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Social Impact Investing in Arts Culture

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Abstract

The creative economy has emerged as a significant driver of economic growth and social development, prompting increased interest in financial instruments that can support and promote the cultural and creative sectors. This thesis aims to investigate the feasibility and potential impact of cultural bonds as a means of financially supporting the arts and culture sector in the European Union (EU). Drawing inspiration from successful case studies, such as Colombia's issuance of *orange bonds*, the study delves into understanding the motivations behind cultural bond issuance and their appeal to investors. Furthermore, this thesis explores the growing trend of sustainable development and digitalization in the creative economy, and their transformative potential.

Multifaceted approaches are adopted to assess the market behavior during different financial cycles, analyzing index returns and volatility to identify assets with favorable risk-return profiles. Correlation coefficients between various indices are investigated to understand potential diversification opportunities. Additionally, a linear regression model serves as a *proxy* for estimating the value of cultural bonds, considering the financial standing and growth potential of the cultural sector, to perceive its potential value added in the market.

By shedding light on the relationship between cultural investments, sustainability, and digitalization, the study strives to empower cultural institutions and entrepreneurs to embrace innovative financial tools to thrive in the new financial era. Ultimately, the findings have the potential to revolutionize the creative economy, driving positive financial returns while fostering social progress and inclusive development in the EU.

Chapter 1

Introduction

This research proposal intends to study how the cultural market can adapt to the new financial era, alongside with sustainability and digitalization, in the European Union.

This thesis will study the motivation behind the issuance of cultural bonds to financially support the cultural sector. Similarly to the green bonds, cultural bonds could make a very wealthy market more transparent, regulated and fair, contributing alongside to the societal development.

As for any bond issuance, there is the need to understand where do the possible investors stand - if they would like to invest or not and how much would they want to invest. In 2021, there was a total of USD 16.6bn expenditure on fine art auction - the highest total ever recorded for a year (Artnet, 2022). Online sales continued to grow even as in-person events resumed. The big three houses (Sotheby's, Christie's, Philips), along with Bonhams and Artnet's own auction platform, together generated a record USD 1.5bn online, up 35% year over year.

Alongside, sustainable development keeps on growing. The year 2021 was declared the International Year of Creative Economy for Sustainable Development at the 74th United Nations General Assembly that aims to bring more social and economic assistance for artists and cultural professionals.

With a evident supply and demand, a new market can be created, i.e., there is a gap that can be fulfilled with cultural bonds. Cultural bonds were not issued yet, so this thesis attempts to foresee how would a market behave in terms of revenue and risk - the main aspects that an investor would look besides the purpose of the bond. For this reason, the first analysis is the return and risk of different indices to have an overview of the market. Then, a second analysis will be conducted on how they can relate among each other, i.e., risk diversification. Finally, a linear regression will be drawn aiming to be a *proxy* of a cultural bond's value.

This paper is divided in six chapters: chapter 1 introduction; chapter 2 literature review: (i) social impact investing, (ii) arts and finance, (iii) arts and social impact investing; (iv) arts and cryptocurrency; chapter 3 data and methodology; chapter 4 results dully divided into (i) index returns and volatility and (ii) cultural bond regression; chapter 5 discussion and implications of the research among different periods (i) Dotcom Bubble to Great Financial Crisis (GFC), (ii) Great Financial Crisis (GFC) to Covid-19 crisis, (iii) Covid-19 crisis onwards, (iv) implications of the research; and chapter 6 conclusion.

Chapter 2

Literature Review

2.1 Social Impact Investing

Sustainability started to gain more solid ground on 2015 with the Paris agreement. The Agenda for Sustainable Development adopted by UN Member States in September 2015, comprising 17 Sustainable Development Goals (SDGs) and 169 specific targets, includes several explicit references to cultural topics. Two examples are:

*8.9 By 2030, devise and implement **policies to promote sustainable tourism** that creates jobs and promotes **local culture and products**.*

*11.4 Strengthen efforts to protect and safeguard the world's **cultural and natural heritage**.*

In Europe, more specifically, the European Green Deal Investment Plan brought direction to public policy and more attractiveness to investment as well. Additionally, there is the European Bauhaus movement where a new Europe can be glimpsed. The New European Bauhaus initiative connects the European Green Deal to our living space by creating a bridge between the science and technology world and arts and culture, leveraging the green and

digital challenges. It calls on all Europeans to imagine and build together a sustainable and inclusive future, situated at the crossroads between art, culture, social inclusion, science, and technology where sustainability, aesthetics and inclusion will be the central piece. On May 4th, 2022, the European Commission approved an envelope of EUR 25m to finance projects that create more sustainable, inclusive, and beautiful spaces in locations across the European Union that will involve citizens in the green transition at the local level.

2.2 Arts and Finance

An individual would invest in art mainly for three following reasons: aesthetically pleasing, financially pleasing and social acceptance, i.e., means of expressing membership of a rising middle class. This thesis will focus on the second because the other two are constant for the consumer, i.e., the willingness to buy a piece of art due to its aesthetics or social rise is constant but the financial availability is not. Therefore, further investigation on how a consumer behavior changes according to the market will be conducted.

Art can be bought as an investment, store of wealth or as a hedge against inflation (Ginsburgh, 2003). Not as typical, but it can be used as a credit default swap derivative to transfer the underlying risk from alternative assets used as collateral whose risks are difficult to estimate, which translates into higher efficiency in the banking sector (Campbell, R., 2007). Stochastic transfer function to time series of sales volumes at the top two international auction houses confirm the hypothesis that the highest category of art is quasi substitute for financial instrument, in other words, the analysis of sales volume data at top international auction houses supports the idea that the highest category of art, due to its perceived value, can act as a quasi substitute for financial instrument or liquidity wealth. This implies that consumers may choose to invest in art as a means of preserving and growing their wealth, like how they would invest in traditional financial instruments (Singer, L.P., and Lynch, G.A., 1997).

Although in the financial community, many see art as an attractive investment because it outperforms more traditional instruments, it can be extremely risky. It is regarded as an alternative investment for capital gains rather than a dividend. We cannot expect that art will behave in the same way as other assets such as real estate or bonds. Usual benchmarks of financial analysis should be disregarded when investing in art, as art does not generate a steady revenue, like dividends, and it is not possible to predict cash returns based on inflation perspectives and interest rates are not suitable to value a work of art. Instead it is a speculation based on the price appreciation in way that sometimes defies financial logic. One should consider the costs linked to storage, insurance, transportation and others (Curry, J.E., 1998).

Characteristics of the risk and return characteristics of art investments have been studied by several authors. However, there is paradoxical evidence about the art investments profitability and its prospects for portfolio diversification in the literature. Baumol (1986) finds that rates of return on paintings were not only exceptionally low, they were also uncommonly dispersed. On the opposite, Buelens and Ginsburgh (1993) states that there are large time periods when art investments perform better than other financial assets. Pesando (1993) applies the Markowitz (1959) framework to judge whether art has a capacity for diversification, and concludes that the art market compares unfavourably to investments in traditional financial assets. Goetzmann (1993) presents that although returns to art investment have exceeded inflation for long periods, they are no higher than what would be justified by the extraordinary risks they represent. He finds evidence as well of a strong relationship between the demand for art and aggregate financial wealth. The findings by Chanel (1995) support this wealth effect: financial markets influence the art market. Both authors argue that this high correlation between the art and the stock and bond markets clearly makes art a poor vehicle for the purposes of portfolio diversification. Mei and Moses (2002) demonstrate that art has a lower volatility and a lower correlation with other financial assets than previously thought, making art an attractive investment for portfolio diversification. Campbell (2007)

obtains a quite low and even negative correlation with other asset classes, resulting in art as being a highly beneficial investment vehicle for an investor's portfolio. On the contrary, Worthington and Higgs (2004) argue that the risk-return characteristics of art are so inferior to financial assets that inclusion of these assets for diversification purposes cannot be supported.

However, it is a market that lacks regulation, transparency, symmetric information, liquidity and therefore, trust. A non-transparent market cannot be efficient. In practice, perfect awareness of a market does not exist, and this is the case in the art industries. This particular market can be classified as highly uncertain, and knowledge is limited. Thus the imperfection's in the market becomes a tool of competition. In art markets, information regarding on markets and products, including potential investors is a way to achieve a competitive edge. There is no replacement for art, art products are unique. Value in the art market is volatile and intangible as it's based on a lot of subjective measures. Price value of art is a derivative of a value based on emotion and clearly reflects the ratio of supply versus demand. The highest price one is willing to pay is usually attributed to a work of art. This is more indicative of the auction system and the price that has been paid is not directly linked to the piece's true value. The art market lies on the intermittently differing views of its players notably when contemporary art is concerned. Usually, art works do not allow a definitive quality assessment, detached and historically supported. For today's players, this is the greatest challenge. No one has a sustainable equation to assess an ongoing value of a piece. Normally, this is carried through due diligence services, by looking at sales history, and the artist's ranking in the market in relation to the success and decline. The final figure is purely guesswork.

The prices behave randomly in the art market. Huge gains and losses can occur within short holding periods, while returns during longer holding periods can be very close to zero, indicative of a random process with a mean of zero (Baumol, 1986). Art yields a flow on non pecuniary viewing services and assets, yielding a return from financial appreciation

and is as well a market that largely benefits from surplus liquidity. Capital markets can temporarily stimulate the art market in the bull market phase through profit taking and portfolio restructuring. But they do not decide the long-term price performance in the art market. Even in times of lower growth and an unattractive capital market tendency, the art market increased largely.

In the art market most segments react rapidly to the changes in the economic environment, especially for objects in lower price categories. Economic slowdown brings a decline to demand while increasing supply and thus forcing selling (Frey, 2003). Nonetheless, the same does is not observed for artworks in the top price category since wealthy individuals have substantial purchasing power, independently of economic downturn. Hence the distribution of income and wealth plays an important role in assessing the price sensitivity of the individual sectors of the art market.

