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THE PORTUGUESE CONTEMPORARY ART AS AN INVESTMENT

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A Work Project, under the supervision of:

Miguel Lebre de Freitas

Luís Catela Nunes

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Abstract

In this paper we investigate what drives the prices of Portuguese contemporary art at auction and explore the potential of art as an asset. Based on a hedonic prices model we construct an Art Price Index as a proxy for the Portuguese contemporary art market over the period of 1994 to 2014. A performance analysis suggests that art underperforms the S&P500 but overperforms the Portuguese stock market and American Government bonds. However, It does it at the cost of higher risk. Results also show that art as low correlation with financial markets, evidencing some potential in risk mitigation when added to traditional equity portfolios.

Keywords: Art; Finance; Investment; Returns

I. Introduction

On May 2013 Francis Bacon's triptych "Three Studies of Lucian Freud" rampaged the international art market by setting a new record on the most expensive painting sold at auction. The auction, held by Christie's in New York, last less than six minutes, time enough to hammer at the astonishing price of \$142.4 million. In 2007, Sotheby's on behalf of David Rockefeller¹ sold the "White Center" (1957), an abstract and three color-based painting by Mark Rothko for \$72.84 million, piece that was bought in 1960 for less than ten thousand dollars. Although Portuguese art never reached these levels, some artists have already beaten some interesting values. The record was set when Vieira da Silva's "Saint-Fargeau" was sold in Paris for an impressive \$1.85 million in 2011. According to the "Wealth Report 2014"² art market saw this year the biggest jump in popularity among the luxury and collectible goods. Also, common sense seems to tell us that contemporary art overperform traditional assets like stocks and bonds in terms of risk and returns.

Following a growing literature on economics of art and combining pure art with finance theory, we are going to investigate what drives the prices in the art market and what makes simple paintings worth so much. Furthermore, we will explore the claim that supports art as an over performing asset over the traditional ones. Our dataset is a representing sample of the Portuguese contemporary art market, with paintings of 71 Portuguese artists auctioned over the last twenty years. To address our questions we are going to evaluate the price determinants, risks, returns and diversification potential of Portuguese contemporary art by the means of an econometric model, known as hedonic regression. We draw conclusions that might be helpful to art investors and auctioneers,

¹ David Rockefeller, youngest son of John D. Rockefeller, is a famous banker and philanthropist. He was the chairman of Chase Manhattan Bank and one of the richest men in United States.

² 'The Wealth Report 2014', Knight Frank (2014)

comparing art paintings to other traditional assets, testing what makes a painting worth it and clarifying the link between art and money. The paper is organized as follows:

Section II provides an overview on the most important literature of the economics of art. Section III gives a brief dataset description, presenting the main characteristics of our database. Section IV presents the hedonic model and shows the main advantages and disadvantages to other approaches. Section V is devoted to the discussion of art price determinants. Section VI analyses Portuguese contemporary art as an investment. An art price index, representing the overall Portuguese contemporary art market is computed. We then compare the historical rates of return and the volatility over the last twenty years with other traditional investments and look for potential diversification benefits of including art in portfolios. In Section VII we draw the main conclusions and propose ideas for further investigation.

II. Literature Review

The view of an economist over the world of art, and the attempt of them to explain it rationally may sound unnatural and inappropriate for every art passionate. However over the last decades, economics of art has been receiving more attention and relevant literature is expanding. Since Anderson (1974) and Baumol (1986) the main stream of discussion has been the financial performance of art as an asset and if it is feasible as an investment or just as a collectible for aesthetic purposes. Other relevant authors such as Galenson (1997, 1999, 2002) examined the creativity patterns of artists, while Chanel (1995) addressed the economic issues associated with market correlations and comovements.

Art as an Investment

In its pioneer article Anderson (1974) relied on a hedonic model to examine auctioned paintings over the period of 1780 to 1970. The results showed an average rate of return of 3.3% per year. Baumol (1986), with the most important contribution to art finance, computed by the means of a repeated sales method, an annual return of 0.55% for the period of 1650 to 1960. He concludes that art paintings should only be acquired only for consumption and pleasure purposes. Buelens and Ginsburgh (1993) revisited Baumol's article to conclude that his results were underestimated and that in fact artwork yields higher returns than bonds. The authors refer that the results should not be generalized to a large period of time or to different schools. By looking at different submarkets and subperiods with a hedonic model, Buelens and Ginsburgh (1993) conclude that art can be a valid alternative investment to traditional assets.

Agnello and Pierce (1996) explore by the means of a hedonic regression the performance of a portfolio of 66 American artists during the period of 1971 to 1992. They conclude that average nominal and real returns for American paintings are found to be over 9% and 3% respectively. As Agnello and Pierce (1996) some other authors started to focus on portfolios of specific countries. Candela et al. (1997) examined the performance of Italian contemporary art, Renneborg et al. (2002) studied Belgian paintings, Hodgson et al. (2004) centered in a portfolio of Canadian paintings and Worthington and Higgs (2006) focused their research with Australian paintings. All works converged into the same result, showing that art underperforms other traditional financial assets.

Mei and Moses (2002) conducted their research with a portfolio of American painters over the period of 1875 to 2000. Using the repeated sales method they conclude that art overperforms fixed income but underperforms American stocks. However the lower volatility and the low correlation with the markets turn art into an appealing asset to

diversify a portfolio and reduce the risk associated to it. Also Pesando and Shum (2008) found a low correlation between markets and artwork that supports the abovementioned idea. Mei and Moses (2002) also conclude that contrarily to common belief, masterpieces underperform markets, conclusion supported by Pesando (1993) but contradicted by Renneboog and Spaenjers (2009).

Although past research have shown that art overperforms fixed income, the reality is that the majority of research does not take transaction and maintenance costs into account. Ashenfelter and Graddy (2003) refer that seller's premium ranges around 10% to 17.5% and buyer's premium is typically 10%. Besides that Frey and Pommerehne (1989) estimate that insurance costs for fire and theft hover around 0.2% to 1% per year.

Atukeren et al. (2007) highlight the importance of psychic returns of art as a consumption good. They find two methods to calculate these dividends. First, through rental prices charged by a Canadian fine art company for its art rental services and secondly, computing the alpha parameter in the CAPM. Both methods yielded an implicit return of 28% per year.

Other articles have focused on the relationships between art and financial markets. Chanel (1995) concluded that financial markets influence the art market with a lag of one year. Through a VAR model they show that financial indicators help to predict art market, although it does not allow for systematic profits. Worthington and Higgs (2001) determined the existence of short and long run causal linkages between markets, however the change in tastes and fashion turn art market extremely difficult to predict.

Career Dynamics

In a series of articles David Galenson (1997, 1999, 2002) uses data on auction prices to study the relation between the artist's age and the valuation of their works. To do

this, he computes age-price profiles with a dataset divided in three birth cohorts. Evidence shows that American painters born after 1920 do their most important work in an earlier stage of life compared to those born before this year. Galenson (1997, 1999) concludes that an increase in demand for contemporary art in the 1950's, mainly due to a change in galleries system, gave artists an incentive to dedicate their lives exclusively to art. Edwards (2004) applied the same techniques to Latin American art and found that a contrary shift in creativity patterns was observable.

III. Dataset Description

This research relies on data on international auctions of Portuguese contemporary art obtained from 'Art Price', an online database on art market information. The dataset covers the period of 1994 to 2014 and it has 2468 observations from 71 Portuguese artists. The following information was taken from the aforementioned source: Artist name, artist's death (year), year of painting execution, size of work (height/width), media, support, date of auction, auction house, venue and hammer price. The mean number for works sold by each artist is 36, wherein the most represented authors are Maria Helena Vieira da Silva, Manuel Cargaleiro and Francis Smith. The data set shows a mean hammer price of \$31.724 and a median of \$8.722, and there are only two artists that reached the \$1 million barrier, Paula Rego and Maria Helena Vieira da Silva.

In this kind of performance analysis, the data set on auction prices may underlie some limitations. First there is an absence of some variables that are relevant to fully characterize a piece of artwork. Information about the style and the provenance of the work are variables with influence on a painting valuation. Secondly, as Edwards (2004) refers, there might be some bias in the data, as those works which are bought in and those which

the owners decide not to sell, are not included in the data set, excluding from it the upper and the lower end of quality distribution. Thirdly, auction prices do not reflect some relevant costs, such as insurance for fire and theft, buyer's and seller's premiums and other transaction costs.

IV. Methodology

Computing the Art Price Index

This paper intends to analyze what are the drivers of contemporary Portuguese art painting prices and to evaluate the performance of these as an investment. Some drawbacks that emerge when analyzing the art market are the heterogeneity of works, as every painting is a unique work of art, and the low liquidity when comparing to other traditional security markets. Two major approaches are generally used to overcome these problems and to compute price fluctuations over time: the repeated sales regression and the hedonic regression models.

The repeated sales method estimates changes in art price based on works that only have been sold twice. The use of pairs of sales avoids heterogeneity since it only compares prices of a same work. This method has however a great disadvantage given that resales are difficult to identify. This limits the size of the dataset and the quality of our price index. Chanel, Gérard-Varet and Ginsburgh (1996) also argue that this method might imply a bias in the data since only quality works are typically auctioned twice.

The hedonic regression model, which is used in our analysis, captures the variations in art price by decomposing the log of art price in two components as it can be seen in equation 1.

$$(1) \log price_i = \sum_{n=1}^N \delta_n C_{in} + \sum_{t=0}^T \partial_t P_{it} + \varepsilon_i$$

where:

$price_i$: price of painting i ($i = 1, \dots, X$)

C_{in} : characteristic n ($n = 1, \dots, N$) of painting i

P_{it} : time dummy; 1 if painting i was auctioned in period t ($0, \dots, T$) and 0 otherwise

δ_n : coefficient for characteristic impact on price

∂_t : coefficient for time dummy effect on price

The first term reflects the impact of the painting characteristics in the price. The second term accounts for the contribution of anything else that is not included in the first part. By choosing a good set of variables that can fully explain the price of a painting, the second term will only reflect the contribution of external factors such as changes in taste, in fashion and inflation. A hedonic regression model allows having access to a significant larger dataset given that it also takes into account single sales observations. A larger data can lead to more accurate results and less biased regressors. However, the hedonic model is based on some strong assumptions. First, as Ashenfelter and Graddy (2003) refer, it is assumed that a typically small set of variables available can fully capture the fixed components of the price. As previously mentioned, there is an issue of omitted variables, such as provenance or style that may have impact on the pricing. The result is a misspecification of the first term in expression (1), which will influence the contribution of second term, this is, the time effects. Second, there is an assumption that preferences and tastes do not change over time. For instance, the impact of a certain artist name on pricing is constant over the period in study. Lastly, the impact of some fixed components is assumed to be the same for all artists. The fact is that a painter can be more dedicated to a particular media or support, adding value differently.

