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ART INVESTMENTS AS AN INFLATION HEDGE

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Abstract

This thesis explores the potential of art as an alternative investment and its effectiveness as a hedge against inflation. The study investigates the relationship between real art returns and inflation, particularly during times of economic turbulences. The analysis is grounded on theories used to account for inflation hedging in other alternative investments, such as real estate and gold. The goal is to determine whether art performance remains stable or increases independently of inflation, and whether it is a desirable asset for portfolio diversification.

Keywords: art investments - alternative assets - inflation hedging - portfolio diversification

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1 Introduction

In recent years, global inflation surged to unprecedented levels above 8%, driven by geopolitical events like the COVID-19 pandemic and the Russian invasion of Ukraine. Prices soared across sectors and reached their highest levels in 2022 of around 8% inflation in the United States and 9.8% in Europe[1]. While the stock market experienced a decline amidst these rising prices, the art market has notably thrived, recording sales totaling $67.8 billion in 2022 (McAndrew 2023). **The question arising here is: Can investments in art be considered a prudent strategy for investors looking to preserve their capital during times of economic instability and high inflation? Can art investments serve as an effective hedge against inflation?** There has always been an ongoing discussion among investors on how to protect their portfolio from inflation and unexpected price changes. Inflation hedging was a hot topic already in the 1970s when the economy experienced a similar scenario like today and inflation reached its all-time high of above 20%[2] in the US due to oil price shocks and energy shortages. Historically, the most common way for investors to protect their portfolio were alternative assets like real estate and commodities due to their low correlation with the stock market, often maintaining or appreciating their value during inflationary periods. The idea of art as an investment, rather than solely as an aesthetic object, traces back to the post-war era when the British Rail Pension Fund allocated a portion of its capital to art. However, it was only in the 2000s that the convergence of art and finance became widely recognized, capturing the interest not only from collectors, art galleries and auction houses, but also of investors without previous ties to the art market willing to invest to diversify their portfolio. This paper aims to find an answer to the previously mentioned research question and contribute to the limited literature on the inflation-hedging properties of art. The research will commence by reviewing existing

[1, 2] International Monetary Fund

research on various hedging strategies and on the role of art as an alternative investment. As there is very little research on art as a hedge against inflation, this paper will be based on theories used to account for inflation hedging on other alternative investments, such as real estate and gold. The goal is to determine whether real returns on art remain consistent or even increase in times of rising inflation, to recover the inflationary effects. The results reveal that real art returns move independently from inflation and still exhibit a positive real return across the investigated periods and inflation levels, implying that art may be a desirable asset for investors looking to safeguard their portfolio from inflation.

2 Inflation Hedging in Literature

The initial part of this study involves a short examination of inflation hedging within existing literature. The first step includes defining inflation hedging, followed by a subsequent focus on inflation hedging theories. The second step explores past research, specifically on assets that have historically proven to be an effective hedge against inflation.

2.1 Inflation hedging

Inflation, as known, is the rate at which the value of a currency declines due to an increase in the cost of a basket of goods and services. In simpler terms, when inflation occurs, the same amount of money buys fewer goods and services than it did before. Similarly, as inflation increases stock and bond investments go into trouble, prompting investors to look for real assets such as gold, real estate, and infrastructure. An inflation hedge is an investment whose real return remains stable during times of high inflation, thus compensating for the loss caused by currency devaluation.

2.1.1 The Fisher Hypothesis

The Fisher's hypothesis (1930) is at the center of most inflation hedging theories, applied in various financial instruments. This economic framework underlines the difference between nominal returns and real returns. The Fisher´s equation states that the real return (r) on an asset equals the nominal return (i) minus the inflation (π). This implies that nominal returns move hand in hand with inflation, while real returns are uncorrelated (Fama und Schwert 1977).

$$r = i - \pi$$

The Fisher´s framework has been expanded by later studies, incorporating additional dimensions of inflation, like expected and unexpected inflation (Fama und Schwert 1977), or by considering different time horizons and asset classes (Bekaert and Wang 2010).

2.1.2 Pearson´s Correlation Coefficient

The Pearson's correlation coefficient measures the linear relationship between two variables and is another commonly used technique to establish an inflation hedge. The coefficient has a range between -1 and 1, with 1 signifying positive and -1 negative linear correlation between the variables. The Fisher's hypothesis and the Pearson's correlation coefficient serve as fundamental concepts in numerous studies and will serve as the foundation of the subsequent research on the efficacy of art as an inflation hedge.

2.2 Alternative Assets

With the economic instabilities and inflation rise in the 1970s inflation hedging gained momentum and so did many studies on alternative investments as inflation hedge. Between 1973 and 1979 the US dollar depreciated by around 20%, driving commodity and gold prices up, with gold experiencing an annual return of approximately 35%, reaching its all-time high

in January 1980[3]. Fama (1981) pioneered research on inflation hedging with a money demand-quantity model, forecasting that an expected decrease in inflation would increase real money balances. This early work laid the foundation for subsequent research on the inflation-hedging properties of various asset classes, such as equities, bonds, commodities, real estate and gold. Geer´s (2000) study, spanning 1970 to 1999, highlights the low correlation between commodity portfolios and traditional assets, showing their efficacy as a hedge, especially against unexpected inflation. Similarly, Bekart & Wang (2010) and Worthington and Pahlavani (2010) conducted research on the correlation between US inflation and gold, historically considered a safe haven during economic downturns. Their analysis reveals inflation betas ranging from 0.9 to 1.4 for expected inflation and 1.1 to 2.4 for unexpected inflation during the post-war period, affirming gold´s role as a reliable inflation hedge. Attié and Roache (2009) highlight the horizon dependency of the inflation hedging properties of assets and suggest that while commodities have quick reaction and may be an effective inflation hedge in the long-run, equities only over the long horizon. In their analysis of the correlation between inflation and asset returns from 1953 to 1971, Fama and Schwert (1977) concluded that residential real estate offers a strong hedge against both expected and unexpected inflation, whereas Treasury bills and bonds give protection against expected inflation.

