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What Matters in Art Investment?

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Abstract

What Matters in Art Investment?
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Founded in previous research on building art indices to analyze the returns of art, this study draws from a dataset built from art pieces made by artists backed by 10 randomly chosen galleries in New York that participated in Art Basel in 2022 to build an annual index from 1886 to 2022. This analysis pushes the boundaries of past research studies in four main ways. One, it focuses on pieces made by artists backed by active New York galleries, giving us a glimpse of what returns could look like if we were to invest only in pieces suggested through a gallery. Two, this paper explores investment differences between three art types: paintings, prints, and sculptures. Three, this paper analyzes the possible link between consumer sentiment and returns. Four, this paper explores the potential relationships between starting price, holding time, and financial returns in an attempt to uncover a valid investment strategy. Consistent to earlier studies, I found that art returns are not as attractive as other potential assets, even if they are split in their respective art type categories. Contrary to earlier studies, volatility is higher across all art types despite the lower correlation with other assets leaving the argument that art can be used as a tool of portfolio diversification as unsatisfactory. Lastly, hold time correlations with returns are low but statistically significant and there is no relationship discovered between consumer sentiment and returns as well as painting bidding price and returns.

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Yifei Gao

March 2023

1 Introduction: The Value of Art

As a social entrepreneur who worked with local Atlanta artists to produce art markets, I have seen first hand the impact art has on the community. Art not only uplifts, it also inspires, leaving the viewer with a sense of awe. As a student who majors in both psychology as well as economics, it became a given that I would naturally be inclined to research a topic that deals with the intersection of both the human expression through art as well as financesâ henceforth this foray into art investment. However, there are larger forces at play as to why this is a topic of interest for me as well as a topic of importance to study within economics. Understanding the value of visual arts alongside investigating the inner workings of art investment is crucial not only for its longevity but also for its value appreciation in both financial and psychological currency. However, before we dive into the value in art, there remains several barriers to entry that I would like to preface my work with which poses a interesting question: "If there are so many challenges to investing in art, why do people still do it?".

The rigidness of the visual arts industry as to who, what, where, and how of buying and selling art have been around for centuries with a few dominant players taking up majority of the market leaving little flexibility for drastic changes. The opaqueness of the art investment market does not give much credit to preserving the culture of buying physical works either, as there is no playbook on how to invest in the arts. Several barriers to entry for common investors remain, such as the knowledge gap, the financial gap, as well as the preservation gap. Based on economic theory, if artâs utility is truly negative, no one would invest in it. However despite these barriers that indicate that art is a bad investment, the market anomaly is that people still buy art and people are still artists. Therefore, it is important that economists investigate this phenomenon as there must be unrecorded positive utility to be found.

In terms of knowledge, lack of expertise in the visual arts often leave investors hesitant to jump in and allows for overbidding/overinvestment in pieces that were recommended to them by a third party: who may not have their best interests in mind. However, often there is not much art investment other than the question of âdo you find this painting visually inspiring?â as most art gallerists curate based on their own personal tastes anyways. For example, John Maynard Keynes, a prominent economist, purchased pieces from friends that he thought were interesting and ended up with quite a high portfolio return years down the line. On the other hand, lack of knowledge of how to know if you are overbidding or how to model future artistic returns are very sparse and unreliable. In part, this is due to the lack of public data. However, until we are able to procure a database that is complete with high frequencies of artistic sales, I believe the closest strategy would be to analyze models that integrate common influences of pricing such as channels of distribution, prestige, number of awards, demographic detail – etc.

The barrier of transaction costs is also something to consider, but they are also very murky in terms of whether the additional collection of several thousand dollars is justified. Upon the regular sales tax, the buyerâs premium (in most auction houses), transportation fees,

insurance, and additional percentages that go to the artists may be heaped onto the purchase price. Buying an art piece is quite different from any other consumer product as most of the time, third party sellers are the ones pushing the work forward. Buyerâs premiums as an income stream for auction houses or additional fees to give to the artist for producing the piece may be applicable, making the arts an unattractive investment. There may be a system that allows for the mass purchase of quality artworks with very low transaction costs, and I believe the answer lies in further investigations of organizational art investments structures.

Lastly, without maintenance, art pieces will wither away. Other financial investments do not require repainting, a specific temperature, nor protective framing. This constant maintenance with the additional costs of transportation and installation will pose another barrier to entering the field of artistic investments. If the goal of researching artistic investment is to increase accessibility and number of invested pieces, this baggage that comes along with the artwork will need to be addressed and efficiently dealt withâ which often comes with either a large price tag or the difficulty of finding someone who is an expert in art refurbishing.

Despite these barriers to entry, it is a curiosity as to why people still invest in art. The conclusion must be that art is valuable in some way to be worth upwards of millions of dollars of investment. It is my hope that as we continue to research the visual arts industry, specifically investment structures and strategies, new opportunities will arise where we are able to challenge and change the course of the arts for the better by investing in systems that evade connection based fame and focus on the raw talent that artists around the world possesses. In the next few paragraphs, I will outline what makes art an valuable financial asset, what makes art an valuable psychological asset, and finally how I arrived at my research questions to explore these topics further.

1.1 Art as a Financial Asset

Visual art can be financially valuable through either returns or its ability to diversify an financial portfolio. Art is often viewed as a luxury item that only the wealthy can afford, but it has become increasingly popular as a financial investment for the common people through innovative companies such as Masterworks: an company that sells stocks of expensive art pieces. The contemporary art market has been shown to produce returns of 13.5% during high inflationary periods since 1945, outperforming traditional assets like stocks, emerging market equities, gold, and U.S. corporate bonds (Masterworks, 2022). As a result, investing in art has become a popular alternative asset, especially for high net worth individuals. However, the specifics of segmentation through data set could change that story dramatically.

