpture, 108,000 easel paintings, 2,500 murals, 95,000 prints, 1.6 million posters and a 20,000 piece Index of American Design, and had operated over 100 community art centers.”
[22] Gorky worked for the WPA from 1934 to the end of the program in 1943 (Spender, 2000), Pollock from 1935 to 1943 (Friedman, 1995), de Kooning from 1935 to 1937 (Stevens and Swan, 2004), Rothko from 1936 to 1939 (Cohen-Solal, 2015), Baziotes from 1936 to 1941 (Preble, 2004) and Tobey between 1938 and 1939 (Bricker Balken, 2017). All of them earned about a hundred dollars a month. Hopper never considered working for the program: according to Levin (2023), he “believed that government funding would merely encourage artistic mediocrity and he condemned Roosevelt an all his works.”
[23] For a more general evaluation of art returns during crisis see the work of David *et al*. (2024) based on auction data from U.K. since 1908.

most of all indirectly, by forcing many European artists to escape toward America, and a few Jewish collectors and dealers to follow the same path, as was the case for the American Peggy Guggenheim and the Italian Leo Castelli, who will play key roles in the evolution of the art market of New York. The Nazis were also upsetting the market by selling what they regarded as degenerate modern art and purchasing or confiscating old master paintings.[24] Many art dealers were directly or indirectly associated with these affairs, and also the Knoedler gallery was involved in the trade of paintings looted by the Nazis during the war, including a portrait of a gentleman by El Greco seized by the Gestapo in 1944 and an *Odalisque* by Matisse confiscated from the Jewish art dealer Paul Rosenberg in 1941, both of which will have to be returned after lawsuits.

The most important impact of the war for art was the migration of prominent refugee artists, mostly surrealists, toward New York: they congregated around local artists giving birth to an unprecented cluster of artistic creativity that became a phenomenal stimulus for innovation (Hellmanzik, 2010). It was also a stimulus for the rapid emergence of new galleries specialized in contemporary art to satisfy increasing supply and demand. They were led by *Art of This Century*, opened in 1942 by Peggy Guggenheim, who gave the first *solo* exhibitions of Pollock, Rothko, Baziotes as well as Robert Motherwell, Adolph Gottlieb, Clifford Still and other pioneers of abstract expressionism, and then the galleries of Sam Kootz (1945), Charles Egan (1946), Betty Parsons (1946), Sidney Janis (1948) and Leo Castelli (1957). These and few others were the first to show works by American artists who were developing a radically new art, and they introduced new marketing and exhibition strategies. They replaced the dark velvet-covered walls of traditional galleries with white walls, and promoted vernissages with the artists. They also started to subsidize emerging painters to foster their production. For instance, Pollock worked for a subsidy of $1,800 per year against sales for Peggy Guggenheim, as recounted by the same dealer (Guggenheim, 1979): there was "a settlement at the end of the year, if I sold more than two thousand seven hundred dollars' worth, allowing one-third to the gallery. If I lost I was to get pictures in return… In 1945, Bill Davies, the collector, who was also a fan of Pollock's, advised me to raise my contract with him to three hundred dollars a month, and in exchange, to take all Pollock's works…I had no idea then what Pollock paintings would be worth. I never sold one for more than a thousand dollars". Peggy retired in 1947 in her Venetian mansion, which then became a museum of contemporary art, but a similar contract was later extended to other dealers (and artists).

2.3. The post-war period

It was in the late 40s that Pollock produced his most innovative works: breaking the rules of traditional easel painting, he developed a sort of dripping dance on large canvases lying on the floor, often described as an "action painting" emerging from the unconscious, just as contemporaneous jazz musicians and actors were breaking their rules with spontaneous rhythms and emotions emerging from the unconscious. Pollock started getting some critical and popular recognition (through the pen of Clement Greenberg and the pages of *Life* magazine), but was far from getting market recognition before his premature death in a car accident in 1956. After the purchase of *Number 1, 1948* by the

[24] The field-marshal Göring confiscated many works from Jewish collectors during his visits to France (some of which were forgeries, as the fake Vermeer's sold by van Meegeren). "His fabled train played a key role on these visits, for he liked to take back with him the treasures he had chosen. Occasionally he took objects on board for Hitler, but of the 21,903 recorded confiscations, approximately 700 paintings were earmarked for the marshal" (Watson, 1992).

MoMA for $1,000, he barely sold five more major paintings when alive (Friedman, 1995). A similar destiny was common to most of the other abstract expressionists, whose alcohol-fueled gatherings, in downtown New York (often at the Cedar Street tavern and the Eight Street Club) or in the Hamptons, fertilized a series of experimental innovations that were slowly appreciated in the market. Art galleries were flourishing in uptown Manhattan and the interest in the new art was also growing, but the market recognition arrived only in the second half of the 50s (when Tobey won the Grand Prize at the Venice Biennale of 1958). According to Ekelund *et al*. (2017), the number of galleries in New York grew from 40 at the beginning of the war to 150 at the end of the war, and by the end of the 50s there were almost 300 galleries, with at least a dozen specialized in the new art.

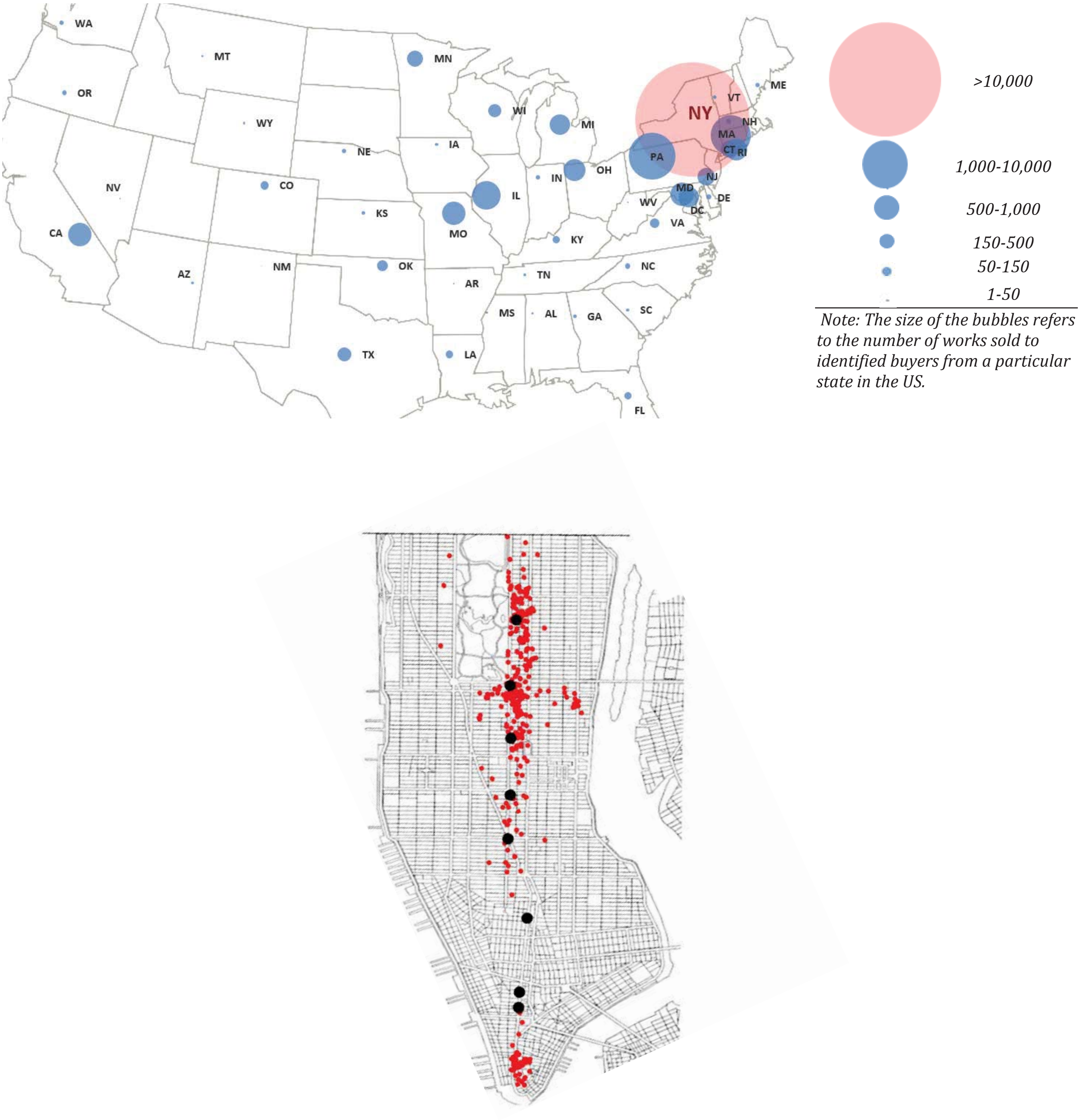
The lively American market attracted also auction houses, not anymore as wholesale outlets but as retail outlets for old masters and impressionists, with Sotheby's opening New York offices in 1955 under the lead of Peter Wilson and purchasing Parke-Bernet in 1964, while Christie's will follow in 1977.[25] Contemporary art, however, was the domain of dealers: it has been estimated that in the mid 60s about fifty thousand new artworks were exhibited every year in galleries of the Upper East Side, with up to forty vernissages a week during the winter and spring seasons (Cohen-Solal, 2010), and by the end of the 60s there were almost a hundred galleries dealing in contemporary art (Watson, 1992, p. 349). The Knoedler gallery, managed since 1956 by Roland Balaÿ (1902-2004), a nephew of Roland Knoedler, remained a generalist gallery, but expanded its activity in modern and contemporary art. Besides a full representation of modern European artists, the gallery traded also works by American modernists such as Max Weber, Marsden Hartley and Charles Demuth, as well as Reginald Marsh, Horace Pippin and the Mexicans artists Rivera and Orozco. In 1955 Knoedler took a major step in the contemporary art sector, becoming the New York dealer of the sculptor Henry Moore and selling 135 of his artworks in the next fifteen years. At the time, the works of the abstract expressionists were barely circulating in the secondary market and Knoedler was initially crowded out by dealers who were more in tune with the new art.[26] However, major collectors of American art were buying from Knoedler, such as the oilmen Thomas Gilcrease and Armand Hammer, the financier Joseph Hirshhorn and members of the Rockefeller family.[27] Gilcrease purchased almost only American art from Knoedler, including three western paintings by George Catlin paid $100,000 each in the mid 50s. Hirshhorn purchased mostly American and contemporary art, including an *Abstraction* of Pollock, paid $16,000 in 1961. By the late 60s, the gallery had finally shifted its focus for American art toward abstract expressionism, trading works by Pollock, de Kooning, Tobey, Gorky and also followers such as Robert De Niro Sr, Bill Parker, Harry Jackson or the Canadian artist Riopelle.

[25] The turning point for the birth of an international auction market (made possible by faster communication and transportation) was the Goldschmidt sale, held at Sotheby's in 1958, when Cézanne's *Garçon au gilet rouge* reached a record price. According to Watson (1992), "[i]ts reserve was £125,000 and the bidding started at only £20,000. The contest quickly became a fight between two dealers from Manhattan, George Keller, and Roland Balay of Knoedler, and they soon lifted the bids to a phenomenal £200,000. At £220,000 Wilson surveyed the room … Keller won, though only in a manner of speaking: he was bidding for Paul Mellon", son of Andrew and major buyer of French and British art, also from Knoedler (see Stourton, 2007).

[26] We are grateful to David Galenson for important clarifications on the competition between dealers in this period.