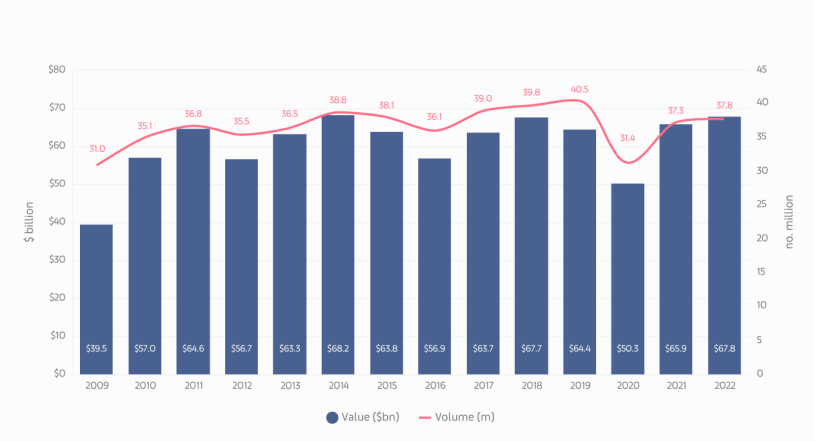
In conclusion, literature underscores the importance of considering various economic scenarios and theories when evaluating the effectiveness of alternative assets as inflation hedges and offers insights into the potential role of art within this unique landscape. This study will apply these economic theories to the art market to analyze the potential of art investments as an effective hedge against inflation.

[3] Data from Macrotrends

3 The Art Market

Global art sales rose by 3% annually to an estimate of $67.8 billion in 2022, exceeding the pre-pandemic level in 2019, according to the UBS and Art Basel Art Market Report 2023. Following a 22% decline in sales in 2020 amid the COVID-19 pandemic, sales rebounded rapidly in 2021, rising 31% to $65.9 billion (McAndrew 2023). The swift adoption of digital platforms and the growing affluence of high-net-worth (HNW) collectors were the primary drivers of this surge

Figure 1: Global Art Market Sales (2009 - 2022)



Source: (McAndrew, The Art Market Report 2023 2023)

With 80% of global art sales expected in 2022, the United States, the United Kingdom, and China represent the three largest art markets. With a 45% year-over-year growth in sales, the US maintained its leading position as global art market leader. The UK and China came in second and third, with 18% and 17% of sales, respectively [4]. The hub of the art market was in Europe, particularly France, in the early 1900s. However, following the 1929 stock market

[4] Source: Figure 2: The Global Art Market Share by Value 2022

crash, the Great Depression, and the depreciation of the French franc, the hub of the art market shifted to the United Kingdom and the United States, where it has stayed ever since.

The US art market had the strongest recovery from the pandemic with a total amount of $30.2 billion in 2022, which is the highest level to date. This growth was mainly driven by the auction sector. The largest art sector by sales volume is the post-war and contemporary art sector, with a share of 54% of the value of global fine art auction sales in 2022.

3.1 Art as a Financial Asset

Art has been recognized as a financial asset for centuries, but its formal recognition as an investment class has evolved over time. Its origins can be found in the turbulent years of the 1970s, which included the oil crisis and a sharp increase in inflation. The British Rail Pension Fund laid the foundation for art investments during that time by investing $70 million, or roughly 3% of its funds, in more than 2000 pieces of art, including highly valued pieces by Matisse and Monet (Kelleher 2013).

Deloitte Luxembourg Advisory director Adriano Picinati di Torcello noted that the concept of art as an alternative investment gained momentum in the late 20th century, as auctions became important events for the high society and auction houses were not only recognized as intermediaries in the art market, but rather luxury good companies. In an interview Adriano Picinati di Torcello said, “This interest in this alternative market was fueled by academic publications analyzing art as an alternative investment and as an option of portfolio diversification in the early 2000s. There were influential articles for instance by the New York University professors Jianping Mei and Michael Moses”[5] (Adam 2017), who later created an index used to measure the art market performance.

[5] This quote comes from an interview Georgina Adam has with Adriano Picinati di Torcello for her book “the dark side of the boom”

Significant developments in the recognition of art as an asset class have been done in recent years, as investors are becoming more interested in alternative investment opportunities. With the financial market in economic turmoil, art has been incorporated in investors' portfolios as an asset class for diversification purposes. It is no longer valued solely for its aesthetic appeal, but it has become a recognized and potentially lucrative financial investment. Art is a store of value and a possible source of capital gain; it's worth increases over time, much like that of financial assets (McAndrew 2010). An artwork's ability to increase in value is dependent on its availability in the secondary market, where supply and demand drive pricing.