One of the primary reasons that art could be considered a valuable investment is its potential for returns. However, the findings within the academic sphere is scattered, with most variation dependent on the data-set from which they draw their returns from. In a early study by Baumol with a net auction transaction size of 640, he discovered that painting returns average around 0.55%, which he states is only 1/6th of how much return government securities could offer, "posing an opportunity loss of the holder of the painting to close to two percentage points per year" (Baumol (1986)). However, this study is heavily disputed as other papers with differing data sets had shown possibility of out-performance of government securities. John Maynard Keynes, the economist, was an avid collector of art. Using pieces that he had collected, returns over time of his long-run buy and hold strategy occasionally outperformed the stock market and consistently outperformed the bonds market (Chambers et al. (2020)). Not only did his collection out perform the bonds market, his return from his arts portfolio is twenty times of what it could've been if had invested in bonds instead (Chambers et al. (2020)). Additionally, in comparison to an index of the overall arts market built by Goetzmann, Renneboog, and Spaenjers (2011), the Keynes collection would've appreciated to outperform the index by 9.17 times Chambers et al. (2020). These findings showcase that art returns tend to fluctuate based on the particular portfolio that is used to

build estimations of returns. It also hints that there must be a strategy in art investment that has yet to be uncovered.

Several factors can affect the returns on an art investment. For example, the age, condition, and provenance of the artwork can all impact the artwork's value. Upon further digging, return tend to depend on both the features of the art pieces analyzed – style, price etc– and time-frame of holding the art piece. (Buelens and Ginsburg (1993)). In terms of type of artwork, this is commonly partitioned by style such as "Old Master", "Impressionist", and "American" paintings. One particular study that focuses on the differences in these returns found that Old Master works, or paintings by famous artists, tend to perform at a higher rate while American paintings and Impressionist works tend to receive returns a bit lower, with American works receiving the lowest returns based on nominal indices (Mei and Moses (2001)). Revisiting Baumol's pessimistic outlook on the investment in the arts, the data set consisted of over 50% of English artists, who tend to have negative returns (Buelens and Ginsburg (1993)). In fact, by segmenting art works by the schools of English, non-English, Dutch, Italian, Impressionists and followers, new insights could be found that type of art has a impact on returns as well as data-set used (Buelens and Ginsburg (1993)). Lastly, it is also found that expensive "master works" tend to under perform art indices (Mei and Moses (2001)). In Mei and Moses (2001), a 10% increase in purchase price leads to a 0.1% decrease in future annual returns. Overall, the more generalized and diversified the art data set was, it is generally found that paintings do outperform bonds consistently, leading to speculation that beating the market could be possible through art asset segmentation (Buelens and Ginsburg (1993)).

To visualize how holding time alters returns we can think to examples such as Van Goghâs Irises, which sold for $53.9 million in 1987, leaving a annual real rate of return of some 12.5% between 1948 and 1987 in its wake (Buelens and Ginsburg (1993)). Studies show that a hold time of between 20 to 40 years tend to account for the slow change in taste over time (Buelens and Ginsburg (1993)) Grappling this logic studies that constructed indices

over these longer time frames tended to show results that outperformed the bonds market (Buelens and Ginsburg (1993)). Pulling in the Keynes collection which out performed the bonds market regularly and occasionally the stock market, we can see that the strategy he used in terms of long-run buy and hold tend to be a good one to use (Chambers et al. (2020)). Because art pieces are held for decades, there can be an expectation that a few long-horizon collectors can reap great gains, even if most market participants under perform a comprehensive, value-weighted benchmark of the asset division (Chambers et al. (2020)) In sum, holding pieces for a long period of time tend to have a positive effect on the returns of works invested in.

Wealthy households with net worth exceeding $30 million often allocate about 4% of their financial portfolio to luxury collectibles such as art (Frank (2019)). Therefore, we can reason that another value of art investment is found in portfolio diversification. During bear markets when diversification is particularly important, the notion of achieving higher risk-adjusted returns by diversifying into assets that exhibit little or negative correlation with equities and bonds can be very appealing (Pownall (2009)). The low correlation between global art indices and other financial indices lead to indications that changes in other financial assets' returns do not affect art returns, making it a good diversification asset (Jureviciene et al. (2012)). Looking at a study that encompassed the time period from 1984 to 2009, when the U.K. equity market recorded the lowest 10% of returns, other financial assets had an average return ranging from -6% for world equity to 1.4% for U.S. corporate bonds, while U.K. government bonds offered good protection with returns close to the average of 9%, art provided notably higher monthly returns than other asset classes (Pownall (2009)). This example further advances the point that art can be a good diversification asset. Additionally, art returns have been found to be positively correlated with global pandemic sentiments, leading to a conclusion that it can be used as an shock hedge against the uncertainty of a global pandemic (Wang (2021)).

All in all, art has financial investment value, including the potential for significant returns

and the benefits of diversification and risk hedging to balance portfolios. However, as with any investment, thorough research is required to understand the specific returns and risks associated with an art investment. It is also important to consider the factors that can affect the artwork's value beyond what was already studied, such as its age, condition, provenance, and the reputation of the artist and auction house. Ultimately, investing in art can be an attractive option for investors seeking to diversify their portfolios and reduce overall risk while enjoying the cultural and aesthetic value of art.