Chanel, Gerard-Varet and Ginsburgh (1996) compare the results between both methods, showing that results are of the same order of magnitude. However hedonic regression model makes it possible to compute price indices without having to gather a large number of resales.

To specify the fixed component of a painting price in the hedonic regression, we use the following variables:

- Artist name (dummy for each artist)
- Alive (dummy is 1 if artist is alive by the time of the auction, 0 c.c.)
- Age of the artist at execution
- Size (in m^2 , second order polynomial)
- Media (dummies for oil, tempera, acrylic, other and mixed)
- Support (dummies for canvas, paper, board, panel, wood, other and mixed)
- Signed (dummy is 1 if work is signed, 0 c.c.)
- Age of painting at date of auction
- Auction house (dummies for Christie's, Sotheby's, Cabral Moncada, Palácio do Correio-Velho, Arcurial, Veritas and other)
- Local of auction (dummies for Lisbon, Paris, Versailles, New York, London and other)

Besides the abovementioned variables, the model specifies a dummy 'Period' for each semester, to capture the impact of time valuation.

To circumvent possible heteroscedasticity issues, we estimate our hedonic model by using heteroscedasticity consistent standard errors. The coefficients δ_n are the variables of interest for a first analysis on the price determinants. Coefficients ∂_t are then used to compute an art price index (API) by setting ∂_0 as base value of 100 and adapting all others correspondingly.

Performance Analysis

Following Bodie, Kane and Marcus (2014)³ one can proceed with a financial analysis of returns and volatilities (standard deviations). To measure the risk adjusted performance we compute the Sharpe ratio by the following formula:

$$(2) \text{ Sharpe ratio} = \frac{r_p - r_f}{\sigma_p}$$

where r_p is the mean return the overall art portfolio, r_f is the risk free rate of return and σ_p is the standard deviation, or volatility, of the art portfolio. By the same means as mentioned above, and based on a subsample composed by the 15 artists with the highest painting price average, we construct another art price index, to which we apply the same analysis. For a better understanding and comparison, performance analyses are also done to the American Three Month Treasury Bill (TB3MS), which is our proxy for risk free investment, and to the Portuguese and American market indices, PSI20⁴ and S&P500, respectively, that serve as financial markets proxies.

Another critical indicator to any investor is the degree of correlation of an asset with the financial markets. If two assets are correlated, then they are going to move in the same direction. An alternative asset with a low degree of correlation could provide portfolio diversification benefits, reducing the risk associated to economic and financial cycles. We then compute the correlation matrix in order to analyze the degree of correlation between the indices.

³ Bodie, Kane and Marcus - Investments (10th edition), p.130

⁴ Portuguese Stock Index - Benchmark stock index of companies that trade on Euronext Lisbon

V. Price Determinants

In our hedonic model we regress the logarithm of the price on a set variables that characterize a piece of art. The following section presents the overall results of our OLS regression and discusses the effects of the hedonic variables in art pricing. The overall outcome presented in table 6, evidence a model with a R-squared of 0.7994 and a root mean squared error of 0.7535. To obtain the present model, successive alternatives were tested and some variables were dropped. For instance, birth period cohorts were created to infer whether the period when the artist was born was determinant or not. This effect turned out to be statistically insignificant. Date mark was also initially included in the model, but it was omitted as a variable due to collinearity issues, this is, the effect of the mark was already explained by other factor, such as age painting, which was computed based on the date mark. Gender was also dropped from the model due to statistical insignificance in explaining price differences. Due to lack of significance the square and the cube of artist age by the time of the work execution were dropped. For a better understanding of some variables, table 1 is presented. The indices shown, are constructed based on the coefficients regressed for each variable. We then set as reference one of the dummies and vary all others accordingly. References are marked with a star.

Table 1: Rankings for Media, Support, Auction House and Local

Media		Support		Auction House		Local	
<i>Oil*</i>	100	<i>Canvas*</i>	100	Sotheby's	107	Versailles	125
Acrylic	98	Panel	85	<i>Christie's*</i>	100	<i>Lisbon*</i>	100
Mixed	81	Wood	63	Veritas	50	Paris	79
Tempera	56	Board	62	Other	47	NYC	41
Other	-199	Other	61	C. Moncada	45	Other	30
		Mixed	54	Palacio	38	London	35
		Paper	36	Artcurial	30		

Variable Analysis

The artist name is one of the main variables expected to influence the price of an artwork at auction. The effect of the artist's names revealed to be collectively different from zero, suggesting that artists have in fact different reputations that might affect the price differently. The results, evidence that the names with highest premiums are Columbano Bordalo Pinheiro and José Malhoa. Some interesting results can also be observed when comparing the name contribution ranking with a simple ranking for average painting prices. Surprisingly, Vieira da Silva, one of the most notorious Portuguese painters and the one with the highest average painting price, drops to the 7th place when analyzing the name contribution to the price. Results suggest that the high prices paid for Vieira da Silva's works are greatly influenced by some common characteristics of the painter's works, such as the usual usage of oil on canvas, the large painting formats and the presence of her signature. Moreover, Vieira da Silva is mostly auctioned in reputed houses like Christie's and Sotheby's. The same reasoning can be applied to Paula Rego and Júlio Pomar reputable names of the Portuguese art market that also drop significantly in the ranking.

Common belief suggests that due to a no longer supply of artwork, dead artists' works are paid at a premium. However, the coefficient testing for the effect of the vital status turned out to be statistically insignificant. A possible reasoning is that artists gradually taper off their production, leading to slowly increases in prices. However the death of an artist can draw attention to its name, peaking the prices for some time. This is temporary though, given that markets tend to adjust.

The coefficient on the artist age is negative and statistically significant. Based on age price profiles used by Galenson (1997) and Edwards (2004), this seems to suggest that, on average, the painters of our sample executed their best works in an early stage of life.

Coefficients for size and size squared are statistically significant, with a positive and a negative effect on price, respectively. Given the second order polynomial function of size on price, one can use the quadratic formula to infer its maximum. By this means the price-maximizing size is 11.06 m². In comparison Agnello and Pierce (1996) and Higgs et al. (2005) estimated optimal sizes of 6.53m² and 6.70m², respectively, while Barre et al. found this size to be 1.70m². It is noted however that painters rarely work on these dimensions, preferring to choose the support dimensions based on what best suits their needs, and with which they can better expose their ideas and emotions.

The coefficient testing for the age of the painting effects is negative and statistically different from zero. Results suggest that buyers at auction might see the age of a painting as a proxy for its conditions and quality, as some medias such as oil slightly tend to discolor and to yellow with age.

To analyze the effects of the media on the price of a painting we consider variables for oil, acrylic, tempera, other material and mixed media. The coefficients are collectively significant and a ranking is presented in table 1. As found by Higgs and Worthington (2005), our results evidence that oil, followed by acrylic, are the medias that more positively influence the price of an original. Oil and acrylic, due to its flexibility, visual aspect and long lasting quality, take part in the majority of masterpieces and were expected to be the most valued medias. Far less valued and sold at a discount are the other medias. This group includes among others, spray paint, serigraphs, and collages, which are usually used in smaller and less valuable works. Results also indicate that mixed medias add more to price than tempera or other medias, given that they usually consist in a combination of medias but with oil or acrylic as base.

Coefficients on supports are also jointly significant, suggesting that these impact differently the price of a work at auction. Table 1 evidences that canvas is the support that

receives a higher premium at auction. A possible explanation for this is that, masterpieces are often executed on canvas due to its flexibility and long lasting quality. Contrarily, paper is the support sold at a higher discount, mainly due to its inherent fragility. In between panel, wood and board add significantly less value to the work due to its inferior flexibility when compared to canvas.

The question of whether artists should or not sign their works remains vivid. While some prominent artists such as Picasso used to sign their work, others like Rothko and Warhol didn't. Some artists defend that the presence of signature attests the authenticity of their work and makes it even more unique. Others argue that the signature may interfere in the image and contrast with the idea exposed. The coefficient testing for the presence of artist's signature in the work is significant and suggests that the art market pays a premium of 86.8% for a signed work. By the same means Agnello et al. (1996) found a signature premium of 44.8% for American artists. A possible explanation is that a signed work is more difficult to reproduce and to forge. However, our model doesn't explore differences among artists' signatures. It might be a fact that a signature of Vieira da Silva is more valuable than one of a second plan artist. This could be biasing the signature coefficient and underestimating the importance of Vieira da Silva name itself, as she used to sign most of her works.⁵

Environment factors as the house and the local where the auction takes place can also play an important role defining the art of price. Coefficients on auction houses are collectively significant evidencing differentiated impacts of houses on auction prices. From table 1 there is evidence of two leading houses in the art market, with Sotheby's and Christie's standing out significantly from the others and with the former slightly commanding this hierarchy. Even representing a good part of the Portuguese art market,

⁵ Effects of different signatures might be tested with dummies that cross the artist name with the presence of signature or not.

national houses like Cabral Moncada, Palácio do Correio-Velho and Veritas fail to influence the prices as the big two do. Results should nevertheless be accepted with caution due to possible bias in data since best auction houses attract the best and most expensive works.

