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Working Paper

Art as an alternative asset class: Risk and return characteristics of the Middle Eastern & Northern African art markets

CFS Working Paper, No. 494

Provided in Cooperation with:
Center for Financial Studies (CFS), Goethe University Frankfurt

Suggested Citation: Kräussl, Roman (2014) : Art as an alternative asset class: Risk and return characteristics of the Middle Eastern & Northern African art markets, CFS Working Paper, No. 494

This Version is available at:
http://hdl.handle.net/10419/103758

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CFS Working Paper Series

No. 494

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Art as an Alternative Asset Class: Risk and Return Characteristics of the Middle Eastern & Northern African Art Markets[1]

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June 2014

Abstract

This chapter analyzes the risk and return characteristics of investments in artists from the Middle East and Northern Africa (MENA) region over the sample period 2000 to 2012. With hedonic regression modeling we create an annual index that is based on 3,544 paintings created by 663 MENA artists. Our empirical results prove that investing in such a hypothetical index provides strong financial returns. While the results show an exponential growth in sales since 2006, the geometric annual return of the MENA art index is a stable13.9 percent over the whole period. We conclude that investing in MENA paintings would have been profitable but also note that we examined the performance of an emerging art market that has only seen an upward trend without any correction, yet.

Keywords: Alternative investments, Art price index, Optimal Asset Allocation
JEL Code: G11, Z11

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Electronic copy available at: http://ssrn.com/abstract=2518131

I. Introduction

The year 2011 has seen important political developments in the Middle East and North Africa (MENA) region. A wave of popular protests, demanding more social equity and stronger economic development has led to political change at an unprecedented and unexpected scale. Social unrest affected many countries, but the degree of resulting political change varied across the region. Protests triggered economic, social, and political reforms in a number of countries, and culminated in the resignation of ruling presidents in Tunisia and Egypt, and a forceful regime change in Libya. While these events have contributed to uncertainty in the short-term, they hopefully present great promise for the future development of the region as a whole.

Despite the political and social developments in the MENA region, the economies of many MENA countries have continued to grow substantially. When most regions of the world were affected by the recent global financial crisis, Qatar has become one of the fastest growing economies in the world. The Qatari economy grew by 18.8% in real terms in 2011, while other Islamic countries' economies like Morocco, Saudi Arabia, and Turkey were also booming (International Monetary Fund, 2012). Capgemini and Merrill Lynch (2011) note in their World Wealth Report that the size of the high-net-worth individuals (HNWIs)[2] population in the Middle East gained 10.4 percent in 2010 to 0.4 million, while their wealth jumped in a single year by 12.5 percent to USD 1.7 trillion. These individuals want to invest a portion of their wealth in alternative investments like art and in particular in art of their own heritage (Citi Private Bank, 2012). This might imply that lagging the booming economy of the MENA region, its art market will follow, and new HNWIs will spend portion of their wealth on their culture's art. According to Capgemini and Merrill Lynch (2011), art accounted for 22 percent of passion investments globally.[3] Moreover, art is most likely to be seen as a financial investment vehicle. In fact, 42 percent of advisors interviewed in the Capgemini and Merrill Lynch (2011) survey believe that their HNWI clients invest in art primarily for its potential to gain value.

The global art market has experienced an extraordinary growth over the last years. The year 2011 was the most prolific year ever recorded for the global art market. Whereas the S&P 500 closed the year 1% down with an 18% drop between July and October, the art market posted a 15% increase in revenue (Artprice, 2012). As a result, the international market grew dramatically during this time, from less than $150 million in 1970 to $60.8 billion in 2011 (Renneboog and

[2] HNWIs are defined as those having investable assets of US$1 million or more, excluding primary residence, collectibles, consumables, and consumer durables.

[3] Investments of passion are luxury collectibles (e.g. luxury automobiles, boats, jets), art, jewelry, gems and watches, along with other collectibles (e.g. wine, antiques, coins, memorabilia), and sports investments.

van Houtte, 2000; Artprice, 2012). At the origin of this growth is the vast global increase in the demand for art. Indeed, a new generation of buyers, both private and institutional, attracted by the potential of generating high returns and ability to use art as a mean of diversifying investment portfolios because of its low correlations with other asset classes, has come into the art market (Bruno and Nocera, 2008). Moreover, other non-financial motivations such as status, leisure, being part of the art world, have played a prominent role as well (Capgemini and Merrill Lynch, 2011).

Since Christie's 2006 inaugural sale in Dubai, the Middle Eastern art market has become a regular feature in the international auction calendar with auction sales increasing from USD 1.7 million in 2006 to USD 29.8 million in 2010 (Artprice, 2012). Investments in large museum infrastructure in Qatar and Abu Dhabi have raised the profile regionally and internationally (Lawrie, 2008). Dubai and Abu Dhabi art fairs have played key roles in educating and generating interest in art investment in the region. As the Middle Eastern art market expands, and the interest in art as an asset class develops, art investment funds could potentially be an attractive addition to the current range of Shari'ah compliant alternative investment products (Deloitte, 2011; Hayat and Kräussl, 2011). Moreover, the appetite for Contemporary Arab art outside the Middle East is stimulated by a strong presence at major cultural meetings and exhibitions, the development of specialized acquisition committees at major art museums like the Tate Modern, the British Museum and the Guggenheim, and by other major events devoted to art from the region such as the exhibition dedicated to Turkish art at Saatchi in 2011 (Artprice, 2012).