[27] In the post-war period Knoedler supplied actors (Gary Cooper and Henry Fonda), politicians (Joe P. Kennedy), car manufacturers (Ford, Chrysler and Agnelli), and some of the greatest collectors of the time (Norton, Wrightsman, Thyssen-Bornemisza, McIlhenny, Pulitzer, Tremaine and more). See Stourton (2007).

Figure 1. Geographic distribution of identified sales by Knoedler in the U.S. and New York



In 1967, with a late but majestic move, Knoedler started to represent the most celebrated of the living abstract expressionists, de Kooning, signing a contract that insured $100,000 per year to the artist against exclusive dealing of his works. The gallery immediately organized a one-man show (Stevens and Swan, 2004): "On the evening of Friday, November 10, 1967, several hundred invited guests pressed into the elegant interior of M. Knoedler and Company on East Fifty-seven Street. Forty-five paintings, twenty-five large drawings, and numerous smaller works hung on velvet-flocked walls. On one wall were the dramatic collection of door paintings: *Woman, Sag Harbor*; *Woman, Accabonac*; *Woman, Springs*; and *Woman, Montauk*. The least expensive paintings cost $12,000; *Figures in Landscape* was $55,000. According to *Time*, this was the most eagerly awaited show of the season". Between various transactions of the same year, Knoedler purchased *The Visit* from the artist for $26,665 and sold it for $45,000 to the Tate in London. In 1968, Knoedler organized an exhibition of de Kooning in Paris. In 1969 the gallery sold at least three major works by abstract expressionists, a *Composition* by Tobey for $4,090, a *Garden in Sochi* by Gorky sold to David L. Kreeger for $40,000 and a *Standing Woman* by de Kooning sold for $50,000. Knoedler presented also Barnett Newman in a group exhibition in Paris (1967) and then in an important one-man show in New York (1969), which included the most significant works of the decade and launched the leading color field painter at the international level.

The involvement of Knoedler in contemporary American art was forced by a rapidly evolving market, which during the 60s was led by the conceptual artists launched by the Castelli gallery,[28] such as Jasper Johns, Robert Rauschenberg (who won the International Grand Prize at the Venice Biennale of 1964) or other Pop artists, and more generally by the continuous birth of new ideas, new genres and new techniques (see Galenson, 2009). For the art of this generation, reflecting the products of popular culture and mass consumption, market recognition was faster and wider (including also early European collectors of American art, led by Panza and Ludwig). The star, Andy Warhol, exploited it by setting up a "factory" for mass production of different art genres, where assistants and machines would even replace his direct contribution (Nuridsany, 2001). As a deep observer of economic mechanisms, Warhol reached a good understanding of the principles of profit maximization in art production: in his words, "[a]n artist is somebody who produces things that people don't need to have but that he – for some reason – thinks it would be a good idea to give them. Business Art is a much better thing to be making than Art Art, because Art Art doesn't support the space it takes up, whereas Business Art does. (If Business Art doesn't support its own space it goes out-of-business.)" *sic* (Warhol, 1975, p. 144). Warhol will become the most successful and influential artist of the rest of the century.

In 1971, the Knoedler gallery, which had just moved headquarters to 19 East 70th Street, close to Central Park, was sold to Armand Hammer, to be gradually refocused on contemporary art under the direction of Lawrence Rubin. The gallery dealt with Motherwell, Gottlieb, Rauschenberg as well as Helen Frankenthaler, Frank Stella and other American artists, in competition with major galleries of New York that were ruling the international market for contemporary art. The Knoedler gallery was closed in 2011, amid lawsuits for fraud after accusations of forgery of paintings by abstract expressionists such as Pollock and Rothko. In its long history, Knoedler had sold all kind of art throughout the entire U.S., including masterpieces ended in the major museums and ordinary works remained in private hands. Fig. 1 displays the distribution of sales in our dataset across U.S. states for identified destinations (Fig. 1 a) and in Manhattan for identified buyers, often located throughout Fifth Avenue, Madison Avenue and Park Avenue (red balls), while the headquarters of the gallery

[28] It's interesting that Leo Castelli was well aware of the economic determinants of art historical evolution. As he noticed, "in every moment in history … there have been periods of economic and cultural prosperity, as in France or Holland. It's in those periods that art inevitably develops, and an elite forms around certain centers. Similar phenomena have happened in all world's capitals. In the United States, there was a period of accelerated growth, and we were able to take advantage of a very healthy economy" (Cohen-Solal, 2010, p. 227).

were moving north along Fifth Avenue (black balls). Most of all, the Knoedler gallery had a key role in the trade of European old master paintings, that attracted the early demand of major American collectors, and of American modern paintings, which gradually joined the supply of European artists.

3. Theoretical predictions on art returns

An art gallery constantly invests in the search and purchase of artworks and tries to sell them at the best prices with the purpose of maximizing expected profits,[29] which serves an important role for the efficient allocation of artworks across collectors.[30] In the golden age of international art dealing, this happened in an environment characterized by limited and asymmetric information between buyers and sellers. Especially in case of old master paintings, the information on authorship, quality and value of artworks was highly uncertain: only few international dealers had a better perspective on supply and demand of artworks in different countries to predict their potential return, and only few *connoisseurs* could verify and, to some extent, certify authorship and quality. In more recent times, other art sectors, such as modern and contemporary art, have been subject to different kinds of risks, mainly related to the volatility of demand and supply, and to the diffusion of forgeries.[31] In such an uncertain environment art dealers are useful to reduce transaction costs in the market, and they tend to allocate acquisitions across sectors and types of artworks trying to maximize the expected revenues net of search costs.

The direct analysis of purchase or sale prices of a generalist gallery can provide important insights on the evolution of the art market. However, the more than two hundred works traded on average by Knoedler every year may not necessarily constitute a representative sample of the art market in New York for a variety of reasons. A gallery allocates its investments considering the expected returns in the short term and the search and marketing costs required to trade different artworks. When the demand for an art sector increases, the gallery may expand its supply of lower quality and cheaper works in that sector, and when the demand for another sector decreases, the gallery may only manage to trade works of quality and price above average, which may bias the relative evolution of its price levels. Hedonic regressions on purchase or sale prices cannot fully control for all the quality differentials of paintings, sculptures and other artworks. Moreover, the relevant changes in willingness to pay are the unexpected ones, which affect prices after the investment decisions of a gallery. Finally, the most relevant contemporary art is appreciated and traded with a natural delay compared to traditional art. For these reasons, and following David *et al*. (2023), our investigation is focused on returns rates rather than purchase or sale prices, and is based on a theoretical analysis of

[29] Occasionally, a gallery signs exclusive contracts with a collector-seller to trade against a commission. The efficiency of these contracts has been emphasized by the art dealer Seligman (1961, p. 213): an exclusive agreement (as opposed to one open to multiple dealers) "assures the collector-seller that his agent's interest are his own, for there is an agreed basis of sales commission, and a fixed minimum of acceptable price on each work to be offered. Then the agent strives to obtain the best possible figure for every item, since he also benefits, and the possibility of conflict between the contracting parties is eliminated from the start."

[30] On the theoretical role of dealers in market organization see Spulber (2002). On art dealers in particular see Cellini and Cuccia (2014).

[31] Art of high value attracts more forgeries. A famous scandal emerged in the 60s around the forger de Hory, who had been creating fake French masters for decades. "The trade was taken in on a widespread scale: Knoedler sold a de Hory 'Matisse' for more than $60,000 and was so proud of the fact that it advertised the sale, with a photograph of the painting, in *ARTnews*" (Watson, 1992, p. 335).

the determinants of returns, emphasizing unexpected components as due to shocks at the aggregate, sector and artist level.

The fundamental implication of the business model of art dealers is that they should allocate purchases to equalize the marginal productivity of investment in alternative sectors and artists. This suggests that the expected return should not vary in a predictable way across different types of investment, except for differences in purchase prices and search costs, which imply higher expected returns for artworks that are less expensive or that require more effort to find sellers and buyers. Formally, let us assume that a risk neutral dealer selects the number of acquisitions n_j for a specific type of artworks by artist j available at price P_j, facing search costs $C(n_j)$ that are increasing and convex in the number of traded works, with $C'(n_j) > 0$ and $C''(n_j) > 0$. The expected resale price is S_j^e while the effective resale price can differ due to unexpected changes in the willingness to pay. An alternative riskless investment A provides a certain return r. Then, the problem of the dealer is to maximize total profits selecting acquisitions over all j under the constraint that total spending equates a given endowment E:

$$\max_{n_j,A} \sum\nolimits_j \left[n_j\left(S_j^e - P_j\right) - C\left(n_j\right)\right] + Ar \quad s.v.: \sum\nolimits_j n_j P_j + A = E$$

Assuming interior solutions, the optimality conditions $S_j^e - P_j = C'\left(n_j\right) + rP_j$ provide expected returns $r_j^e = \frac{S_j^e - P_j}{P_j}$ that satisfy:

$$r_j^e = r + \frac{C'\left(n_j\right)}{P_j}$$

which implies deviations from the certain return r due to the price of acquisition P_j, the number of works per artist n_j, and type-specific features affecting the marginal search cost $C'\left(n_j\right)$. In particular, we expect that:

a) the art return should change with the prevailing real interest rate over the relevant time frame of art deals. In practice, most artworks are re-sold within a year, therefore we expect a correlation with one year interest rates on U.S. treasury bonds adjusted for the inflation rate.
b) the return on artworks should be inversely related with the purchase price. In practice, every deal requires time and effort for the search of sellers and buyers under imperfect information, and even if art dealers are incentivized to invest more for more valuable artworks, the fixed costs are more relevant for works of low value and become less important when the value of the artwork increases. This implies that a higher return is needed for dealers to spend time and effort in trading works of low value, while a lower return is acceptable for works of high value.[32]
c) the return should increase with the number of works traded per artist. Since the search costs are increasing and convex in the number of traded works, this number should be positively

[32] Moreover, one can also expect that the intensity of competition with rival dealers is stronger for highly valuable works, and the intensity of competition between the fewer potential art collectors can be weaker. Finally, both sellers and buyers tend to invest more to learn the market value of more valuable works, which limits the spread that can be obtained by intermediaries. All these market frictions associated with the intermediation of art dealers point in the direction of a lower rate of return for more valuable artworks. Notice that in an efficient market without these frictions there should be no systematic relation between returns and prices (see Etro and Stepanova, 2021).

associated with the return. In practice, a higher expected return is needed to compensate a dealer for higher search costs.

d) artworks are differentiated along various other characteristics affecting the search costs, therefore we need to take into account that artworks that require higher search costs need a higher expected return to be traded. As we will discuss in detail below, search costs may be affected by the same nature of the artworks or the investments needed to promote them.

Of course, what we observe in the data are not the expected returns, but the effective returns on sold works, therefore systematic deviations in these returns should be due also to *ex post* variations in demand and supply that are *ex ante* unexpected. Accordingly, we will run regressions for the effective logarithmic return $r_{ijt} = log(S_{ijt}/P_{ijt})$ of artwork *i* by artist *j* purchased at time *t* through the following baseline model:

$$r_{ijt} = \alpha r_t + \beta log(P_{ijt}) + \gamma log(n_j) + \boldsymbol{X}_i\boldsymbol{\delta} + \tau_t + \varepsilon_{ijt}$$

where α is the coefficient on the riskless real return r_t at time *t* and should be positive, β is the coefficient on the log of the purchase price of artwork *i* by artist *j* at time *t* and should be negative, γ is the coefficient on the log of the number of works traded of artist *j* and should be positive, $\boldsymbol{X}_i$ represents the other characteristics of artwork *i* with a vector of coefficients $\boldsymbol{\delta}$, τ_t is a set of time fixed effects and ε_{ijt} the error term. The model will also be useful to isolate changes in the willingness to pay for relevant art sectors, say European old masters vs American artists, over time. In particular, let us assume that the effective resale price is $S_{ijt} = S_{ijt}^e(1 + \eta_t)$, where η_t is a percentage shock with zero expectation reflecting unexpected changes in the willingness to pay for works of a certain sector at time *t*. Then, the log return $r_{ijt} \approx log(S_{ijt}^e/P_{ijt}) + \eta_t$ allows us to isolate the evolution of changes in willingness to pay that are not expected in the market.