The art market is divided into sub-categories, featuring newly issued art from emerging artists and blue-chip art consisting of more established and renowned artworks. Blue-chip art is often considered a secure investment, illustrated by the success of Jean-Michel Basquiat's "Untitled"[6] highlighting art's allure for high-net-worth investors. Initially sold in 2004 for $4.5 million, the painting was resold 12 years later for $57.3 million. In 2022, it was once again sold in New York, this time for $85 million, including fees, to a private buyer. Beyond being an investment, art, as a form of luxury goods associated with wealth, transcends its role to make a social statement. The intersection of art and finance has extended beyond individual investors to include large corporation, notably banks like UBS, JPMorgan, Bank of America, Deutsche Bank, UniCredit, Morgan Stanley and Goldman Sachs. These institutions diversify their alternative asset portfolio by investing in art not only for financial reasons but also to enhance their brand and foster cultural exchange. As UBS CEO Sergio Ermotti said, "our art collection is not just an investment, but also an asset that reflects the values of the bank and our commitment to society". There are many ways to invest in art. The most traditional ones are art fairs, auctions, private dealers, or galleries, while there are also more modern ways such as online marketplaces like Artsy. As art investments gained popularity among a broader audience,

[6] Figure 5: Jean Michel Basquiat "Untitled" (1982)

the natural progression was the development of a platform that could enable everyone to invest in art, not just high-net-worth individuals. This step was done by Masterworks, an online platform that gives everyone the change to invest in a fraction of a blue-chip artwork. The company acquires artworks and holds them for three to five years, depending on the art market circumstances. During that period everyone, from high-net-worth individuals to the broader public, can invest in a fraction of the artwork. The goal was to create a platform that would allow anyone to invest in art.

3.2 Risks

Despite its increasing integration into financial strategies, the art market presents various challenges for investors, especially for those without a specialized understanding of its nuances. The art market lacks strict regulation, coordination mechanisms, or institutional structures (McAndrew 2010). Transparency issues, information asymmetry, and high transaction costs, pose a problem for investors (McAndrew 2010) (Penasse 2017). It is hard to find reliable figures about the art market, auction sales from major auction houses are the most easily trackable. This regulatory gap makes it challenging for investors and participants to authenticate and accurately appraise the value of artworks. In addition to that, the value of an artwork and collectibles more broadly, is driven by demand, making them rather illiquid assets that cannot be easily converted into cash. Despite their potential to appreciate in times of economic turmoil, the low demand for artworks makes it difficult for investors to quickly sell these luxury goods when needed. Overall, investing in art demands consideration of potential risks and the adoption of mitigation strategies, particularly for individuals lacking expertise in the sector.

3.3 Literature on Art as an inflation hedge

In the post-war period researchers, such as Stein (1977), Baumol (1986), and Goetzmann (1993) initiated conversations on art as a potential hedge against inflation, utilizing the repeated-sales regression approach to analyze the returns on fine art. This marked the commencement of numerous papers and research studies.

Goetzmann (1993) investigates the financial returns on art investments between 1715 and 1986. His research shows that art is positively correlated to financial markets and that art returns were higher than the London Stock Exchange returns between 1850 and 1986, providing evidence for the inflation-hedging properties of art. Similar results have been found by Stein (1977), who estimated the financial returns on investing in the art market between 1946 and 1968. To conduct this analysis, he developed the first price index for pre-World War II paintings from US and UK auction prices and estimated the nominal appreciation of paintings, finding that in the 1950s and 1960s, art was a better investment than stocks. On the contrary, Baumol (1986) critically analyses the performance of art investments and finds that the financial returns from art are very low and that transaction costs are very high. He provides a critical perspective on the financial aspect of art and concludes that art investments are very risky, especially for investors that are not experts in the art market. On the contrary, Mei and Moses (2002) discovered that although art underperforms the S&P 500, it outperforms fixed income securities. It has been observed that art exhibits less volatility and correlation with other assets, rendering it a desirable investment option for portfolio diversification and therefore, an effective inflation hedge.

In conclusion, while art can be a valuable alternative asset for portfolio diversification, its effectiveness as an inflation hedge is not clear. As literature suggests, the performance of art can vary based on the economic environment. While some research suggests it outperforms fixes incomes, others conclude that it underperforms the stock market. This paper will put a

greater focus on the performance of art prices and its characteristics during times of economic uncertainties.

4 Analysis

4.1 Research hypothesis

The literature review established a solid foundation for the study and identified two primary research hypotheses to test. The first hypothesis is based on the Fisher´s hypothesis (1930), which lies at the foundation of inflation hedging theories, the nominal return on an investment equals its real return plus inflation, suggesting that nominal interest rates move hand in hand with inflation. This theory was further expanded by Fama and Schwert (1977) who state that "in order for an asset to be a complete hedge against inflation the nominal return on the asset varies in one-on-one correspondence with both the expected and unexpected components of inflation rate, and the real return on the asset is uncorrelated with the inflation rate". The second hypothesis proposes that art can be considered an effective hedge against inflation if the real return on art remains relatively stable across different inflation scenarios, low, medium, and high inflation, meaning that art prices have a comparably low volatility.

4.2 Data

The data used in this analysis is sourced from secondary data sources, specifically focusing on information from Bloomberg and the Art Market Research. The latter provides comprehensive data on the art market, including market trends, pricing, and artists performance. Given the limited availability of data, especially for art prices, the analysis will cover the period between 1978 and 2023 for most of the research, with some restrictions when it comes to the correlation with other asset classes such as real estate and commodities. The data is collected monthly and

the regional focus is on the United States, considering that it makes up about 45% of the values of the global art market.