A large percentage of art investment value come from auction houses, also known as secondary market (Ginsburgh et al, 2003). It is hard to know *per se* how much percentage is for sure in the secondary market of arts as the value of the entire art market cannot be quantified. However, in absolute terms the highest price paid for a painting was USD 450m at a Christie's auction in 2017 - Salvador Mundi by Leonardo da Vinci. The value in arts is determined by hedonic pricing where price factors are identified according to the premise that price is determined both by internal characteristics of the good being sold such as artist reputation, historical significance, scarcity and condition, and external factors affecting it such as economic conditions, investor sentiment, art market regulations, demographics shifts, cultural trends and geopolitical factors.

Therefore, the consumption of art can be classified as consumption of a non-essential good. For this reason, it can be stated that demand for art is inelastic, i.e., when the price goes up, the demand will remain fairly constant (Singer, L.P., and Lynch, G.A., 1997). However it can have momentums. From 2003 to 2007, contemporary art market grew by 851%, yet during 2007 crisis it shrunk.

It is not clear that art is a good investment. Rates of return are lower than stocks and bonds, and the risk is higher. Only during brief boom periods did art outperform traditional asset classes. When the stock market is in a downturn, the art market booms. When markets are bad, people like to invest in something tangible. However, low correlation of returns between art works and financial assets can be a good indication of a great investment to diversify the traditional portfolio (Worthington and Higgs, 2004).

There are many downturns in art. These include liquidity, pricing, performance, costs, track records and conflict of interests. Concerning liquidity, most art funds cannot just sell the majority of their artworks from one day to the next, for the sake of retaining their value they are normally held for a period of 18 months and thus characterized with high illiquidity. Regarding pricing and performance, there is no price standardization and transparency in the market. Art fund managers can only rely on Mei&Moses Fine Art Index, artprice.com or Art Market Research. However, these are considered boutique indices and not been approved by any formal ratings agency yet. Art needs to be appraised on size, creation date, condition, name and reputation of artist. “Price opacity of art is a unique characteristic that will remain. The market is unregulated and pricing is based on strong networks and information shared between dealers and clients. It’s a bit like a conspiracy”. Regarding to the fourth drawback, costs, in the art market they are hidden. “They are associated with distribution channels in the forms of commission rates, insurance, transportation and value added taxes. The fact is that owning art costs money” (Kusin, 2007). Investing in art funds is a fledgling market and track records have not yet been established.

While the art market has weakness that have led to varying support, some speculators see inefficiencies in the market as an opportunity. Some banks support investing in art especially investors favoring a buy-and-hold strategy. Art presents an alternative approach to portfolio diversification, enabling optimal allocations to investors together with an opportunity for risk. Returns can outperform other asset classes with low or negative correlations to typical classes. Art investment can also decrease a portfolio’s risk because of its low or negative

correlation to domestic or international equity. Investing in art can also bring tax benefits. In the United States, the Internal Revenue Service considers that an investor in art is someone who can claim that one's interest is purely as an investment and indicates that one should consult occasionally with experts and subscribe to the relevant periodicals. Moreover, the structure of the art market is somewhat unregulated, prices fluctuate and returns are high. The demand for art is very much dependent on people's wealth, the belief that this wealth and on the whims of society's taste. One of the most prominent examples of art investing is the The British Rail Pension fund, where in 1974, for nearly a decade thereafter, invested 2.9% of its overall retirement fund portfolio in the art market. Buying Old Masters, Impressionist paintings, Chinese porcelain, medieval works of art and antiquities under the guidance of Sotheby's from 1987 to 1999, cashed out in a series of sales, the portfolio of artworks sold for roughly USD 300m. Even though there was not a gain on every purchase, with good advice and during a time when the markets were booming, the pension fund came out ahead, with a reported compounded annual return of 11.3%.

Despite the promises of big returns and the hedging against inflation, many features of the art commodity has investors shying away from it. For one hand, art is a very volatile, as an alternative asset it has performed better in some decades than others. In the 1970's, gold was the best investment, providing a lower percentage of risk than stocks. Art at that time provided the most nominal twelve month returns, but also the greatest chance of loss. However, in the 1980's, art outperformed gold, stocks, bonds, and real estate. In the 90s, art collapsed: gold and many commodities showed over 50% loss. Art, gold, and commodities offer the least attractive risk-reward potential but provide inferior returns while generating substantially more risk. These three asset classes may be more appropriate investments for those with truly long-term horizons.

There is a gap that needs clearance: does investment in arts held a positive return?

2.3 Arts and Social Impact Investing

Art can be used as a catalyst of change. Culture is who we are and what shapes our identity. It can be used to poverty reduction and a human-centered, inclusive and equitable development path. No development can be sustained without it (UNESCO, 2022).

Over the most recent years, the relationship between sustainability, arts, and culture has attracted growing interest. This has fostered in different parties such as civil society, governments, non-governmental organizations, private business, investors that are interested to implement more effective and inclusive strategies for the preservation and valorization of culture.

There is space for culture, social impact investment and sustainability to exist at the intersection between philanthropy and investment. This is a new domain for the art and wealth management industry, providing a new client service for wealth managers that focuses on social impact and purpose-led investment in the art and culture sector (Creativity Culture & Capital, 2022). As part of the global shift in sustainable investment trends, today's investors view social investments as an opportunity. In the survey of *Creativity, Culture and Capital: Impact Investing in the global creative economy* report in 2021, 28% of collectors and 31% of art professionals identified sustainable impact investment in the arts as their most attractive investment model. Among the younger demographics (under 35 years old), this was even higher where that 50% said socially responsible investments products in the culture were the most compelling investment model. This implies that wealth managers could expand their sustainable investment offerings by targeting Cultural and Creative Sectors (CCS). While the CCS are usually seen as having few economic relevance, data shows they represent a key growth driver in many countries and are some of the fastest-growing sectors in the global economy. The CCS also suffer from a lack of funding, driving a need to explore different alternative sources of income and partnerships and reconsider many typical funding models. In spite of this, the CCS are still slow to bridge with impact investors, as it a challenge to provide their eligibility evidence for this type of investment.

With the increasing recognition that the CCS can support cities to become *smarter*, we may see cultural bonds become real in the future, helping to develop a new generation of smart cities. These bonds would successfully integrate culture and creativity within an inclusive and sustainable urban growth strategy, where the repayment of cultural and creativity investments would be subject to social - and not just financial - impact.

Several studies show that the broad artistic and creative sector represents a powerful level for economic and social development either by the direct and indirect economic impacts that can boost urban regeneration, improve tourism and eno-gastronomic sectors or by active engagement and social cohesion, promotion of cultural diversity, reduction of inequalities, development of more peaceful and inclusive societies. Moreover, cultural and creative industries have become major drivers of economies and trade strategies both in developed and developing countries, adding around 3.1% of the world's GDP, direct and indirect employment development (UNESCO, 2022), urban regeneration and territorial valorization, social cohesion and inclusion, psycho-physical well-being.

An article from *Financial Times* dated September 2019 stressed the fact that USD 12tn are being used for positive environmental, social and impact through funds, and one quarter are assets under managements. Therefore, why aren't the cultural institutions investing in these opportunities?

In fact there are benefits of the measurement and reporting of the impact of cultural and creative projects such as transparency, strategies, resource planning and allocation, strengthening reputation and improving public opinion support for fund-raising.

Cultural institutions should be at the forefront of socially responsible investing. They could use the Social Return on Investment (SROI) that measures the social, environmental, and economic value created by a business or a project. SROI considers both the financial returns generated by an investment and the social/ ecological outcomes it produces. So far, it is the smaller art organizations that are leading the way. In 2018, Building for the Arts and Creative Capital, each invested in the NYC Inclusive Creative Economy Fund – the

first impact investment vehicle targeting low-income communities. Also, the Souls Grown Deep Foundation committed its entire USD 1m endowment to an impact investment strategy focused on promoting racial and social justice and economic opportunities in arts.

Could we see a cultural bond market develop similarly to the green, social and sustainable bond market, which is estimated to have reached a market size of USD 1tn? And could the World Bank and European Investment Bank lead the way, as they did with the onset of the green bond market?

Identical to green bonds, cultural bonds could be fixed income instruments that foster sustainability, designed explicitly for CCS projects that hasten and sustain a dynamic creative economy contributing to social progress. Cultural bonds could also include tax incentives, such as tax exemptions and credits, to enhance their attractiveness to investors. These tax advantages would provide a monetary incentive to deal with prominent social issues and help to develop the creative industries. To qualify for cultural bond status, a third party - a cultural bond standards board - should verify that the bond would fund projects that benefited the CCS.

Therefore there is a gap that needs clearance: can investment in art bring positive financial and social return or not? In other words, is arts investment compelling with ESG path? Cultural bonds is the logical way to bring cultural assets under management and leverage them.

2.4 Arts and Cryptocurrency

Society is facing environmental and economical challenges. New revolutions in the technology side, such as digitalization, can help to foster the growth of the economies and create new streams of success and new capacities to compete.

Nadini et al. (2021) studied that even though the share of transactions in NFT¹ has been decreasing since 2020, the share of volume has been increasing. This means that there is a currency appreciation in this market.

For example, before Covid-19 crisis, 62% of Swiss culture institutions had no digital content. After this crisis, 46% increase offerings. But 42% said that they have no plans to offer additional digital content, therefore cultural institutions need to decide what to do with digitalization without leaving aside the physical encounters as well. Digitalization is not a substitution but an increase of possibilities. Moreover, auction houses generated more than USD 200m in the sale of NFTs in 2021.

NFTs can help to solve existing problems in the arts finance world such as lack of transparency (blockchain ledgers are publicly stored) and too much liquidity concentration, i.e., there are less barriers to enter the market. Either way, it is a trend that is bringing a lot of liquidity, therefore, an increase in investors demand that can open doors for culture institutions that want to follow the path of digital content.