Results also show that coefficients testing for impacts of the venue are jointly significant. Table 1 presents a hierarchy for locals and outstands Lisbon and mainly Versailles as the centers of Portuguese contemporary art, given that these are the places that pay higher premiums and most value the Portuguese art. The French citizenship of Vieira da Silva⁶ is likely to bias the results as this prominent artist enjoyed great reputation in French territory. Curiously, Versailles presents an interesting premium over Paris, which can be result of a greater diversification of works auctioned in the city of light. Lisbon continues to be appear as a center for Portuguese artwork, which is natural due to a better work recognition by Portuguese art collectors. Despite of being home to high-income collectors and investors and main centers for international art, New York and London do not appear as relevant in the Portuguese art context. This may in fact suggest a low degree of internationalization for the overall Portuguese contemporary art.

VI. Financial Analysis

In this section we regard art as an investment asset and apply finance theory to analyze the performance of our sample as a proxy for the overall Portuguese contemporary art market. We then compare it with other traditional assets and explore the benefits of art to portfolio diversification.

⁶ Vieira da Silva (1908-1992) adopted French citizenship in 1956. For great part of her live, the artist lived and worked in Paris.

Return and Volatility – The ‘Overall’ and the ‘Greatest Artists’ Portfolios

As mentioned in section IV, the art price index (API), constructed based on the coefficients ∂_t , from equation 1, represent the evolution of the Portuguese contemporary art market between 1994 and 2014. A look over the 20-year period shows an average annual nominal rate of return of 4.53% and an annual volatility of 28.44%. Shortening the time span to the past 5 years, returns and volatility reduce significantly to -2.91% and 10.76%, respectively. The higher volatility for the overall period could also be result of a sparser data in the earlier years. Other portfolios may also be considered. An alternative portfolio is created based on a subsample of 15 greatest⁷ Portuguese contemporary artists, to test whether investing solely on masters is a better and sounder investment. Outcome reveals a less diversified portfolio with a slightly better annual nominal return of 4.72% but a higher volatility of 35.22% over the 20-year period. Results however show a more solid portfolio on the last 5 years when compared with the overall portfolio.

To draw some conclusions on the potential of Portuguese contemporary art as an asset, we compare its performance with financial markets’ benchmarks. With data collected from Bloomberg, we construct indices and analyze the performance of S&P500 and PSI20, proxies for the American and Portuguese stock markets respectively. For its low risk profile, TB3MS, the 3 Month Treasury bill from United States Government, is used as a proxy for a risk free investment. Alongside with the APIs, financial market indices are presented in figure 1 for the period of 1994 to 2014.

⁷ A new hedonic regression model was estimated based on this subsample. The 15 greatest artists are based on a ranking for the average painting price.

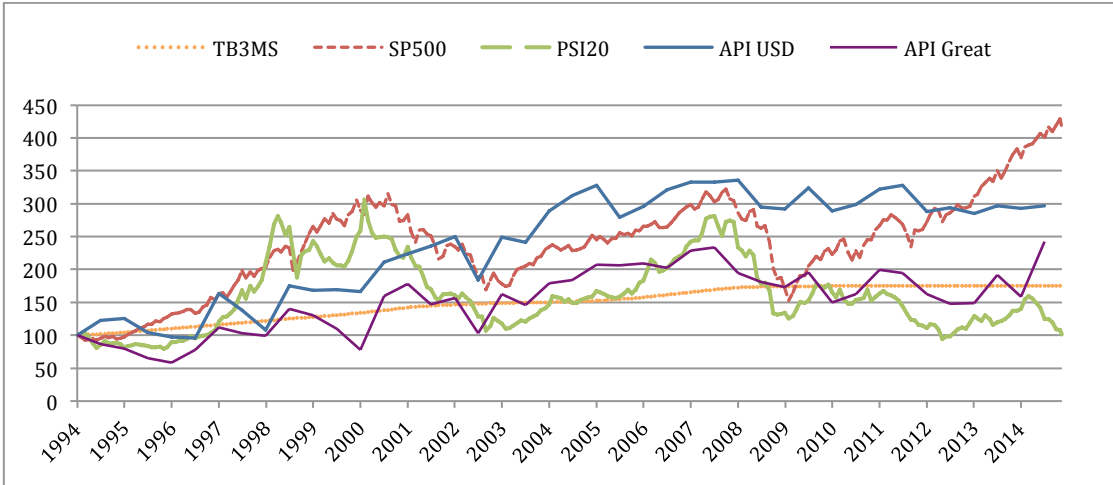


Figure 1: API USD, API Great, SP500, PSI20 and TB3MS indices over a 20-year period

From the figure 1, one can infer that the Portuguese contemporary art market was affected by the 2008 financial turmoil. Even though, the art market remained stable and somewhat immune to such a sharp plunge by the financial markets. Setting 1994 as base year, the art portfolio recorded a performance over the Portuguese stock market, only being surpassed by SP500 in the latter years. Since 2009, the Portuguese contemporary art market has been quite frozen, experiencing no significant fluctuations as figure 2 depicts.

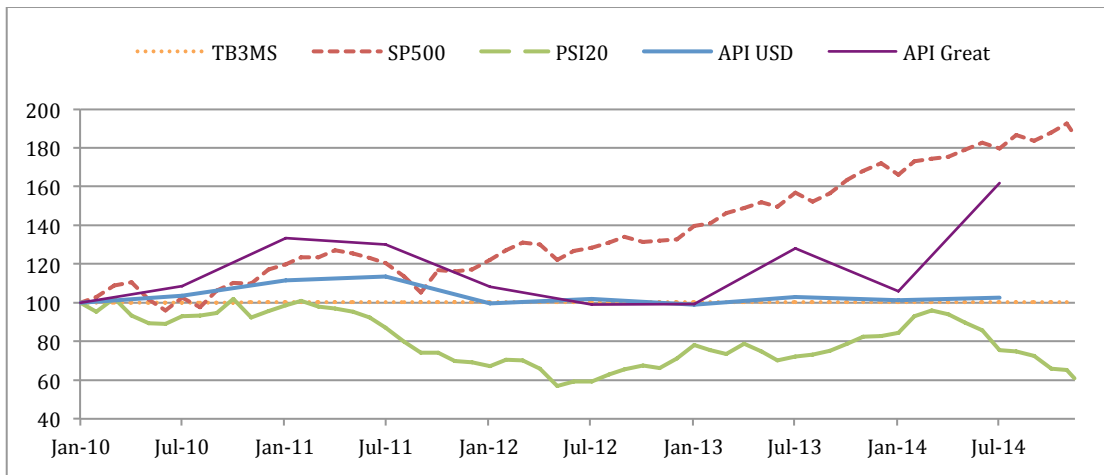


Figure 2: API, SP500, PSI20, TB3MS indices over a 5-year period

Table 2 summarizes a financial analysis to the marketable portfolios, for both 20 and 5-year periods. Over the last 5 years, SP500 was the highest yielding portfolio, with a

mean annual nominal return of 12.42%, contradicting the negative tendency of PSI20 and the overall API that underperformed low risk bonds. For a largest time span, the Portuguese contemporary art continues to underperform the American stock market. However it overperforms Portuguese stock and US Government Treasury Bills. Nevertheless, finance theory risk-return trade fundamental, which states that potential return rises with an increase in risk, seems not to always hold.

Table 2: Performance Analysis

		API (USD)	API (Great)	SP500	PSI20	TB3MS
1994-2014	Nominal Return	4.53%	4.72%	7.05%	0.04%	2.72%
	Volatility	28.44%	35.22%	14.98%	20.33%	0.63%
	Sharpe Ratio	0.064	0.057	0.289	-0.132	
2010-2014	Nominal Return	-2.91%	4.31%	12.42%	-10.63%	0.07%
	Volatility	10.76%	33.11%	13.13%	18.70%	0.01%
	Sharpe Ratio	-0.278	0.048	0.940	-0.572	

Risk and Diversification – Sharpe Ratio and Market Correlations

From an investor perspective is also important to have in mind the weight between risk and reward. The Sharpe ratio measures the risk-adjusted performance, making possible to analyze if a higher yielding portfolio does not come at costs of an increasing proportional risk. By this means, Portuguese contemporary art is a less attractive asset than American stocks, but more than the Portuguese benchmark. In the period of 1994 to 2014 the total art portfolio reveals to have a better Sharpe ratio than the portfolio for the greatest artists. This fact changes for the 5-year period, which shows a better relation of excess return and risk for the top artists portfolio in the last years.

Also important is to explore how returns on art are correlated with other assets, to measure in what extent adding art to a traditional portfolio mitigates risk or not. Past

literature has been addressing this question based on two different methods. While some authors explored the correlation matrixes between returns of art and its benchmarks, others estimated a Capital Asset Pricing Model. In the present paper we compute a correlation matrix of the indices, shown in table 3, as the CAPM regression coefficients revealed to be statistically insignificant.

Table 3: Correlation Matrix

	API (USD)	API (Great)	TB3MS	SP500	PSI20
API (USD)	1.000				
API (Great)	0.661	1.000			
TB3MS	0.140	0.061	1.000		
SP500	0.178	0.072	0.110	1.000	
PSI20	0.135	-0.040	0.269	0.691	1.000

As Mei and Moses (2002), we find low correlations between our art portfolio and the financial markets, suggesting possible diversification benefits and risk mitigation, of adding art to an equity portfolio. Results show that the art price index is slightly more correlated with the S&P500 than with the PSI20. Also there is evidence that a portfolio of great artists is less correlated with the financial market than the overall portfolio. This support the idea that a portfolio composed by the best artists is more immune to financial breakdowns.

Is Art a Good Investment?

Although results suggest that Portuguese contemporary art may in fact have potential as a marketable asset, can a profit seeker, assume that it is a good investment? It is important to notice that the hedonic prices model used in this paper does not account for some other risks and expenses. Ashenfelter and Graddy (2003) highlight for the existence of significant seller’s premiums of 10 to 17.5% and buyer’s premiums accounting for 10% of the hammer price. Pommerehne (1989) also estimates that insurance costs can float around

0.2 to 1% per year. Unlike most developed financial markets such as the bond and the equity markets, there are still some high transaction costs that make this market illiquid and less attractive to investors.

For those who look at a painting as consumption good, Portuguese contemporary art is more likely to be a fine investment. Atukeren et al. (2007) emphasize the relevance of psychic returns, which are not captured by the hedonic model. The author estimates psychic returns for Canadian paintings to hover around 28% per annum.