1.2 Art as a Psychological Asset

The psychological benefit of the arts is profound, and there have been attempts to model its non-financial value in an economical sense. It stands to consider that art investments do not just consist of monetary value, but also aesthetic value in its identity as a consumption good (Mandel (2009)). Past economic literature referring to the value of art outside of its monetary value focused on the development of emotional dividends (Lovo and Spaenjers (2018)). In the field of neuro-aesthetics, the value of art is neurally grounded in the social brain fueling arguments of practical implications for mental health and other neurological conditions such as dementia (Van Leeuwen et al. (2022)). In the literature on marketing, the aesthetic fidelity effect brings an important perspective on how a productâs aesthetics extend beyond the onset of purchasing behavior, but also the impact on how consumers perceive the value of future consumption experiences of the product (Wiecek et al. (2019)). Therefore, in order to evaluate the sentimental value of art in a fiscal way over time, interdisciplinary means crossing boundaries of economics, neuro-aesthetics, as well as marketing could be considered.

Art can be considered a form of social capital, as it enhances human capital in various ways. Firstly, it provides aesthetic pleasure and positive emotions. As mentioned prior, buying art as a luxury item or even viewing it as an aesthetic object leads to positive emotions which fuel consumption (Mandel (2009), Lovo and Spaenjers (2018), Shi et al. (2021)). People derive

pleasure from looking at art, and this pleasure-seeking is a fundamental human need that has a monetary value (Kaufman (2010)). Thus, the perception of art inadvertently derives value through pleasure, which can be seen by transferring financial currency to utility from pleasure and vice versa. Furthermore, Cupchik et al. (2009) noted that the enjoyment of visual aesthetics is a significant consequence of perceiving art (Cupchik et al. (2009)). Not only are pleasure factors increased, so is the well being of individuals. Through viewing and enjoying art, we can see there to be a general impact on well-being due to a decrease of stress (Cuypers et al. (2012)). Art also facilitates personal growth, promotes social cohesion, and can be used as a tool for maintaining a sense of continuity over time, which is important for the well-being of older people (Newman et al. (2013), overall when people view art they receive positive emotions both from a survey perspective and a fMRI perspective which adds to the well being of the individual, enhancing human capital.

Secondly, art enhances learning, which is integral to human capital growth in the areas of productivity (Langelett (2002)). Diving into specifics, a study found that the arts can be used to enhance science education at different levels (Braund and Reiss (2019)). For example, using the arts as a language to teach scientific concepts can be a powerful way of enabling learning (Braund and Reiss (2019)). In addition, the integration of the arts into science education can help close the gap between school science and the changing nature of science in the real world, resulting in a more relevant and engaging science education(Braund and Reiss (2019)). Similarly, Tyler and Likova (2012) noted that visual arts can enhance learning by placing technical concepts in a broader context of relevance to everyday life and the larger goals of improving the quality of life and advancing to a more evolved society (Tyler and Likova (2012)). All in all, art has a social use as a medium of higher education which is integral to human capital growth.

Lastly, humans also derive an internal understanding of themselves as well as others from viewing art. Art can be deeply intertwined with cultural identity, making it a point of preservation and cultural tracking (Choi Caruso (2005)). For instance, Koptseva (2012) noted that

Khakass artists tend to appeal to the ethnic theme, and ethical values are seen in their works (Koptseva and Nevolko (2012)). Additionally, shifts in identity are captured through art, as seen in the tracking of Polynesian migration to Australia (Rodriguez (2009)). In other studies on perception and understanding, we see that art acts as a channel for discovery (Leder et al. (2004)). The particular aspects that are emphasized within perception and understanding are appraisals in judgements of beauty and preference, a deeper understanding of meaning and creating that meaning ourselves, and feelings that change like an epiphany known as transcendence (Pelowski and Akiba (2011)). Moreover, art can lead to social bonding or the beginning of rituals or revolutions within communities (**??**). Such findings indicate art can generate a greater sense of self and inter-being identity, which are factors that influence decision making as well as quality of human capital.

In conclusion, art has immense social value and importance beyond its monetary worth, as it enriches our lives in numerous ways. By providing aesthetic pleasure, enabling learning, and facilitating personal growth within our communities, art enhances human capital. Art is, therefore, an important investment and has value in numerous ways. Because of its value in numerous aspects, it is a given that we should explore the field of art, in terms of research, in numerous lights.

1.3 Study Details

The field of art investment research has gained significant attention in recent years as the art market has grown in size and importance. The development of art indices has been one of the key innovations in this field, as it allows investors to track the performance of art as an asset class over time. However, the current art indices are primarily based on past research, and do not account for the unique characteristics of the current art market. This has led to the development of several novel research questions that aim to address these gaps in knowledge.

The first research question is focused on the comparison of an art index made from artists backed by currently active galleries to other financial assets and indices from past research. This question is significant as galleries are known to pick artists based on their taste and guesses on who will be the next big thing. Moreover, galleries are known to mark up prices or cheat in auctions through internal bidding, a insight gained from speaking to gallerists in the Atlanta area, leading to an inaccurate representation of the art market. Prices are positively correlated with artist reputation but tend to be negative with gallery reputation (Reinstaller and SchÃ¶nfeld (2007)). As such, an art index made from artists backed by active galleries is expected to provide a more accurate reflection of the current art market. The novelty of this research question lies in the comparison of this index to past indices and other financial assets, which has not been explored in prior research.