In spite of being a revolutionary phenomenon that could deserve a deeper analysis, this aspect was left out of this thesis.

¹Non-fungible tokens (NFTs) are unique cryptographic tokens that exist on a blockchain and cannot be replicated

Chapter 3

Data and Methodology

To further investigate the validity of the aforementioned hypothesis, a model on STATA was run using the following data:

- S&P500 Price Index
- MSCI World Price Index
- MSCI Europe Price Index
- FTSE 100 Price Index
- NASDAQ Price Index
- NIKKEI 225 Price Index
- Dow Jones Price Index
- FTSE World Broad Investment Grade Bond Index
- FTSE Euro Broad Investment Grade Bond Index
- FTSE World Government Bond Index
- Gold Price Index

- Crude Oil Price Index
- S&P GSCI Commodity Index
- ArtPrice Global Index
- Harmonized CPI: Jewelry, Clocks, and Watches for Euro area
- PPI by Commodity: Miscellaneous Products - Jewelry (Gold and Platinum) and Silverware
- IPI (End Use): Coins, Gems, Jewelry, and Collectibles
- Harmonized CPI: Wine for Euro area
- Harmonized CPI: Books for Euro area
- LVMH Price Index
- Art Consumption Norm

First, data from different index was considered as a good representation of the prices in the market. In order to have a complete overview of the different investment options an investor could do, and to have as well an outline of the different returns and risks, it was decided to choose S&P500 Price Index, MSCI World Price Index, MSCI Europe Price Index, FTSE 100 Price Index, NASDAQ Price Index, Nikkei 225 Price Index and Dow Jones Price Index. Second, as the target was to analyze the possibility to issue a cultural bond, FTSE World Broad Investment Grade Bond Index, FTSE Euro Broad Investment Grade Bond Index and FTSE World Government Bond Index were added in order to have a good comparison with different bonds. Third, due to the fact that arts is the class of alternative investments, Gold Price Index, Crude Oil Price Index and S&P GSCI Commodity Index were taken as good representation for alternative class investments type. Fourth, ArtPrice Global Index was used as a representation of the art index. Mei Moses and Art Research Art

Index are the most well-known art index but, unfortunately, it was not possible to share their data. In order to minimize any bias issue, we expanded the arts observations by adding CPI, PPI and IPI of different possible art investments such as jewelry, clocks, watches, silverware, coins, gems, collectibles, wine and books. Fifth, after having the first results, it was decided to include Art Consumption expenditure data as well to have a general overview of how much a typical consumer would invest in art. However, it is the consumer with a higher disposable income that tends to have a higher percentage of art investment as this is a luxury good. For this reason, the LVMH stock was added to have a sound representation of the wealthy consumer as well.

The currency used was USD and the following currencies were converted into USD in May 24th, 2023 - see table 3.1.

USD	Others
USD 1	GBP 0.808
USD 1	JPY 140.21
USD 1	EUR 0.93

Table 3.1: Currency exchange

This will result in a comparative study due to the fact that there are still ongoing discussions about the first cultural bonds issuance, so accurate data will be lacking.

The research question that this thesis addresses is the social impact investing in arts culture through the issuance of cultural bonds. In order to analyze this, first we will compare the different returns and volatilities among index and second, we will create a regression that will be a proxy of the cultural bond in order to compare the behavior of the cultural bond among the other investment classes. It is possible to conclude that there will be a gain in cultural bond if:

- (i) there is a significant correlation among the other investment classes and;
- (ii) a positive/ attractive return compared with the other investment classes.

Therefore, these are the hypotheses that can be derived from these main questions.

H0: There is a gain with the emission of cultural bonds

H1: There is no gain with the emission of cultural bonds

Chapter 4

Results

Based on the literature review, the expected outcome will be the confirmation of the null hypothesis already mentioned. Besides the financial part where the main point will be the model and the outcome from the model run on STATA, it is expected to demonstrate the various returns and risk of the above mentioned index. Later, a *proxy* of cultural bond will be conducted by a linear regression to analyse a probable issuance and if it is wise to issue it comparing with the return and risk profile of the other index.

The data was provided by Eikon, Artprice, FRED Economic Data and Euronext quarterly. STATA was used to examine the summary statistics of the data.

4.1 Index Returns and Volatility

4.1.1 Dotcom Bubble to Great Financial Crisis

In this chapter, we present the index return and risk data from the Dotcom Bubble to the Great Financial Crisis (January 1st 1998 to September 30th 2008). The table 4.1 provides a summary of the key variables, including the number of observations, mean, standard deviation, minimum and maximum values for each index. To analyze the performance of the index, refer to mean to look at the return and to the standard deviation for the volatility of each index.

Overall, the index with a more stable return indicated a stable volatility whereas the index with a higher average return had a higher volatility, as expected. The NASDAQ Index had a volatility of 45.34, implying significant fluctuations in its returns, which might be attributed to its focus on technology companies. The Gold Index showed a standard deviation of 64.34, indicating substantial price swings, which aligns with its role as a safe-haven asset during times of economic uncertainty.

It's evident that the ArtPrice Global Index exhibits higher returns compared to other major indices like the S&P 500 Price Index and MSCI World Price Index during the same period. However, it's essential to note that the art-related index also demonstrates a relatively higher level of volatility, as indicated by its larger standard deviation. This suggests that investing in the art market can potentially yield significant returns but may come with increased risk.

Overall, the results on table 4.1 emphasize the importance of diversification in an investment portfolio. While art-related investments can offer attractive returns, investors should carefully assess their risk tolerance and consider a well-balanced approach that includes a mix of assets across different industries and regions. Additionally, past performance may not necessarily predict future results, so thorough research and understanding of the art market are crucial before making any investment decisions.

In the following chapter, we will delve deeper into the analysis, conduct additional tests, and explore the relationships between different variables to gain a comprehensive understanding of the financial landscape during this specified time frame.

Variable	Obs	Mean	Std. Dev.	Min	Max
S&P 500 Index	43	125.08	18.99	84.012	157.33
MSCI World Index	43	125.37	24.81	78.82	174.42
MSCI Europe Index	43	129.38	33.76	73.99	202.34
FTSE 100 Index	43	106.18	16.94	70.36	134.95
NASDAQ Index	43	142.94	45.34	74.64	291.20
NIKKEI 225 Index	43	90.56	20.61	52.25	133.28
Dow Jones Index	43	131.24	18.68	96.00	175.71
FTSE World Broad Investment Grade Bond Index	38	125.99	16.73	98.90	152.18
FTSE Euro Broad Investment Grade Bond Index	38	123.58	17.26	96.97	146.95
FTSE World Government Bond Index	38	121.65	14.07	98.78	144.00
Gold Index	43	147.60	64.34	89.25	325.59
Crude Oil Index	43	245.10	159.68	68.74	828.75
S&P GSCI Commodity Index	43	153.50	64.99	65.10	360.94
ArtPrice Global Index	43	146.10	43.72	95.52	240.30
CPI Jewelry, Clocks and Watches	43	110.62	12.40	98.83	141.04
PPI Jewelry and Silverware	43	107.30	9.19	98.28	131.22
IPI Coins, Gems, Jewelry and Collectibles	43	118.46	24.84	98.67	176.29
CPI Wine Euro Area	43	109.30	4.80	100.00	119.95
CPI Book Euro Area	43	110.18	5.92	100.00	118.18
LVMH Index	34	71.17	17.55	42.35	101.66

Table 4.1: Indices Return and Risk from Dotcom Bubble to Great Financial Crisis

4.1.2 Great Financial Crisis to Covid-19 Crisis

The table 4.2 presents the index returns and volatility for various indices spanning from the Great Financial Crisis to the Covid-19 Crisis (October 1st 2008 to March 21st 2020). The data includes 41 observations for each variable, providing valuable insights into the performance and risk levels of these indices during the mentioned period.

The NASDAQ Price Index, heavily focused on technology stocks, had the highest average return among all indices at 254.94. However, its volatility was also the highest with a standard deviation of 110.22. The NIKKEI 225 Price Index, representing the Japanese market, had the lowest average return of 94.015, with a standard deviation of 31.48, which is quite high for its returns.

The performance of the Dow Jones Price Index was similar to the S&P 500, with an average return of 195.97 and a standard deviation of 61.03.

Shifting to the bond indices, the FTSE World Broad Investment Grade Bond Price Index had an average return of 194.85, while the FTSE Euro Broad Investment Grade Bond Price Index had a slightly higher average return of 197.21. Both bond indices exhibited relatively lower volatility compared to equity indices.

In the commodities sector, the Crude Oil Price Index had an average return of 421.95, with the highest volatility among the commodity indices, recording a standard deviation of 125.56. Gold Index, on the other hand, displayed an average return of 443.67 and a standard deviation of 77.49.

The ArtPrice Global Index, which reflects the performance of the art market, had an average return of 170.44, with a standard deviation of 27.89.

Overall, the table 4.2 reveals diverse performance patterns and risk levels across the various financial indices during the period spanning from the Great Financial Crisis to the Covid-19 crisis. Equity indices, such as the S&P 500 Price Index and NASDAQ Price Index, exhibited higher average returns, but they were also accompanied by greater volatility, indicating higher risk. On the other hand, bond indices, like the FTSE World Broad In-

vestment Grade Bond Price Index and FTSE Euro Broad Investment Grade Bond Price Index, demonstrated more stable returns with lower volatility, making them comparatively less risky investments.

In the commodities sector, the Crude Oil Price Index displayed substantial average returns, but it also recorded the highest volatility among the commodity indices, suggesting greater uncertainty and risk associated with commodities. The Gold Index, while providing relatively lower average returns compared to crude oil, exhibited lower volatility, making it a potentially more stable investment option.