Internationalization of Portuguese Art Market

The degree of internationalization is another interesting characteristic for a marketable asset. An international asset is more likely to have a higher liquidity and a higher demand, being therefore more attractive. Using the nominal exchange rate at the day of the auction we convert prices to Euros, regress the hedonic model in this currency and apply finance-theory as previously. Regression outcome evidences similar estimations for all regressors except some differences in time dummies. Table 4 presents the annual returns and volatilities for both estimations in US Dollars and Euros. Even that the differences are small the price index in euros presents a higher volatility for both 20 and 5-year periods. Although differences are little, a smaller volatility may suggest that the mindset for Portuguese art pricing is the US Dollar, giving an idea of a market with some degree of internationalization.

Table 4: Performance Analysis for API in Dollars and Euros

		API (USD)	API (EUR)
1994-14	Nominal Return	4.53%	3.49%
	Volatility	28.44%	30.27%
2010-14	Nominal Return	-2.91%	-2.82%
	Volatility	10.76%	10.83%

VII. Conclusions

Using data on auction prices from 71 Portuguese contemporary artists over the period of 1994 to 2014, we compute a hedonic regression model to investigate what drives the prices of art and to explore the potential of Portuguese contemporary art as an alternative investment asset.

Based on results of our hedonic model regressions we find the name of the artist to be one important driver of painting prices with Columbano Bordalo Pinheiro and José Malhoa as the names with the highest premiums on this study. The vital status appears to not have relevant impact on prices, with the auctioneers trading without any premium the dead artists' works. Results also suggest that the price of a painting is maximized with the dimensions of 11.06m². Moreover, the art market seems to pay a premium for works on canvas and paintings elaborated on oil and acrylic. The artist signature also has a great positive influence on the price of an artwork. Sotheby's and Christie's are the two leaders of the art market and the ones that reach highest premiums. Lisbon and Versailles seem to be the places where the Portuguese contemporary art is most valued.

Based on the hedonic regression coefficients of the time dummies we compute a semi-annual art price index, as a proxy for the Portuguese contemporary art market. A performance analysis shows that our overall portfolio underperforms American stock market but overperforms the Portuguese one, yielding mean nominal returns of 4.53% for the 20 year period and -2.91% for the last 5 year. A portfolio based on the 15 greatest artists is also computed evidencing to be more immune to a financial turmoil, with nominal returns of 4.72% and 4.31% for the 20 and 5-year period respectively. We also find art to be the most volatile among all assets. For a better view on the risk-adjusted performance we compute the Sharpe ratios. Our results show an overall art portfolio, underperforming the

SP500, with a Sharpe ratio of 0.064 over the 20-year period.

Correlation matrix results suggest that art market has low correlations with financial markets. The art portfolios seem to be more correlated to the SP500 though. These low correlations may evidence some diversification potential, helping investors to mitigate the risk of their portfolios.

Baumol (1986) states that although art is a rational choice for those who can extract high returns in form of aesthetic pleasure, art does not seem to be a good option for financial purposes. In this paper we find that even though art overperforms government bonds, it does it at cost of a much higher volatility and risk. It is also important to notice these are nominal returns that do not take into account some other important transaction costs. However if an investor is able to capture the psychic returns or take advantage of them by means of art renting, Portuguese contemporary art can be seen as a feasible alternative investment.

Further research should explore some other important hedonic variables that could improve the hedonic model, such as the provenance and the style of the painting. It is also interesting to test the effects of each artist signature individually in the art pricing. To do this it is important to solidify and expand a dataset on Portuguese contemporary art.

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Appendix

Table 5: Descriptive Statistics

Descriptive Statistics		Percentage sold of/in:	
Observations	2 468	Artist: Maria Helena Vieira da Silva	11%
Number Artists	71	Media: Oil	78%
Mean Works per Artist	36	Support: Canvas	57%
Median Works per Artist	25	House: Palácio Correio-Velho Cabral Moncada	60%
Mean Price	31 724	Local: Lisbon	72%
Median Price	8 722		
Max Price	1 844 748		

Table 6: Hedonic Regression Model Regression Output (Prices in US Dollars)

Numb of Obs; 1431	Omitted variables:		Artist: Maria Helena Vieira da Silva					
F (136.1294): 61.47			Media: Oil					
Prob > F: 0.000			Support: Canvas					
R-squared: 0.7994			Auction House: Christie's					
Root MSE: 0.7535			Local: Lisbon					
Description	Variable	Coeff.	Std	t-stat	pvalue		95% Conf. Int.	
Abel Cardoso	_Iartist_1	-1.683	0.367	-4.580	0.000	***	-3.505	-2.491
Abel Manta	_Iartist_2	-2.142	0.468	-4.580	0.000	***	-3.854	-2.126
Abel Salazar	_Iartist_3	0.000	(omitted)					
Acácio Lino	_Iartist_4	-2.262	0.374	-6.050	0.000	***	-4.086	-2.983
Albano Sousa	_Iartist_5	-4.573	0.240	-19.030	0.000	***	-4.396	-3.646
Alfredo Keil	_Iartist_6	0.672	0.590	1.140	0.255		-2.363	-1.130
Álvaro Lapa	_Iartist_7	-3.587	0.388	-9.250	0.000	***	-2.691	-1.852
Ana Hatherly	_Iartist_8	-4.593	0.442	-10.400	0.000	***	-4.450	-2.954
Angelo de Souza	_Iartist_9	-3.701	0.430	-8.610	0.000	***	-2.995	-1.861
António Carneiro	_Iartist_10	-0.838	0.422	-1.990	0.047	**	-2.932	-1.798
António S. Areal	_Iartist_11	-3.567	0.346	-10.310	0.000	***	-2.872	-2.055
António Sena	_Iartist_12	-4.586	0.440	-10.430	0.000	***	-3.753	-2.620

António Silva Lino	_Iartist_13	-4.477	0.234	-19.110	0.000	***	-4.800	-3.900
António Soares	_Iartist_14	-2.117	0.475	-4.460	0.000	***	-3.621	-1.801
Artur Bual	_Iartist_15	-4.298	0.244	-17.630	0.000	***	-3.822	-3.247
Artur Loureiro	_Iartist_16	-0.643	0.706	-0.910	0.363		-3.997	-1.956
A. Cruzeiro Seixas	_Iartist_17	0.000	(omitted)				-3.324	-1.343
Aurélia de Sousa	_Iartist_18	0.000	(omitted)					
Candido Costa Pinto	_Iartist_19	-2.556	0.421	-6.080	0.000	***	-3.248	-1.609
Carlos Botelho	_Iartist_20	-0.821	0.157	-5.240	0.000	***	-1.496	-0.910
Carlos Calvet	_Iartist_21	-3.654	0.363	-10.070	0.000	***	-3.377	-2.233
Celestino Alves	_Iartist_22	-4.266	0.188	-22.680	0.000	***	-4.396	-3.712
Bordalo Pinheiro	_Iartist_23	1.568	0.630	2.490	0.013	**	-1.480	0.288
D. Alvarez	_Iartist_24	-1.293	0.568	-2.280	0.023	**	-2.492	-0.263
Dordio Gomes	_Iartist_25	-0.919	0.317	-2.900	0.004	***	-2.250	-1.116
Eduardo Batarida	_Iartist_26	-4.144	0.472	-8.790	0.000	***	-3.273	-2.044
Eduardo Viana	_Iartist_27	-0.627	0.579	-1.080	0.279		-2.825	-0.721
Falcao Trigo	_Iartist_28	-1.152	0.301	-3.820	0.000	***	-2.742	-2.023
Figueiredo Sobral	_Iartist_29	-6.332	0.336	-18.850	0.000	***	-6.099	-5.038
Francis Smith	_Iartist_30	-0.539	0.284	-1.900	0.058	*	-1.999	-1.370
Graça Morais	_Iartist_31	-4.669	0.467	-9.990	0.000	***	-3.446	-2.497
Guilherme Parente	_Iartist_32	-4.683	0.418	-11.210	0.000	***	-3.833	-2.818
Jaime Murteira	_Iartist_33	-3.794	0.181	-20.990	0.000	***	-4.057	-3.361
Joao Silva Palolo	_Iartist_34	-4.582	0.419	-10.940	0.000	***	-3.309	-2.631
Joao Hogan	_Iartist_35	-3.132	0.192	-16.350	0.000	***	-3.221	-2.534
Joao M. de Oliveira	_Iartist_36	0.854	0.567	1.510	0.132		-2.063	-0.895
Joao Reis	_Iartist_37	-2.541	0.264	-9.630	0.000	***	-3.430	-2.414
Joao Vaz	_Iartist_38	1.260	0.489	2.580	0.010	***	-1.288	-0.350
Joao Vieira	_Iartist_39	-4.112	0.318	-12.920	0.000	***	-3.344	-2.674
Joaquim Rodrigo	_Iartist_40	-2.270	0.250	-9.080	0.000	***	-2.576	-1.624
Jorge Martins	_Iartist_41	-4.261	0.402	-10.590	0.000	***	-3.365	-2.442
Jose Escada	_Iartist_42	-4.040	0.464	-8.710	0.000	***	-3.397	-2.052
Jose Souza Pinto	_Iartist_43	0.415	0.547	0.760	0.448		-2.376	-1.205
Jose Malhoa	_Iartist_44	1.480	0.537	2.760	0.006	***	-1.311	-0.226
José de Guimarães	_Iartist_45	-3.620	0.411	-8.800	0.000	***	-2.805	-1.804
Juliao Sarmento	_Iartist_46	-4.489	0.471	-9.520	0.000	***	-3.292	-2.292
Julio Pomar	_Iartist_47	-2.159	0.348	-6.200	0.000	***	-1.957	-0.834