Shocks that influence the effective returns can work at the aggregate level, at the sector level or at the artist level. An aggregate demand shock can be associated with improved economic conditions that increase the willingness to pay of collectors:[33] therefore we expect that some measure of economic growth in the U.S. in the year of resale should be positively correlated with art returns. A shock at the sector level is associated with unexpected changes in the willingness to pay for artworks in that sector, reflecting changes in the preferences of collectors or in art historical values that start to be reflected by markets. A supply shock at the artist level can be associated with the sudden death of the artist, which reduces the expected supply of artworks and tends to increase their value (Ekelund *et al*., 2017; Penasse *et al*., 2021): we expect this to be reflected also in the rate of return in case of death immediately before the sale.

A variety of factors influence the search strategies of dealers and their returns (see Cellini and Cuccia, 2014). For instance, a common resale strategy involves setting a high price initially and then reducing it over time until a buyer is found. As in a descending price auction, this insures that each resale price reflects the maximum willingness to pay for the characteristics of the artwork between all the potential

[33] The business cycle usually has an ambiguous impact on markups of different sectors, but the impact on the markup of art dealers reflects a gap between purchase prices and resale prices in different moments. When an artwork is sold in a booming period, the willingness to pay of art collectors should be higher on average (relative to the time of purchase) and the return rate should be higher as well.

art collectors. And it necessarily implies a negative relation between the rate of return and the time artworks spend in the inventory of the gallery before the sale (David *et al*., 2023). At a more general level, search costs are related with investments by dealers to advertise sales. For instance, exhibitions are a common marketing tool used by major dealers, and Knoedler organized hundreds of exhibitions that are carefully recorded in its archives.[34] The gallery selected artists to promote through *solo* exhibitions, with a frequent focus on established American artists: over a century there were 22 exhibitions for Whistler, 12 for Remington, 11 for Sargent, 7 for de Kooning, and 3 each for Homer, Hartley and Gorky.[35] But there was also attention to new emerging artists: *An exhibition of portraits by Mark Tobey*, organized by Knoedler in 1917, was the first *solo* exhibition of an experimental artist who will later become a leading abstract expressionist (Bricker Balken, 2017). The gallery invested in these shows to attract customers, therefore we expect higher returns for artists for which Knoedler organized a *solo* exhibition. This is also consistent with the finding by Li *et al*. (2022), for which exhibitions in renowned galleries have a positive impact on returns.

It is legitimate to expect that art dealers can bear lower returns when they are betting on some form of long term investment. This may be the case of new artists (without a history of previous sales in the Knoedler gallery) or illiquid artists (whose past works went mostly unsold in the Knoedler gallery): in these cases, the return may arrive only on future sales by the same artists, once they are established in the market. Moreover, art dealers frequently pool large investments to preserve liquidity and increase the churn of transactions, reducing search costs and risks (see Feigenbaum *et al*., 2024), which implies a lower return in case of a consortium of dealers. Similar arguments apply in case of more works purchased or sold together. The search costs of art dealers are also related with the nature of the artworks. Small works bear low (direct and opportunity) costs of display in a gallery and in exhibitions, and fit the needs of more potential customers, while larger works have a high cost of display and fit a more selected clientele, requiring higher search costs: therefore we expect returns to be positively correlated with the size of artworks. Similarly, still life and landscape paintings appeal a larger potential demand than portraits and history paintings, which usually require more marketing efforts and therefore a higher return to justify an investment. Finally, a generalist gallery such as Knoedler may want to trade marginally in sectors that bear lower expected returns, with the main purpose of covering a niche for its customers, as in case of watercolor and pastel paintings or sculpture.[36]

The forces that lead to the equalization of expected returns on art investments suggests that most of the remaining (and) high variability in effective returns should be due to changes in demand and supply conditions that could not be systematically forseen. Even the most careful art experts cannot figure out short run and long run trends in demand and supply of art, and the rise and decline of different sectors. However, for the two key sectors traded at the Knoedler gallery, namely European old masters and American modern artists, we now know that the century under investigation

[34] Out of 1,733 exhibitions recorded in the Knoedler archives, 1,015 were *solo* exhibitions, while the others were group exhibitions or exhibitions of important collections. For instance, Knoedler organized group exhibitions on “Contemporary English Painting” in 1916, “French Art of the Last Fifty Years” in 1927 and “Texas Contemporary Artists” in 1952.
[35] We can also count 6 exhibitions for El Greco, 11 for Rembrandt, 5 for Gainsborough, 4 for Corot, 7 for Picasso and 4 for Moore.
[36] This resonates well with the account of a famous international art dealer stating that “the reluctance of the public, and even of many museums, to collect sculpture makes it one of the least profitable fields for the dealer” (Seligman, 1961, p. 249).

experienced dramatic changes. During the *gilded age* an increasing demand of European old masters by American collectors was gradually pushing their prices upward. Moreover, old master paintings faced limited supply because of their intrinsic nature (and restrictions on exports), as well as higher risk (due to uncertainty in attributions and other forms of risk associated with international trade) and search costs:[37] for these reasons one may expect higher than average and increasing returns in this sector during the *gilded age*. Possibly in the attempt to exploit the emerging demand of art, new and more innovative American artists tried to develop a domestic school of increasing originality. This diverted some of the demand toward American art during the interwar period, gradually increasing its prices and ultimately fostering the emergence of the New York leadership in the post-war period. In front of such trends, we expect to find evidence of positive shocks to the willingness to pay for European old masters until WWI, when the demand for this sector reached its peak, and then a slow decline of the unexpected returns. At the same time we expect to find evidence of a positive trend in the return on American artists, with positive shocks to the willingness to pay from the 20s to the 60s, when the New York school became dominant.

4. Empirical analysis

Our empirical analysis is based on purchases and sales of artworks recorded in the archives of Knoedler between 1870 and 1970.[38] The prices are converted into 1870 dollars to obtain real return rates.[39] Descriptive statistics are presented in Table 1. The average artwork is purchased for $4,415 and expects to remain in stock for more than a year, but the median price is much lower, $701, and the median permanence in the inventories of the gallery is only seven months. On average the log return is 46%: of course, this margin covers not only the search costs for the works and the fixed costs of the gallery, but also the costs related to unsold works (which were largely handed back to the initial owners). About 14% of the artworks are by European old masters (here defined as born before 1760) and these are more expensive than the average works. Instead, half of the traded works are by living artists (at the time of the sale), and they are substantially cheaper. The majority of works are from artists active during the XIX century or the beginning of the XX century, largely French masters, who represent 40% of all the works traded by the gallery, and were also dominating the international market. About 11% of the works are by American artists, featuring prices well below the average; the complete list of the American artists traded by Knoedler is in the Appendix. The vast majority of the artworks are paintings (96%), almost half of which are genre paintings, while a third of the paintings represent landscapes and the remaining ones are divided between the other genres.[40] Only in the last decades under consideration abstract art was traded by the gallery, and it corresponds to

[37] Trade in masterpieces by old masters (and mistresses) involved a variety of additional "services that went well beyond the commerce of art to involve the aftercare and display of a valued client's collection, arranging for insurance, purchasing covered wire, frames and other practical items" (Reist, 2020).
[38] As noticed by Jensen (2018) some of the records may not be reliable or complete. However, by considering artworks that are effectively purchased and sold at distinct prices, we focus on reliable cases of intermediation.
[39] Currency conversion rates are taken from *Currency conversion tables: A hundred years of change* (1970, by Robin Leonard Bidwell, Rex Collings Limited, London). Transformation into dollar prices of 1870 is performed using CPI statistics from Carter *et al*. (2006) for years until 1913 and US Bureau of Labor Statistics CPI data for later years.
[40] The works are assigned to different genres in the Getty dataset, and we omit few works with unspecified genre. The rarest genre is represented by still life paintings, which include works by American specialists of the *gilded age*, such as William Harnett and few female artists (for a discussion on gender discrimination through genre specialization in the XIX century see Greenwald, 2021). In the latest period the gallery sold also American folk art, including works by Edward Hicks and Grandma Moses.

1% of the dataset, including a couple of paintings by Kandinsky sold in 1960 for $10,000 and in 1970 for $160,000, and many works by Poliakoff. As expected, the descriptive statistics do not emphasize clear differentials between returns on alternative types of investments.

Table 1: Descriptive statistics

	Mean		Median
Real total return	46%	(70%)	46%
Purchase price (*1870 $*)	4,415	(27,015)	701
Time in stock (*months*)	15.89	(23.38)	7

	Mean	Average Purchase price (*1870 $*)		Average return	
New artist	0.07	3,129	(37,566)	54%	(91%)
Illiquid artist	0.1	1,828	(7,042)	41%	(79%)
Exhibited artist	0.17	9,983	(38,481)	48%	(76%)
Primary market - Direct purchase from an artist	0.01	888	(1,671)	44%	(58%)
European Old Master	0.14	14,376	(67,944)	49%	(96%)
American artist	0.11	2,164	(6,992)	54%	(74%)
Living artist	0.5	1,547	(3,912)	43%	(57%)
Death effect case	0.01	2,084	(4,125)	39%	(85%)
Object type					
Painting	0.96	4,783	(28,375)	46%	(69%)
Pastel	0.01	3,244	(9,890)	39%	(75%)
Watercolor	0.01	1,497	(5,320)	28%	(58%)
Sculpture	0.03	2,299	(3,274)	58%	(76%)
Genre					
Abstract	0.01	5,266	(9,462)	49%	(74%)
Still life	0.04	2,755	(10,190)	49%	(72%)
Genre paintings	0.48	2,651	(12,043)	44%	(65%)
Figurative	0.04	11,627	(54,643)	42%	(83%)
Landscape	0.32	3,888	(18,509)	48%	(68%)
Portrait	0.11	14,020	(64,235)	50%	(85%)
Dated work	0.34	7,264	(33,125)	52%	(85%)
Size known	0.04	6,337	(22,576)	51%	(67%)
Consortium of dealers	0.12	16,698	(62,928)	32%	(99%)

Note: Standard deviations in parentheses.

4.1. Art prices

For a preliminary exploration of the data we exploit its unique length over a century to build a price index in real terms based on sale prices. This is obtained from a standard hedonic regression for the (log) price of sale, controlling for the main characteristics of the works (see the Appendix). The baseline specification does not control for artists's fixed effects, but confirms differences between European old masters and modern American artists. The full specification with artists's fixed effects explains a large part of price variability and is used to obtain the price index of Fig. 2. As expected, the sale price of a representative work is higher when it is a larger painting by an established artist with a *solo* exhibition in the gallery, and is lower in case of new or illiquid artist, and for direct purchases from the artist. Even controlling for a variety of factors, the European old masters were sold at prices well above average, while abstract and American artists were priced largely below average. Other substantial differences between genres reflect traditional hierarchies in pricing on the secondary art market. We do not find significant price differentials between female and male artists.[41] As expected, joint purchases by multiple dealers were associated with higher prices, which required a sharing of investment to reduce the risk in the search for appropriate buyers.