4.2.1 Inflation

The most widely used measure of actual inflation is the Consumer Price Index (CPI), which represents the prices that consumers pay for a range of goods and services. In the United States, key components of this index include energy prices, food, beverages, and transportation costs, representing the broader economic landscape. The prices of a sample of typical products whose prices are periodically gathered are used to create statistical estimations that are used to generate the CPI index. The three primary components of inflation that will be taken into consideration are actual, predicted, and unexpected inflation. The calculation of actual inflation will rely on the Consumer Price Index (CPI), with information sourced from Bloomberg. The data for expected inflation is provided by a survey conducted by the University of Michigan, that collects consumers expectation on the change in price of goods and services. Subtracting the expected inflation from the actual inflation the unexpected inflation is yielded.

4.2.2 Art

The art market is rather opaque and there are only few reliable sources that track art prices. The main art indexes that represent the art market performance are the Mei Moses index, the ArtPrice index, and the All Art index. This research will build on the All Art index provided by the Art Market Research (AMR).

AMR All Art Index – The All Art Index tracks the evolution of the global art market and contains prices of the most important artists working in painting, sculpture, print, and photography over the last three centuries, like Jean-Michel Basquiat and Giacomo Balla. The methodology used to calculate the index was created by AMR. The prices are calculated on a

24-months window and the prices recorded are “hammer prices”, which is the amount that the hammer of the auctioneer lands on. Any premiums that the auction house may decide to add are not included in this price.

AMR All Art Top Traded (TT) Index – A subcategory of the index is the All Art Top Traded (TT) Index, which includes only artists whose works have been sold at least 30 times in a 24-month period. The methodology to construct the index is the same as for the All Art Index.

4.2.3 Gross Domestic Product (GDP)

The economic growth of the United States relies on the Gross Domestic Product (GDP), sourced from FRED economic data. The analysis will incorporate the logarithmic percentage change of GDP to examine the correlation between art prices and the country's economic growth.

4.2.4 Other Assets

In a second step the analysis will calculate the correlation between real art returns and other asset classes such as the stock market, commodities, real estate, and gold.

Stocks – The stock returns are based on the S&P 500 index, which represents the 500 leading companies in the United States and covers around 80% of the available market capitalization.

Commodities - When it comes to inflation hedging, one of the main alternative investments taken into consideration are commodities. The iShares S&P GSCI commodity-indexed trust (GSG) is a measure to represent the overall performance of the commodities market. The exchange-traded fund (ETF) tracks the performance of a diversified group of commodities, such as energy, metals, and agriculture. The impact on the index of each commodity is based on the market capitalization of each.

Gold – As gold is a tangible good that is unaffected by yield decisions, it can be used as insurance during difficult economic times. The spot price of gold is collected from Bloomberg

in US dollar per ounce on a monthly basis. Like the other assets the analysis will focus on the monthly percentage change of gold.

Real Estate – To measure the performance of real estate the analysis will be based on the Dow Jones US Real Estate Index (DJUSRE). This index provides a guideline for housing properties in the US and is used by investors and analyst to track the performance of the real estate sector and make investment decisions.

4.3 Methodology

Based on Fisher´s (1930) and Fama and Schwert´s (1977) inflation-hedging theories, the inflation-hedging characteristics of an asset are given by the relationship between its nominal and real returns and inflation. In addition to that, art must function as a valuable diversification asset within a portfolio, implying that it should exhibit minimal or no correlation with other assets. The methods used in this paper to conduct the analysis are correlation and regression analyses and the returns on art as well as on other assets are expressed as inflation-adjusted returns in logarithmic notation.

In a first step, a correlation matrix will examine the relationship between the returns on various asset classes expressed in real terms and the real return on art investments. Specifically, the analysis explores the correlation between art, the stock market and other asset classes, such as real estate, commodities, and gold. Furthermore, the relationship between real return on art (the dependent variable) and inflation (the independent variable) is analyzed through a regression analysis (Formula 1). If the first research hypothesis holds true, the analysis should reveal no relationship between inflation and real art returns in order for art to be regarded as an effective inflation hedge.

$$(1) \quad \ln r_t(art) = \beta_0 + \beta_1 \ln r_t(infl) + \varepsilon_t$$

$$(2)^{7} \quad \ln r_t(art) = \beta_0 + \beta_1 \ln r_t\,(infl) + \beta_2 \ln r_t\,(GDP) + \beta_3 \ln r_t\,(\Delta infl) + \varepsilon_t$$

The same regression analysis is conducted by adding two additional variables, GDP, and unexpected inflation (Formula 2). The latter is particularly important because investment decisions are driven by expectations and therefore unexpected inflation could theoretically influence the demand for artwork, the first one, GDP, is a control variable, used assuming that economic growth could be a determinant of the investments in art.

Also, the effect of inflation or unexpected inflation on real returns may take time to manifest in the art market. To account for this a regression analysis with real art returns with a 3 and 6-months lag is conducted (Formula 3).

$$(3)^{8} \ \ln r_{t+q}(art) = \beta_0 + \beta_1 \ln r_t\,(infl) + \beta_2 \ln r_t\,(GDP) + \beta_3 \ln r_t\,(\Delta infl) + \varepsilon_t$$

The previous three analyses are conducted in a long-term time horizon that goes from 1978 to the present. In a second step, to account for the second research hypothesis, the same regressions will be run for various sub-periods characterized by low, medium, and high inflation. This approach aims to understand the dynamics between art prices and inflation changes under different inflationary conditions. Subsequently, an analysis of the volatility in real art returns is conducted to understand whether it remains constant or varies over time. In a second step, the volatility in real art returns (σ_t) is regressed against actual inflation, unexpected inflation, and economic growth to determine if it is influenced by these factors (Formula 4). Again, the analysis was conducted over the entire period and the aforementioned sub-periods.

$$(4) \quad \sigma_t(art) = \beta_0 + \beta_1 \ln r_t\,(infl) + \beta_2 \ln r_t\,(GDP) + \beta_3 \ln r_t\,(\Delta infl) + \varepsilon_t$$

[7] Where t represents the various time horizons, which vary between the three scenarios of low, medium and high inflation, and the entire period analyzed (1978 – present)

[8] Where **q** is the lag length of the real returns on art. In our case 3 and 6 months.