The NIKKEI 225 Price Index stood out with the lowest average return, indicating the Japanese market's relatively weaker performance during the mentioned period. However, it also had a lower standard deviation, suggesting a more stable trend compared to some of the higher-returning but more volatile indices.

Variable	Obs	Mean	Std. Dev.	Min	Max
S&P 500 Index	41	177.73	58.78	82.22	300.28
MSCI World Index	41	160.50	37.57	85.97	233.19
MSCI Europe Index	41	141.26	19.58	88.21	172.23
FTSE 100 Index	41	119.79	17.99	76.45	149.70
NASDAQ Index	41	254.94	110.22	97.34	512.40
NIKKEI 225 Index	41	94.015	31.48	53.15	158.07
Dow Jones Index	41	195.97	61.03	96.22	334.57
FTSE World Broad Investment Grade Bond Index	41	194.85	21.77	151.56	223.82
FTSE Euro Broad Investment Grade Bond Index	41	197.21	27.79	147.12	234.36
FTSE World Government Bond Index	41	179.33	18.85	144.57	206.76
Gold Index	41	443.67	77.49	291.59	617.16
Crude Oil Index	41	421.95	125.56	209.87	615.74
S&P GSCI Commodity Index	41	129.10	40.23	68.58	234.12
ArtPrice Global Index	41	170.44	27.89	122.39	234.33
CPI Jewelry, Clocks and Watches	41	190.38	20.56	142.58	209.31
PPI Jewelry and Silverware	41	170.52	18.42	127.15	193.58
IPI Coins, Gems, Jewelry and Collectibles	41	207.61	15.48	170.67	232.36
CPI Wine Euro Area	41	131.35	6.66	120.55	142.51
CPI Book Euro Area	41	124.30	4.02	117.98	131.75
LVMH Index	41	157.70	67.21	46.37	323.71

Table 4.2: Indices Return and Risk from Great Financial Crisis to Covid-19 Crisis

4.1.3 Covid-19 Crisis onwards

The table 4.3 summarizes the findings from the analysis of index returns and risk measures for various financial indices spanning from Covid-19 crisis until nowadays (April 1st 2020 to December 31st 2022). The dataset consists of 17 observations for each index, allowing for a comprehensive examination of their performance and risk profiles during this period.

In terms of equity indices, the S&P 500 Index exhibited an average return of 366.00, with a standard deviation of 70.57. The returns for the S&P 500 Price Index ranged from a minimum of 258.32 to a maximum of 491.14. Similarly, the MSCI World Price Index had an average return of 266.73 and a standard deviation of 44.75, with returns ranging from 197.82 to 345.05. The MSCI Europe Price Index displayed an average return of 163.09 and a standard deviation of 20.37, with its returns ranging from 126.96 to 198.10. The FTSE 100 Price Index showed an average return of 134.94 and a standard deviation of 11.40, with returns ranging from 110.45 to 146.87.

Moving on to global equity indices, the NASDAQ Price Index recorded an average return of 694.09, making it the highest among all indices. However, it also had the highest volatility, with a standard deviation of 180.57. The returns for the NASDAQ Price Index ranged from 422.54 to 996.27. On the other hand, the NIKKEI 225 Price Index, representing the Japanese market, had an average return of 162.76, with a standard deviation of 22.97, ranging from 123.97 to 193.02. The Dow Jones Index displayed an average return of 373.71 and a standard deviation of 53.57, with returns ranging from 277.14 to 459.50.

In the bond market, the FTSE World Broad Investment Bond Price Index showed an average return of 237.55, with a standard deviation of 13.10. The returns for this index ranged from 212.22 to 253.06. The FTSE Euro Broad Investment Bond Price Index had an average return of 238.79 and a standard deviation of 15.33, with returns ranging from 204.86 to 254.60. The FTSE World Government Bond Price Index exhibited an average return of 215.76 and a standard deviation of 11.66, with returns ranging from 192.36 to 228.94.

Analyzing commodity indices, the Gold Price Index had an average return of 583.32, with

a standard deviation of 70.64. Its returns ranged from 447.22 to 668.70. The Crude Oil Price Index displayed an average return of 366.82, with a standard deviation of 124.66, ranging from 161.67 to 627.21. The S&P GSCI Commodity Price Index had an average return of 85.79 and a standard deviation of 22.63, with returns ranging from 53.35 to 126.64.

The IPI Coins, Gems, Jewelry, and Collectibles exhibited the highest return among all art commodity indices, with an average of 237.25 and a standard deviation of 14.95. The returns for this index ranged from 215.16 to 261.02, indicating significant potential for investment gains in this sector.

On the other hand, the CPI Book Euro Area displayed the lowest volatility among all indices, recording a standard deviation of merely 2.83. Despite its low volatility, the CPI Book Euro Area still presented a respectable average return of 134.89. The values for this index ranged from 131.79 to 141.03.

Lastly, focusing on the Art and Luxury sector, the ArtPrice Global Price Index showed an average return of 134.77, with a standard deviation of 12.93, ranging from 114.93 to 159.70. The LVMH Price Index had an average return of 562.95 and a standard deviation of 178.69, ranging from 303.02 to 866.55.

These results provide valuable insights into the performance and risk characteristics of various indices during the analyzed period.

Variable	Obs	Mean	Std. Dev.	Min	Max
S&P 500 Index	17	366.00	70.57	258.32	491.14
MSCI World Index	17	266.73	44.75	197.82	345.05
MSCI Europe Index	17	163.09	20.37	126.96	198.10
FTSE 100 Index	17	134.94	11.40	110.45	146.87
NASDAQ Index	17	694.09	180.57	422.54	996.27
NIKKEI 225 Index	17	162.76	22.97	123.97	193.02
Dow Jones Index	17	373.71	53.57	277.14	459.50
FTSE World Broad Investment Bond Index	17	237.55	13.10	212.22	253.06
FTSE Euro Broad Investment Bond Index	17	238.79	15.33	204.86	254.60
FTSE World Government Bond Index	17	215.76	11.66	192.36	228.94
Gold Index	17	583.32	70.64	447.22	668.70
Crude Oil Index	17	366.82	124.66	161.67	627.21
S&P GSCI Commodity Index	17	85.79	22.63	53.35	126.64
ArtPrice Global Index	17	134.77	12.93	114.93	159.70
CPI Jewelry, Clocks and Watches	17	227.16	12.04	209.25	247.89
PPI Jewelry and Silverware	17	200.77	14.80	179.97	224.23
IPI Coins, Gems, Jewelry and Collectibles	17	237.25	14.95	215.16	261.02
CPI Wine Euro Area	17	145.54	4.88	140.99	158.17
CPI Book Euro Area	17	134.89	2.83	131.79	141.03
LVMH Index	17	562.95	178.69	303.02	866.55

Table 4.3: Indices Return and Risk from Covid-19 crisis onwards

4.2 Cultural Bond Regression

The results of the cultural bond regression analysis are presented in Table 4.5. This analysis aimed to explore the relationship between various cultural bond dependent variables and their coefficients, standard errors, t-values, p-values, and confidence intervals.

The first predictor variable, Art Consumption, showed a coefficient of 15.54, with a standard error of 36.05. However, the t-value of 0.43 and the corresponding p-value of 0.67 indicate that this variable is not statistically significant in explaining the cultural bond.

Similarly, the ArtPrice Global Index predictor had a coefficient of 16.88, a standard error of 25.27, a t-value of 0.67, and a p-value of 0.51, suggesting that it also lacks statistical significance in relation to the cultural bond.

On the other hand, the variable CPI Jewelry, Clocks, and Watches exhibited a coefficient of 649.40, a standard error of 161.18, a high t-value of 4.03, and an extremely low p-value of 0.00, indicating its strong and highly significant impact on the cultural bond. The 95% confidence interval for this variable ranges from 970.04 to 328.75, further supporting its significance.

Similarly, the predictors PPI Jewelry and Silverware and IPI Coins, Gems, Jewelry, and Collectibles demonstrated significant coefficients of 334.33 and 215.30, respectively, with p-values of 0.01 and 0.02, suggesting that they also contribute significantly to the cultural bond *proxy*.

However, the variables CPI Wine Euro Area and CPI Books Euro Area did not show statistically significant relationships with the cultural bond, as their p-values were 0.31 and 0.55, respectively.

The LVMH Index, on the other hand, exhibited a strong positive impact on the cultural bond, with a coefficient of 81.62, a low standard error of 6.51, and a highly significant t-value of 12.53 (p-value = 0.00). Its 95% confidence interval ranged from 68.66 to 94.58, indicating the precision of the estimation.

Furthermore, the Bull Market Dummy variable, which represents a binary indicator for

a bull and bear market, did not demonstrate a statistically significant relationship with the cultural bond, as its p-value was 0.26.

Lastly, the constant term in the model had a coefficient of -6,283.01, with a large standard error of 31,181.15 and a non-significant t-value of -0.20 (p-value = 0.84).

Overall, the regression model had a high explanatory power, as indicated by the R-squared value of 0.8959. This means that approximately 89.59% of the variance in the cultural bond can be explained by the included predictor variables. The Adjusted R-squared value of 0.8845 further confirms the model’s reliability.

The root mean square error (RMSE) of the model was 4,949.9, indicating an acceptable level of estimation accuracy for the predicted cultural bond values.

In conclusion, the results suggest that certain indices, such as CPI Jewelry, Clocks, and Watches, PPI Jewelry and Silverware, IPI Coins, Gems, Jewelry, and Collectibles, and the LVMH Index, significantly influence the cultural bond, while others, such as Art Consumption and the ArtPrice Global Index, do not show significant relationships. The Bull Market Dummy variable and the constant term were also found to be statistically insignificant predictors of the cultural bond.