These developments are partly driven by the interest for opening and establishing new museums, fairs and galleries, which are expanding in the Middle East since 2006 with the first edition of Art Dubai and opening of Christie's Dubai (Deloitte, 2011). In Dubai, there were only five art galleries a decade ago, while currently there are 85. For example, both the Museum of Middle East Modern Art (MOMEMA) in Dubai and the Museum of Islamic Art (MIA) were opened in 2008, while 2010 had seen the opening of the Arab Museum of Modern Art in Doha (Amirsadeghi and Eisler, 2010). Nowadays, there are art fairs in Beirut, Morocco, Dubai and Abu Dhabi. In addition to the Middle Eastern countries, some of the world's leading museums, such as Guggenheim, the Louvre and the British Museum have built separate Islamic Art wings. Guggenheim is also building a franchise in Abu Dhabi that will focus on contemporary art of the Middle East.

In recent years, numerous papers have examined the financial characteristics of the art markets (see, e.g., Renneboog and Spaenjers, 2013). However, aside from Kräussl and Logher, (2010) little attention has been paid to the risk and return characteristics of emerging art markets

such as fine art from countries within the MENA region. To our knowledge, the only paper dedicated to the performance of MENA art is Seckin and Atukeren (2006) who construct a hedonic price index and finds that the art market in Turkey is driven by economic fundamentals. They examine the performance of investments in art compared to those in stocks, foreign exchange, gold, and bank deposits over the period 1989 to 2005. They find that investing in paintings by Turkish artists is a viable alternative to conventional investments, especially in an emerging market, i.e., in an environment of high inflation, macroeconomic volatility, and political uncertainty.

This chapter will close the gap in the literature and provide the first extensive financial analysis of the MENA art world. In particular we analyze the risk and return characteristics of investments in artworks by artists from the MENA region over the sample period 2000 to 2012. By using hedonic regression modeling techniques, we create an annual index that is based on 3,544 paintings, created by 663 MENA artists, and sold by international auction houses worldwide. Our empirical results prove that investing in an index of MENA artists provides strong returns. While the results show an exponential growth in sales since 2006, the geometric annual return of the MENA index is 13.9 percent over the whole period. We find that investing in MENA paintings would have been profitable but it is important to note that we have examined the performance of an emerging art market that has only seen an upward trend without any correction, yet.

The remainder of this chapter is organized as follows. Section 2 presents the sample underlying our MENA art index and discusses the methodology. Section 3 introduces the constructed MENA art index, analyzes the risk and return characteristics of this index, and investigates within an optimal asset allocation framework whether investing in MENA art is a good investment. Section 4 concludes and presents an outlook on the MENA art markets.

II. Data and Methodology

According to the International Monetary Fund (2012), the MENA region comprises the following countries: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen. We have added Turkey to this list. All data on MENA artists is obtained from *Blouin Art Sales Index (BASI)*.[4] We only consider paintings sold at auctions. As a starting point, a list of

[4] As a robustness check both databases of *Artnet* (www.artnet.com) and *Artprice* (www.artprice.com) were consulted to check whether an artist auctioned additional paintings that are not covered by BASI and to conduct more information.

all painters qualified for the MENA regional criteria is created. Then, all relevant information about the artist such as date of birth, day of death, and nationality is collected. Thereafter, all paintings that were sold or bought-in are compiled. Each auction record is accompanied with the following features regarding the individual painting: title, surface, sales price converted to USD, whether the artwork is signed or not, name of the auction house, medium and material used, and sale date. Only records that have at least these features are included in the dataset.

Our final sample contains 663 individual artists from the MENA region who had 3,544 paintings sold over the period 2000 to 2012 in 59 different auction houses. We observe a total auction turnover of over $155 million with an average price for a painting of $43,736. The average number of sales per year is 273. Figure 1 indicates that Turkish artists had the maximum number of sales during the period under review. With 814 paintings, they accounted for nearly a quarter of the segment's total volume. When it comes to turnover, however, the Iranians and Egyptians paintings, with 650 and 476 auction sales respectively, both represented larger percentages of sales by USD turnover. This implies that the average Iranian or Egyptian painting is more expensive than the Turkish one.

Figure 2 shows a summary of the auction houses with most frequent sales in our dataset, accompanied with the number of paintings they had sold. We observe that Christie's Dubai auctioned with 988 sales the highest number of paintings from MENA artists, but the major part is still auctioned in Western countries, especially in Europe. Sotheby's London auctioned the most expensive piece of art in our sample, which is an oil on canvas painting created by the Turkish artist Osman Handy-Bey and titled "A Lady of Constantinople", for over $5.5 million.