The second research question aims to investigate the influence of art type, such as painting, sculpture, or prints, on art returns and how this compares to other investment assets. This research question is significant as it explores the impact of overbidding, as well as the psychological perceptions of value across 2D and 3D art. Prior research has shown that overbidding has an impact on art returns, but this has not been explored in terms of art structural type (Mei and Moses (2001)). Additionally, research on the psychological perceptions of value across different art mediums has been limited, and this research question seeks to fill that gap.

The third research question examines the relationship between art returns and consumer sentiment over time. This research question is significant as it seeks to understand how consumer sentiment affects art returns. Previous research has found that art returns are related to how wealthy the wealthiest are (Goetzmann et al. (2010)). The consumer sentiment survey used in this research question is from the general sentiment surveyed from the general American population (University of Michigan). This research question aims to expand on prior research by exploring the relationship between consumer sentiment and art returns over time.

The fourth and final research question explores whether a basic investment strategy can be created using the variables of initial auction price and holding times to maximize return. Earlier, the ability of pieces that start out at a low buying price and has long holding times to generate higher returns were documented. This research question is significant as it explores the possibility of creating a strategy for the arts market, which is an underdeveloped area of research. The observed under-performance of artworks and occasional over-performance are widely documented, but how we can get consistent high returns are rarely explored. Additionally, the inclusion of art investments in high net worth individualsâ financial portfolios highlights the importance of understanding the art investment market for everyday investors in order to democratize the market.

In conclusion, the four research questions outlined above address significant gaps in the knowledge of art investment research. These questions are novel as they explore the current art market in terms of gallery supported artist performance and its unique characteristics, which have not been explored in prior research. The development of these research questions highlights the importance of understanding the art investment market, especially as it becomes an increasingly innovative investment asset.

1.4 Data Extraction and Relevance

Art Basel is an international art fair featuring top performing artists across the globe. Artists who are featured at Basel are considered to be the upcoming superstars of the industryâ as are the galleries who go to Art Basel to represent them. Art Basel is hosted in a variety of cities and locations: in the United States, Hong Kong, as well as the UK. Several prominent art collectors also attend to fetch pieces for collections from artists that catch their eye. Art galleries select artists to support based on their personal style. This is particularly interesting to us as data because we can model the galleries as individual investors who follow a specific number of artists. As we have seen in past studies, the taste of an individual, such as the study on Maynard Keynes, may be a factor as to why certain portfolios can outperform

other financial assets. Depending on how the index does, we can derive whether collecting the pieces from professional galleries is actually worth the cost when looking at the returns gallery chosen artists' works produce.

In the 2022 Art Basel, there were hundreds of attending galleries. In order to maximize relevancy to the current art market which is required of this project, I have limited data collection to the New York galleries. The reason being that New York is a top destination for art collection in the United States. Within New York, the number of galleries represented at Basel sum up to 73 galleries. Due to the limited time allotted to complete this thesis, I utilized a simple random sample of 10 galleries from the pool of 73 which are: Miguel Abreu, Acquavella, Alexander and Bonin, Blum Poe, Marianne Boesky, Bortolami, Tanya Bonakdar, Gavin Brown's Enterprise, and Galerie Buchholz. Below is a summary of the pieces' average prices, standard deviations, numbers per medium. This is the compilation result from 399 artists in total.

Table 1: Summary Statistics of Art Pieces

Art Type	Mean Price	STD	N
Prints	$26,827.52	$156,699.74	4,925
Paintings	$330,902.88	$1,679,271.66	4,265
Sculptures	$77,513.89	$135,572.88	278

From the preliminary analysis, paintings tend to be priced much higher than sculptures and prints. This may be due to higher consumption of paintings in general and the feasibility of collecting a painting to store at home. For example, a sculpture would take up too much space. Additionally, the idea of using a art piece as a status symbol is also present, and due to the modern nature of the sculptures, they may not be classical enough to be categorized as such (Mandel (2009)). In regards to prints, because of the case of higher rate of re-productivity, that may be why the mean price significantly dips below that of the paintings and sculptures. In terms of standard deviation, sculptures have the least amount of variation which can be attributed to either the medium itself or the amount of sculpture

data available for auction. Prints tend to have a medium amount of standard deviation with paintings having a significant higher standard deviation. This may be due to the influence of high demand of specific artist and in part due to the higher amount of painters in the world.

In this study, the data used consists of basic information on art pieces, including the artist, artwork type, auction price, holding time, and sale date. This data was scraped from Artsy.com. Although data specific to gallery sales is difficult to obtain, each gallery supports a select group of artists that they believe produce high-quality artwork. By clicking into the websites for the galleries of interest, the artists that they have supported and sell can be found. Thus, we utilized data on these artists from the ten New York-based galleries that participated in Art Basel 2022. The time frame of the data post processing spans from 1986 to 2022, and we utilized Goetzmann (1992)'s index-building methods to create an Repeated Sales Regression art index from the new gallery based data. However, due to the shorter hold times of prints, we were unable to build an index with this technique, which unfortunately would be missing from the analysis.

To address the research question of how gallery supported artists do in returns compared to other financial investments, data from the SP 500 as well as the DOW were pulled for the identical time period of 1986 - 2002. Returns per year were calculated for the art index through Goetzmann (1992)'s formula for repeated sales regression. Returns for the DOW and SP 500 were also calculated through the log return of the year prior over the current year. Lastly, the risk free rate of return was calculated from treasury yields and was subtracted from annual returns for all three indices to reveal real returns. The mean and standard deviation of each index is recorded.