Julio Resende	_Iartist_48	-2.164	0.207	-10.480	0.000	***	-2.123	-1.440
Lourdes Castro	_Iartist_49	-2.688	0.587	-4.580	0.000	***	-2.819	-0.691
Noronha da Costa	_Iartist_50	-4.851	0.566	-8.570	0.000	***	-4.281	-2.537
Manuel Baptista	_Iartist_51	-5.156	0.401	-12.870	0.000	***	-4.487	-3.448
Manuel Cargaleiro	_Iartist_52	-2.806	0.272	-10.310	0.000	***	-2.373	-1.627
Manuel Saude	_Iartist_53	-1.298	0.334	-3.890	0.000	***	-3.057	-2.340
Maria F. Amado	_Iartist_54	-5.781	0.293	-19.710	0.000	***	-5.552	-4.652
Mario Cesariny	_Iartist_56	-3.153	0.312	-10.090	0.000	***	-3.033	-2.000
Nadir Afonso	_Iartist_57	-2.247	0.268	-8.390	0.000	***	-2.187	-1.288
Nikias Spakinakis	_Iartist_58	-3.221	0.353	-9.130	0.000	***	-2.747	-1.744
Paula Rego	_Iartist_59	-1.070	0.389	-2.750	0.006	***	-0.444	0.594
Pedro Cabrita Reis	_Iartist_60	-4.642	0.566	-8.210	0.000	***	-3.202	-2.009
Pedro Calapez	_Iartist_61	-5.210	0.528	-9.860	0.000	***	-3.827	-2.775
Pedro Leitao	_Iartist_62	-4.858	0.385	-12.610	0.000	***	-4.957	-3.570
Pedro Portugal	_Iartist_63	-6.833	0.607	-11.260	0.000	***	-5.024	-3.974
Pedro Proença	_Iartist_64	-6.626	0.591	-11.200	0.000	***	-4.850	-3.819
Raul Perez	_Iartist_65	-4.718	0.461	-10.230	0.000	***	-3.742	-2.640
Rene Bertholo	_Iartist_66	-3.913	0.391	-10.000	0.000	***	-3.325	-2.209
Rolando Nogueira	_Iartist_67	-3.368	0.299	-11.260	0.000	***	-3.329	-2.304
Simão da Veiga	_Iartist_68	-2.826	0.499	-5.670	0.000	***	-4.928	-3.184
Sofia Areal	_Iartist_69	-6.494	0.573	-11.340	0.000	***	-4.771	-3.806
Tulio Victorino	_Iartist_70	-2.511	0.233	-10.760	0.000	***	-3.454	-2.587
Veloso Salgado	_Iartist_71	-0.615	0.462	-1.330	0.183		-2.997	-1.968
Alive (1 if yes)	alive	-0.138	0.150	-0.920	0.359		-0.433	0.157
Age of artist	age	-0.042	0.009	-4.620	0.000	***	0.762	0.947
Size of work (m ²)	size	0.854	0.047	18.180	0.000	***	-0.045	-0.033
Size squared (m ²)	size2	-0.039	0.003	-12.840	0.000	***	-0.181	0.141
Acrylic	_Imedia_1	-0.020	0.082	-0.250	0.805		-0.424	0.041
Mixed	_Imedia_2	-0.191	0.118	-1.610	0.107		-3.768	-2.203
Other	_Imedia_4	-2.985	0.399	-7.480	0.000	***	-0.672	-0.203
Tempera	_Imedia_5	-0.437	0.120	-3.650	0.000	***	-0.605	-0.149
Board	_Isupport_1	-0.377	0.116	-3.250	0.001	***	-0.699	-0.224
Mixed	_Isupport_3	-0.461	0.121	-3.810	0.000	***	-0.904	0.133
Other	_Isupport_4	-0.385	0.264	-1.460	0.145		-0.332	0.031
Panel	_Isupport_5	-0.151	0.093	-1.630	0.104		-0.839	-0.432

Paper	_Isupport_6	-0.636	0.104	-6.130	0.000	***	-0.569	-0.169
Wood	_Isupport_7	-0.369	0.102	-3.610	0.000	***	0.443	1.293
Signed (1 if yes)	signed	0.868	0.217	4.010	0.000	***	-0.004	0.004
Age of work	agepaint	-0.043	0.010	-4.490	0.000	***	-0.403	0.904
1994:2	_Iperiod_2	0.251	0.333	0.750	0.452		-0.450	0.870
1995:1	_Iperiod_3	0.252	0.336	0.750	0.453		-0.706	0.671
1995:2	_Iperiod_4	0.025	0.351	0.070	0.944		-0.881	0.594
1996:1	_Iperiod_5	-0.059	0.376	-0.160	0.876		-0.714	0.448
1996:2	_Iperiod_6	-0.048	0.297	-0.160	0.870		-0.186	1.116
1997:1	_Iperiod_7	0.592	0.332	1.780	0.075	*	-0.355	0.812
1997:2	_Iperiod_8	0.356	0.299	1.190	0.235		-0.750	0.377
1998:1	_Iperiod_9	-0.017	0.289	-0.060	0.953		-0.045	1.032
1998:2	_Iperiod_10	0.663	0.278	2.390	0.017	**	-0.365	1.099
1999:1	_Iperiod_11	0.579	0.376	1.540	0.124		-0.222	0.989
1999:2	_Iperiod_12	0.595	0.313	1.900	0.057	*	-0.326	0.846
2000:1	_Iperiod_13	0.515	0.304	1.690	0.090	*	0.220	1.198
2000:2	_Iperiod_14	0.963	0.256	3.760	0.000	***	0.271	1.274
2001:1	_Iperiod_15	1.069	0.264	4.050	0.000	***	0.343	1.498
2001:2	_Iperiod_16	1.218	0.302	4.030	0.000	***	0.484	1.477
2002:1	_Iperiod_17	1.320	0.264	5.000	0.000	***	-0.554	1.120
2002:2	_Iperiod_18	0.622	0.432	1.440	0.150		0.323	1.491
2003:1	_Iperiod_19	1.289	0.311	4.150	0.000	***	-0.012	1.620
2003:2	_Iperiod_20	1.186	0.425	2.790	0.005	***	0.695	1.809
2004:1	_Iperiod_21	1.676	0.300	5.580	0.000	***	0.932	2.013
2004:2	_Iperiod_22	1.897	0.292	6.510	0.000	***	0.822	2.264
2005:1	_Iperiod_23	2.010	0.381	5.280	0.000	***	0.424	1.714
2005:2	_Iperiod_24	1.535	0.348	4.410	0.000	***	0.639	1.666
2006:1	_Iperiod_25	1.661	0.288	5.770	0.000	***	0.918	1.933
2006:2	_Iperiod_26	1.935	0.282	6.860	0.000	***	0.973	1.961
2007:1	_Iperiod_27	2.018	0.283	7.120	0.000	***	0.627	2.279
2007:2	_Iperiod_28	2.005	0.443	4.520	0.000	***	0.960	1.940
2008:1	_Iperiod_29	2.044	0.282	7.240	0.000	***	0.479	1.602
2008:2	_Iperiod_30	1.635	0.319	5.120	0.000	***	0.441	1.428
2009:1	_Iperiod_31	1.571	0.292	5.370	0.000	***	0.761	1.718
2009:2	_Iperiod_32	1.876	0.283	6.620	0.000	***	0.333	1.304

2010:1	_Iperiod_33	1.498	0.289	5.180	0.000	***	0.444	1.423
2010:2	_Iperiod_34	1.612	0.298	5.410	0.000	***	0.619	1.534
2011:1	_Iperiod_35	1.798	0.285	6.310	0.000	***	0.704	1.622
2011:2	_Iperiod_36	1.884	0.289	6.530	0.000	***	0.212	1.142
2012:1	_Iperiod_37	1.441	0.294	4.910	0.000	***	0.263	1.205
2012:2	_Iperiod_38	1.497	0.297	5.040	0.000	***	0.112	1.056
2013:1	_Iperiod_39	1.390	0.301	4.620	0.000	***	0.203	1.161
2013:3	_Iperiod_40	1.488	0.305	4.880	0.000	***	0.138	1.065
2014:1	_Iperiod_41	1.450	0.306	4.740	0.000	***	0.131	1.133
2014:2	_Iperiod_42	1.481	0.321	4.610	0.000	***	-1.056	-0.351
Artcurial	_Ihouse_1	-0.704	0.180	-3.920	0.000	***	-0.857	-0.245
Cabral Moncada	_Ihouse_3	-0.551	0.156	-3.530	0.000	***	-0.790	-0.265
Other	_Ihouse_4	-0.528	0.134	-3.940	0.000	***	-0.937	-0.307
Palácio C. Velho	_Ihouse_5	-0.622	0.160	-3.880	0.000	***	-0.136	0.278
Sotheby's	_Ihouse_6	0.071	0.105	0.670	0.503		-0.852	-0.144
Veritas	_Ihouse_7	-0.498	0.180	-2.760	0.006	***	-0.966	-0.343
London	_Ilocal_2	-0.654	0.159	-4.120	0.000	***	-1.061	-0.110
New York	_Ilocal_3	-0.586	0.242	-2.420	0.016	**	-0.889	-0.306
Other	_Ilocal_4	-0.598	0.149	-4.020	0.000	***	-0.509	0.094
Paris	_Ilocal_5	-0.207	0.154	-1.350	0.178		-0.318	0.822
Versailles	_Ilocal_6	0.252	0.291	0.870	0.386		9.629	11.054
Constant	_cons	13.990	0.895	15.63	0.000	***	12.235	15.746
						*	1% Significance	
						**	5% Significance	
						***	10% Significance	

Table 7: Hedonic Model Regression Output (Prices in Euros)