Figure 3 shows a summary of the different mediums used in the MENA database for the same period, along with the percentage of paintings for each medium. We see that within the sample of MENA artworks, more than 46% (1,644 pieces) of the auction sales were oil on canvas paintings. As it can be observed from the figure, the other most commonly used mediums in the dataset are mixed media (on canvas), oil on panel, and acrylic (on canvas).

Figure 4 shows that most of the auctioned MENA artworks seem to have been sold for reasonable prices, with 70 percent of them sold for below $50,000. Just a small number of artworks (34 in total, less than 1%) fetched prices above $500,000 in the period under study.

Table 1 presents the top 50 artists by USD turnover in our MENA database.[5] The total USD turnover of the artist is represented in the fourth column, while column five shows the total

[5] We note here that data provided by *Artnet* or *Artprice* deliver a slightly different ranking of the top 50 MENA painters.

number of sold paintings. Table 1 also illustrates the record sale for each artist.

Art markets differ substantially from financial markets, and this potentially limits the strict applicability of well-known financial techniques. Investing in art requires typically an extensive knowledge of art and its market, and a substantial amount of capital to acquire the work of famous artists. The market is highly segmented and dominated by few large auction houses, and only a small number of artworks are presented for sale throughout the year. Art investment comes with risk, deriving from both the physical risk of fire and theft, and the possibility of reattribution to a different artist. As a result, the cost of insurance can be prohibitive. While auction prices represent the value of art works, it comes with a complex and subjective set of beliefs that is based on past, present and future prices, and individual tastes and fashion.

Paintings are heterogeneous assets and a variety of physical and non-physical characteristics contribute to the uniqueness of each one. To construct our MENA art index, we follow standard hedonic modeling to separate the characteristics that determine the price of a painting (see Kräussl, 2010). The dependent variable in our hedonic model is the natural logarithm of the sale price in USD. The independent variables used in our model describe the following characteristics: medium, auction house, surface, signature, estimate price, living status, artist reputation, and date of sale. A major disadvantage that comes with the regression of the hedonic pricing model is multicollinearity. A high correlation between the considered variables increases the standard error of the regression coefficients. In order to overcome the problem of multicollinearity, each dummy variable contains a reference variable, which is deleted from the sample.

Sales date: These dummy variables are based on the sales date of the paintings. Each dummy variable represents one year starting from 2000 to 2012. A value of one indicates the painting is created in period *t* using the MENA art index.

Country of origin: As illustrated in Figure 1, most of the paintings in our dataset were created by artists with Turkish nationality and additionally, whose paintings are highly valued. Hence, Turkey will be used as the reference variable, thereby expecting that most other country dummies will show negative coefficients, except for Egyptian and Iranian art, since they are highly valued as well.

Auction house: According to de la Barre et al. (1994) the more renowned auction houses have a positive significant effect on the price of a painting. They reason that the more established and famous auction houses will offer the 'best' work, while the less familiar and smaller auction houses will have less quality paintings (see also, Renneboog and Spaenjers (2013)). Figure 2 shows the most common auction houses in our sample. We assign those auction houses a separate dummy variable, i.e., a dummy's value of one indicates that the painting was auctioned by one of

these leading auction houses: Christie's Dubai and Sotheby's London. We expect that the coefficient estimates will have a positive sign, assuming that the better and more expensive artists (paintings) will be auctioned by these auction houses.

Medium: We know from the seminal art market literature that oil on canvas is the most used material by painters and has the highest sales prices (de la Barre et al., 1994; Kräussl, 2010). Figure 3 shows that this statement is shared, since the MENA sample shows that more than 46% of the paintings sold at auction are oil on canvas. Therefore we will specify oil on canvas as the reference variable in our hedonic regression model; we assign other mediums, such as oil on panel a separate dummy variable. The dummy D_{it} will have a value of one, when one of the dummies has the appointed medium. We expect negative coefficient estimates since the reference variable oil on canvas is assumed to fetch the highest prices.

Surface: The variable surface explains the impact of the size of a painting and is calculated as the width multiplied by the height of the painting. These continuous surface values are logged in the hedonic regression model.

Signature: Anderson (1974) explains that the strength of the attribution towards the painter is a significant feature of the sales price. Paintings who are signed by the painter are more expensive than unsigned pieces. A dummy value of one indicates that the artist did not sign the painting. We expect that signed paintings are more valuable than unsigned painters and will thereby have positive coefficients.

To make use of our time dummy variables and to perform an OLS regression on the pooled data from all available sales, we construct the following hedonic regression model:

$$\ln P_{it} = \alpha + \sum_{j=1}^{Z} \beta_j x_{ij} + \sum_{t=0}^{\tau} \gamma_t D_{it} + \varepsilon_{it} \quad \varepsilon \sim N(0, \sigma^2), \tag{1}$$

where P_{it} represents the price of painting i at time t, α is the regression intercept, β_j is the coefficient value of quality characteristic x, Xij is the quality characteristic value of the painting, the antilog of λ_t reflects the coefficient value for the time dummy, and D_{it} represents the time dummy variable, which has the value of one when the painting was sold in the considered time period t.