In regards to how art type of sculpture, prints, or paintings influence the data, new indices were created after filtering each work by art type. As mentioned prior, due to the shorter hold times of prints, the technique outlined by Goetzmann (1992) was unable to capture the index for the prints. However, a returns index for paintings and sculptures were able to be

constructed. Similar to the approach above, risk free rates calculated from treasury yields were subtracted for each annual index. The mean and standard deviation of each index is recorded.

To measure consumer sentiment, we utilized the University of Michigan Survey of Consumers (University of Michigan). This survey is a simple random sample conducted via phone across the 48 coterminous states and the District of Columbia (University of Michigan). It is true that the target audience for most paintings tend to be the wealthy who do not need to worry as much about economic outlook, perhaps due to the massive amount wealth they have already accumulated. However, the importance of understanding the implications of how consumer sentiment, which affects stock prices, which indirectly affects the wealthy could potentially relate to art returns (Goetzmann et al. (2010)). Therefore in order to better understand both the ability for an art investment to diversify a portfolio and potential predictive variables of art investment, a simple correlation was calculated for each index constructed above: DOW, SP 500, All Art Index, Paintings, Sculptures, and Consumer Sentiment (CI). Up to this point, the first three research questions would've been addressed to a surface level extent.

In regards to the final research question of whether an investment strategy can be created using the variables of initial auction price and holding times to maximize returns several data points were collected. First, the holding time per piece was collected per art piece and then correlations and p-values were calculated in order to understand whether holding time actually mattered in art investment. Second, the returns data per art piece was cleaned and returns per year were averaged to see if initial auction price has an impact on future returns. Initial auction price is defined as the initial offering price or the first price ever documented for a public auction for a particular piece was collected for prints, paintings, and sculptures. Following that, a simple correlation and the p-values were calculated to understand whether there is some sort of relationship between initial selling price and the real returns.

2 Methodology

The index formation method is adapted from Goetzmann (1992)'s paper on real estate repeated sale estimators. This technique is utilized by Mei and Moses (2001) to curate their art indices and is widely accepted by the arts industry as a measure of how the art market is performing. Goetzmann (1992) starts by assuming that the continuously compounded return for a certain asset i in period t, $r_{i,t}$, may be represented by μ_t, the continuously compounded return of a price index of art, and an error term:

$$r_{i,t} = \mu_t + \eta_{i,t} \tag{1}$$

Where μ_t, may be thought of as the average return in period t of paintings in the portfolio. Here, μ is a T-dimensional vector whose individual elements are μ_t.

The observed data consist of purchase and sales price pairs $P_{m,t}$ and P_{m,t_l} of the individual paintings comprising the index, as well as the dates of purchase and sale which are defined as t and t_l. Thus, the logged price relative for asset m, held between its purchase date t and its sales date, t_l, are expressed as:

$$\mu_t = \log\left(\frac{P_{m,t}}{P_{m,t_l}}\right) \tag{2}$$

In order to populate the All Art Type index, a vector of returns had to be created. Taking paintings, prints, and sculptures data, the μ_t between each repeated sale was calculated. The same was done for individual paintings so that an vector, defined as y with length N, full of painting returns were populated. Additionally, sculptures were also place through the same process, leaving an vector of returns for sculptures. Although an index of prints was not able to be calculated, an vector of returns was still computed.

Next, in order to take into account of holding periods a matrix, defined as X is created with rows of whose ith row is a series of dummy variables corresponding to the periods to be estimated, where the first nonzero dummy appears in the period immediately after the purchase date and the last nonzero dummy appears on the sales date. All sales dates are counted annually. For reference, the ith row may look like:

$$x_i = (0, ..., 0, 1, 1, ..., 1, 0, ...0) \tag{3}$$

Since the time frame of my data spans from 1986 to 2022, there will be a total of 36 items in each row. Ones will be placed in any year that the painting was held all the way until the year the painting was sold.

Using the set of normal equations for a weighted least squares regression, we uncover additional variables that would be necessary to create a repeated sales regression index:

$$P_y^{-1} = P^{-1}X\mu + P^{-1}v \tag{4}$$

In the equation above, the matrix of holding times X is defined. Additionally the vector of logged price relatives y is also specified along with μ which is the continuously compounded return of a price index of art. Lastly, we have v, which is the error term. $P^{-}1$ is defined as the diagonal weight matrix, whose diagonal elements can be calculated by:

$$\frac{1}{\sqrt{t_l - t - 1}} \tag{5}$$

The above equation is one over the square root of the the date of sale minus the date of purchase minus one.

Goetzmann (1992) defines an new variable Ω below:

$$P'P = \Omega \tag{6}$$

In order to provide the maximum-likelihood estimate of μ_t, where X is an NxT matrix, which has a row of dummy variables for each asset in the sample and a column for each holding interval the equation below is used.

$$\hat{\mu} = ((X'(\Omega^{-}1)X)^{-}1)X'(\Omega^{-}1)y \tag{7}$$

Ω is a weighting matrix, whose weights is set as the times between sales or holding periods. Therefore, using the equation above, the maximum likelihood estimate of the logged price relative series is constructed annually for all art types. Note here that due to shorter holding periods of prints, there were columns where no prints were held, therefore leading to the inability to construct that index.

3 Results & Discussion

The art market has long been a topic of interest for researchers and investors alike, with its unique characteristics making it an attractive alternative investment asset class. However, recent studies have suggested that art returns from active galleries are negative overall and underperform other financial assets with higher volatility. This has led to questions regarding the viability of art as a financial investment and its role in portfolio diversification.