Numb of Obs; 1431		Omitted Variables:		Artist: Maria Helena Vieira da				
F (136.1294): 61.47				Media: Oil				
Prob > F: 0.000				Support: Canvas				
R-squared: 0.7994				Auction House: Christie's				
Root MSE: 0.7535				Local: Lisbon				
Description	Variable	Coeff.	Std	t-stat	pvalue		95% Conf. Int.	
Abel Cardoso	_Iartist_1	-1.660	0.364	-4.560	0.000	***	-2.375	-0.945
Abel Manta	_Iartist_2	-2.124	0.462	-4.600	0.000	***	-3.030	-1.218
Abel Salazar	_Iartist_3	0.000	(omitted)					
Acácio Lino	_Iartist_4	-2.266	0.372	-6.090	0.000	***	-2.996	-1.536
Albano Sousa	_Iartist_5	-4.573	0.240	-19.090	0.000	***	-5.043	-4.104
Alfredo Keil	_Iartist_6	0.684	0.588	1.160	0.245		-0.470	1.838
Álvaro Lapa	_Iartist_7	-3.610	0.386	-9.360	0.000	***	-4.367	-2.853
Ana Hatherly	_Iartist_8	-4.600	0.438	-10.510	0.000	***	-5.459	-3.741
Angelo de Souza	_Iartist_9	-3.715	0.428	-8.680	0.000	***	-4.555	-2.875
António Carneiro	_Iartist_10	-0.832	0.420	-1.980	0.048	**	-1.655	-0.009
António S. Areal	_Iartist_11	-3.571	0.343	-10.400	0.000	***	-4.245	-2.897
António Sena	_Iartist_12	-4.609	0.438	-10.520	0.000	***	-5.468	-3.749
António Silva Lino	_Iartist_13	-4.484	0.232	-19.330	0.000	***	-4.940	-4.029
António Soares	_Iartist_14	-2.134	0.478	-4.470	0.000	***	-3.072	-1.197
Artur Bual	_Iartist_15	-4.307	0.243	-17.760	0.000	***	-4.783	-3.832
Artur Loureiro	_Iartist_16	-0.628	0.703	-0.890	0.371		-2.007	0.750
A. Cruzeiro Seixas	_Iartist_17	0.000	(omitted)					
Aurélia de Sousa	_Iartist_18	0.000	(omitted)					
Candido Costa Pinto	_Iartist_19	-2.558	0.423	-6.050	0.000	***	-3.388	-1.728
Carlos Botelho	_Iartist_20	-0.821	0.156	-5.280	0.000	***	-1.126	-0.516
Carlos Calvet	_Iartist_21	-3.658	0.362	-10.120	0.000	***	-4.368	-2.949
Celestino Alves	_Iartist_22	-4.266	0.189	-22.610	0.000	***	-4.637	-3.896
Bordalo Pinheiro	_Iartist_23	1.578	0.627	2.520	0.012	**	0.348	2.807
D. Alvarez	_Iartist_24	-1.275	0.561	-2.270	0.023	**	-2.375	-0.174
Dordio Gomes	_Iartist_25	-0.922	0.317	-2.910	0.004	***	-1.544	-0.300
Eduardo Batarida	_Iartist_26	-4.155	0.470	-8.840	0.000	***	-5.077	-3.233
Eduardo Viana	_Iartist_27	-0.608	0.590	-1.030	0.303		-1.766	0.550
Falcao Trigoso	_Iartist_28	-1.138	0.300	-3.790	0.000	***	-1.726	-0.550
Figueiredo Sobral	_Iartist_29	-6.327	0.337	-18.800	0.000	***	-6.987	-5.666

Francis Smith	_Iartist_30	-0.524	0.283	-1.860	0.064	*	-1.079	0.030
Graça Morais	_Iartist_31	-4.677	0.464	-10.080	0.000	***	-5.587	-3.767
Guilherme Parente	_Iartist_32	-4.695	0.414	-11.340	0.000	***	-5.507	-3.883
Jaime Murteira	_Iartist_33	-3.792	0.180	-21.020	0.000	***	-4.146	-3.438
Joao Silva Palolo	_Iartist_34	-4.590	0.416	-11.030	0.000	***	-5.406	-3.773
Joao Hogan	_Iartist_35	-3.135	0.191	-16.440	0.000	***	-3.509	-2.761
Joao M. de Oliveira	_Iartist_36	0.871	0.563	1.550	0.122		-0.233	1.976
Joao Reis	_Iartist_37	-2.521	0.261	-9.640	0.000	***	-3.034	-2.008
Joao Vaz	_Iartist_38	1.265	0.485	2.610	0.009	***	0.314	2.217
Joao Vieira	_Iartist_39	-4.120	0.316	-13.030	0.000	***	-4.740	-3.499
Joaquim Rodrigo	_Iartist_40	-2.288	0.250	-9.150	0.000	***	-2.778	-1.798
Jorge Martins	_Iartist_41	-4.276	0.400	-10.690	0.000	***	-5.060	-3.491
Jose Escada	_Iartist_42	-4.023	0.464	-8.670	0.000	***	-4.933	-3.113
Jose Souza Pinto	_Iartist_43	0.423	0.543	0.780	0.436		-0.642	1.489
Jose Malhoa	_Iartist_44	1.491	0.532	2.800	0.005	***	0.447	2.535
José de Guimarães	_Iartist_45	-3.632	0.409	-8.880	0.000	***	-4.434	-2.829
Juliao Sarmento	_Iartist_46	-4.499	0.470	-9.580	0.000	***	-5.421	-3.578
Julio Pomar	_Iartist_47	-2.170	0.347	-6.250	0.000	***	-2.852	-1.489
Julio Resende	_Iartist_48	-2.161	0.206	-10.490	0.000	***	-2.566	-1.757
Lourdes Castro	_Iartist_49	-2.712	0.585	-4.640	0.000	***	-3.859	-1.564
Noronha da Costa	_Iartist_50	-4.870	0.563	-8.660	0.000	***	-5.974	-3.767
Manuel Baptista	_Iartist_51	-5.179	0.398	-13.000	0.000	***	-5.960	-4.397
Manuel Cargaleiro	_Iartist_52	-2.819	0.271	-10.420	0.000	***	-3.349	-2.288
Manuel Saude	_Iartist_53	-1.289	0.332	-3.880	0.000	***	-1.940	-0.638
Maria F. Amado	_Iartist_54	-5.790	0.292	-19.790	0.000	***	-6.363	-5.216
Mario Cesariny	_Iartist_56	-3.175	0.311	-10.190	0.000	***	-3.786	-2.564
Nadir Afonso	_Iartist_57	-2.257	0.267	-8.450	0.000	***	-2.781	-1.733
Nikias Spakinakis	_Iartist_58	-3.230	0.351	-9.190	0.000	***	-3.919	-2.540
Paula Rego	_Iartist_59	-1.077	0.387	-2.780	0.005	***	-1.836	-0.317
Pedro Cabrita Reis	_Iartist_60	-4.661	0.564	-8.260	0.000	***	-5.768	-3.554
Pedro Calapez	_Iartist_61	-5.227	0.525	-9.950	0.000	***	-6.258	-4.196
Pedro Leitao	_Iartist_62	-4.869	0.382	-12.730	0.000	***	-5.619	-4.119
Pedro Portugal	_Iartist_63	-6.845	0.603	-11.340	0.000	***	-8.028	-5.661
Pedro Proença	_Iartist_64	-6.651	0.587	-11.330	0.000	***	-7.803	-5.499
Raul Perez	_Iartist_65	-4.732	0.459	-10.320	0.000	***	-5.632	-3.832
Rene Bertholo	_Iartist_66	-3.923	0.390	-10.050	0.000	***	-4.689	-3.157

Rolando Nogueira	_Iartist_67	-3.368	0.294	-11.440	0.000	***	-3.945	-2.790
Simão da Veiga	_Iartist_68	-2.815	0.497	-5.670	0.000	***	-3.790	-1.840
Sofia Areal	_Iartist_69	-6.514	0.569	-11.450	0.000	***	-7.631	-5.398
Tulio Victorino	_Iartist_70	-2.509	0.232	-10.810	0.000	***	-2.964	-2.054
Veloso Salgado	_Iartist_71	-0.613	0.460	-1.330	0.183		-1.515	0.289
Alive (1 if yes)	alive	-0.132	0.150	-0.880	0.359		-0.427	0.163
Age of artist	age	-0.043	0.009	-4.680	0.000	***	-0.060	-0.025
Size of work (m ²)	size	0.853	0.047	18.150	0.000	***	0.761	0.945
Size squared (m ²)	size2	-0.038	0.003	-12.790	0.000	***	-0.044	-0.033
Acrylic	_Imedia_1	-0.020	0.082	-0.250	0.805		-0.180	0.140
Mixed	_Imedia_2	-0.191	0.119	-1.610	0.108		-0.423	0.042
Other	_Imedia_4	-2.979	0.398	-7.490	0.000	***	-3.759	-2.199
Tempera	_Imedia_5	-0.437	0.119	-3.660	0.000	***	-0.671	-0.202
Board	_Isupport_1	-0.379	0.116	-3.250	0.001	***	-0.607	-0.150
Mixed	_Isupport_3	-0.463	0.121	-3.830	0.000	***	-0.701	-0.226
Other	_Isupport_4	-0.365	0.266	-1.370	0.170		-0.885	0.156
Panel	_Isupport_5	-0.150	0.093	-1.620	0.105		-0.332	0.032
Paper	_Isupport_6	-0.640	0.103	-6.200	0.000	***	-0.842	-0.437
Wood	_Isupport_7	-0.369	0.101	-3.640	0.000	***	-0.568	-0.170
Signed (1 if yes)	signed	0.869	0.217	4.000	0.000	***	0.443	1.295
Age of work	agepaint	-0.043	0.009	-4.540	0.000	***	-0.061	-0.024
1994:2	_Iperiod_2	0.308	0.336	0.920	0.360		-0.351	0.967
1995:1	_Iperiod_3	0.383	0.338	1.130	0.258		-0.281	1.047
1995:2	_Iperiod_4	0.146	0.354	0.410	0.680		-0.548	0.840
1996:1	_Iperiod_5	0.029	0.377	0.080	0.939		-0.711	0.769
1996:2	_Iperiod_6	0.031	0.298	0.100	0.917		-0.553	0.616
1997:1	_Iperiod_7	0.566	0.333	1.700	0.090	*	-0.088	1.221
1997:2	_Iperiod_8	0.280	0.302	0.930	0.354		-0.313	0.873
1998:1	_Iperiod_9	-0.107	0.291	-0.370	0.712		-0.677	0.463
1998:2	_Iperiod_10	0.640	0.280	2.290	0.022	**	0.091	1.189
1999:1	_Iperiod_11	0.362	0.381	0.950	0.341		-0.384	1.109
1999:2	_Iperiod_12	0.392	0.316	1.240	0.215		-0.229	1.013
2000:1	_Iperiod_13	0.413	0.306	1.350	0.177		-0.187	1.012
2000:2	_Iperiod_14	0.932	0.259	3.600	0.000	***	0.424	1.440
2001:1	_Iperiod_15	1.025	0.267	3.840	0.000	***	0.501	1.548
2001:2	_Iperiod_16	1.161	0.304	3.810	0.000	***	0.564	1.759