The estimated coefficients on the time dummies, i.e., the outcome from the hedonic regression model, are used to create the MENA art price index over the period 2000 to 2012. The MENA art index is computed using the following equation:

$$Index_{t+1} = \frac{Exp(Y_{t+1})}{Exp(Y_t)}. \tag{2}$$

The antilog (or exponential) of the sequence of time dummies is taken. We set the first year, i.e., the base year to 100 and compute the relative changes to this base year for the next years. Hence, the MENA art price index is conducted.

III. Risk and Return Characteristics of the MENA Art Index

Figure 5 shows the development of the MENA art index we created over the period 2000 to 2012. This index is based on more than 3,544 artworks created by 663 Middle Eastern and North African artists. Their works were sold at 59 different international auction houses and fetched more than $155 million.

In unreported results, the hedonic regression analyses show that, as expected, far-famed auction houses, surface and living status of the painter have a huge impact on the price of a painting and thereby supporting the findings of previous studies. Paintings from Iranian artists are more valuable than paintings from any other Islamic countries in the MENA region.

The segment "art of the MENA region" is one of the international auction world's most recent creations. Figure 5 indicates that the first five years show little variation in the sales volume and the index climbs to just 154, representing a healthy but modest return on investment. In the following seven years, the index soared fourfold, and the number of lots sold annually grew from 87 to 580, representing a growth of nearly sevenfold. Despite the global financial crisis of 2008 the MENA art index steadily (even exponentially) grew from 256 in 2008 to 565 at the end of 2012. These empirical findings demonstrate very strong and solid growth. The geometric annual return of the MENA art price index for the period 2000 to 2012 is 13.9 percent, representing an extremely positive return.[6]

To determine whether MENA art is a worthy investment and not to get blinded by the high 13.9 percent p.a., the risk and return characteristics needs to be compared with other asset classes. Previous research had already looked into the performance of art investments and its eligibility of inclusion in an optimal portfolio. Baumol (1986) finds that art prices behave randomly, and stock markets perform much better. Goetzmann (1993) finds a positive correlation with equity and an upward price trend prices over the years. Pesando (1993) concludes that art market returns are inferior to those of stocks, bonds and T-bills. Mei and Moses (2002) find that art underperforms stocks but outperforms fixed-income securities and can be a useful tool for portfolio diversification.

[6] Common art market return estimates are ranging between 5% and 10% for different styles such as Old Masters and Contemporary over the last decade. See the website www.art-finance.com for a number of available art market indices.

We obtain daily returns from Datastream for the following asset classes: the MSCI World index as a proxy for the global equity returns, the Citigroup World Government Bond index (WGBI) for government bonds, the Merrill Lynch US Corporate Master Bond index for corporate bonds, the Datastream World Real Estate index as a proxy for the global real estate market, the GSCI Commodity index for international commodities, the DJ Credit Suisse Hedge index is used to measure hedge funds returns, and private equity returns are proxied by the LPX50. We use the three-month Treasury bills as the risk-free rate.

In order to measure whether investing in the MENA art index would yield diversification benefits, we construct in the following an optimal portfolio. The framework we use to calculate the optimal assets allocation is based on the standard Markowitz (1952) mean-variance optimization approach:

$$Max_w = w'E[R] + (1 - w'i)R^f - \frac{\lambda}{2} w'\Omega w, \tag{3}$$

where $w'E[R]$ is the expected portfolio return on the assets calculated on portfolio weight *w*, $\frac{\lambda}{2}$ is the investor's risk aversion parameter, and $w'\Omega w$ is the covariance matrix of the asset returns. We do not allow short selling and all individual weights sum up to one. We specify and investigate three different risk aversion parameters, namely λ = 1, 2, and 10, where one denotes an investor with a low level of risk aversion, and λ = 10 indicates that the investor is highly risk averse (and should probably not invest at all in volatile asset classes).

Table 2 provides the descriptive statistics of our constructed MENA art index and the other asset classes. The geometric average return of the MENA index shows 8.9% and has thereby the second best return after government bonds during the years 2000 to 2012. Notable is the geometric average return of real estate at -2.0%, which indicates that over the last 13 years real estate investments yielded negative returns. With a standard deviation of 0.315, the MENA art index is a less volatile investment than private equity (0.433) and shows a higher return over the sample period. When looking at the risk and return characteristics, investing in MENA art seems to be a better investment than investing in private equity, which is also supported by the Sharpe Ratios: for private equity we observe a Sharpe Ratio of only 0.527, while the corresponding one for the MENA art index is, with 2.387, substantially higher. Corporate and government bonds show a higher Sharpe Ratio, which indicates that the return compensates the risk-taken and that both bond classes perform better than art. This also holds for hedge funds. Table 2 proves that according to its Sharpe Ratio, MENA art investments have strongly outperformed public equity,

private equity, real estate, and commodities, but slightly underperformed hedge funds and corporate bonds, while government bonds had the best performance over the studied period.