Figure 2: Art Price Index in real terms from hedonic regression on Knoedler's sale prices

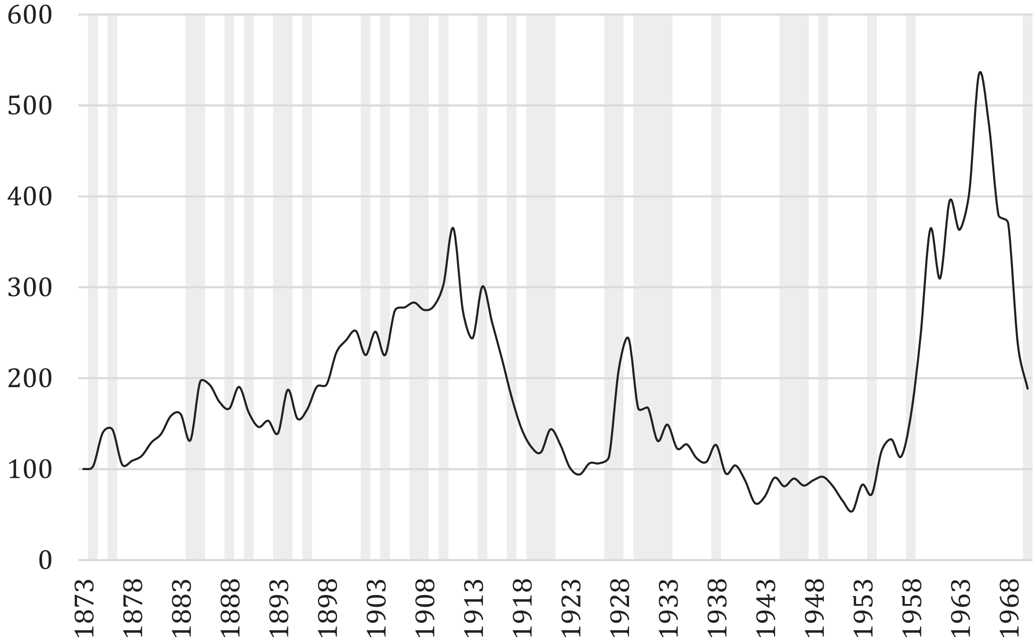
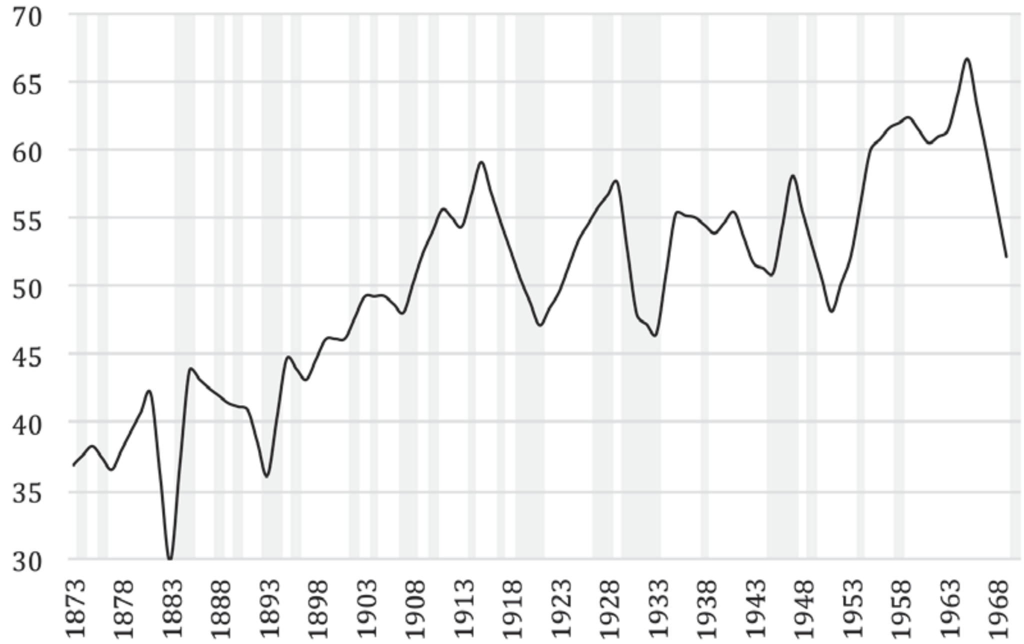


Figure 3: Predicted Return Rate in Real Terms from Regression on Knoedler's Returns



[41] This may be due to complex selection effects. A prominent artist such as Georgia O'Keefe was not traded by Knoedler, but during this period her works were also rarely traded in the secondary market.

Keeping in mind that sales were mainly in the U.S., the value of a representative work sold by Knoedler emphasizes a substantial growth during the so-called American Renaissance up to the beginning of WWI: Knoedler was initially building a clientele on traditional sectors sacrificing returns to expand its market, but later investments to enter new sectors allowed the gallery to obtain higher margins. The art price index exhibits a subsequent decline, with a modest recovery in the 20s and a deeper collapse through the Great Depression, until the end of WWII: however, in this period Knoedler managed to exploit its leadership to preserve good margins on a reduced amount of transactions. The latest post-war period shows a substantial increase of the art price index, largely driven by modern and contemporary art, which allowed Knoedler to obtain high margins until the late 60s.

4.2. Art returns

Our main exploration of art returns is presented in Table 2. The dependent variable is the logarithm of the ratio of sale and purchase price in real terms. The baseline specification includes all the characteristics of the artworks and of the artists, and controls for time fixed effects. Through these we build the predicted percentage return of Fig. 3, which shows the evolution of a representative return on artworks traded by the gallery: this started with a modest return at the end of the XIX century, and fluctuated around 50/60% for the rest of the period. The baseline specification in Table 2 uses fixed effects by decades to account for other short term controls. The full specification adds controls for the characteristics of the buyers that are known *ex post*, with a full set of destination and buyer fixed effects, whose coefficients are reported in Tables 3 and 4 for interesting cases.

Our investigation of the basic determinants of return rates can only explain a small part of the variability in our baseline specification (1), which is consistent with the principle of equalization of expected returns across investments, since the remaining variability in effective returns should be mostly unexpected *ex ante*. But not surprisingly, the R^2 coefficient increases substantially in the specification (2) with a full set of fixed effects accounting for heterogeneity *ex post* in the willingness to pay of the buyers. The baseline specification allows us to test our main predictions. First, the art return rate is highly correlated with the short term real interest rate,[42] as our formal analysis suggests: changes in interest rates are largely shifted into changes in art returns. Second, the art return is significantly lower for artworks purchased at a higher price, since the dealer faces a lower cost of search and management per unit of investment: when the price of an artwork doubles the return is reduced by about 15%. In other words, generalist art dealers keep trading cheaper works because they expect higher margins on them, while they accept a lower margin on more expensive works. Third, the art return is positively associated with the number of works traded per artist. While ideally this relation should be tested on works by artists in shorter periods, we have used the total number of works traded by Knoedler for each artists and the relation remains clearly relevant, with a 4% increase in return when the number of works doubles.

[42] The data on the one year interest rate in real terms are from Siegel (1992).

Table 2: Determinants of returns, OLS regressions

	Baseline model			Extended model with Destinations & Buyers FEs		
	(1)			(2)		
Dependent variable: real total return	Coef		SE	Coef		SE
Short-term interest rate	0.788	***	(0.159)	0.376	**	(0.181)
Log (Purchase price, *in 1870 $*)	-0.153	***	(0.004)	-0.21	***	(0.005)
Log (Number of works per artist)	0.042	***	(0.004)	0.033	***	(0.004)
US GDP growth rate	0.75	***	(0.098)	0.327	***	(0.109)
Imports tariff rate	0.877	***	(0.048)	0.967	***	(0.054)
Living artist	-0.101	***	(0.011)	-0.119	***	(0.012)
Artist died in the year of resale	-0.005		(0.053)	-0.062		(0.062)
Artist died within one year before the resale	0.245	**	(0.103)	0.050		(0.111)
Artist died within two year before the resale	0.51	**	(0.229)	0.033		(0.220)
Artist died more two year before the resale	-0.178		(0.134)	-0.136		(0.146)
Time in inventory (*in months*)	-0.005	***	(0.000)	-0.003	***	(0.000)
Exhibited artist	0.076	***	(0.014)	0.088	***	(0.015)
New artist	-0.088	***	(0.023)	-0.113	***	(0.024)
Illiquid artist	-0.081	***	(0.017)	-0.03	*	(0.017)
Consortium of dealers	-0.132	***	(0.020)	-0.006		(0.021)
Number of works purchased together	-0.006	***	(0.002)	-0.006	***	(0.002)
Number of works sold together	-0.011	**	(0.004)	-0.012	***	(0.004)
Work dimensions (Unknown size is omitted)						
Size is less than 0.5 square meters	-0.044	**	(0.018)	-0.026		(0.020)
Size is in between 0.5 and 0.75 square meters	0.082	***	(0.028)	0.082	***	(0.029)
Size is in between 0.75 and 1 square meters	0.082	**	(0.039)	0.101	**	(0.041)
Size is in between 1 and 2 square meters	0.194	***	(0.032)	0.175	***	(0.034)
Size is more than 2 square meters	0.271	***	(0.071)	0.279	***	(0.073)
Dated work	0.013		(0.022)	-0.006		(0.023)
Primary market - Direct purchase from an artist	-0.045		(0.036)	-0.096	**	(0.043)
Female	0.048		(0.031)	0.024		(0.034)
Genre (Genre paintings are omitted)						
Abstract	-0.086		(0.059)	0.011		(0.070)
Still life	-0.042	*	(0.024)	-0.042	*	(0.025)
Landscape	0.011		(0.010)	-0.003		(0.011)
Figurative	0.139	***	(0.028)	0.137	***	(0.028)
Portrait	0.136	***	(0.019)	0.109	***	(0.020)
Object type (Painting is omitted)						
Sculpture	-0.061	*	(0.035)	-0.168	***	(0.037)
Pastel	-0.094		(0.061)	-0.138	**	(0.070)
Watercolor	-0.218	***	(0.056)	-0.084		(0.051)
Time fixed effects	(YES)			(YES)		
Destination and Buyers' fixed effects (see Table 4-5)				(YES)		
Constant	1.122	***	(0.031)	1.69	***	(0.042)
Observations	22,075			22,075		
R-squared	0.15			0.45		

Note: Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1

Our next set of predictions concerns the impact of demand and supply factors. We find that the return is pro-cyclical, as it is positively correlated with the yearly growth rate (after controlling for decade dummies),[43] confirming that a positive demand shock increases prices and therefore also the effective returns, while the margins of the dealer are reduced in a downturn. We also find strong evidence of a death effect with substantially higher returns for artists deceased one or two years before the sale, confirming that a negative supply shock (here associated with a cut in the production of the artist) increases prices and effective returns, as already noted by Ekelund *et al*. (2017), Penasse *et al*. (2021), Ursprung and Zigova (2021) and others. We also use another control variable that is related to the supply side, and is the level of the tariff on imported works: a one-percentage-point increase in tariff translates into a less than proportional increase in return, suggesting that the burden of import duties was in part shifted into higher sale prices.