5 Results

This section summarizes the key findings derived from the analysis on the inflation-hedging properties of art investments. Starting with a concise visual overview and description of the data, the subsequent presentation outlines the outcomes of diverse regression analyses, volatility assessments, and the correlation matrix. Overall, the data supports Fisher´s theory, by showing that real art returns show little to no relationship with actual and unexpected inflation and are not impacted by economic expansion. Nevertheless, real art returns remained high even in times of high inflation, suggesting that investments in art could serve as a promising investment during times of high inflation. Moreover, the minimal or nonexistent correlation between art and other assets positions it as an appealing option for portfolio diversification.

5.1 Descriptive Statistics

The first step of the research is a comparison of available data in order to choose the appropriate means for the analysis. Figure 4 is a graphical representation of the All Art and All Art Top Traded index. The All Art top traded Index demonstrates a higher volatility with a value of around 62.7% in comparison to the All Art index which has a volatility of around 24.6%. This observation is given by the increased observations that the All Art Top Traded index has compared the All Art index. In addition to that, the All Art Index exhibits a more gradual and consistent growth over time, therefore providing a more accurate performance representation of the overall art market. For these reasons the research will use the All Art Index to represent the performance of the art market.

Figure 2: All Art & All Art Top Traded (TT) Index

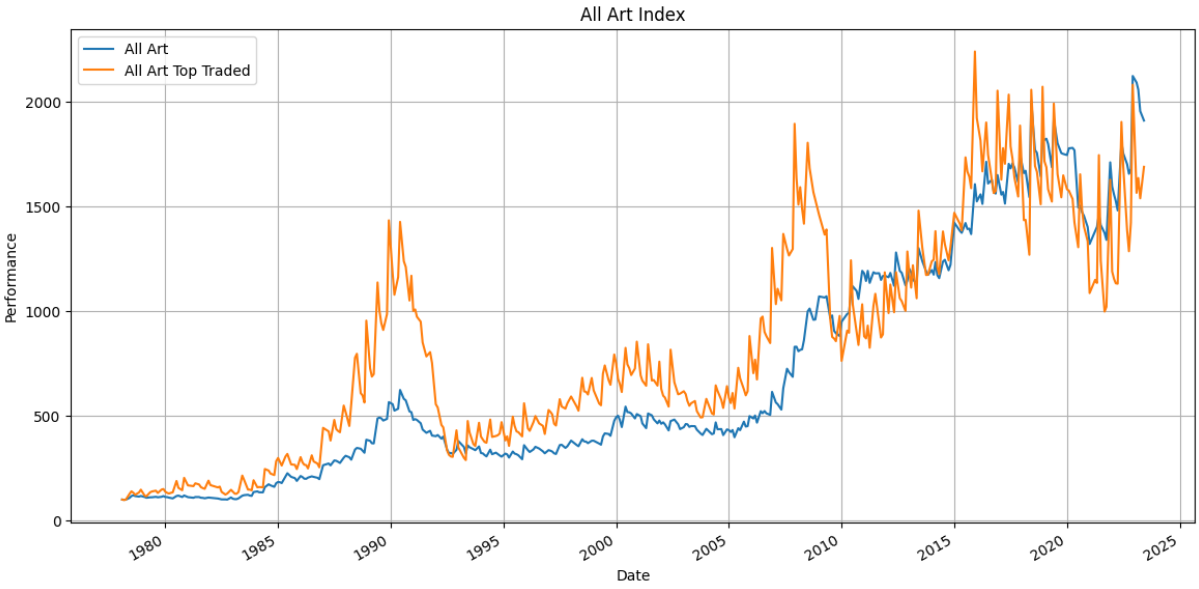
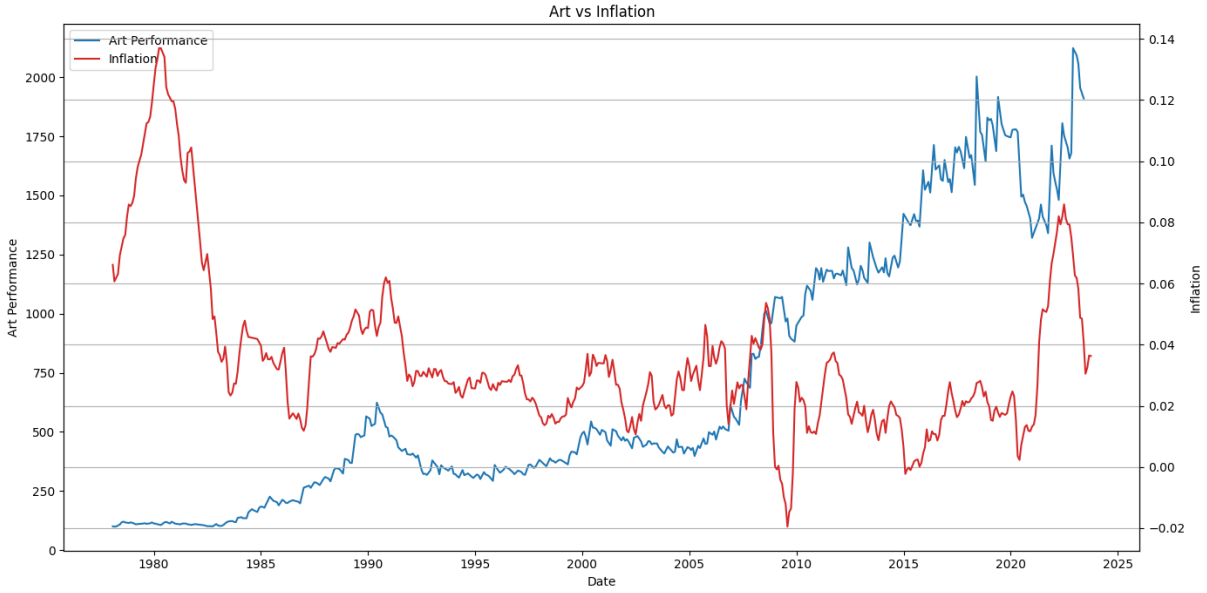