Our study aimed to provide further insight into the performance of art as an investment asset, specifically focusing on the returns of various mediums such as sculptures, paintings, and prints. We also sought to investigate the relationship between art returns and general consumer sentiment, holding time, and initial auction prices. Some key takeaways from the

results of the study are concluded here.

Our analysis found that sculptures have a positive real return, while paintings have a negative real return, potentially due to overbidding in the auction market. We also found that there is no relationship between general consumer sentiment and art returns, which could be attributed to the nature of the art market and its reliance on a small number of high net worth individuals.

Interestingly, our study found that holding time is statistically significant in positive correlations with art returns, indicating that the longer an artwork is held, the higher the potential return. However, this effect is minimal, suggesting that other factors may have a greater impact on art returns. Notably, we found that initial auction prices have no huge impact on future returns other than for the medium category of sculptures, highlighting the efficiency of the art market in correcting for any overbidding in the auction process.

Overall, our findings provide valuable insights into the performance of art as an investment asset and its role in portfolio diversification. These results may be useful for investors and researchers looking to better understand the art market and its potential as a financial investment. Now we will dive into the analysis and discussion of potential reasoning for the results received.

3.1 Analyzing Returns Between Indices

The first research question delves into the returns of the art market by comparing an art index made from artists backed by active galleries to other financial assets and indices from previous studies. Galleries are known to influence prices through their taste and intuition, leading to an set of repeated sales formed by said taste. Moreover, internal bidding practices within galleries made aware through speaking with gallerists in the region would further skew prices. In today's world, most art is obtained through either auctions or an gallery. By

creating an art index based on auction sales of artists backed by currently active galleries, a accurate reflection of the art market can be achieved. The novelty of this research question lies in comparing this new index to other financial assets, which has yet to be explored. Does taste from galleries matter? If they do, we can expect to see a high return for the art pieces that are chosen. If they do not, or if there are malpractices that falsely overprice the intitial bidding price of the asset, then we will see a much lower return.

Additionally, the influence of art type on art returns and how this compares to other investment assets was explored here as well. Although prior research has shown that overbidding has an impact on art returns, it has not been studied in terms of art structural type. The idea is that perhaps there is a preference of art type which leads to high returns. Or if the returns are negative, we can witness the partial effects of overbidding on different sectors of the art market (Mei and Moses (2001)). Additionally, research on the psychological perceptions of value across different art mediums has been limited, and this research question seeks to fill that gap. By examining the returns of different art types and comparing them to other investment assets, a better understanding of the value of different art mediums can be obtained. With this goal in mind, a table of the mean and standard deviation of the return indices of All Art Types (including sculptures, paintings, and prints) is compared to the SP 500, the DOW, Paintings, and Sculptures. The results are shown below:

Table 2: Means and Standard Deviations of Returns Over 1986 - 2022

Asset	**Mean**	**SD**
AllArtType	-0.014165	0.186198
S&P500	0.034560	0.166822
DOW	0.036530	0.137968
Paintings	-0.023119	0.253014
Sculptures	0.000287	0.482154

The table provides information on the means and standard deviations of real returns for five different asset types over the period 1986 to 2022.

The SP500 and DOW indices have positive mean returns of 0.034560 and 0.036530, respectively, with standard deviations of 0.166822 and 0.137968. These two indices have relatively high mean returns compared to all art indices and the lowest standard deviation. This means that not only are they decently high on returns, they also are of lower volatility than investing in art.

AllArtType, which represents the returns of all types of art, has a negative mean return of -0.014165 and a standard deviation of 0.186198. This suggests that, on average, investing in art has not been profitable over the period examined. Regardless, compared to the returns of paintings by itself, it is a bit higher, hinting that perhaps it is a marriage of both sculpture returns and print returns (which were not able to be captured as an index by itself due to inadequate data) that brings the average returns up. Through some simple estimation math using the sample sizes of each art type and their respective returns, we can estimate that the print mean return may hover around -.00723. This leads to the conclusion that in terms of returns, sculptures may be the best investment option. When we are analyzing at the index of all art types it's standard deviation is significantly lower than that of Paintings and Sculptures alone, leading to the conclusion that either A) prints are highly nonvolatile or B) the convergence of multiple medium types has an effect of decreasing the standard deviation of a art investment portfolio with the second part more likely.

Paintings have a larger negative mean return of -0.023119, indicating that investing in this type of art has been less profitable than investing in other types of art. However, paintings have a lower standard deviation of returns (0.253014) compared to sculptures indicating that despite its negative return, it is more stable than the sculptures data set.

Sculptures have a mean return close to zero (0.000287) with a high standard deviation of returns (0.482154). This suggests that investing in sculptures has not provided significant returns on average, and has been associated with high risk. However, considering that sculptures increased the mean returns of all art types, having them within a portfolio may have balancing effects.

Overall, the table indicates that investing in the stock market (SP500 and DOW) has provided higher returns on average compared to investing in art (AllArtType, Paintings, and Sculptures). This has garnered similar results to other studies such as Goetzmann et al. (2010), Mei and Moses (2001), Baumol (1986), and Buelens and Ginsburg (1993). However, since paintings real returns alongside the all art returns were negative, our results contradict studies that say that art tends to out perform government assets, leading to a conclusion that perhaps pieces bought through auction supported by galleries may not be the best strategy.