Statistic	Value	Interpretation
Number of observations	92	-
F-statistic	78.43	Significant
Prob >F	0.00	Highly significant
R^2	0.8959	High explanatory power
Adjusted R^2	0.8845	Adjusted R-squared
Root Mean Square Error	4,949.9	Estimation accuracy

Table 4.4: Complementary table

Cultural Bond	Coefficient	Std. err	t	P-value	Conf. Int.	95% CI
Art Consumption	(15.54)	36.05	(0.43)	0.67	(87.26)	56.17
ArtPrice Global Index	(16.88)	25.27	(0.67)	0.51	(67.16)	33.39
CPI Jewelry, Clocks and Watches	(649.40)	161.18	(4.03)	0.00	(970.04)	(328.75)
PPI Jewelry and Silverware	334.33	128.60	2.60	0.01	78.50	590.15
IPI Coins, Gems, Jewelry and Collectibles	215.30	86.53	2.49	0.02	43.15	387.44
CPI Wine Euro Area	332.84	323.77	1.03	0.31	(311.25)	976.93
CPI Books Euro Area	(195.99)	324.76	(0.60)	0.55	(842.05)	450.07
LVMH Index	81.62	6.51	12.53	0.00	68.66	94.58
Bull Market Dummy	1,408.47	1234.00	1.14	0.26	(1046.35)	3863.29
Constant	(6,283.01)	31,181.15	(0.20)	0.84	(68,312.26)	55,746.24

Table 4.5: Cultural Bond Regression *proxy*

Chapter 5

Discussion and Implications of the research

The data collected was divided in three periods to analyze a complete scenario of a financial cycle. The events selected for the segregation of data were crisis periods, namely the Dotcom bubble, the Great Financial Crisis (GFC) and Covid-19 crisis.

5.1 Dotcom bubble to Great Financial Crisis

The price index with the highest return is NASDAQ and the price index with the lowest return is NIKKEI 225. The price index with the lowest volatility is FTSE 100 and the one with the highest volatility is NASDAQ.

The bond index with the highest return is FTSE World Broad Investment Grade Bond Index and the ones with the lowest return is FTSE World Government Bond Index. The bond index with the lowest volatility is FTSE World Government Bond Index and the one with the highest volatility is FTSE Euro Broad Investment Grade Bond Index.

The commodity with the highest return is Crude Oil Price Index and the one with the lowest is Gold Price Index. The commodity with the lowest volatility is Crude Oil Price Index and with the highest volatility is Gold Price Index.

The Art Price Index with the highest return is ArtPrice Global Index and the one with the lowest is LVMH Price Index. The Art Price Index with lowest volatility is Harmonized CPI Wine for Euro area and the Art Price Index with the highest volatility is ArtPrice Global Index.

The table 6.1 presents the correlation coefficients between different financial market indices. These coefficients indicate the strength of the linear relationship between the respective indices, with a value of 1.0 representing a perfect positive correlation, -1.0 indicating a perfect negative correlation, and 0 suggesting no correlation. The closer a number is from -1, the better it is for portfolio diversification.

Upon analyzing the correlation coefficients in table 6.1, - see appendix - several important observations can be made. First, despite regional variations, some indices demonstrate significant positive correlations across different regions. Notably, the S&P 500 and MSCI World have a high positive correlation, indicating a strong linkage between the U.S. and global equity markets.

Gold exhibits a weak positive correlation with most equity indices, indicating its potential as a safe-haven asset during times of economic uncertainty. Crude oil shows negative correlations with many indices, suggesting its sensitivity to economic factors such as demand and geopolitical events. These correlations involving safe-haven assets emphasize their potential role in diversifying investment portfolios during uncertain economic times.

To have a perspective on the risk-return profile of the investment, Sharpe ratio was used, and results are presented in the table 6.4 in the appendix. According to this formula, the worst investments regarding their risk-return profile are Crude Oil Price Index, Gold Price Index, SP GSCI Commodity Index, NASDAQ Price Index, ArtPrice Global Index. And the best investments are Harmonized CPI Wine for Euro Area, Harmonized CPI Books for Euro Area, Harmonized CPI Jewelry, Clocks and Watches for Euro area, PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware, FTSE World Government Bond Index.

Based on the analysis conducted, the worst assets to invest in, considering their risk-return profile, are Crude Oil Price Index, Gold Price Index, SP GSCI Commodity Index, NASDAQ Price Index, and ArtPrice Global Index. These assets exhibited higher levels of volatility relative to their returns, making them less favorable investment choices during the specified period.

On the other hand, the best assets to invest in, considering their risk-return profile, are Harmonized CPI Wine for Euro Area, Harmonized CPI Books for Euro Area, Harmonized CPI Jewelry, Clocks and Watches for Euro area, PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware, and FTSE World Government Bond Index. These assets demonstrated more attractive risk-adjusted returns, indicating a better potential for stable and favorable investment performance during the examined financial cycle.

Diversification across different asset classes, including safer assets like government bonds and stable commodities, may be prudent to mitigate risks and achieve a balanced portfolio.

5.2 Great Financial Crisis to Covid-19 crisis

The price index with the highest return is NASDAQ and the price index with the lowest return is NIKKEI 225, just like the previous period. The price index with the lowest volatility is FTSE100 and the one with the highest volatility is NASDAQ.

The bond index with the highest return is FTSE Euro Broad Investment Grade Bond Index and the one with the lowest return is FTSE World Government Bond Index. The bond index with the lowest volatility is FTSE World Government Bond Index and the one with the highest volatility is FTSE Euro Broad Investment Grade Bond Index.

The commodity with the highest return is Gold Price Index and the one with the lowest is SP GSCI Commodity Index. The commodity with the lowest volatility is SP GSCI Commodity Index and with the highest volatility is Crude Oil Price Index.

The Art Price Index with the highest return is IPI (End Use) Coins, Gems, Jewelry, and Collectibles and the one with the lowest is Harmonized CPI Books for Euro Area. The Art Price Index with lowest volatility is Harmonized CPI Books for Euro area and the Art Price Index with the highest volatility is ArtPrice Global Index.

Upon analyzing the correlation coefficients on table 6.2 in appendix, several significant observations emerge. Gold displays weak positive correlations with most equity indices, suggesting its potential as a safe-haven asset during times of economic uncertainty.

Furthermore, crude oil exhibits negative correlations with many indices, highlighting its sensitivity to economic factors like demand and geopolitical events.

Moreover, LVMH, a prominent luxury goods company, demonstrates moderate positive correlations with various equity indices, possibly reflecting its sensitivity to changes in economic conditions and consumer confidence.

To have a perspective on the risk-return profile of the investment, Sharpe ratio was used, see table 6.5 in the appendix. According to this formula, the worst investments regarding their risk-return profile are NASDAQ Price Index, LVMH Index, SP500 Price Index, NIKKEI 225 Price Index and Dow Jones Price Index. And the best investments to make are Harmonized CPI Books for Euro Area, Harmonized CPI Wine for Euro Area, IPI (End Use) Coins, Gems, Jewelry and Collectibles, Harmonized CPI Jewelry, Clocks and Watches for Euro area and PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware.

In conclusion, NASDAQ continues to demonstrate the highest returns among price indices, albeit with the highest volatility, making it a high-risk, high-reward investment. On the other hand, NIKKEI 225 remains the price index with the lowest returns, indicating it may not be the most favorable investment choice.

Among bond indices, FTSE Euro Broad Investment Grade Bond Index yields the highest returns but also carries the highest volatility, making it a riskier option. In contrast, FTSE World Government Bond Index offers more stability with the lowest volatility, albeit at the

cost of relatively lower returns.

In the commodities market, Gold Price Index has consistently shown strong returns and displays potential as a safe-haven asset during economic uncertainty, whereas the SP GSCI Commodity Index exhibits the lowest volatility.

Gold's weak positive correlations with most equity indices suggest its attractiveness as a safe-haven during economic uncertainty, while crude oil's negative correlations with many indices highlight its sensitivity to economic factors and geopolitical events.

Art prices also vary significantly, with IPI (End Use) Coins, Gems, Jewelry, and Collectibles displaying the highest returns, and Harmonized CPI Books for Euro Area demonstrating the lowest returns and volatility among art price indices.

The Sharpe ratio evaluation further emphasizes the importance of considering risk-adjusted returns. Investments like NASDAQ Price Index, LVMH Index, SP500 Price Index, NIKKEI 225 Price Index, and Dow Jones Price Index are identified as the least favorable due to their high risk and relatively lower returns. Conversely, investments such as Harmonized CPI Books for Euro Area, Harmonized CPI Wine for Euro Area, IPI (End Use) Coins, Gems, Jewelry, and Collectibles, and PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware show better risk-return profiles.

5.3 Covid-19 Crisis onwards

The price index with the highest return is NASDAQ and the price index with the lowest return is NIKKEI 225, just like the previous period. The price index with the lowest volatility is FTSE100 and the one with the highest volatility is NASDAQ.

The bond index with the highest return is FTSE Euro Broad Investment Grade Bond Index and the one with the lowest return is FTSE World Government Bond Index, just like the two previous periods. The bond index with the lowest volatility is FTSE World Government Bond Index and the one with the highest volatility is FTSE Euro Broad Investment

Grade Bond Index.

The commodity with the highest return is Gold Price Index and the one with the lowest is S&P GSCI Commodity Index. The commodity with the lowest volatility is S&P GSCI Commodity Index and with the highest volatility is Crude Oil Price Index.

The Art Price Index with the highest return is LVMH Price Index and the one with the lowest is Harmonized CPI Books for Euro Area. The Art Price Index with lowest volatility is Harmonized CPI Books for Euro area and the Art Price Index with the highest volatility is LVMH Price Index.

Understanding correlation coefficients between different financial market indices is crucial for identifying portfolio diversification opportunities. The correlation coefficients in Table 6.3 provide insights into the relationships between various assets, helping investors to build well-diversified portfolios.