Figure 5 is a visual representation of the normalized inflation-adjusted art prices and the US inflation rate since 1978. The graph clearly shows the rather constant increase of art prices over the entire period, with a pronounced appreciation in the overall price performance observed starting from 2009. This rise since 1978 can explain the attention that art has gained as an investment starting from around 2009 and 2010, which led to many research and studies related to the relationship between the art and finance and the increasing awareness of art as an alternative asset class. Furthermore, it can be observed that during times of economic crises and high inflation, such as the financial crisis in 2008 and the recent inflation surge that started in 2021, art prices remained stable and increased further. As inflation surged beyond 5% in 2007 and subsequently dropped to -2% between 2009 and 2010, art prices exhibited a return of 33.1% during this tumultuous period. In contrary, stock market returns fell by more than 50%. Likewise, following the covid-19 pandemic in 2020, inflation values reached all-time high levels of above 8% in 2022 in the US. Nonetheless, art returns still exhibited an increase of 32.6% reaffirming its ability to retain value in times of economic turbulences.

Figure 3: Normalized Art Prices vs Inflation (since 1978)



To strengthen this argument the graphical examination extends to the performance of art compared to other conventional assets, namely S&P 500, Commodities, Gold, Real Estate and Bonds. The graph clearly shows that Art exhibits the highest returns over the entire period, along with Gold and Commodities.

Based on the visual interpretation, art appears to be an excellent investment due to its high and consistent performance throughout time. However, further research is needed to examine the inflation-hedging capabilities of the asset.

5.2 Correlation matrix

The first analysis will look at the relationship between real art returns and real returns on other traditional financial assets such as equities, bonds, real estate, commodities, and gold to make a compelling case for portfolio diversification. A correlation matrix is generated to calculate the correlation coefficients of the real art returns and the real returns of stocks, bonds, commodities, real estate, and gold. As well known, the resulting values, ranging between -1 and 1, signify perfect negative or perfect positive correlation, with a coefficient around 0

indicating little or no correlation between the two variables. The plot below clearly illustrates that art appears to have minimal correlation with the other assets, supporting its potential as an uncorrelated asset for portfolio diversification.

Figure 4: Correlation matrix

5.3 Regression Analysis

This section summarized the results of various Ordinary Least Square (OLS) regression analyses, that have been executed to establish a relationship between real art returns and inflation. Table 1 represents the results of four different regression analyses of real art returns on actual inflation, GDP, and unexpected inflation, from 1978 until today, and in periods of low, medium, and high inflation. The real art returns used for the analysis are inflation-adjusted and in logarithmic form, in order to account for various issues such as normality and heteroskedasticity that can arise when running and ordinary least square (OLS) regression.

The first regression shows a very low R-squared, meaning that there is little or no correlation between art and the independent variables. The coefficients related to inflation, GDP and

unexpected inflation are not statistically significant with a significance level lower than 5%, indicating that fluctuations in art returns are not influenced by value changes in inflation or the economy. Subsequently, for a more nuanced exploration of the economic contexts and their effects on art returns, the analysis categorizes inflation into three levels: low inflation (below 2%), medium inflation (between 2% and 4.5%), and high inflation (anything above 4.5%). The delineation of thresholds for the three inflation periods is determined by referencing the 2% target inflation set by the European Central Bank and the 50^{th} and 75^{th} percentiles that represent specific points in the distribution of inflation.

With this method, we aim to shed light on how art and inflation interact in various inflationary contexts. As seen in Table 1 all three regressions seem not to result into a clear relationship between the dependent and independent variables, having a very low R-squared value and minimal or statistically insignificant coefficients. Given that the period with inflation levels between 2% and 4.5% exhibits statistically significant coefficients for both actual and unexpected inflation, supporting the potential relationship, the low R-squared values may suggest that the model explains a very small portion of the variability of real art returns. However, the information is not conclusive, and the evidence is insufficient to confirm a clear relationship. Consequently, in this context as well, the real return on art appears to be independent of the inflation level.

Table 1: Regression of real returns on inflation, GDP, and unexpected inflation

	REAL RETURNS ON ART			
	1973 - present	**low inflation**	**mid inflation**	**high inflation**
Actual Inflation	1.541	6.579	28.370	-2.224
p-value	0.600	0.734	0.029	0.670
GDP	0.042	0.575	1.250	-1.243
p-value	0.936	0.350	0.467	0.433
Unexpected Inflation	-3.757	-15.364	-27.669	1.883
p-value	0.303	0.442	0.032	0.748
No. Observations	389	101	206	82
R-squared	-0.002	0.055	0.009	-0.029
p-value (F-statistic)	0.542	0.037	0.181	0.876

In periods marked by economic uncertainty and surging inflation, monetary policy actions, such as changes in interest rates, or demand and supply changes may take time to affect the economy and investors investment decisions. For this reason, the effect of inflation may take time to manifest in the art market. Acknowledging this temporal dimension, the subsequent phase of the regression analysis extends to include 3-month and 6-month lagged returns. The temporal lag is calculated on the real art returns, to see whether art returns have a delayed effect on inflation. The 3-months results seem to be very similar to the previous regression, with very low R-squared value and non-significant coefficients for all four scenarios of long-term and the three levels of inflation (Table 2).