In a second step we are going to measure the risk and return characteristics of each index separately using the single-index CAPM model. The regression results are shown in Table 3. The second column presents the estimated α coefficient for the different asset class indices. A positive α indicates an abnormal (positive) return and therefore the asset class should have a higher weight in an optimal, well-diversified portfolio. On the other hand, a negative α coefficient indicates that the index is overpriced and should have less weight in the portfolio. When looking at Table 3, both corporate bonds and government bonds have a negative α coefficient. On the contrary, the MENA art index shows the highest α coefficient of 0.096, which indicates that MENA art investments earn an abnormal return that is not attributed to systemic risk. However, we have to be careful in drawing conclusions out of these findings since none of these CAPM regression results for α are statistically significant.

The fourth column of Table 3 shows that we find the MENA art index has a very high and positive β coefficient of 1.103 over the period 2000 to 2012, which is significant at 1%. Our constructed MENA art index does not only move in the same direction as public equity but also present more systemic risk than MSCI World Equity index. Despite the highest Treynor Ratio of all asset classes considered, these findings imply that art investments in the MENA region are not an interesting alternative to hedge returns of global equity.

Nevertheless, MENA art can be an interesting asset to diversify an optimal portfolio. In a final step we therefore construct an optimal asset allocation. The pair-wise correlation matrix in Table 4 is calculated and used to construct the optimal asset allocation. The constructed portfolio for the optimal asset allocation includes all other asset classes accompanied with the MENA art index and evaluates for different levels of investor's risk aversion. Panel A of Table 5 presents the optimal asset allocation for λ = 1, 5, and 10, respectively. We observe that MENA art investments would be included in all optimal, well-diversified portfolios. We also see that the highly risk-averse investors (λ = 10) almost invest in government bonds only. This finding is in line with the standard finance literature, which states that government bonds are among the safest investments. On the contrary, investors with a low risk aversion (λ = 1) should invest 65.6% in the MENA index and only 34.4% in government bonds. For investors with a risk aversion level of two, the results are vice versa.

It is remarkable that no other asset class would be included in our optimal portfolios, neither for low nor for high levels of risk aversion. However, we note here once again that both asset classes, MENA art and government bonds showed over the period 2000 to 2012 extremely strong

returns, i.e., the non-inclusion of any other asset class in an optimal portfolio of a mean-variance investor is surprising, but only at first sight. Panel B of Table 5 presents the optimal asset allocation exercise for the same risk aversion constraints, but additionally we restrict the classical mean-variance optimizing investor to not include more than 30% of one asset class in her portfolio. The results show more diversification between the assets but almost no changes in the optimal asset allocation for risk aversion levels of one or two. Only for the highly risk averse investors ($\lambda = 10$) we observe some variation between the different asset classes. Interestingly, we observe once again that public equity would have received zero weights for any level of risk aversion, even in the 30% restricted scenario. We clearly observe here the impact of the "lost decade" of public equity during our sample period between 2000 and 2012.

Summarizing our empirical analysis of the risk and return characteristics of the MENA art index, we can conclude that investing in MENA art, i.e., including it in our optimal, well-diversified portfolio would have been profitable, and wise decision. We note that this is mostly due to the fact that, in our scope of research, we examined the performance of an emerging art market that has only seen an upward trend without any correction, yet.

IV. Outlook

The language of contemporary art is global, and collectors are increasingly interested in seeing differences in dialogue. Diversity is the other big trend in terms of geography as well as in the individual artists' practices. Today, artists may be born in the Middle East, live in Europe, and sell to collectors in Asia and America (Sloman, 2009). Since Christie's 2006 inaugurated annual auctions in Dubai, the market for Post-war and Contemporary art of the MENA region has grown at a staggering rate. Additionally, with the regional presence of other international leading auction houses such as Sotheby's in Doha and Bonhams in Dubai, the market has started to mature and come into focus.

Moreover, large museum infrastructure investments in Qatar and Abu Dhabi has raised the profile in the region and internationally. The Dubai and Abu Dhabi art fairs have played key roles in educating and generating interest in art buying and investment in the region. As the MENA art market expands, and the interest in art as an asset class develops, art investment funds could potentially be an attractive addition to the current range of Shari'ah compliant alternative investment products (Deloitte, 2011). Also outside the MENA region, the appetite for MENA artworks is stimulated by a strong presence at major cultural meetings due to exhibitions and by the development of specialized acquisition committees at major art museums like the Tate

Modern, the British Museum and the Guggenheim, as well as by other major events such as the exhibition dedicated to Turkish art at Saatchi in 2011.

This chapter is the first thorough quantitative analysis of the financial aspects of the MENA art market. We construct an annual MENA art index over the period 2000 to 2012. We observe the financial characteristics and the risk-return trade-off and calculate a very strong geometric annual return of 13.9%. The MENA art index outperforms global equity markets, as measured by the MSCI World, but also performs very strong in comparison with other alternative asset classes such as private equity, real estate, and commodities. This finding is supported by the optimal asset allocation exercise, which is performed using the Markowitz (1952) framework. The results show that with or without constraints and for different levels of risk aversion, the MENA index is included in a well-diversified portfolio.