Table 3: Regression results, selected values of *Destinations'* fixed effects (Table 2, model 2)

	observations	Coef.		SE
United States				
East Coast				
New York City - Madison Avenue	141	0.138	**	(0.070)
New York City - Park Avenue	157	0.125	**	(0.060)
New York City - Fifth Avenue	194	0.042		(0.059)
Boston	1,036	0.043		(0.027)
Washington	340	0.109	**	(0.046)
Connecticut	246	0.107	**	(0.043)
Florida	43	-0.239		(0.163)
Massachusetts	298	0.159	***	(0.038)
Maryland	447	0.11	**	(0.051)
Rhode Island	394	0.010		(0.032)
New York State	239	0.089	***	(0.033)
Pennsylvania	1797	0.149	***	(0.039)
Mid West				
Chicago	631	0.109	***	(0.031)
Illinois	43	0.118		(0.087)
Michigan	345	0.108	***	(0.038)
Missouri	447	0.091	***	(0.031)
Ohio	389	0.083	**	(0.036)
West and South				
Los Angeles	100	0.231	***	(0.063)
California	352	0.136	***	(0.044)
Louisiana	52	-0.005		(0.091)
Texas	163	0.110		(0.067)
Europe	2,879	-0.095	***	(0.035)
Rest of the World	308	0.162	***	(0.056)

Note: Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1
Coefficients report markup premium/discount with respect to the baseline category – *New York City (excluding Madison, Park and Fifth Avenue)*

Other findings confirm predictions based on the marketing strategies of art dealers. The return decreases when the artworks spend more time in the stock of the gallery in search for a buyer, and the dealer has to accept lower resale prices: an additional month in the gallery reduces the return by 0.5%. This confirms analogous findings by David *et al*. (2023) on the Goupil gallery. Consistently

[43] Data on US GDP *per capita* are from the Maddison tables in Bolt and van Zanden (2020).

with our predictions, we find significantly higher returns for works by artists that the gallery honoured with *solo* exhibitions. We unveil lower returns for new artists traded by Knoedler, and for critical artists, here defined with a value of unsold works that exceeds the value of sold works by more than half. In the case of artworks purchased together with other dealers, the return appears lower: these joint account transactions were mostly secret and aimed at sharing costs and risks for high profitle acquisitions (insuring the incentives for each dealer to search buyers through an additional share of the joint profits), which justified a lower return than usual. When the size is known, the return increases consistently with it, confirming the need of higher returns on larger works that involve higher costs of display and marketing. There are minor differences across genres, although figurative works and portraits exhibit higher returns than average, possibly reflecting higher search costs compared to landscapes, still life and genre paintings, that typically fit a wider range of potential buyers. Sculpture and watercolors were more rarely traded by Knoedler and exhibit a lower return than paintings. Finally, there are no significant differentials for returns on dated works, direct purchases from artists and works by female artists.

Table 4: Regression results, selected values of *Buyers'* fixed effects (Table 2, model 2)

	observations	Coef.		SE
Collectors				
Frick, Clay	162	0.406	***	(0.053)
Havemeyer, Harry and Louisine	17	0.216		(0.161)
Huntington, Arabella and Collis	31	0.146	*	(0.087)
Palmer, Potter	32	-0.258	***	(0.070)
Altman, Benjamin	28	0.17	***	(0.052)
Mellon family	122	0.216	***	(0.076)
Widener family	17	0.192		(0.161)
Lehman family	17	0.334	***	(0.117)
Rothschild family	12	0.176		(0.131)
Rockefeller family	74	0.161	***	(0.052)
Guggenheim family	8	0.108		(0.087)
Johnson, John	22	-0.157	**	(0.061)
Hirschhorn, Joseph	53	-0.171	*	(0.091)
Gilcrease, Thomas	77	0.782	**	(0.345)
Museums				
MET, New York	17	0.469	***	(0.126)
MFA, Boston	9	0.431	*	(0.225)
Other American museums	281	0.219	***	(0.056)
Auction houses and dealers				
Christie's	114	-1.704	***	(0.123)
Sotheby's	34	-0.993	***	(0.261)
Parke-Bernet Galleries	46	-1.389	***	(0.188)
American Art Association	343	-0.589	***	(0.040)
John Levy Gallery	303	-0.319	***	(0.043)
Haseltine Gallery	504	-0.823	***	(0.049)
Vose Gallery	233	-0.138	***	(0.034)
Schaus Gallery	22	-0.044		(0.107)
Babcock Gallery	21	-0.44	***	(0.105)
Kraushaar Gallery	21	-0.203	**	(0.080)
Graham & Sons Gallery	8	-0.264	**	(0.120)
Colnaghi Gallery	141	-0.605	***	(0.104)

Note: Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1
Coefficients report markup premium/discount with respect to the baseline category - *Unknown Buyer*

Other findings confirm predictions based on the marketing strategies of art dealers. The return decreases when the artworks spend more time in the stock of the gallery in search for a buyer, and the dealer has to accept lower resale prices: an additional month in the gallery reduces the return by 0.5%. This confirms analogous findings by David *et al*. (2023) on the Goupil gallery. Consistently with our predictions, we find significantly higher returns for works by artists that the gallery honoured with *solo* exhibitions. We unveil lower returns for new artists traded by Knoedler, and for critical artists, here defined with a value of unsold works that exceeds the value of sold works by more than half. In the case of artworks purchased together with other dealers, the return appears lower: these joint account transactions were mostly secret and aimed at sharing costs and risks for high profile acquisitions (insuring the incentives for each dealer to search buyers through an additional share of the joint profits), which justified a lower return than usual. When the size is known, the return increases consistently with it, confirming the need of higher returns on larger works that involve higher costs of display and marketing. There are minor differences across genres, although figurative works and portraits exhibit higher returns than average, possibly reflecting higher search costs compared to landscapes, still life and genre paintings, which typically fit a wider range of potential buyers. Sculpture and watercolors were more rarely traded by Knoedler and exhibit a lower return than paintings. Finally, there are no significant differentials for returns on dated works, direct purchases from artists and works by female artists.

Our specification (2) in Table 2 includes a full set of destination and buyer fixed effects with the purpose of verifying how they affected *ex post* returns. A selection of these effects is displayed in Tables 3 and 4, where the baseline category is sales to New York City with unknown buyers. We find higher returns for works sold to collectors based in major U.S. states and also in some major cities, such as Washington, Chicago and Los Angeles: this is likely to reflect a standard selection effect, for which distant collectors purchased only in case of high willingness to pay for particular works. Within New York City, we also find higher returns for sales to major addresses such as Madison Avenue and Park Avenue, often hosting richer collectors.

On the top of this, significantly higher returns apply to acquisitions for American museums (such as the MET, the MoMA, and also museums of Brooklyn, Cincinnati, Saint Louis, Kansas City, Toledo and other American cities) and for major collections (such as those of Henry Frick, of Philip and Robert Lehman and of Andrew and Paul Mellon, but not in case of Potter Palmer, John Johnson or Joseph Hirschhorn, who were known to search for good deals). Instead, the returns are lower than average when the final buyers are major auction houses (especially Christie’s and Sotheby’s), or other dealers looking for further resale (especially frequent purchasers such as the Haseltine Art Galleries of Philadelphia and the John Levy Galleries of New York).

4.3. The rise of American art

We finally focus our attention on the two key sectors traded by Knoedler, those of European old masters and American artists, keeping in mind that the large majority were painters. Table 5 extends the baseline specification taking into account these sectors. The first specification (1) shows that the gallery obtained a premium on the trade of European old masters, which is consistent with the limited supply and high demand of this sector in the early part of the century under consideration. Interestingly, also the return on American art is higher than average, implying frequent positive shocks to the willigness to pay for this sector. Controlling for interactions with the time trend in specification (2) we unveil a more complex scenario, where the return on old master paintings follows an inverse-U shape, and the return on American art starts below average and then follows an increasing trend (without significant non-linearities).

To better visualize the different patterns, Fig. 4 reports the estimates of the percentage differences in returns between European old masters and American artists compared to the market average, with the 90% confidence intervals (based on the specifications of Table 5). These reflect the evolution of shocks to the willingness to pay for these sectors. Around WWI the return of investments in European old masters reached a peak and then started to decline, while the return on investments in American modern artists reached the average level at the same time and then kept increasing, ending about 20% higher than the average return in the 60s.[44] These results appear consistent with an increasing interest and demand by American collectors for their national art compared to other forms of art. As we have seen, the inset of WWI was the end of an era for the Atlantic trade of old masters, and the Armory show of 1913 was also the beginning of a new interest in modernism. According to Ekelund *et al.* (2017), "the real shift to collecting American art occurred in the 1920s": it was the beginning of a diversion of demand from foreign to domestic art, which was supported during the 30s by museums and public programs, until the end of these programs "led to a new wave of competition between artists and the abstract-expressionist style expanded."

Writing in 1946, Knoedler's director Henschel was already noting that "in the last years, interest in the American School has steadily increased" (see Knoedler, 1996). The new and increasing demand of American art has probably contributed to foster the developments of the New York school whose innovations were going to continue for decades. While we cannot make claims on causality, the evidence on the art returns is consistent with this path, reflecting a long wave of increasing interest in American art in general. Remarkably, this was not driven by the explosion of Pop art in the 60s, which reached the secondary market only during the 70s (after the Scull sale), and was not even driven by abstract expressionism, which barely started to sell in the primary market during the 50s with a limited impact on the secondary market in the 60s.[45] It was a general increase in demand for all the American art that slowly created a market for the post-war innovators. The same fact that a traditional gallery such as Knoedler shifted its attention toward the most innovative American artists, in spite of competition by an increasing number of New York dealers who were more in tune with the new art, is symptomatic of the importance that contemporary American art reached in the post-war period.

[44] We have also considered the evolution of European modernists, including post-impressionists, symbolists, expressionists, cubists, surrealists and abstractists (Redon, Gauguin, van Gogh, Toulouse-Lautrec, Seurat, Signac, Vuillard, Buffet, Modigliani, Utrillo, Giacometti, Brancusi, Arp, Matisse, Vlaminck, Derain, Rouault, H. Rousseau, Kokoschka, Braque, Picasso, Gris, De Chirico, Ernst, Mirò, Chagall, Kandinski, Klee). What emerges is an increasing trend for the unexpected returns.

[45] For an interesting account of market access for an abstract expressionist of the second generation see the autobiography of Schueler (1999).