3.2 Correlations Between Indices

Earlier on, we discussed how returns of art investments from auctions that are gallery based tended to dip below stock returns and be either on par with or below the yield of government assets. However, the diversification effects of art investments have yet to be studied. This can be done through a correlation table. Within the correlation table, the consumer sentiment index is also added to investigate whether it contains possibility to become a predictive variable for the directionality of financial assets. Additionally, the correlations between the stock indices and art assets are analyzed to see if 1) there are low correlations and 2) if they are statistically significant which could lead to a clue as to whether or not art assets from auctions based on gallery artists can be used as portfolio diversification.

Table 3: Correlations of Real Returns Over 1986 - 2022

	Art	S&P500	DOW	Paintings	Sculptures	CI
Art	1.000	0.032	-0.008	0.781***	0.226	0.138
S&P500	0.032	1.000	0.963***	0.217	0.339**	0.235
DOW	-0.008	0.963***	1.000	0.181	0.240	0.220
Paintings	0.781***	0.217	0.181	1.000	0.230	0.106
Sculptures	0.226	0.339**	0.240	0.230	1.000	0.263
CI	0.138	0.235	0.220	0.106	0.263	1.000

*** p ¡ 0.001, ** p ¡ 0.01, * p ¡ 0.05 (two-tailed tests)

This table presents the correlations between real returns of various assets over the period of 1986-2022. The first thing to note is that the correlation between art and the SP500 and DOW indices is quite low, with correlations of only 0.032 and -0.008, respectively. This indicates that art returns are not strongly related to the returns of these traditional financial assets, indicating that it can be used as a tool of portfolio diversification in general.

The correlations between the SP500, DOW, and paintings and sculptures are all positive. This point is interesting as we see that within the Art index, it is negatively (although only slightly) with the DOW. This may be due to the absent information regarding how a print index may correlate with the rest of the indices here. This may hint that prints are negative when it comes to correlations with stock indices and could be great diversification assets. Further study with more print data will need to be conducted.

The correlation between art returns and the CI (Consumer Index) is also relatively low, at 0.138. This indicates that art returns are not strongly related to overall consumer sentiment, as measured by the University of Michigan's Consumer Index. This can be explained through the high wealth profiles of normal art investors and the lower wealth profiles of the consumers who took the survey. However, this link is necessary to explore to see if art returns exist in a vacuum in comparison to general consumer sentiment about the economy, which is proven to be accurate.

There is a strong positive correlation between art returns and returns on paintings, with a correlation coefficient of 0.781***. This suggests that returns on paintings are highly related to art returns, which is to be expected due to its sample size, making paintings a significant driver of art returns. In contrast, the correlation between art returns and sculpture returns is only 0.226, which is relatively low compared to the correlation between art returns and paintings. This may mean that sculptures tend to move a bit differently than the other types of art that composes the Art index. This is a positive as that may mean within art portfolios themselves, sculptures tend to act as a diversification agent.

Overall, this table suggests that art returns are not strongly related to traditional financial assets like the SP500 and DOW, making it a possible diversification asset. It also suggests that consumer sentiment, as measured by the CI, is not strongly related to art returns. The low correlations of consumer sentiment index with the DOW and SP 500 came as a surprise as the assumption is that if stock indices are a indication of how wealthy the wealthy are Goetzmann et al. (2010) then they should be highly correlated with art indices which contains items bought mostly by the rich Mandel (2009) and if consumer sentiment can predict stock indices, they should be able to predict art indices as well – which turned out to be false.

3.3 Holding Times and Initial Prices

In this study, we investigate the potential for developing a basic investment strategy in the arts market that utilizes two key variables: initial auction price and holding times. Previous research has shown that pieces with low buying prices and long holding times tend to generate higher returns. However, the development of a systematic investment approach for the arts market remains an underdeveloped area of research. This research question is therefore significant as it addresses the need to explore ways of achieving consistent high returns in an industry that is notorious for its occasional over- and under-performance. Moreover, the inclusion of art investments in the portfolios of high net worth individuals highlights the importance of understanding the art investment market for everyday investors in order to democratize the market.

Table 4: Correlation between Hold-time and Real Returns Over 1986 - 2022

Art Type	Corr	P-value
Print	0.0398**	0.0053**
Paint	0.0632***	3.65e-05***
Sculpt	0.221***	0.0002***

The table displays the correlation coefficients and p-values between the holding time of

artworks and their corresponding real returns over the period of 1986-2022, categorized by art type (print, paint, and sculpture).

For prints, the correlation coefficient between holding time and real returns is 0.0398, indicating a weak positive relationship. However, the p-value of 0.0053 suggests that this correlation is statistically significant at the 0.05 level. This implies that holding onto prints for a longer period of time may lead to slightly higher returns, but other factors such as market trends and demand should also be considered.

For paintings, the correlation coefficient between holding time and real returns is 0.0632, indicating a moderate positive relationship. The p-value is 3.65e-05, which is extremely low and suggests that this correlation is highly statistically significant. This result implies that holding onto paintings for a longer period of time may lead to significantly higher returns. This finding may be particularly relevant for investors in the art market who are looking to adopt a long-term investment strategy.

For sculptures, the correlation coefficient between holding time and real returns is the strongest among the three art types, at 0.221. This indicates a strong positive relationship between holding time and real returns. The p-value of 0.0002 is extremely low, suggesting that this correlation is highly statistically significant. This result implies that holding onto sculptures for a longer period of time may lead to substantially higher returns, and may be of particular interest to investors who are seeking a high-return investment strategy.