The positive performance and growth of the MENA art market in the last 13 years have coincided with a dramatic increase in their HNWI population. Because the economy in many of the MENA regions is booming, expectations are that the MENA art market will continue to grow. Moreover, the middle classes in these countries, who are perhaps not yet buying art to any large extent, will create new customers over the next decade. For instance, since Christie's opened its first auction house in Dubai in 2006, its client base grew each year with more than 20% (Deloitte (2011)). As such, we assign a favorable outlook for future growth in the MENA art markets, implying more record sales. We would like to mention once again that the MENA art market is an emerging one, which hasn't experienced in our sample period any substantial correction. An average annual return of 13.9 percent is very high and there is no guarantee that the MENA art index will continue with strong growth. Nonetheless, we are confident to say that MENA art investment is a good asset allocation decision; for sure for someone with an interest in MENA art.

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Table 1. Top 50 MENA Artists, 2000-2012

This table presents the top 50 MENA artists in our sample over the years 2000 to 2012. We sort the overall 663 artists by their total turnover USD figures. This table also presents the artist's nationality, the total sales at auction, the title of the painting that fetched the record price at auction, as well as the record price in USD, and the date and place of the record.

Rank	Artist	Nationality	Total Turnover	Total Sales at Auction	Artwork	Price in USD	Date	Auction House
1	Mahmud Said (1897-1964)	Egyptian	$ 13,878,886	41	The Whirling Dervishes	$ 2,546,500	26-Oct-10	Christie's, Dubai
2	Martiros Saryan (1880-1972)	Armenian	$ 11,365,629	70	The Poet (On The Foothills Of Aragats)	$ 623,650	26-Nov-12	Sotheby's, London
3	Farhad Moshiri (1963-)	Iranian	$ 11,362,864	62	Secret Garden	$ 987,750	16-Apr-13	Christie's, Dubai
4	Osman Hamdy-Bey (1842-1910)	Turkish	$ 9,557,110	14	A Lady Of Constantinople	$ 3,380,500	30-May-08	Sotheby's, London
5	Mohammad Ehsai (1939-)	Iranian	$ 8,800,584	47	He Is The Merciful	$ 1,161,000	30-Apr-08	Christie's, Dubai
6	Charles Hossein Zenderoudi (1937-)	Iranian	$ 7,647,047	59	Tchaar-Bagh	$ 1,609,000	30-Apr-08	Christie's, Dubai
7	Mubin Orhon (1924-1981)	Turkish	$ 6,362,012	84	Composition abstraite	$ 372,298	1-Jun-10	Artcurial - Briest, Poulain, F. Tajan, Paris
8	Fateh Moudarres (1922-1999)	Syrian	$ 5,429,229	108	Untitled	$ 374,500	26-Oct-10	Christie's, Dubai
9	Fahr-El-Nissa Zeid (1901-1991)	Turkish	$ 5,396,992	36	Break of the Atom and Vegetal Life	$ 2,741,000	29-Oct-13	Christie's, Dubai
10	Ahmed Alsoudani (1975-)	Iraqi	$ 5,274,147	14	Baghdad I	$ 713,250	14-Oct-11	Christie's, London
11	Paul Guiragossian (1926-1993)	Lebanese	$ 4,924,603	61	La Lutte de l'Existence	$ 605,000	29-Oct-13	Christie's, Dubai
12	Abdel Hadey El-Gazzar (1925-1965)	Egyptian	$ 4,681,760	17	Fishing	$ 746,500	19-Apr-11	Christie's, Dubai
13	Sohrab Sepehri (1928-1980)	Iranian	$ 4,390,896	16	Untitled (from the Tree-Trunks series)	$ 662,500	25-Oct-11	Christie's, Dubai
14	Louai Kayali (1934-1978)	Syrian	$ 4,338,631	62	Fisherman in Arwad	$ 194,500	25-Oct-11	Christie's, Dubai
15	Chafik Abboud (1926-2004)	Lebanese	$ 4,089,546	154	LE CHEMIN D'ALEP	$ 387,750	16-Apr-13	Christie's, Dubai
16	Nejad Devrim (1923-1994)	Turkish	$ 3,857,010	98	Abstract Composition	$ 1,190,502	26-Apr-12	Sotheby's, London
17	Hamed Nada (1924-1990)	Egyptian	$ 3,696,312	30	Henna Eve	$ 602,500	27-Apr-10	Christie's, Dubai
18	Ahmed Moustafa (1943-)	Egyptian	$ 3,595,716	11	The Night Journey And Ascension	$ 842,500	16-Dec-10	Sotheby's, Doha
19	Mihr Ali (1795-1830)	Persian	$ 3,276,217	5	Portrait of Fath Ali	$ 1,430,320	12-Oct-04	Sotheby's, London