Positive correlations are observed between the S&P 500 Index and several major indices like the MSCI World, NASDAQ, Dow Jones, and LVMH. This indicates that these equity markets move in tandem during the observed period, reflecting their interconnectedness. Therefore, while investing in these indices can provide exposure to different markets, it may not provide strong diversification benefits.

On the other hand, the MSCI Europe Index shows a positive correlation with various indices, indicating its linkage with both global and regional markets. One interesting observation is the positive correlation between the MSCI Europe Index and the FTSE 100 Index, which represents the UK market. This suggests potential diversification opportunities by combining investments in European and UK equities.

Investors seeking further diversification may consider assets with negative correlations to equity markets. The FTSE World Government Bond Index, for instance, demonstrates negative correlations with equity indices like the S&P 500, MSCI World, and NASDAQ. This indicates that government bonds could serve as a hedge against equity market downturns, enhancing portfolio stability.

Adding art assets to an investment portfolio can potentially reduce overall risk and enhance diversification, as they may respond differently to economic and market conditions compared to traditional financial assets. Art assets, like gold, may act as a hedge against economic uncertainty, providing stability in a portfolio during market turbulence. However, investing in art requires careful consideration, as the art market is subject to its own dynamics and is relatively illiquid compared to traditional financial markets. Therefore, investors interested in art assets should conduct thorough research, seek expert advice, and understand the potential risks associated with investing in this unique asset class.

To have perspective on the risk-return profile of the investment, Sharpe ratio was used, see table 6.6 in the appendix. According to this formula, the worst investments to make regarding their risk-return profile are Crude Oil Price Index, LVMH Price Index, S&P Commodity Index, NASDAQ Price Index and SP500 Price Index. And the best investments are Harmonized CPI Books for Euro Area, Harmonized CPI Wine for Euro Area, IPI (End Use) Coins, Gems, Jewelry and Collectibles, Harmonized CPI Jewelry, Clocks and Watches for Euro area and PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware.

In conclusion, NASDAQ continues to demonstrate the highest returns among price indices, but its high volatility calls for prudent allocation. On the other hand, NIKKEI 225 remains the price index with the lowest returns, suggesting caution when considering this investment option.

FTSE Euro Broad Investment Grade Bond Index remains the bond index with the highest returns but also the highest volatility, while FTSE World Government Bond Index shows consistent stability with the lowest volatility. Investors should carefully consider their risk tolerance and investment objectives when selecting bond investments.

Gold Price Index stands out with the highest returns among commodities and its potential as a safe-haven asset during economic uncertainty. However, Crude Oil Price Index exhibits the highest volatility and should be approached with caution.

Art assets, represented by LVMH Price Index, offer the highest returns among art price indices but come with higher volatility. Harmonized CPI Books for Euro Area, with its lowest volatility, provides stability for art investments.

Understanding correlation coefficients between different financial market indices is crucial for building diversified portfolios. Positive correlations between certain equity indices indicate interconnectedness, while negative correlations between equity indices and FTSE World Government Bond Index suggest potential portfolio diversification benefits.

The Sharpe ratio analysis provides valuable insights into the risk-return profiles of various investments. Investors should carefully evaluate their risk appetite and investment goals when considering investments like Crude Oil Price Index, LVMH Price Index, S&P Commodity Index, NASDAQ Price Index, and SP500 Price Index, which exhibit higher risks and lower returns.

On the other hand, investments such as Harmonized CPI Books for Euro Area, Harmonized CPI Wine for Euro Area, IPI (End Use) Coins, Gems, Jewelry and Collectibles, Harmonized CPI Jewelry, Clocks and Watches for Euro area, and PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware offer more favorable risk-return profiles.

5.4 Implications of the Research

The results of this thesis are strongly connected to an investor's preference, i.e., risk appetite, how much comfortable would it be to forego some financial return for societal return.

As can be seen in table 6.7, the best assets to invest are the ones that yield the lowest risk, therefore, lowest return. On the basis of the optimal return/risk allocation, there is a strong preference for art sector assets such as wine or books. Surprisingly, the LVMH Index reported as the second lowest sharpe ratio between the GFC until nowadays. This implies

that non-luxury art assets can in fact have a more comfortable return than the luxury ones. The volatility throughout the periods studied can be better visualized on the figure 6.1. It can be clearly seen that the indices with the largest returns such as Crude Oil, Gold and NASDAQ are the ones with the most visible volatility. Hence, diversifying a portfolio with indices with lower return but lower risk with indices with higher return but greater risk, can be an optimal way to minimize potential losses of an investor's portfolio. Therefore, there is a place for art indices to counterbalance the most volatile indices.

Thus, the null hypothesis is accepted. There is a gain in the issuance of cultural bonds for its intrinsic value and for the potential risk diversification that can add to the market. It is expected that after its issuance more popularity will make the market increase even further, bringing a larger return to the cultural bond market.

Apart from the financial return, there is the social and cultural return that the market will bring. Important to mention a study where valuable insights can be drawn from a successful case study in Colombia involving the issuance of *orange bonds* to support the cultural sector. The case of Bancóldex, Colombia's development bank, highlights the potential of cultural bonds as a financial instrument to drive positive impact and growth in the cultural and creative industries. The Colombian government recognized the significance of the creative economy, contributing 3.2% of the country's GDP and generating almost 600,000 jobs, according to figures from the National Department of Statistics (DANE). Bancóldex's approach involved the creation of a new business unit focused on the creative and cultural sector. Through the issuance of *orange bonds* in 2018, Bancóldex successfully raised funds to support the development of the creative industries. The issuance received significant interest from investors, with a 2.9x oversubscription, indicating the confidence and interest generated in the capital markets. As of August 2021, Bancóldex had carried out 4,071 credit operations, with 98% of these concentrated in micro and small businesses across all 32 counties in Colombia. This highlights the success of the *orange bonds* in providing financial support to a wide range of cultural and creative projects and businesses, contributing to

economic growth and job creation in the sector.

The Colombian case study demonstrates the positive outcomes and potential impact of cultural bonds in supporting the creative economy. It sets a precedent for the successful implementation of such financial instruments in other regions, including the European Union, to boost the cultural sector's growth and resilience.

Chapter 6

Conclusion

In conclusion, this thesis aims to investigate the adaptation of the cultural market to the new financial era in the European Union while incorporating sustainability and digitalization. The study focuses on the issuance of cultural bonds as a means to financially support the cultural sector, analogous to green bonds that promote environmentally friendly projects. By introducing cultural bonds, the objective is to create a more transparent, regulated, and fair market that contributes to societal development.

Throughout the literature review it is highlighted the significance of the arts and finance relationship, the potential of art investment, and the intersection of arts and impact investing. It emphasizes the importance of the creative economy and its contribution to economic and social development.

This thesis proposes a structured approach, employing data analysis and methodologies to assess the viability and potential success of cultural bonds. It aims to understand the motivations behind their issuance and their appeal to investors. By analyzing index returns and volatility, the research assess the market's behavior in terms of revenue and risk. Additionally, it explores how different indices relate to each other to identify diversification opportunities. The development of a linear regression model serves as a *proxy* for estimating the value of cultural bonds.

The hypothesis, addressing the potential gains with the issuance of cultural bonds, adds a specific and testable dimension to the study. The research acknowledges its limitations, such as the challenges in valuing art as an investment.

The contributions of the thesis to the field are significant, as it addresses an emerging and underexplored area at the intersection of arts, finance, sustainability, and digitalization. It has the potential to inform policymakers and cultural institutions in designing effective strategies for supporting the cultural sector. The establishment of a CCS impact bond market and the adoption of Social Return on Investment (SROI) as a measurement tool can drive positive financial and social returns in the cultural market.

It recognizes the cultural and creative sectors (CCS) as important growth drivers, contributing significantly to economic and social development. However, it acknowledges the challenges faced by the sector and the need for financial support and impact investing. In this context, the research proposes the innovative concept of cultural bonds to bridge the funding gap and strengthen the creative economy.

This thesis holds the promise of contributing valuable knowledge and insights to support the growth and resilience of the cultural sector in the changing financial landscape. By fostering a dynamic and inclusive creative economy, it aims to unlock the potential of the cultural market in the European Union, driving positive societal development and sustainable growth.

The analysis of index returns and volatility offers insights into the market's behavior during different periods. The study identifies assets with higher risk-return profiles, such as NASDAQ Price Index, LVMH Price Index, S&P Commodity Index, NASDAQ Price Index, and S&P 500 Price Index, and those with better risk-return profiles, such as Harmonized CPI Books for Euro Area, Harmonized CPI Wine for Euro Area, IPI (End Use) Coins, Gems, Jewelry and Collectibles, Harmonized CPI Jewelry, Clocks, and Watches for Euro area, and PPI by Commodity Miscellaneous Products Jewelry (Gold and Platinum) and Silverware.

The findings also shed light on the correlation coefficients between different financial

market indices. Positive correlations are observed between the S&P 500 Index and several major indices, indicating their linkage during the observed period. However, the MSCI Europe Index shows positive correlations with various indices, suggesting diversification opportunities by combining investments in European and UK equities.

The linear regression model serves as a proxy for estimating the value of cultural bonds. By incorporating relevant data on the cultural sector's financial standing and growth potential, the study can assess the viability and attractiveness of cultural bonds as an investment option for investors. It can be drawn that cultural bonds will bring added value to the market, not only financially but on the cultural and societal component as well. Hence the null hypothesis is accepted.

Overall, this thesis hopefully provides valuable insights into the potential of cultural bonds in financially supporting the cultural sector while promoting sustainable and inclusive growth in the European Union. By drawing from successful case studies and analyzing market behaviors, this thesis can contribute to the development of effective strategies and financial instruments, empowering the cultural and creative industries to thrive in the new financial era.