Table 2: Regression of real art returns 3-months lagged

	3-MONTHS LAG ON ART			
	1973 - present	**low inflation**	**mid inflation**	**high inflation**
Actual Inflation	0.602	-24.129	22.623	3.044
p-value	0.841	0.235	0.092	0.562
GDP	0.157	0.191	2.311	2.806
p-value	0.768	0.767	0.190	0.093
Unexpected Inflation	-0.978	26.792	-21.359	-5.171
p-value	0.792	0.200	0.114	0.375
No. Observations	386	98	203	79
R-squared	-0.007	-0.010	0.004	0.032
p-value (F-statistic)	0.983	0.563	0.278	0.143

On the other hand, when computing a 6-months lag on real art returns and regressing it for the period between 1978 and the present there seems to be some kind of relationship between art returns and unexpected inflation. In fact, when isolating the regression between real art returns 6-months lagged and unexpected inflation the coefficient is statistically significant with a value of around 3.48, suggesting a positive causal relation between the variables. If art prices increase when unexpected inflation rises, it suggests that art may serve as an effective hedge against inflation (Table 3). This indicates that during times of unexpected inflation, the value of art tends to hold steady or even rise, protecting the purchasing power of the money invested in it.

Table 3: Regression of real art returns 6-months lagged

	6-MONTHS LAG ON ART			
	1973 - present	**low inflation**	**mid inflation**	**high inflation**
Actual Inflation	-3.375	5.877	19.025	-0.821
p-value	0.262	0.769	0.163	0.875
GDP	-0.452	0.961	-1.853	-0.438
p-value	0.387	0.130	0.299	0.790
Unexpected Inflation	7.107	-9.873	-20.929	2.404
p-value	0.054	0.631	0.128	0.678
No. Observations	383	95	200	76
R-squared	0.012	0.004	0.004	-0.034
p-value (F-statistic)	0.060	0.346	0.298	0.909

Despite this exception the overall analysis is predominantly not significant among all three levels of inflation, reaffirming the previously stated conclusion that real art returns vary independently from inflation. These results align with the theory set forward by Fama and Schwert (1977), which asserts that an asset functions as an ideal hedge when its nominal returns move hand in hand with inflation and its real returns are not correlated with inflation at all. Ultimately, there is a positive correlation coefficient of approximately 0.9 between nominal art returns and inflation, suggesting that art may be used as a hedge against inflation. The relationship if further analyzed in the next step.

5.4 Volatility analysis

Following the conclusion that art returns remain unaffected by changes in inflation, the subsequent crucial analysis centers on the volatility of art returns. Integrating volatility into the examination of art's inflation-hedging properties is essential for a comprehensive understanding of the risk and return dynamics. While high volatility may suggest increased risk, it also implies the potential for higher returns. Given art's demonstrated stability and appreciation in periods of high inflation, rendering it an attractive hedge, the next step involves scrutinizing how fluctuations in inflation may impact the volatility of art returns.

Table 4 shows the average annualized returns on art, the stock market, and gold. It is evident that real art returns remain positive throughout all three inflation levels, with art returns appearing to have a real return of roughly 7.62% during times of high inflation. As illustrated in Table 5, the average annualized return on art stands at approximately 11.9%, surpassing the annualized return on the stock market, represented by the S&P 500 index, which lies around 8.7%. Additionally, art outperforms the stock market during both medium and high inflation periods. As the stock market registers a negative return of -4.6% in time of high inflation, art exhibits positive real returns, that are comparable to those of gold, which has historically been

seen as a safe haven during times of high inflation. These results show, that even though real art returns have no correlation to inflation, they still exhibit stable and high performance throughout all three levels of inflation.

Table 4: Average performance of Art, stock market and gold during low, medium, and high inflation

	Low	Medium	High
All Art index	10.66%	14.27%	7.62%
S&P 500	14.63%	11.11%	-4.60%
Gold	11.28%	0.59%	8.37%

Table 5: Annualized real returns and volatility of Art

	ART PERFORMANCE			
	1973 - present	**low inflation**	**mid inflation**	**high inflation**
average return	11.90%	10.70%	14.30%	7.60%
volatility	24.60%	24.00%	24.30%	25.80%

Moreover, an analysis of the volatility in real returns on art reveals a consistently stable value of around 25%, irrespective of the time horizon—be it long-term or during periods of low, medium, or high inflation. This consistently low and stable volatility further solidifies the argument for art as a reliable Investment during times of high inflation.

Subsequently, the association between the volatility of art returns and GDP, actual inflation, and unexpected inflation is investigated by a regression study. As detailed in Table 6, the R-squared value is notably small, and the coefficients on the independent variables are statistically insignificant. This implies that inflation does not serve as an explanatory factor for the volatility observed in art returns. These findings are consistent with the earlier results, reinforcing the assertion that art stands as an hedge against inflation.