In conclusion, the table suggests that there is a positive correlation between holding time and real returns for artworks, regardless of the type of art. However, the strength of the correlation varies between different art types, with sculptures showing the strongest correlation. These findings suggest that investors in the art market may benefit from a long-term investment strategy, particularly for paintings and sculptures. Nonetheless, as with any investment, other factors such as market trends and demand should also be taken into consideration.

Table 5: Correlation between Initial Selling Price and Real Returns Over 1986 - 2022

Art Type	Corr	P-value
Prints	0.0225	0.3155
Paintings	-0.0029	0.9072
Sculptures	0.1896*	0.0406*

This table shows the correlation between the initial selling price and the real returns for different types of artwork over the period 1986-2022. The results indicate that there is a weak positive correlation between the initial selling price and the real returns for prints, with a correlation coefficient of 0.0225. However, the p-value of 0.3155 suggests that this relationship is not statistically significant.

For paintings, the correlation coefficient is negative, indicating that there is a weak negative relationship between the initial selling price and real returns. However, the correlation coefficient is extremely close to zero (-0.0029) and the p-value of 0.9072 suggests that this relationship is not statistically significant. Therefore, we can conclude that there is no significant correlation between the initial selling price and real returns for paintings.

The most significant result is for sculptures, where there is a moderate positive correlation between the initial selling price and real returns, with a correlation coefficient of 0.1896. The p-value of 0.0406 suggests that this relationship is statistically significant at the 0.05 level. Therefore, we can conclude that there is a significant positive relationship between the initial selling price and real returns for sculptures.

These results suggest that the initial selling price may not be a reliable indicator of future returns for all types of artwork. For prints and paintings, the relationship is weak and not statistically significant, indicating that other factors may have a greater impact on real returns. However, for sculptures, the initial selling price appears to be a good indicator of future real returns, and investors may consider this when making investment decisions. This result may also provide important signals as to which markets may be more corrupt as it is

seen that overbidding tends to lead to negative returns Mei and Moses (2001).

It is important to note that correlation does not necessarily imply causation, and other factors such as the quality of the artwork, the artist's reputation, and market conditions may also have an impact on real returns. Therefore, further research is needed to fully understand the relationship between the initial selling price and real returns for different types of artwork.

4 Conclusion

The findings of our analysis indicate that art is a complex and challenging asset class for investors. We found that art returns from currently active galleries are negative overall and mostly under-perform other financial assets with higher volatility, making it an unattractive financial investment. However, we acknowledge that this could be due to overbidding and gallery mis-action, which could be influencing the market dynamics.

Our analysis suggests that sculptures, despite their high volatility, may be a better investment compared to other art forms. High volatility may also be a factor of the much smaller comparative sample size of 278. Therefore, it is suggested that another study be conducted with higher amounts of sculpture data to investigate how that art type holds in large quantities against other measures of financial assets.

However, we also acknowledge that the influence of gallery tastes on pricing may be a factor worth further exploration. Further research efforts may shed light on the implications of galleries within the art market, which have scarcely been studied other than in relation to how prices positively correlate with an artist's reputation and negatively correlate with a gallery's reputation Reinstaller and SchÃ¶nfeld (2007). We must also analyze how returns differ between galleries. There is a knowledge gap for common investors when thinking about investing in the arts market. In order to fill that gap, further transparency, or forced

transparency through studies such as this must be required.

Our research revealed that sculptures have a positive real return, while paintings have a negative real return, and art in general (paintings, sculptures, and prints) have a negative real return. This finding could be the consequence of overbidding or due to the psychological input of viewing the art medium. Some potential possibilities of investigation are analyzing brain activation between mediums to see if there are more stimulation between the types, which provides incentives for people to pick one medium type over the other. Another possibility is to analyze overbidding per art type using Mei and Moses (2001)'s methods on proving overbidding in the arts market.

We also believe that research into the issue of corruption within galleries may help create a positive uptick in art investments, as well as studying the segmentation of author influence as a factor to predict art prices and future evaluations. Additionally, further analysis of the segmentation of art investors can be put into place to understand the application of sentiment and its potentially predictive relation to the art market.

Overall, we found that there are no relationships between general consumer sentiment and art returns, which could be attributed to the conspicuous consumption nature of the art market and the skew of investor wealth. However, we still must investigate how value presented in psychological form or our beliefs abut the future may influence the pricing and therefore returns of a scarce and valuable good.

Further research could also involve utilizing granular data from consumer surveys to attempt to analyze correlations based on income level, as well as analyzing Twitter scrapes of sentiment alongside returns. An intersection between visual perception and perceived value of pieces may also be studied to analyze whether sculptures, due to higher visual stimulation and ability to interact, lead to higher returns.

In terms of variables that could potentially explain returns, holding time was found to be statistically significant in positive correlations with art returns, indicating that investors who

hold onto their art assets for longer periods may see higher returns. Nevertheless, the effect of holding time was found to be minimal, indicating that other factors have a greater impact on art returns. However, this doesn't mean that for another data set the effects may continue to be minimal. Further segmentation of art type, style, and artist demographics may reveal more about the value longevity of the pieces that are invested in.

Finally, we believe that breaking down holding time for different types of art, such as contemporary, cubism, classical, and realism, may indicate which pieces are good to hold for longer and which should be held for shorter periods of time. Additionally, studying the initial selling price of art pieces over time may yield more results as to particular strategies and identify potential sources of gallery price corruption. Overall, our study provides valuable baseline insights into the performance of art as an investment asset and its role in portfolio diversification, highlighting the need for further research and analysis in this field to increase its value and the number of investors.

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