					Shah seated against a jewelled bolster			
20	Ghada Amer (1963-)	Egyptian	$ 3,254,602	50	The Golden Painting 2	$ 223,515	27-Jun-13	Sotheby's, London
21	Jilali Gharbaoui (1930-1971)	Moroccan	$ 2,694,076	30	Composition	$ 257,400	18-Dec-10	Compagnie Marocaine des Objets d'Art, Casablanca
22	Burhan Cahit Dogancay (1929-2013)	Turkish	$ 2,604,228	34	Pink door	$ 454,725	14-Jun-10	Aguttes, Paris
23	Mirza Baba (1795-1830)	Persian	$ 2,512,840	3	A Portrait of A Lady	$ 1,524,500	6-Oct-10	Sotheby's, London
24	Ismail Jalayir (1830-1875)	Persian	$ 2,373,410	3	Portrait of Mirza Ali Asghar Khan Amin al-Sultan	$ 1,392,525	11-Oct-06	Sotheby's, London
25	Afshin Pirhashemi (1974-)	Iranian	$ 2,359,588	22	Rapture	$ 554,500	27-Apr-10	Christie's, Dubai
26	Erol Akyavas (1932-1999)	Turkish	$ 2,220,002	20	End of encounter	$ 872,269	5-Apr-11	Bonhams, London
27	Ahmed Cherkaoui (1934-1967)	Moroccan	$ 2,145,038	31	Talisman rouge, Paris	$ 410,200	11-May-13	Compagnie Marocaine des Objets d'Art, Casablanca
28	Safwan Dahoul (1961-)	Syrian	$ 2,141,644	27	Rêve 16	$ 219,750	16-Apr-13	Christie's, Dubai
29	Mario Prassinos (1916-1985)	Turkish	$ 2,009,430	181	Les Epines	$ 108,827	10-Nov-08	Bonhams, London
30	Chant Avedissian (1951-)	Egyptian	$ 1,915,344	11	Icons Of The Nile	$ 1,565,000	22-Apr-13	Sotheby's, Doha
31	Reza Derakshani (1952-)	Iranian	$ 1,817,971	39	Prelude in Pink	$ 146,500	25-Oct-11	Christie's, Dubai
32	Nasrollah Afjehei (1933-)	Iranian	$ 1,744,991	24	Wave	$ 218,500	19-Apr-11	Christie's, Dubai
33	Selim Turan (1915-1994)	Turkish	$ 1,592,398	61	Composition	$ 288,197	29-Jun-09	Artcurial - Briest, Poulain, F. Tajan, Paris
34	Massoud Arabshahi (1935-)	Iranian	$ 1,462,220	32	Untitled	$ 277,000	30-Apr-08	Christie's, Dubai
35	Rachid Koraichi (1947-)	Algerian	$ 1,323,085	6	Scrutateur De l'Arrière Passion (Scrutineer Of The Hidden Passion)	$ 665,000	22-Apr-13	Sotheby's, Doha
36	Miloud Labied (1939-2008)	Moroccan	$ 1,306,080	33	Composition	$ 164,080	11-May-13	Compagnie Marocaine des Objets d'Art, Casablanca
37	Faramarz Pilaram (1937-1982)	Iranian	$ 1,291,990	17	Untitled	$ 385,000	30-Apr-08	Christie's, Dubai

38	Marwan Kassab Bachi (1934-)	Syrian	$ 1,212,564	36	GROSSER KOPF (NACH RECHTS) (Large Head (Turned Towards the Right))	$ 171,750	16-Apr-13	Christie's, Dubai
39	Ayman Baalbaki (1975-)	Lebanese	$ 1,204,079	14	Ya'Illahi (Dear Lord)	$ 377,000	22-Apr-13	Sotheby's, Doha
40	Sedaghat Jabbari (1961-)	Iranian	$ 1,156,720	10	Divine Names	$ 433,000	31-Oct-07	Christie's, Dubai
41	Leon Tutundijan (1905-1968)	Armenian	$ 1,147,990	62	Déjeuner de fruits	$ 124,016	8-Jun-11	Tajan, Paris
42	Fikret Saygi Moualla (1903-1967)	Turkish	$ 1,138,380	150	Peniches au quai a Paris	$ 66,345	19-Dec-02	Aguttes, Paris
43	Koorosh Shishegaran (1945-)	Iranian	$ 1,107,803	20	Human at Rest	$ 145,000	30-Apr-08	Christie's, Dubai
44	Dia Azzawi (1939-)	Iraqi	$ 1,081,028	31	The Human Condition	$ 109,000	31-Oct-07	Christie's, Dubai
45	Nja Mahdaoui (1937-)	Tunisian	$ 1,042,466	19	Triptych 3	$ 140,500	27-Oct-09	Christie's, Dubai
46	Taner Ceylan (1967-)	Turkish	$ 1,014,260	6	1879 (From The Lost Painting Series)	$ 374,067	7-Apr-11	Sotheby's, London
47	Abdul Kadir Al-Rais (1951-)	Emirati	$ 1,002,400	7	Bishra (Announcement)	$ 385,000	30-Apr-08	Christie's, Dubai
48	Charles Garabed (1872-1947)	Turkish	$ 989,437	78	On White Sands	$ 91,759	24-Nov-09	Christie's, Dubai
49	Abdallah Benanteur (1931-)	Algerian	$ 983,771	32	Des Pots et des Bouteilles	$ 116,500	30-Oct-08	Sotheby's, London
50	Saliba Douaihy (1912-1994)	Lebanese	$ 982,588	19	Regeneration	$ 278,500	17-Apr-12	Christie's, Dubai

Table 2. Descriptive Statistics

This table lists the descriptive statistics of the MENA index and all other alternative asset classes. All figures are calculated from annual returns calculated over the period 2000-2012. All data are converted to compounded returns. The risk-free rate used to calculate the Sharpe Ratio is the average 3-month T-bill secondary market rate over the same period.