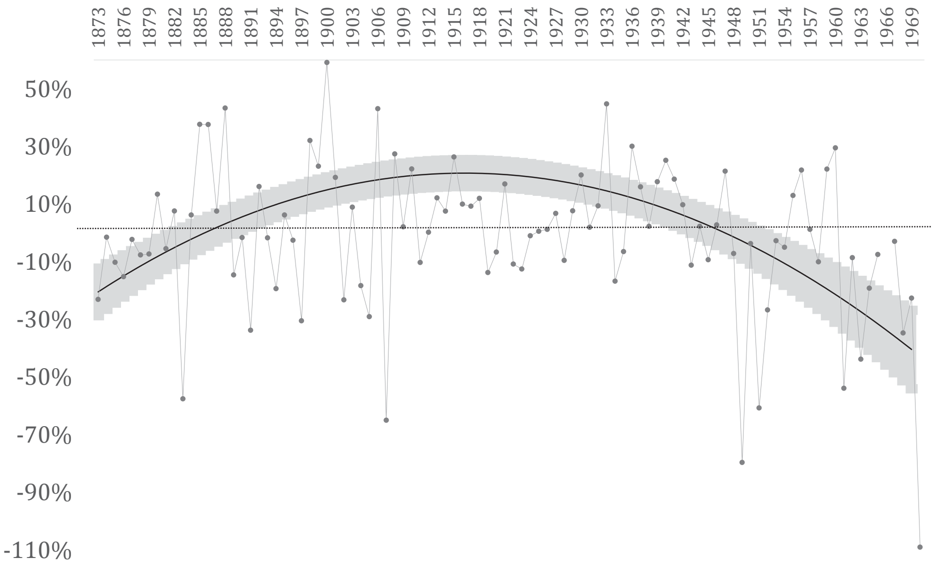
Table 5: Determinants of returns, OLS regressions

	Baseline model			Baseline model with time trend interactions		
Dependent variable: real total return	(1) Coef		SE	(2) Coef		SE
Short-term interest rate	0.648	***	(0.126)	0.715	***	(0.127)
Log (Purchase price, *in 1870 $*)	-0.144	***	(0.004)	-0.148	***	(0.004)
Log (Number of works per artist)	0.046	***	(0.004)	0.05	***	(0.004)
US GDP growth rate	0.626	***	(0.093)	0.632	***	(0.093)
Imports tariff rate	0.81	***	(0.042)	0.816	***	(0.042)
Living artist	-0.103	***	(0.011)	-0.098	***	(0.011)
Artist died in the year of resale	0.035		(0.053)	0.028		(0.053)
Artist died within one year before the resale	0.295	***	(0.102)	0.287	***	(0.102)
Artist died within two year before the resale	0.544	**	(0.226)	0.526	**	(0.224)
Artist died more two year before the resale	-0.136		(0.134)	-0.153		(0.132)
Time in inventory (*in months*)	-0.005	***	(0.000)	-0.005	***	(0.000)
Exhibited artist	0.074	***	(0.014)	0.072	***	(0.014)
New artist	-0.111	***	(0.023)	-0.081	***	(0.022)
Illiquid artist	-0.092	***	(0.017)	-0.089	***	(0.017)
Consortium of dealers	-0.138	***	(0.020)	-0.136	***	(0.020)
Number of works purchased together	-0.006	***	(0.002)	-0.006	***	(0.002)
Number of works sold together	-0.013	***	(0.004)	-0.012	***	(0.004)
Work dimensions (Unknown size is omitted)						
Size is less than 0.5 square meters	-0.052	***	(0.018)	-0.059	***	(0.018)
Size is in between 0.5 and 0.75 square meters	0.062	**	(0.028)	0.054	**	(0.028)
Size is in between 0.75 and 1 square meters	0.060		(0.039)	0.051		(0.039)
Size is in between 1 and 2 square meters	0.17	***	(0.033)	0.174	***	(0.033)
Size is more than 2 square meters	0.252	***	(0.071)	0.272	***	(0.071)
Dated work	0.013		(0.023)	0.012		(0.023)
Primary market - Direct purchase from an artist	-0.048		(0.036)	-0.004		(0.036)
Female	0.054	*	(0.031)	0.056	*	(0.031)
Genre (Genre paintings are omitted)						
Abstract	-0.102	*	(0.058)	-0.083		(0.058)
Still life	-0.053	**	(0.024)	-0.046	*	(0.024)
Landscape	0.022	**	(0.010)	0.021	**	(0.010)
Figurative	0.131	***	(0.028)	0.133	***	(0.029)
Portrait	0.145	***	(0.019)	0.118	***	(0.019)
Object type (Painting is omitted)						
Sculpture	-0.051		(0.035)	-0.055		(0.035)
Pastel	-0.076		(0.062)	-0.088		(0.061)
Watercolor	-0.234	***	(0.056)	-0.234	***	(0.056)
Time trend	0.006	***	(0.000)	0.006	***	(0.000)
European Old Masters	0.066	***	(0.019)	0.142	***	(0.023)
European Old Masters x Trend				0.008	***	(0.001)
European Old Masters x Trend squared (Figure 4)				-0.0002	***	(0.000)
American Artists	0.033	**	(0.016)	-0.038		(0.015)
American Artists x Trend (Figure 4)				0.004	***	(0.001)
Constant	1.247	***	(0.030)	1.254	***	(0.030)
Observations	22,075			22,075		
R-squared	0.15			0.15		

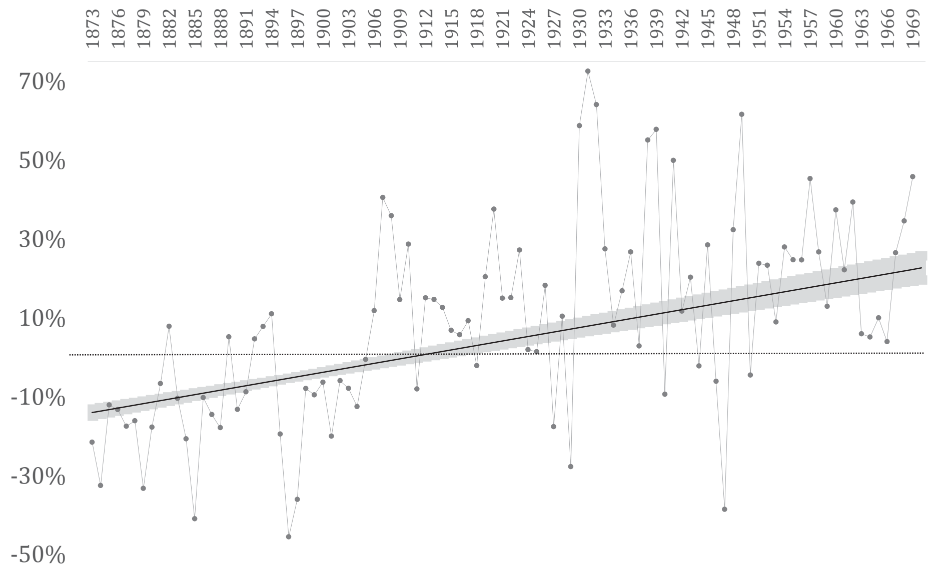
Note: Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1,
Trend is specified as 0 in 1900, 1 in 1901, 2 in 1902, -1 in 1899, -2 in 1898 and so on.

Figure 4: The time pattern of deviations of returns from the market average (in percent).

(a) European Old Masters



(b) American artists



Note: solid black line is the trend and gray shaded area is 95% confidence intervals estimated from regression interaction's coefficients in Table 5, Specification (2). Dashed line indicates zero-difference threshold. Dots indicate the differences between the average returns for European Old Masters and American artists, and the market average return in a given year.

5. Conclusion

This work has examined art trade through the analysis of a small business unit and its returns on investment, but the story of Knoedler was intertwined with the evolution of the American art market over a century. The American art of this century started with the foundation of the MET in New York to host European artworks while a large colony of American artists migrated to Paris, and ended with the MET's exhibition on "New York Painting and Sculpture 1940-1970", while crowds of international artists moved to Manhattan.[46] Our analysis of art intermediation has shown that, controlling for a variety of explanatory variables for the return rates of an art gallery, the extra-returns on European old masters followed an inverse U shape with a peak in WWI, while the returns on American modern artists constantly increased over the century, moving above average since WWI. In other words the 20s were the turning point, when demand finally started to shift toward American art promoting the development of a new school.

References

Bjelajac, David, 2005, *American Art. A cultural history*. Prentice Hall, NJ.

Borowiecki, Karol, 2022, Good Reverberations? Teacher Influence in Music Composition since 1450, *Journal of Political Economy*, 130, 4, 991-1090.

Borowiecki, Karol and Diana Greenwald, 2018, Arts and Culture, in Diebolt C. and Haupert M. Eds, *Handbook of Cliometrics*, Springer, Berlin, Heidelberg, 1-24.

Bolt, Jutta and Jan Luiten Van Zanden, 2020, Maddison style estimates of the evolution of the world economy. A new 2020 update, Maddison-Project WP-15.

Bricker Balken, Debra, 2017, *Mark Tobey. Threading Light*, Rizzoli.

Carter, Susan, Scott Gartner, Michael Haines, Alan Olmstead, Richard Sutch and Gavin Wright (Eds.), 2006, *Historical statistics of the United States: Millennial edition*, Cambridge: Cambridge University Press.

Cellini, Roberto and Tiziana Cuccia, 2014, The Artist-Art Dealer Relationship as a Marketing Channel, *Research in Economics*, 68, 1, 57-68.

Cohen-Solal, Annie, 2001, *Painting American. The rise of American artists, Paris 1867-New York 1948*, Knopf, New York.

Cohen-Solal, Annie, 2010, *Leo and his Circle: the life of Leo Castelli*, Knopf, New York.

Cohen-Solal, Annie, 2015, *Mark Rothko*, Yale University Press, New Heaven.

Craven, Wayne, 1994, *American Art: History and culture*, New York.

David, Géraldine, Christian Huemer and Kim Oosterlinck, 2023, Art Dealers' Strategy. The case of Goupil, Boussod & Valadon from 1860 to 1914, *Business History*, 65, 1, 24-55.

[46] As art historian Sam Hunter has emphasized, a special role in this drammatic evolution was played by the gallery: "Knoedler & Company opened in New York just as the city was beginning to gain its cultural footing. The gallery attracted collectors, artists and, ultimately, other galleries to the city, serving as both a cornerstone and a catalyst in the recognition of New York as the center of the art world" (Knoedler, 1996).

David, Géraldine, Yuexin Li, Kim Oosterlinck and Luc Renneboog, 2024, Art in Times of Crisis, *European History Review*, in press.

De Marchi, Neil and Hans J. Van Miegroet, 2006, The History of Art Markets, in *Handbook of the Economics of Art and Culture*, V. A. Ginsburgh and D. Throsby (Eds.), Vol. 1, 69-122.

Dupin de Beyssat, Claire, Diana Seave Greenwald and Kim Oosterlinck, 2023, Measuring nepotism and sexism in artistic recognition: the awarding of medals at the Paris Salon, 1850–1880, *Journal of Cultural Economics*, 47, 3, 407-36.

Ekelund, Robert B., John D. Jackson and Robert D. Tollison, 2017, *The Economics of American Art: Issues, Artists, and Market Institutions*. Oxford University Press.

Etro, Federico, 2018, The Economics of Renaissance Art, *Journal of Economic History*, 78, 500-38.

Etro, Federico, 2024, Art Markets in the Greco-Roman World, *Journal of Economic History*, 84, 432-78.

Etro, Federico, Silvia Marchesi and Elena Stepanova, 2020, Liberalizing Art. Evidence on the Impressionists at the End of the Paris Salon, *European Journal of Political Economy*, 62, C, 101857.

Etro, Federico and Elena Stepanova, 2021, Art Return Rates from Old Master Paintings to Contemporary Art, *Journal of Economic Behavior & Organization*, 181, 94-116.

Fahlman, Betsy, 2007, *James Graham & Sons: A Century and a Half in the Art Business*, James Graham & Sons, New York.

Fahlman, Betsy, 2010, *Kraushaar Galleries. Celebrating 125 Years*, Kraushaar Galleries, New York.

Feigenbaum, Gail, Sandra van Ginhoven and Edward Sterrett (Eds), 2024, *Money in the Air: Art Dealers and the Making of a Transatlantic Market, 1880-1930*, Getty Publications, Los Angeles.

Friedman, Bernard, 1995, *Jackson Pollock. Energy made visible*, Da Capo Press.

Galenson, David, 2009, *Conceptual Revolutions in Twentieth-century Art*, Cambridge: Cambridge University Press.

Galenson, David, 2024, *Innovators*, Oxford: Oxford University Press.

Gimpel, René, 1966, *Diary of an Art Dealer*, Farrar, Straus & Giroux, New York.

Goldstein, Malcolm, 2000, *Landscape with Figures. A history of art dealing in the United States*, Oxford University Press, Oxford.

Greenwald, Diana, 2021, *Painting by Numbers. Data-driven histories of nineteenth-century art*, Princeton University Press, Princeton.