2002:1	_Iperiod_17	1.261	0.266	4.750	0.000	***	0.740	1.783
2002:2	_Iperiod_18	0.450	0.419	1.070	0.283		-0.372	1.272
2003:1	_Iperiod_19	1.024	0.311	3.290	0.001	***	0.414	1.635
2003:2	Iperiod_20	0.849	0.422	2.010	0.044	**	0.021	1.677
2004:1	_Iperiod_21	1.307	0.304	4.310	0.000	***	0.712	1.903
2004:2	_Iperiod_22	1.476	0.292	5.060	0.000	***	0.904	2.048
2005:1	_Iperiod_23	1.608	0.380	4.230	0.000	***	0.862	2.354
2005:2	_Iperiod_24	1.200	0.350	3.430	0.001	***	0.513	1.887
2006:1	_Iperiod_25	1.276	0.290	4.400	0.000	***	0.707	1.846
2006:2	_Iperiod_26	1.521	0.284	5.350	0.000	***	0.963	2.079
2007:1	_Iperiod_27	1.574	0.286	5.510	0.000	***	1.014	2.134
2007:2	_Iperiod_28	1.470	0.448	3.280	0.001	***	0.592	2.348
2008:1	_Iperiod_29	1.446	0.284	5.080	0.000	***	0.888	2.004
2008:2	_Iperiod_30	1.174	0.315	3.730	0.000	***	0.556	1.791
2009:1	_Iperiod_31	1.105	0.294	3.760	0.000	***	0.529	1.681
2009:2	_Iperiod_32	1.329	0.285	4.670	0.000	***	0.771	1.888
2010:1	_Iperiod_33	1.068	0.290	3.680	0.000	***	0.499	1.638
2010:2	_Iperiod_34	1.136	0.300	3.790	0.000	***	0.548	1.724
2011:1	_Iperiod_35	1.288	0.286	4.500	0.000	***	0.726	1.850
2011:2	_Iperiod_36	1.405	0.290	4.840	0.000	***	0.836	1.974
2012:1	_Iperiod_37	1.013	0.295	3.440	0.001	***	0.435	1.592
2012:2	_Iperiod_38	1.073	0.299	3.590	0.000	***	0.487	1.659
2013:1	_Iperiod_39	0.955	0.303	3.160	0.002	***	0.361	1.548
2013:3	_Iperiod_40	1.015	0.306	3.320	0.001	***	0.414	1.616
2014:1	_Iperiod_41	0.968	0.307	3.150	0.002	***	0.365	1.571
2014:2	_Iperiod_42	1.019	0.322	3.160	0.002	***	0.387	1.650
Artcurial	_Ihouse_1	-0.705	0.180	-3.920	0.000	***	-1.057	-0.352
Cabral Moncada	_Ihouse_3	-0.552	0.156	-3.540	0.000	***	-0.858	-0.246
Other	_Ihouse_4	-0.529	0.134	-3.950	0.000	***	-0.792	-0.267
Palácio C. Velho	_Ihouse_5	-0.623	0.160	-3.880	0.000	***	-0.937	-0.308
Sotheby's	_Ihouse_6	0.072	0.106	0.690	0.493		-0.135	0.280
Veritas	_Ihouse_7	-0.494	0.180	-2.740	0.006	***	-0.847	-0.140
London	_Ilocal_2	-0.655	0.158	-4.140	0.000	***	-0.965	-0.344
New York	_Ilocal_3	-0.598	0.243	-2.460	0.014	**	-1.075	-0.121
Other	_Ilocal_4	-0.599	0.149	-4.020	0.000	***	-0.891	-0.307
Paris	_Ilocal_5	-0.207	0.154	-1.350	0.177		-0.509	0.094

Versailles	_llocal_6	0.239	0.290	0.830	0.410		-0.330	0.809
Constant	_cons	14.176	0.890	15.930	0.000	***	12.430	15.922
							***	1% Significance
							**	5% Significance
							*	10% Significance

Table 8: Hedonic Model Regression Output (Sub Sample of 15 Greatest Artists)

Numb of Obs; 548		Omitted Variables:		Artist: Maria Helena Vieira da				
F (136.1294): 28.17				Media: Oil				
Prob > F: 0.000				Support: Canvas				
R-squared: 74.34				Auction House: Christie's				
Root MSE: 0.76845				Local: Lisbon				
Description	Variable	Coeff.	Std	t-stat	pvalue		95% Conf. Int.	
Carlos Botelho	_lartist_1	-1.188	0.185	-6.410	0.000	***	-1.553	-0.824
C. Bordalo Pinheiro	_lartist_2	0.000	(omitted)					
Dórdio Gomes	_lartist_3	-1.455	0.332	-4.380	0.000	***	-2.107	-0.802
Eduardo Viana	_lartist_4	-1.245	0.613	-2.030	0.043	**	-2.449	-0.041
Francis Smith	_lartist_5	-1.230	0.249	-4.940	0.000	***	-1.719	-0.741
Joao Vaz	_lartist_6	-0.255	0.402	-0.640	0.526		-1.046	0.535
Joaquim Rodrigo	_lartist_7	-2.224	0.280	-7.940	0.000	***	-2.775	-1.674
Jose Souza Pinto	_lartist_8	-0.960	0.475	-2.020	0.044	**	-1.894	-0.026
Jose Malhoa	_lartist_9	-0.014	0.449	-0.030	0.976		-0.896	0.869
Juliao Sarmiento	_lartist_10	-3.970	0.487	-8.160	0.000	***	-4.926	-3.014
Julio Pomar	_lartist_11	-2.205	0.394	-5.600	0.000	***	-2.979	-1.431
Julio Resende	_lartist_12	-2.201	0.261	-8.440	0.000	***	-2.714	-1.689
Nadir Afonso	_lartist_14	-2.353	0.319	-7.380	0.000	***	-2.980	-1.727
Paula Rego	_lartist_15	-0.712	0.418	-1.700	0.089	*	-1.533	0.109
Alive (1 if yes)	alive	0.175	0.204	0.860	0.392		-0.227	0.577
Age of artist	age	-0.018	0.009	-1.960	0.051	*	-0.037	0.000
Size of work (m ²)	size	0.868	0.075	11.630	0.000	***	0.722	1.015
Size squared (m ²)	size2	-0.038	0.004	-9.930	0.000	***	-0.045	-0.030
Acrylic	_lmedia_1	0.203	0.192	1.050	0.293		-0.176	0.581

Mixed	_Imedia_2	0.021	0.273	0.080	0.940		-0.517	0.558
Other	_Imedia_4	-2.728	0.453	-6.020	0.000	***	-3.619	-1.838
Tempera	_Imedia_5	-0.576	0.171	-3.380	0.001	***	-0.911	-0.241
Board	_Isupport_1	-0.511	0.220	-2.330	0.020	**	-0.943	-0.079
Mixed	_Isupport_3	-0.345	0.174	-1.980	0.048	**	-0.688	-0.003
Other	_Isupport_4	-0.941	0.334	-2.810	0.005	***	-1.597	-0.284
Panel	_Isupport_5	-0.050	0.149	-0.330	0.740		-0.343	0.244
Paper	_Isupport_6	-0.473	0.167	-2.830	0.005	***	-0.801	-0.145
Wood	_Isupport_7	-0.542	0.223	-2.430	0.016	**	-0.981	-0.104
Signed (1 if yes)	signed	1.050	0.319	3.290	0.001	***	0.423	1.678
Age of work	agepaint	-0.016	0.008	-1.960	0.051	*	-0.033	0.000
1994:2	_Iperiod_2	-0.017	0.360	-0.050	0.963		-0.725	0.691
1995:1	_Iperiod_3	-0.195	0.280	-0.700	0.486		-0.744	0.355
1995:2	_Iperiod_4	-0.307	0.444	-0.690	0.489		-1.180	0.565
1996:1	_Iperiod_5	-0.384	0.440	-0.870	0.383		-1.248	0.480
1996:2	_Iperiod_6	-0.139	0.322	-0.430	0.666		-0.772	0.494
1997:1	_Iperiod_7	0.175	0.294	0.600	0.551		-0.402	0.753
1997:2	_Iperiod_8	0.127	0.336	0.380	0.705		-0.533	0.787
1998:1	_Iperiod_9	-0.010	0.280	-0.030	0.973		-0.560	0.541
1998:2	_Iperiod_10	0.416	0.340	1.220	0.222		-0.253	1.085
1999:1	_Iperiod_11	0.388	0.265	1.470	0.143		-0.132	0.908
1999:2	_Iperiod_12	0.157	0.365	0.430	0.668		-0.560	0.874
2000:1	_Iperiod_13	-0.158	0.427	-0.370	0.712		-0.997	0.682
2000:2	_Iperiod_14	0.579	0.296	1.960	0.051	*	-0.002	1.160
2001:1	_Iperiod_15	0.818	0.292	2.800	0.005	***	0.244	1.393
2001:2	_Iperiod_16	0.679	0.476	1.430	0.154		-0.257	1.615
2002:1	_Iperiod_17	0.566	0.307	1.840	0.066	*	-0.038	1.169
2002:2	_Iperiod_18	0.156	0.442	0.350	0.724		-0.712	1.024
2003:1	_Iperiod_19	0.769	0.374	2.060	0.040	**	0.035	1.503
2003:2	_Iperiod_20	0.440	0.432	1.020	0.308		-0.408	1.288
2004:1	_Iperiod_21	0.975	0.300	3.250	0.001	***	0.385	1.566
2004:2	_Iperiod_22	0.923	0.364	2.530	0.012	**	0.208	1.639
2005:1	_Iperiod_23	1.257	0.381	3.300	0.001	***	0.509	2.005
2005:2	_Iperiod_24	1.148	0.362	3.170	0.002	***	0.437	1.859
2006:1	_Iperiod_25	1.194	0.305	3.920	0.000	***	0.595	1.792
2006:2	_Iperiod_26	1.122	0.315	3.560	0.000	***	0.502	1.742