Appendix

A. Index Correlation

Dotcom Bubble to Great Financial Crisis

	S&P 500	MSCI World	MSCI Eur	FTSE 100	NASDAQ	NIKKEI 225	Dow Jones	FTSE World	FTSE Europe	FTSE Gov	Gold	Crude Oil	S&P Com	ArtPrice	CPI JCW	PPI JewSil	IPI CJC	CPI Wine	CPI Books	LMVH	
S&P 500	1.0000																				
MSCI World	0.9888	1.0000																			
MSCI Europe	0.8417	0.9091	1.0000																		
FTSE 100	0.3566	0.3753	0.5029	1.0000																	
NASDAQ	0.9615	0.9660	0.8249	0.1337	1.0000																
NIKKEI 225	0.9486	0.9506	0.8180	0.3167	0.9319	1.0000															
Dow Jones	0.9757	0.9790	0.8893	0.4844	0.9082	0.9482	1.0000														
FTSE World	0.1850	0.2770	0.4115	(0.3817)	0.3949	0.1674	0.1288	1.0000													
FTSE Europe	0.0153	0.1306	0.3585	(0.2748)	0.2113	0.0151	(0.0093)	0.9529	1.0000												
FTSE World Gov	0.0597	0.1475	0.2835	(0.4585)	0.2788	0.0353	(0.0073)	0.9892	0.9560	1.0000											
Gold	0.7265	0.6773	0.4078	(0.1925)	0.7695	0.6832	0.6454	0.2905	0.0241	0.2200	1.0000										
Crude Oil	0.6549	0.5979	0.4335	0.6818	0.4724	0.6245	0.6713	(0.4718)	(0.5335)	(0.5581)	0.3026	1.0000									
S&P Com	0.5117	0.4394	0.2735	0.7218	0.2872	0.4760	0.5463	(0.6686)	(0.7046)	(0.7389)	0.1844	0.9600	1.0000								
ArtPrice	0.6005	0.6815	0.7740	0.0748	8.6978	0.6387	0.6021	0.5085	0.4720	0.4135	0.3127	0.1489	(0.0408)	1.0000							
CPI JewCIWat	0.7364	0.6376	0.3031	0.1844	0.6338	0.7089	0.6967	(0.3184)	(0.5502)	(0.4012)	0.7652	0.6970	0.6802	0.0671	1.0000						
PPI JewSil	0.7172	0.6130	0.2709	0.1449	0.6214	0.6573	0.6593	(0.3074)	(0.5367)	(0.3819)	0.7576	0.6430	0.6355	0.0487	0.9768	1.0000					
IPI CoGemJewCol	0.7917	0.7027	0.3871	0.1722	8.7037	0.7374	0.7423	(0.2089)	(0.4564)	(0.2973)	0.8169	0.7008	0.6495	0.1671	0.9792	0.9523	1.0000				
CPI Wine	0.3688	0.2564	(0.0112)	0.3462	0.1732	0.3361	0.3859	(0.7399)	(0.8796)	(0.7857)	0.3665	0.6768	0.7898	(0.2572)	0.8285	0.8148	0.7655	1.0000			
CPI Books	0.6184	0.5183	0.2169	0.3141	0.4698	0.6027	0.6120	(0.5111)	(0.6900)	(0.5894)	0.5676	0.6927	0.7465	(0.0648)	0.9346	0.8918	0.8829	0.8751	1.0000		
LMVH	0.8699	0.8189	0.6064	0.3785	0.7654	0.8650	0.8810	(0.1872)	(0.3777)	(0.3039)	0.6460	0.7343	0.6745	0.3292	0.8951	0.8351	0.8973	0.6895	0.8517	1.0000	

Table 6.1: Index Correlation Dotcom Bubble to Great Financial Crisis

Great Financial Crisis to Covid-19 crisis

	S&P 500	MSCI World	MSCI Eur	FTSE 100	NASDAQ	NIKKEI 225	Dow Jones	FTSE World	FTSE Europe	FTSE Gov	Gold	Crude Oil	S&P Com	ArtPrice	CPI JCW	PPI JewSil	IPI CJC	CPI Wine	CPI Books	LMVH	
S&P 500	1.0000																				
MSCI World	0.9890	1.0000																			
MSCI Europe	0.7792	0.8616	1.0000																		
FTSE 100	0.9351	0.9619	0.8672	1.0000																	
NASDAQ	0.9934	0.9764	0.7451	0.9120	1.0000																
NIKKEI 225	8.9582	8.9466	0.7544	0.8612	0.9565	1.0000															
Dow Jones	0.9945	0.9842	0.7723	0.9347	0.9931	0.9444	1.0000														
FTSE World	0.9369	0.9102	0.6539	0.8853	0.9180	0.8622	0.9163	1.0000													
FTSE Europe	0.9415	0.9158	0.6720	0.8755	0.9204	0.8957	0.9129	0.9911	1.0000												
FTSE World Gov	0.9331	0.8980	0.6205	0.8604	0.9155	0.8681	0.9094	0.9966	0.9930	1.0000											
Gold	0.0261	0.0558	0.0716	0.2009	0.0127	(0.2072)	0.0629	0.1832	0.0699	0.1271	1.0000										
Crude Oil	(0.3731)	(0.2764)	0.0618	(0.1485)	(0.3918)	(0.4766)	(0.3292)	(0.4460)	(0.4928)	(0.5034)	0.4736	1.0000									
S&P Com	(0.6858)	(0.6055)	(0.2376)	(0.5215)	(0.7082)	(0.7224)	(0.6560)	(0.7591)	(0.7809)	(0.7914)	0.2301	0.8678	1.0000								
ArtPrice	(0.3988)	(0.3277)	(0.0389)	(0.2414)	(0.4472)	(0.3928)	(0.3987)	(0.3881)	(0.3918)	(0.4156)	0.1534	0.4813	0.5751	1.0000							
CPI JewCIWat	0.7865	0.7831	0.6005	0.8287	0.7591	0.6411	0.7856	0.8903	0.8365	0.8589	0.5555	(0.1040)	(0.4766)	(0.1833)	1.0000						
PPI JewSil	0.5368	0.5415	0.4075	0.6481	0.5066	0.3501	0.5510	0.6776	0.5936	0.6339	0.7610	0.1195	(0.2363)	(0.0168)	0.9217	1.0000					
IPI CoGemJewCol	0.3320	0.3673	0.3694	0.4848	0.2938	0.1249	0.3448	0.4809	0.3917	0.4256	0.8770	0.3382	0.0256	0.1862	0.8053	0.9198	1.0000				
CPI Wine	0.9608	0.9434	0.7207	0.8972	0.9436	0.9068	0.9482	0.9656	0.9655	0.9602	0.1150	(0.3519)	(0.6798)	(0.3470)	0.8654	0.6373	0.4455	1.000			
CPI Book	0.9550	8.9323	0.6974	0.8966	0.9434	0.8982	0.9436	0.9547	0.9519	0.9518	0.0912	(0.4018)	(0.7095)	(0.4138)	0.8373	0.6133	0.4056	0.9619	1.0000		
LMVH	0.9222	0.9090	0.6787	0.8763	0.9454	0.8512	0.9441	0.8546	0.8275	0.8403	0.1968	(0.2710)	(0.6345)	(0.4343)	0.7804	0.5941	0.3916	0.8752	0.8729	1.0000	

Table 6.2: Index Correlation Great Financial Crisis to Covid-19 crisis

Covid-19 crisis onwards

	S&P 500	MSCI World	MSCI Eur	FTSE 100	NASDAQ	NIKKEI 225	Dow Jones	FTSE World	FTSE Europe	FTSE Gov	Gold	Crude Oil	S&P Com	ArtPrice	CPI JCW	PPI JewSil	IPI CJC	CPI Wine	CPI Books	LVMH	
S&P 500	1.0000																				
MSCI World	0.9888	1.0000																			
MSCI Europe	0.8417	0.9091	1.0000																		
FTSE 100	0.3566	0.3753	0.5029	1.0000																	
NASDAQ	0.9615	0.9660	0.8249	0.1337	1.0000																
NIKKEI 225	0.9486	0.9506	0.8180	0.3167	0.9319	1.0000															
Dow Jones	0.9557	0.9790	0.8893	0.4844	0.9082	0.9482	1.0000														
FTSE World	0.1850	0.2770	0.4115	(0.3817)	0.3949	0.1674	0.9163	1.0000													
FTSE Europe	0.0153	0.1306	0.3585	0.2748	0.2113	0.0151	0.9129	0.9529	1.0000												
FTSE World Gov	0.0597	0.1475	0.2835	(0.4585)	0.2788	0.0353	0.9094	0.9892	0.9560	1.0000											
Gold	0.7265	0.6773	0.4078	(0.1925)	0.7695	0.6832	0.0629	0.2905	0.0241	0.2200	1.0000										
Crude Oil	0.6549	0.5979	0.4335	0.6818	0.4724	0.6245	(0.3292)	(0.4718)	(0.5335)	(0.5581)	0.3026	1.0000									
S&P Com	0.5117	0.4394	0.2735	0.7218	0.2872	0.4760	(0.6560)	(0.6686)	(0.7046)	(0.7389)	0.1844	0.9600	1.0000								
ArtPrice	0.6005	0.6815	0.7740	0.0748	0.6978	0.6387	(0.3987)	0.5085	0.4720	0.4135	0.3127	0.1489	0.5751	1.0000							
CPI JewCIWat	0.7364	0.6376	0.3031	0.1844	0.6338	0.7089	0.7856	(0.3184)	(0.5502)	(0.4012)	0.7652	0.6970	(0.4766)	0.0671	1.0000						
PPI JewSil	0.7172	0.6130	0.2709	0.1449	0.6214	0.6573	0.5510	(0.3074)	(0.5367)	(0.3819)	0.7576	0.6430	(0.2363)	0.0487	0.9768	1.0000					
IPI CoGemJewCol	0.7917	0.7027	0.3871	0.1722	0.7037	0.7374	0.3448	(0.2089)	(0.4564)	(0.2973)	0.8169	0.7008	0.0256	0.1671	0.9792	0.9523	1.0000				
CPI Wine	0.3688	0.2564	(0.0112)	8.3462	0.1732	0.3361	0.9482	(0.7399)	(0.8796)	(0.7857)	0.3665	0.6768	(0.6798)	(0.2572)	0.8285	0.8148	0.7655	1.0000			
CPI Book	0.6184	0.5183	0.2169	0.3141	0.4698	0.6027	0.9436	(0.5111)	(0.6900)	(0.5894)	0.5676	0.6927	(0.7095)	(0.0648)	0.9346	0.8918	0.8829	0.8751	1.0000		
LVMH	0.8699	0.8189	0.6064	0.3785	0.7654	0.8650	0.9441	(0.1872)	(0.3777)	(0.3039)	0.6460	0.7343	(0.6345)	0.3292	0.8951	0.8351	0.8973	0.6895	0.9523	1.0000	