Greenwald, Diana and Kim Oosterlinck, 2022, The Changing Faces of the Paris Salon, *Poetics*, 92, Part B, 101649.

Guggenheim, Peggy, 1979, *Out of This Century*, André Deutsch Ltd, London.

Havemeyer, Louisine, 1961, *Sixteen to Sixty. Memoirs of a collector,* Metropolitan Museum of Art, New York.

Hellmanzik, Christiane, 2010, Location matters: Estimating cluster premiums for prominent modern artists, *European Economic Review*, 54, 2, 199-218.

Jensen, Robert, 2018, Exploring the Knoedler Gallery's Premium Picture Market, 1872-1934, *Art & Visual Studies Presentations*, 7.

Jensen, Robert, 2023, The Rise and Fall and Rise again of the Contemporary Art Market, *Journal of Cultural Economics*, 47, 3, 461-88.

Kalmbach, Sally Sexton, 2009, *Jewel of the Gold Coast: Mrs. Potter Palmer's Chicago*, Ampersand, Chicago.

Knoedler, 1996, *The Rise of the Art World in America: Knoedler at 150*, Knoedler & Company, New York.

Levin, Gail, 2023, *Edward Hopper: an intimate biography*, University of California Press, Berkeley.

Li, Yuexin, Xiaoyin Ma and Luc Renneboog, 2023, In art we trust, *Management Science*, in press.

May, Robert, 2010, Culture wars: the U.S. art lobby and congressional tariff legislation during the gilded age and progressive era, *Journal of the Gilded Age and the Progressive Era*, 9, 1, 37-91.

Montias, John, 2002, *Art at Auction in 17th Century Amsterdam*, Amsterdam University Press, Amsterdam.

Netzer, Dick, 1978, *The subsidized muse: Public support for the arts in the United States*, Cambridge University Press.

Nuridsany, Michel, 2001, *Andy Warhol*, Flammarion, Paris.

Oosterlinck, Kim, 2017, Art as a wartime investment: Conspicuous consumption and discretion, *The Economic Journal*, 127, 607, 2665-2701.

Oosterlinck, Kim, Anne-Sophie Radermecker and Yuqing Song, 2024, The valuation of copies for Chinese artworks, *Journal of Cultural Economics*, in press.

Pénasse, Julien, Luc Renneboog and José A. Scheinkman, 2021, When a master dies: Speculation and asset float, *Review of Financial Studies*, 34, 8, 3840-3879.

Penot, Agnès, 2017, The Perils and Perks of Trading Art Overseas: Goupil's New York Branch, *Nineteenth-Century Art Worldwide*, 16, 1, 55-69.

Piano, Ennio, 2022, Specialization and the firm in Renaissance Italian art, *Journal of Cultural Economics*, 46, 4, 659-97.

Piano, Ennio and Clara Piano, 2023, Bargaining over beauty: The economics of contracts in Renaissance art markets, *Journal of Law and Economics*, 66, 2, 225-257.

Piano, Ennio and Tanner Hardy, 2022, Rent Seeeking and the Decline of the Florentine School, *Public Choice*, 192, 1, 59-78.

Preble, Michael, 2004, *William Baziotes: paintings and drawings*, 1934-1962, Skira, Milan.

Prown, Jules David, 2001, *Art as Evidence. Writings on art and material culture*, Yale University Press, New Haven.

Radermecker, Anne-Sophie, 2021, *Anonymous Art at Auction: The Reception of Early Flemish Paintings in the Western Art Market (1946–2015)*, Brill, Leiden.

Reist, Inge, 2020, Knoedler and Old Masters in America, Ch. 11 in *Old Masters Worldwide. Markets, Movements and Museums*, 1789-1939, Susanna Avery-Quash and Barbara Pezzini Eds., Bloomsbury, London, 195-209

Saarinen, Aline Bernstein, 1958, *The Proud Possessor. The lives, times and tastes of some adventurous American art collectors*, Random House, New York.

Saltzman, Cynthia, 2008, *Old Masters, New World. America's raid on Europe's great pictures*, Penguin Books, New York.

Schueler, Jon, 1999, *The Sound of Sleat: A Painter's Life*, Picador, New York.

Secrest, Meryle, 2005, *Duveen: A Life in Art*, University of Chicago Press, Chicago.

Seligman, Germain, 1961, *Merchants of Art: 1880-1960. Eighty years of professional collecting*, Appleton-Century-Crofts, New York.

Shubik, Martin, 2003, Dealers in art, Ch. 24 in *A Handbook of Cultural Economics*, Towse Ed., Edward Elgar, 194-200.

Siegel, Jeremy, 1992, The Real Rate of Interest from 1800-1990: A study of the U.S. and the U.K, 1992, *Journal of Monetary Economics*, 29, 2, 227-252.

Simpson, Colin, 1987, *The Partnership: the Secret Association of Bernard Berenson and Joseph Duveen*, Bodley Head, London.

Spender, Matthew, 2000, *From a High Place: A life of Arshile Gorky*, University of California Press, Oakland.

Spulber, Daniel, 2002, Market Microstructure and Incentives to Invest, *Journal of Political Economy*, 110, 2, 352-381.

Stevens, Mark and Annalyn Swan, 2004, *De Kooning: An American Master*, Alfred a Knopf Incorporated, New York.

Stourton, James, 2007, *Great Collectors of Our Time. Art collecting since 1945*, Scala, London.

Ursprung, Heinrich and Katarina Zigova, 2021, The Ultimate Coasian Commitment: Estimating and explaining artist-specific death effects, WP 21-13, Universite Libre de Bruxelles.

Warhol, Andy, 1975, *The Philosphy of Andy Warhol: from A to B and back again*, Harcourt Brace, New York.

Watson, Peter, 1992, *From Manet to Manhattan. The rise of the modern art market*, Random House, New York.

Wildenstein, Daniel and Yves Stavridès, 2001, *Marchands d'Art*, Artema, Turin.

Wilmerding, John, 1976, *American Art*, Penguin Books, New York.

Appendix 1: Determinants of sale prices, hedonic regressions

	(1)			(2)		
Log Sale price, *in 1870 $*	Coef		SE	Coef		SE
Genre (Genre paintings are omitted)						
Abstract	-0.919	***	(0.110)	-0.164		(0.146)
Still life	-0.337	***	(0.050)	-0.097	*	(0.051)
Landscape	-0.078	***	(0.021)	-0.052	**	(0.025)
History	0.589	***	(0.057)	0.127	**	(0.058)
Portrait	0.593	***	(0.037)	0.086	**	(0.042)
Object type (Painting is omitted)						
Sculpture	-0.519	***	(0.062)	-0.915	***	(0.107)
Pastel	-0.188	*	(0.098)	-0.487	***	(0.092)
Watercolor	-1.334	***	(0.125)	-0.928	***	(0.115)
Work dimensions (Unknown size is omitted)						
Size is less than 0.5 square meters	0.086	**	(0.035)	-0.040		(0.032)
Size is in between 0.5 and 0.75 square meters	0.613	***	(0.055)	0.58	***	(0.048)
Size is in between 0.75 and 1 square meters	0.51	***	(0.081)	0.664	***	(0.071)
Size is in between 1 and 2 square meters	0.806	***	(0.069)	0.898	***	(0.060)
Size is more than 2 square meters	1.188	***	(0.133)	1.223	***	(0.128)
Dated work	0.311	***	(0.046)	0.163	***	(0.042)
Primary market - Direct purchase from an artist	-0.562	***	(0.101)	0.085		(0.072)
New artist	-0.798	***	(0.039)	0.043		(0.043)
Illiquid artist	-0.631	***	(0.032)	-0.108	***	(0.038)
Exhibited artist	0.808	***	(0.027)	2.296		(1.584)
Female artist	0.032		(0.069)	3.275	**	(1.641)
Consortium of dealers	0.601	***	(0.034)	0.086	***	(0.033)
Number of works purchased together	-0.026	***	(0.003)	-0.008	***	(0.002)
Number of works sold together	0.079	***	(0.011)	0.075	***	(0.012)
Provenance (US is omitted)						
European continent	0.026		(0.026)	0.134	***	(0.021)
United Kingdom	0.098	***	(0.034)	0.051		(0.032)
European Old Masters	0.231	***	(0.035)			
American artists	-0.476	***	(0.030)			
Artist fixed effects				(YES)		
Year fixed effects (Figure 2)	(YES)			(YES)		
Constant	6.26	***	(0.081)	5.837	***	(1.539)
Observations	22,075			22,075		
R-squared	0.35			0.72		

Note: Robust standard errors in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1

Appendix 2: American artists (N. of obs.) in order of appeareance in the Knoedler gallery

BIERSTADT, ALBERT (26)
BROWN, JOHN GEORGE (54)
CHURCH, FREDERIC EDWIN (9)
HART, JAMES MCDOUGAL (18)
HART, WILLIAM (21)
INNESS, GEORGE (115)
JOHNSON, DAVID (13)
LAMBDIN, GEORGE COCHRAN (1)
MORAN, EDWARD (31)
RICHARDS, WILLIAM TROST (39)
BEARD, JAMES HENRY (7)
BECKER, GEORGE J. (6)
JOHNSON, EASTMAN (16)
LEE-ROBBINS, LUCY (4)
MARTIN, HOMER DODGE (21)
MOZIER, JOSEPH (1)
SATTERLEE, WALTER (1)
BACON, HENRY (9)
CHASE, HENRY (2)
FARNY, HENRY (1)
FUECHSEL, HERMAN (3)
HALL, GEORGE HENRY (2)
IRVING, JOHN BEAUFAIN (8)
MOELLER, LOUIS CHARLES (3)
WALL, A. BRYAN (2)
BISBING, HENRY SINGLEWOOD (2)
FULLER, GEORGE (10)
RYDER, ALBERT PINKHAM (15)
BRICHER, ALFRED THOMPSON (1)
RUSSEAU, PERCIVAL LEONARD (39)
STYKA, TADEUSZ (1)
BECKWITH, JAMES CARROLL (1)
HITCHCOCK, GEORGE (3)
WHISTLER, JAMES ABBOTT MCNEILL (61)
GIHON, ALBERT DAKIN (1)
STUART, GILBERT (79)
BRUSH, GEORGE DE FOREST (5)
SARGENT, JOHN SINGER (129)
REMINGTON, FREDERIC (40)
DOUGHERTY, PAUL (5)
DAVIES, ARTHUR BOWEN (2)
TRYON, DWIGHT WILLIAM (48)
ABBEY, EDWIN AUSTIN (1)
DEWING, THOMAS WILMER (2)
METCALF, WILLARD LEROY (3)
SLOAN, JOHN (2)
BUSH, NORTON (1)
COLE, THOMAS (5)
HEADE, MARTIN JOHNSON (8)
LATY, MICHAEL (1)
MARIN, JOHN (1)
MORSE, SAMUEL FINLEY BREESE (2)
WALDO, SAMUEL LOVETT (2)
DICKINSON, PRESTON (1)
DURRIE, GEORGE HENRY (1)
MYERS, JEROME (1)
PEALE, RAPHAELLE (5)
STEARNS, JUNIUS BRUTUS (1)
GLACKENS, WILLIAM JAMES (1)
HASELTINE, WILLIAM STANLEY (3)
MACCAMERON, ROBERT LEA (1)
NAST, THOMAS (1)
PIPPIN, HORACE (2)
RAY, MAN (1)
FEKE, ROBERT (1)
MILLER, ALFRED JACOB (15)
CATLIN, GEORGE (5)
CHADWICK, WILLIAM F. (2)
DUNKERLEY, JOSEPH (2)