Table 6: Regression of art volatility on actual inflation, GDP and unexpected inflation

	Art Volatility
Actual Inflation	-0.065
p-value	0.545
GDP	-0.017
p-value	0.073
Unexpected Inflation	0.107
p-value	0.363
No. Observations	360
R-squared	0.009
p-value (F-statistic)	0.102

6 Conclusion

Based on the analysis conducted, it seems that allocating investments to artworks serves as an effective hedge against inflation, contributing to improved risk diversification within an investment portfolio. Investors appear to be aware of this aspect, as evidenced by their inclination to increase art investments in periods where actual inflation surpasses expected inflation over the subsequent six months.

To enhance the robustness of these findings, it would be important on the one hand to use data for a more granular analysis of various types of art investments and on the other hand to broaden the survey to different countries. However, addressing the first aspect remains challenging due to the persisting lack of transparency in the art market, which hinders the collection of reliable and distinct prices for various segments of the art market.

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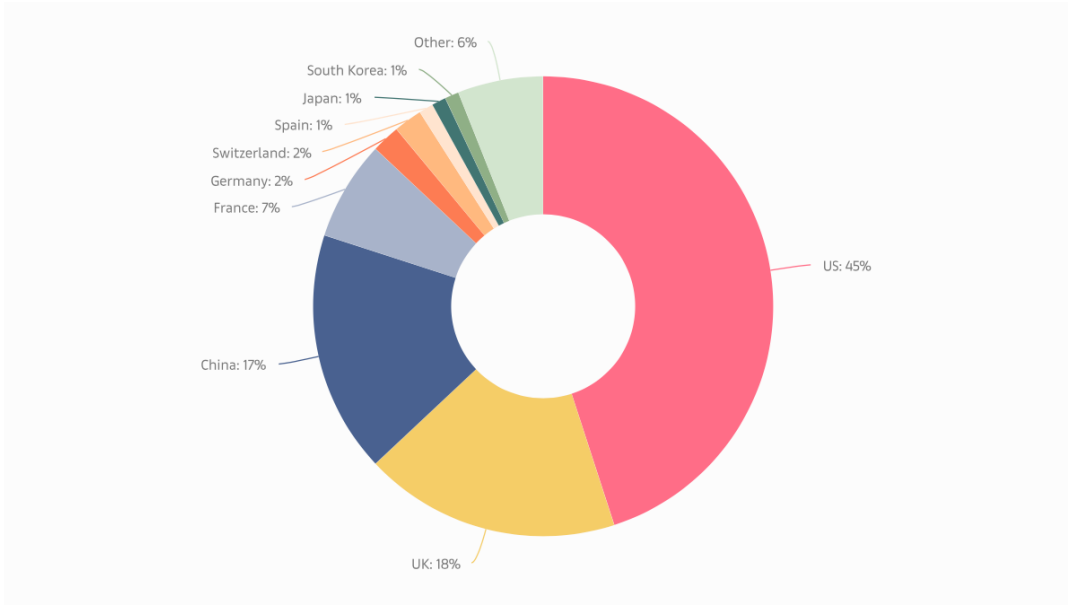
8 Appendix

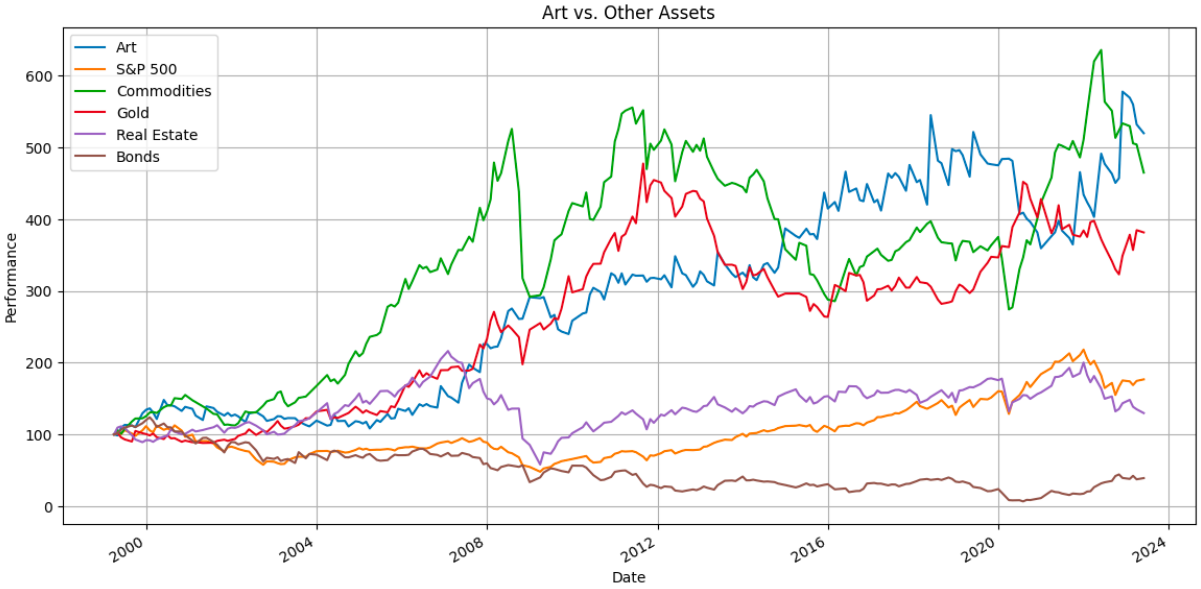
Figure 5: Jean Michel Basquiat "Untitled" (1982)

Figure 6: The Global Art Market Share by Value 2022



Source: (McAndrew, The Art Market Report 2023 2023)

Figure 7: Art & Other Assets



Note: Prices are normalized and Inflation-Adjusted