2007:1	_Iperiod_27	1.348	0.326	4.140	0.000	***	0.707	1.988
2007:2	_Iperiod_28	1.392	0.764	1.820	0.069	*	-0.108	2.893
2008:1	_Iperiod_29	1.084	0.319	3.390	0.001	***	0.456	1.711
2008:2	_Iperiod_30	0.926	0.425	2.180	0.030	**	0.091	1.761
2009:1	_Iperiod_31	0.856	0.368	2.330	0.020	**	0.133	1.578
2009:2	_Iperiod_32	1.086	0.350	3.100	0.002	***	0.397	1.775
2010:1	_Iperiod_33	0.634	0.379	1.670	0.095	*	-0.110	1.379
2010:2	_Iperiod_34	0.784	0.377	2.080	0.038	**	0.043	1.524
2011:1	_Iperiod_35	1.098	0.332	3.310	0.001	***	0.446	1.750
2011:2	_Iperiod_36	1.144	0.351	3.260	0.001	***	0.454	1.834
2012:1	_Iperiod_37	0.798	0.343	2.330	0.020	**	0.124	1.471
2012:2	_Iperiod_38	0.666	0.370	1.800	0.073	*	-0.061	1.392
2013:1	_Iperiod_39	0.651	0.350	1.860	0.063	*	-0.036	1.338
2013:3	_Iperiod_40	1.001	0.375	2.670	0.008	***	0.263	1.738
2014:1	_Iperiod_41	0.648	0.368	1.760	0.079	*	-0.076	1.372
2014:2	_Iperiod_42	1.576	0.572	2.760	0.006	***	0.453	2.699
Artcurial	_Ihouse_1	-0.750	0.215	-3.480	0.001	***	-1.173	-0.326
Cabral Moncada	_Ihouse_3	-0.646	0.252	-2.560	0.011	**	-1.141	-0.150
Other	_Ihouse_4	-0.495	0.146	-3.390	0.001	***	-0.782	-0.208
Palácio C. Velho	_Ihouse_5	-0.599	0.245	-2.450	0.015	**	-1.080	-0.118
Sotheby's	_Ihouse_6	0.086	0.105	0.820	0.414		-0.121	0.293
Veritas	_Ihouse_7	-0.601	0.310	-1.940	0.053	*	-1.210	0.009
London	_Ilocal_2	-0.796	0.249	-3.200	0.001	***	-1.285	-0.307
New York	_Ilocal_3	-0.712	0.310	-2.300	0.022	**	-1.321	-0.104
Other	_Ilocal_4	-0.797	0.257	-3.100	0.002	***	-1.302	-0.292
Paris	_Ilocal_5	-0.366	0.254	-1.440	0.149		-0.865	0.132
Versailles	_Ilocal_6	0.128	0.333	0.380	0.700		-0.526	0.782
Constant	_cons	12.061	1.001	12.050	0.000	***	10.093	14.028
							***	1% Significance
							**	5% Significance
							*	10% Significance

Table 9: Ranking of name contribution

Rank ¹	Artist	Coeff.	Index	Price ²
1	Columbano Bordalo	1.568	257	5
2	Jose Malhoa	1.480	248	3
3	Joao Vaz	1.260	226	10
4	Joao Marques de Oliveira	0.854	185	29
5	Alfredo Keil	0.672	167	22
6	Jose Julio de Souza Pinto	0.415	142	13
7	<i>Maria Helena Vieira da</i>	0.000	100	1
8	Francis Smith	-0.539	46	15
9	Veloso Salgado	-0.615	38	45
10	Eduardo Viana	-0.627	37	6
11	Artur Loureiro	-0.643	36	39
12	Carlos Botelho	-0.821	18	7
13	Antonio Carneiro	-0.838	16	33
14	Dordio Gomes	-0.919	8	9
15	Paula Rego	-1.070	-7	2
16	Falcao Trigo	-1.152	-15	32
17	Dominguez Alvarez	-1.293	-29	17
18	Manuel Saude	-1.298	-30	47
19	Abel Cardoso	-1.683	-68	61
20	Antonio Soares	-2.117	-112	54
21	Abel Manta	-2.142	-114	50
22	Julio Pomar	-2.159	-116	4
23	Julio Resende	-2.164	-116	12
24	Nadir Afonso	-2.247	-125	8
25	Acacio Lino	-2.262	-126	58
26	Joaquim Rodrigo	-2.270	-127	11
27	Tulio Victorino	-2.511	-151	48
28	Joao Reis	-2.541	-154	46
29	Candido Costa Pinto	-2.556	-156	26
30	Lourdes Castro	-2.688	-169	31
31	Manuel Cargaleiro	-2.806	-181	21
32	Simao da Veiga	-2.826	-183	43
33	Joao Hogan	-3.132	-213	34
34	Mario Cesariny	-3.153	-215	40
35	Nikias Spakinakis	-3.221	-222	18
36	Rolando Sa Nogueira	-3.368	-237	35
37	Antonio Santiago Areal	-3.567	-257	25
38	Alvaro Lapa	-3.587	-259	28

39	Jose de Guimarães	-3.620	-262	36
40	Carlos Calvet	-3.654	-265	42
41	Angelo de Souza	-3.701	-270	16
42	Jaime Murteira	-3.794	-279	64
43	Rene Bertholo	-3.913	-291	20
44	Jose Escada	-4.040	-304	38
45	Joao Vieira	-4.112	-311	30
46	Eduardo Batarda	-4.144	-314	19
47	Jorge Martins	-4.261	-326	24
48	Celestino Alves	-4.266	-327	65
49	Artur Bual	-4.298	-330	55
50	Antonio Silva Lino	-4.477	-348	68
51	Juliao Sarmento	-4.489	-349	14
52	Albano Sousa	-4.573	-357	59
53	Joao Antonio da Silva Palolo	-4.582	-358	23
54	Antonio Sena	-4.586	-359	51
55	Ana Hatherly	-4.593	-359	69
56	Pedro Cabrita Reis	-4.642	-364	27
57	Graça Morais	-4.669	-367	41
58	Guilherme Parente	-4.683	-368	67
59	Raul Perez	-4.718	-372	52
60	Luis Noronha da Costa	-4.851	-385	56
61	Pedro Leitao	-4.858	-386	62
62	Manuel Baptista	-5.156	-416	60
63	Pedro Calapez	-5.210	-421	49
64	Maria Fernando Amado	-5.781	-478	70
65	Figueiredo Sobral	-6.332	-533	71
66	Sofia Areal	-6.494	-549	66
67	Pedro Proença	-6.626	-563	63
68	Pedro Portugal	-6.833	-583	57
69	Abel Salazar	0.000		53
70	Artur Manuel Cruzeiro	0.000		44
71	Aurelia de Sousa	0.000		37

Maria Helena Vieira da Silva as reference = 100

1: Rank of name contribution

2: Rank of average work price

Table 10: Art Price Indices

	API (USD)	API (EUR)	API (Great)
1994:1	100.00	100.00	100.00
1994:2	125.07	130.76	98.32
1995:1	125.23	138.29	80.53
1995:2	102.46	114.61	69.26
1996:1	94.13	102.90	61.58
1996:2	95.15	103.12	86.10
1997:1	159.22	156.64	117.52
1997:2	135.57	128.05	112.71
1998:1	98.31	89.28	99.04
1998:2	166.34	163.97	141.60
1999:1	157.92	136.22	138.80
1999:2	159.54	139.22	115.67
2000:1	151.48	141.26	84.23
2000:2	196.32	193.22	157.91
2001:1	206.91	202.46	181.82
2001:2	221.75	216.14	167.92
2002:1	231.98	226.15	156.58
2002:2	162.24	145.02	115.62
2003:1	228.89	202.44	176.89
2003:2	218.57	184.92	144.00
2004:1	267.60	230.73	197.54
2004:2	289.71	247.63	192.35
2005:1	300.96	260.80	225.71
2005:2	253.53	220.00	214.79
2006:1	266.13	227.64	219.38
2006:2	293.47	252.10	212.19
2007:1	301.84	257.40	234.75
2007:2	300.45	247.02	239.22
2008:1	304.40	244.62	208.35
2008:2	263.45	217.36	192.59
2009:1	257.08	210.52	185.58
2009:2	287.58	232.94	208.60
2010:1	249.75	206.84	163.44
2010:2	261.20	213.61	178.36

2011:1	279.78	228.83	209.78
2011:2	288.44	240.50	214.44
2012:1	244.06	201.34	179.76
2012:2	249.73	207.27	166.56
2013:1	239.02	195.48	165.07
2013:2	248.80	201.52	200.08
2014:1	245.01	196.80	164.80
2014:2	248.06	201.86	257.60

Table 11: OLS estimations for CAPMs between Financial Markets and Art Indices

API (USD)	Coef.	Std. Err.	t-stat	p-value	95% Conf. Int.	
excSP500	0.301	0.276	1.09	0.281	-0.256	0.859
cons	0.019	0.030	0.62	0.538	-0.042	0.080

CAPM (API USD and SP500)

API (Great)	Coef.	Std. Err.	t-stat	p-value	95% Conf. Int.	
excSP500	0.236	0.399	0.59	0.557	-0.571	1.044
cons	0.029	0.044	0.67	0.504	-0.059	0.118

CAPM (API Great & SP500)

API (USD)	Coef.	Std. Err.	t-stat	p-value	95% Conf. Int.	
excPSI20	0.153	0.174	0.88	0.383	-0.198	0.504
cons	0.027	0.029	0.91	0.367	-0.032	0.086

CAPM (API USD & PSI20)

API (Great)	Coef.	Std. Err.	t-stat	p-value	95% Conf. Int.	
excPSI20	-0.007	0.251	-0.03	0.977	-0.515	0.501
cons	0.037	0.042	0.87	0.392	-0.049	0.122

CAPM (API Great & PSI20)

Note: the first coefficient of each regression account for the Betas of the CAPMs. The constant represents the alpha of the model