KENSETT, JOHN FREDERICK (5)
LAWRIE, ALEXANDER (9)
MOSLER, HENRY (7)
STEWART, JULIUS LEBLANC (1)
STORY, GEORGE HENRY (4)
WYDEVELD, ARNOUD (1)
BRIDGMAN, FREDERICK ARTHUR (26)
EGLAU, MAXIMILIAN T. (1)
HENRY, EDWARD LAMSON (9)
HOMER, WINSLOW (45)
MOORE, HARRY HUMPHREY (4)
WILES, LEMUEL MAYNARD (1)
DESVARREUX-LARPENTEUR, JAMES (5)
NEAL, DAVID DALHOFF (1)
ROBBINS, HORACE WOLCOTT (1)
BAIRD, WILLIAM BAPTISTE (6)
BOUGUEREAU, ELIZABETH JANE GARDNER (15)
BROWN, GEORGE LORING (3)
KNIGHT, RIDGWAY (210)
SEARLE, HELEN R. (1)
SONNTAG, WILLIAM LOUIS (5)
BAKER, GEORGE AUGUSTUS (1)
CASILEAR, GEORGE W. (1)
DANA, WILLIAM PARSONS WINCHESTER (1)
HEKKING, J. ANTONIO (1)
O'KELLY, ALOYSIUS C. (1)
ANDERSON, ABRAHAM ARCHIBALD (1)
COLMAN, SAMUEL (1)
HILLIARD, WILLIAM HENRY (12)
MCCORD, GEORGE HERBERT (24)
WEEKS, EDWIN LORD (23)
BRISTOL, JOHN BUNYAN (1)
DOLPH, JOHN HENRY (4)
QUARTLEY, ARTHUR (2)
WHITTLE, CHARLES (1)
MOWBRAY, HENRY SIDDONS (5)
GAY, WALTER (9)
SMILLIE, GEORGE HENRY (2)
CHAMPNEY, JAMES WELLS (1)
COOMANS, DIANA (5)
COOMANS, HEVA (6)
HARNETT, WILLIAM MICHAEL (16)
JONES, HUGH BOLTON (2)
TURNER, CHARLES YARDLEY (1)
BOGGS, FRANK MYERS (8)
LINFORD, CHARLES (5)
MARR, CARL VON (2)
MCENTEE, JERVIS (1)
TAIT, ARTHUR FITZWILLIAM (5)
MORRELL, IMOGENE ROBINSON (2)
ROSENTHAL, TOBY EDWARD (1)
HARRISON, THOMAS ALEXANDER (33)
HASBROUCK, DU BOIS FENELON (2)
MUSS-ARNOLT, GUSTAVE (29)
PARTON, ARTHUR (1)
VAN BOSKERCK, ROBERT WARD (5)
WIGGINS, CARLETON (2)
CHASE, WILLIAM MERRITT (30)
GREEN, CHARLES EDWIN LEWIS (1)
HOWE, WILLIAM HENRY (3)
MILLET, FRANCIS DAVIS (6)
TWACHTMAN, JOHN HENRY (16)
MURPHY, JOHN FRANCIS (89)
BELLOWS, ALBERT FITCH (1)
HONRATH, THÉODORE (1)
KNIGHT, LOUIS ASTON (13)
SIMMONS, EDWARD EMERSON (1)
TRACY, JOHN M. (8)
DESOUZA, DANIEL (2)
MAXFIELD, JAMES E. (1)
MCEWEN, WALTER (7)
MILLER, CHARLES, HENRY (1)
MUHRMANN, HENRY (1)
ULRICH, CHARLES FREDERIC (1)
FREER, FREDERICK WARREN (1)
SHAW, A.C. (1)
VEZIN, FREDERIK (1)
ALEXANDER, JOHN WHITE (3)
BAKER, WILLIAM BLISS (1)
DE HAVEN, FRANKLIN (2)
DEARTH, HENRY GOLDEN (4)
COFFIN, WILLIAM ANDERSON (3)
DAVIS, CHARLES HAROLD (1)
DEWEY, CHARLES MELVILLE (2)
MASON, W. SANFORD (3)
WYANT, ALEXANDER HELWIG (45)
DAY, FRANCIS (1)
COLIN, RICHARD (1)
LA FARGE, JOHN (4)
COPLEY, JOHN SINGLETON (25)
CRANE, BRUCE (1)
REID, ROBERT (2)
VOLK, DOUGLAS (1)
BLAKELOCK, RALPH ALBERT (26)
PEALE, CHARLES WILLSON (22)
TARBELL, EDMUND CHARLES (2)
FLAGG, MONTAGUE (1)
POTTHAST, EDWARD HENRY (3)
ROBINSON, THEODORE (9)
SULLY, THOMAS (29)
WAUGH, FREDERICK JUDD (2)
WEST, BENJAMIN (10)
WILLIAMS, FREDERICK BALLARD (1)
MANSHIP, PAUL HOWARD (5)
PEALE, REMBRANDT (12)
SMIBERT, JOHN (4)
CASSATT, MARY (33)
DAINGERFIELD, ELLIOTT (2)
FRIESEKE, FREDERICK CARL (3)
HAWTHORNE, CHARLES WEBSTER (2)
KENT, ROCKWELL (5)
MINOR, ROBERT CRANNELL (1)
NEWMAN, ROBERT LOFTIN (1)
PEALE, JAMES (4)
RANGER, HENRY WARD (3)
THAYER, ABBOTT HANDERSON (2)
THEÜS, JEREMIAH (5)
WEIR, JULIAN ALDEN (7)
WILES, IRVING RAMSAY (1)
BEAL, GIFFORD REYNOLDS (1)
MORAN, THOMAS (16)
POLK, CHARLES PEALE (1)
LOCKMAN DEWITT, MCCLELLAN (1)
TRUMBULL, JOHN (7)
COATES, E.C. (2)
DESSAR, LOUIS PAUL (2)
DUVENECK, FRANK (6)
HASSAM, CHILDE (26)
REDFIELD, EDWARD WILLIS (1)
MACMONNIES, FREDERICK WILLIAM (2)
CHURCH, FREDERICK STUART (1)
CURRAN, CHARLES COURTNEY (1)
HASELTINE, HERBERT (15)
GRUPPE, CHARLES PAUL (3)
JARVIS, JOHN WESLEY (3)
BROWN, MATHER (2)
EARL, RALPH (10)
PLATT, CHARLES ADAMS (2)
POWERS, HIRAM (5)
BELLOWS, GEORGE WESLEY (7)
COUSE, EANGER IRVING (1)
HOFFMAN, MALVINA (3)
MCKNIGHT, DODGE (2)
STERNE, MAURICE (1)
KING, CHARLES BIRD (4)
BUTTERSWORTH, JAMES EDWARD (3)
HEALEY, GEORGE PETER ALEXANDER (8)
HOLLAND, RAYMOND (1)
OBERTEUFFER, GEORGE (2)
ANSHUTZ, THOMAS POLLOCK (1)
CROPSEY, JASPER FRANCIS (12)
PEALE, MARGARETTA ANGELICA (1)
PEALE, SARAH MIRIAM (2)
BLYTHE, DAVID GILMOUR (1)
EILSHEMIUS, LOUIS MICHEL (9)
TIRRELL, GEORGE (1)
WOOD, THOMAS WATERMAN (3)
CHAPMAN, JOHN GADSBY (1)
DANTON, FERDINAND (JUNIOR) (2)
DOUGHTY, THOMAS (7)
DURAND, ASHER BROWN (6)
EDMONDS, FRANCIS WILLIAM (4)
HAVELL, ROBERT (1)
ROTHERMEL, PETER FREDERICK (1)
ALLSTON, WASHINGTON (3)
CABOT, EDWARD CLARKE (1)
DEMUTH, CHARLES (1)
DURRIE, JOHN (1)
EAKINS, THOMAS (18)
HICKS, EDWARD (14)
MOUNT, WILLIAM SIDNEY (4)
NEAGLE, JOHN (2)
ROSSITER, THOMAS PRITCHARD (1)
WHITTREDGE, WORTHINGTON (7)
ELLIOTT, CHARLES LORING (4)
GAUL, GILBERT WILLIAM (3)
LAWSON, ERNEST (3)
SAVAGE, EDWARD (2)
WALKER, JAMES (1)
AVERY, MILTON (5)
BLUME, PETER (2)
BROWERE, ALBERTUS D.O. (4)
COOPER, COLIN CAMPBELL (1)
LUKS, GEORGE BENJAMIN (3)
MEEKER, JOSEPH RUSLING (1)
MOSES, ANNA MARY ROBERTSON (3)
STANLEY, JOHN MIX (6)
UFER, WALTER (1)
VANDERLYN, JOHN (1)
HIDLEY, JOSEPH (3)
MAURER, ALFRED HENRY (3)
AUDUBON, JOHN JAMES (1)
FISHER, ALVAN T. (1)
HOWLAND, ALFRED CORNELIUS (1)
KEITH, WILLIAM (1)
QUIDOR, JOHN (3)
RUSSELL, CHARLES MARION (10)
SMITH, RUSSELL (2)
HARRIS, CHARLES XAVIER (1)
HENRI, ROBERT (3)
HILL, THOMAS (2)
NAHL, CHARLES CHRISTIAN (1)
RANNEY, WILLIAM (4)
SCHREYVOGEL, CHARLES (4)
SHINN, EVERETT (8)
BADGER, JOSEPH (3)
HIRST, CLAUDE RAGUET (2)
INMAN, HENRY (2)
PETO, JOHN FREDERICK (8)
POPE, ALEXANDER (2)
ROPES, GEORGE (1)
WYETH, NEWELL CONVERS (9)
BILLINGS, EDWIN T. (1)
CARROLL, JOHN (1)
DEYOUNG, JOE (1)
JENNYS, J. WILLIAM (2)
KUHN, WALT (3)
PARKER, BILL (1)
PEALE, RUBENS (1)
PHILIPP, ROBERT (1)
VEDDER, ELIHU (1)
BERNINGHAUS, OSCAR EDWARD (1)
CURTIS, GEORGE A. (1)
GOLLINGS, ELLING WILLIAM (4)
HARDING, CHESTER (1)
KUNIYOSHI, YASUO (2)
PRENDERGAST, MAURICE BRAZIL (5)
THOMPSON, A. WORDSWORTH (1)
EICHHOLTZ, JACOB (1)
HARLEY, STEVE (3)
TCHELITCHEW, PAVEL (1)
COMEGYS, GEORGE H. (1)
HUNT, WILLIAM MORRIS (1)
ROGERS, JOHN H. (1)
WEBER, MAX (1)
BOYLE, JOHN J. (1)
DAVIDSON, JO (1)
EASTMAN, SETH (1)
FRASER, JAMES EARLE (1)
HURD, PETER (1)
MEIGS, WALTER (1)
CAHOON, RALPH (1)
DUNTON, WILLIAM HERBERT (1)
HARTLEY, MARSDEN (5)
JACKSON, HARRY (1)
POLLOCK, JACKSON (1)
AMES, JOSEPH ALEXANDER (1)
KANE, JOHN (2)
BROWN, JUDITH (1)
ZORACH, MARGUERITE THOMPSON (1)
HOFMANN, CHARLES C. (1)
MARSH, REGINALD (1)
SYMONS, GARDNER (1)
BERMAN, EUGENE (1)
SHARP, JOSEPH HENRY (2)
CRAIG, CHARLES (1)
BRUCE, EDWARD BRIGHT (2)
DEKOONING, WILLEM (2)
GORKY, ARSHILE (1)
TOBEY, MARK (1)
DENIRO, ROBERT SR (1)