Table 6.3: Index Correlation Covid-19 crisis onwards

B. Sharpe Ratio

Dotcom Bubble to Great Financial Crisis

Index	Mean	SD	Sharpe Ratio
S&P 500 Price Index	125.08	18.99	6.59
MSCI World Index	125.37	24.81	5.05
MSCI Europe Index	129.38	33.76	3.83
FTSE 100 Index	106.18	16.94	6.27
NASDAQ Index	142.94	45.34	3.15
NIKKEI 225 Index	90.56	20.61	4.39
Dow Jones Index	131.24	18.68	7.03
FTSE World Broad Investment Grade Bond Index	125.99	16.73	7.53
FTSE Euro Broad Investment Grade Bond Index	123.58	17.26	7.16
FTSE World Government Bond Index	121.65	14.07	8.65
Gold Index	147.60	64.34	2.29
Crude Oil Index	245.10	159.68	1.53
S&P GSCI Commodity Index	153.50	64.99	2.36
ArtPrice Global Index US	146.10	43.52	3.36
CPI Jewelry, Clocks, and Watches	110.62	12.40	8.92
PPI Jewelry and Silverware	107.29	9.18	11.68
IPI Coins, Gems, Jewelry, and Collectibles	118.46	24.84	4.77
CPI Wine Euro area	109.30	4.80	22.75
CPI Books Euro area	110.18	5.92	18.62
LVMH Index	71.17	17.55	4.05

Table 6.4: Sharpe Ratio: Dotcom Bubble to Great Financial Crisis

Great Financial Crisis to Covid-19 crisis

Index	Mean	SD	Sharpe Ratio
S&P 500 Price Index	187.71	64.96	2.89
MSCI World Index	166.04	40.25	4.13
MSCI Europe Index	142.26	19.08	7.46
FTSE 100 Index	121.62	18.23	6.67
NASDAQ Index	275.25	124.45	2.21
NIKKEI 225 Index	97.93	32.60	3.00
Dow Jones Index	207.43	69.22	3.00
FTSE World Broad Investment Grade Bond Index	198.20	23.51	8.43
FTSE Euro Broad Investment Grade Bond Index	201.03	29.325	6.86
FTSE World Government Bond Index	182.28	20.43	8.92
Gold Index	446.72	75.17	5.94
Crude Oil Index	412.22	124.19	3.32
S&P GSCI Commodity Index	124.74	40.90	3.05
ArtPrice Global Index	166.73	29.31	5.69
CPI Jewlery, Clocks, and Watches	192.31	20.59	9.34
PPI Jewelry and Siverware	171.58	17.91	9.58
IPI Coins, Gems, Jewelry, and Collectibles	208.48	15.04	13.86
CPI Wine Euro area	132.33	7.10	18.66
CPI Books Euro area	125.02	4.48	27.93
LVMH Index	157.70	67.21	2.35

Table 6.5: Sharpe Ratio Great Financial Crisis to Covid-19 crisis

Covid-19 crisis onwards

Index	Mean	SD	Sharpe Ratio
S&P 500 Index	389.36	63.30	6.15
MSCI World Index	280.22	42.15	6.65
MSCI Europe Index	166.33	22.10	7.53
FTSE 100 Index	133.26	12.26	10.87
NASDAQ Index	758.89	154.00	4.93
NIKKEI 225 Index	170.37	20.77	8.20
Dow Jones Index	388.74	51.79	7.51
FTSE World Broad Investment Grade Bond Index	239.10	14.23	16.80
FTSE Euro Broad Investment Grade Bond Index	238.35	17.16	13.89
FTSE World Government Bond Index	216.76	12.83	16.90
Gold Index	615.76	38.27	16.09
Crude Oil Index	283.55	138.09	2.05
S&P GSCI Commodity Index	87.58	25.73	3.40
ArtPrice Global Index	136.62	13.33	10.25
CPI Jewelry, Clocks, and Watches	231.79	9.61	24.11
PPI Jewelry and Silverware	206.40	11.99	17.21
IPI Coins, Gems, Jewelry, and Collectibles	243.36	11.16	21.81
CPI Wine Euro area	146.52	5.21	28.11
CPI Books Euro area	135.68	2.77	49.04
LVMH Index	562.95	178.69	3.15

Table 6.6: Sharpe Ratio Covid-19 crisis onwards

Indices Returns

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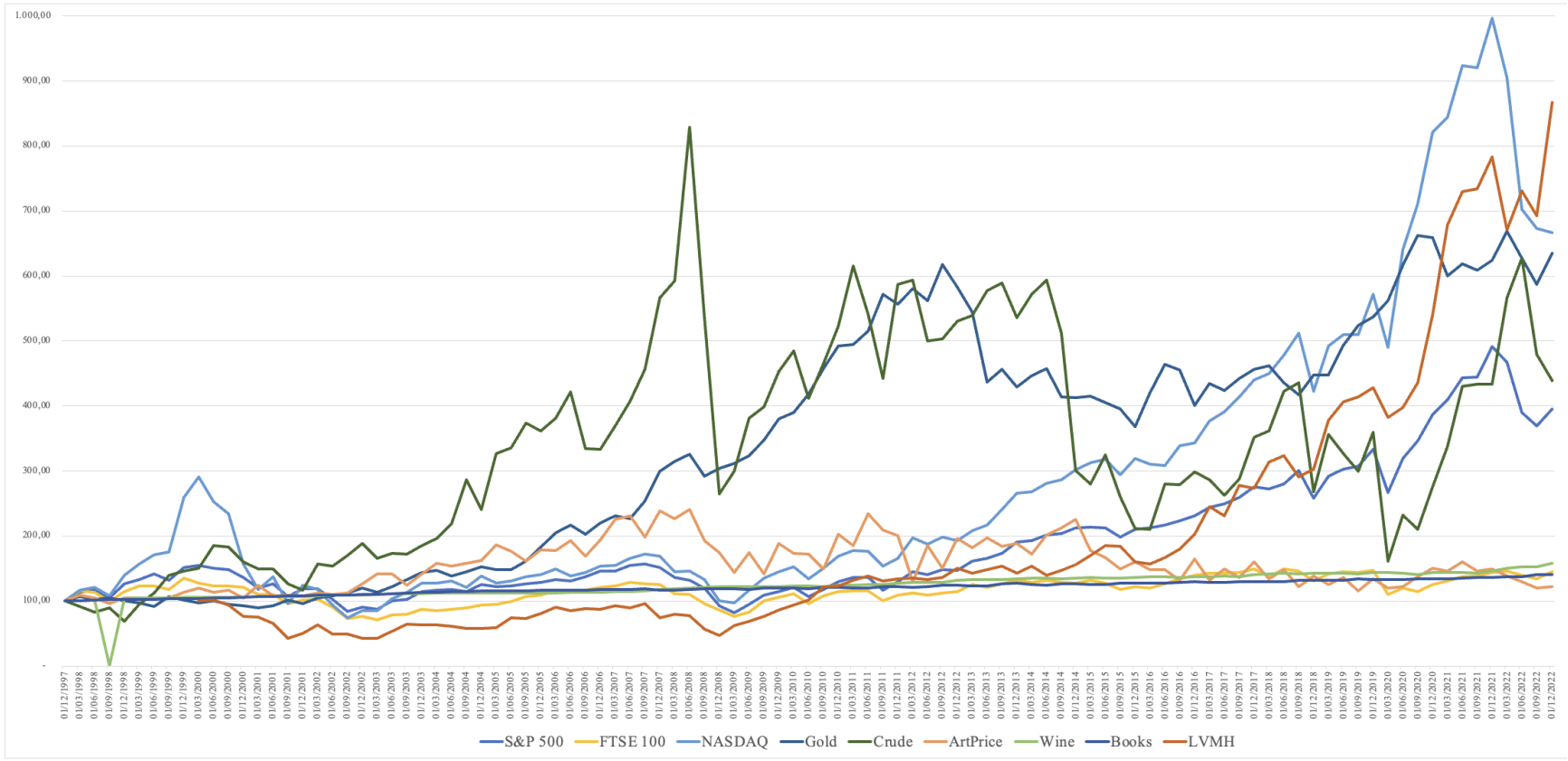


Figure 6.1: Indices Returns

Decision Making

Period	Dotcom Bubble to GFC	GFC to Covid-19 crisis	Covid-19 crisis onwards
Highest return	CRUDE OIL	GOLD	NASDAQ
Lowest return	NIKKEI 225	NIKKEI 225	S&P COMMODITY
Highest risk	CRUDE OIL	CRUDE OIL	NASDAQ
Lowest risk	WINE	BOOKS	BOOKS
Highest sharpe ratio	WINE	BOOKS	BOOKS
Lowest sharpe ratio	CRUDE OIL	NASDAQ	CRUDE OIL

Table 6.7: Investment decision making

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