	MENA	Equity	Corporate bonds	Government bonds	Real estate	Commodities	Private equity	Hedge funds
Observations	13	13	13	13	13	13	13	13
Artihm. Mean	0.139	0.045	0.066	0.084	0.027	0.050	0.041	0.098
Geom. Mean	0.089	0.027	0.076	0.095	-0.020	0.050	0.048	0.084
Median	0.196	0.116	0.059	0.091	0.116	0.172	0.166	0.111
Maximum	0.557	0.269	0.220	0.236	0.311	0.404	0.821	0.231
Minimum	-0.703	-0.546	-0.084	-0.088	-0.696	-0.625	-1.119	-0.212
Std. Dev.	0.315	0.219	0.068	0.084	0.263	0.310	0.433	0.108
Sharpe Ratio	2.387	0.645	2.407	3.934	0.907	0.582	0.527	2.727
Skewness	-1.462	-1.440	0.092	-0.074	-1.265	-0.947	-0.983	-1.367
Kurtosis	4.769	4.331	3.757	2.702	4.456	2.638	4.630	5.194
Jarque-Bera	7.785	6.707	0.405	0.074	5.678	2.481	4.346	8.190
Probability	0.020	0.035	0.817	0.964	0.058	0.289	0.114	0.017
Sum	2.222	0.727	1.048	1.348	0.437	0.805	0.658	1.575
Sum Sq. Dev.	1.493	0.718	0.070	0.106	1.041	1.437	2.812	0.176

Table 3. CAPM Regression Results

This table shows the outcome of the single index model (CAPM) using the equation $R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it}$. The dependent variable is one of the considered asset classes shown in the table and the independent variable is the global equity index (MSCI World) minus the risk-free rate (3-month T-bill). The significance levels are indicated as ***, **, and *, indicating statistical significance at 1%, 5%, and 10%, respectively.

	α		***β***						
Asset class	Coef.	(Std. Error)	Coef.	(Std. Error)		*R*-squared	F-statistic		Treynor Ratio
MENA	0.096	-0.118	1.103	0.148	***	0.756	55.731	***	0.428
Equities	0.000	0.000	1.000	0.000	***	1.000		***	0.257
Corporate bonds	-0.002	0.032	1.083	0.052	***	0.926	437.681	***	0.268
Government bonds	-0.008	0.038	1.140	0.053	***	0.950	457.142	***	0.314
Real estate	0.001	0.042	0.932	0.049	***	0.963	360.983	***	0.394
Commodities	0.054	0.047	0.815	0.075	***	0.765	117.299	***	0.345
Private equity	0.040	0.054	0.930	0.013	***	0.923	178.829	***	0.360
Hedge funds	0.027	0.034	1.080	0.039	***	0.980	750.512	***	0.350

Table 4. Correlation Matrix

This table displays the correlation coefficients of the log returns of all alternative asset classes over the period from 2000 to 2012.

Correlation	MENA	Equity	Corp. bonds	Gov. bonds	Real estate	Commodities	Private equity	Hedge funds
MENA	1							
Equities	-0.202	1						
Corp. bonds	-0.223	0.169	1					
Gov. bonds	-0.358	0.160	0.420	1				
Real estate	-0.134	0.781	0.051	-0.151	1			
Commodities	0.134	0.109	-0.096	-0.118	0.623	1		
Private equity	-0.033	0.904	0.128	-0.309	0.826	0.526	1	
Hedge funds	-0.254	0.768	0.049	-0.078	0.701	0.563	0.755	1

Table 5. Optimal Asset Allocation

This table presents the results of the optimal asset allocation. The numbers represent the weights of each asset used in the portfolio. Short selling is prohibited and the sum of all weights equals one. Each portfolio face as a constraint the level of risk aversion measured by lambda. Panel A presents the unrestricted results, while Panel B restricts the mean-variance portfolio investor to put a maximum of 30% into one asset class.

	Panel A. Gamma Constraint		
Asset class	$\lambda = 1$	$\lambda = 2$	$\lambda = 10$
MENA	0.656	0.335	0.076
Equity	0	0	0
Corporate bonds	0	0	0
Government bonds	0.344	0.665	0.867
Real estate	0	0	0
Commodities	0	0	0
Private equity	0	0	0.058
Hedge funds	0	0	0
Total	1	1	1

	Panel B. Gamma Constraint and Restriction <= 30% per asset class		
Asset class	$\lambda = 1$	$\lambda = 2$	$\lambda = 10$
MENA	0.300	0.300	0.156
Equity	0	0	0
Corporate bonds	0	0	0
Government bonds	0.300	0.300	0.300
Real estate	0	0	0
Commodities	0.040	0.078	0.244
Private equity	0.060	0.022	0
Hedge funds	0.300	0.300	0.300
Total	1	1	1

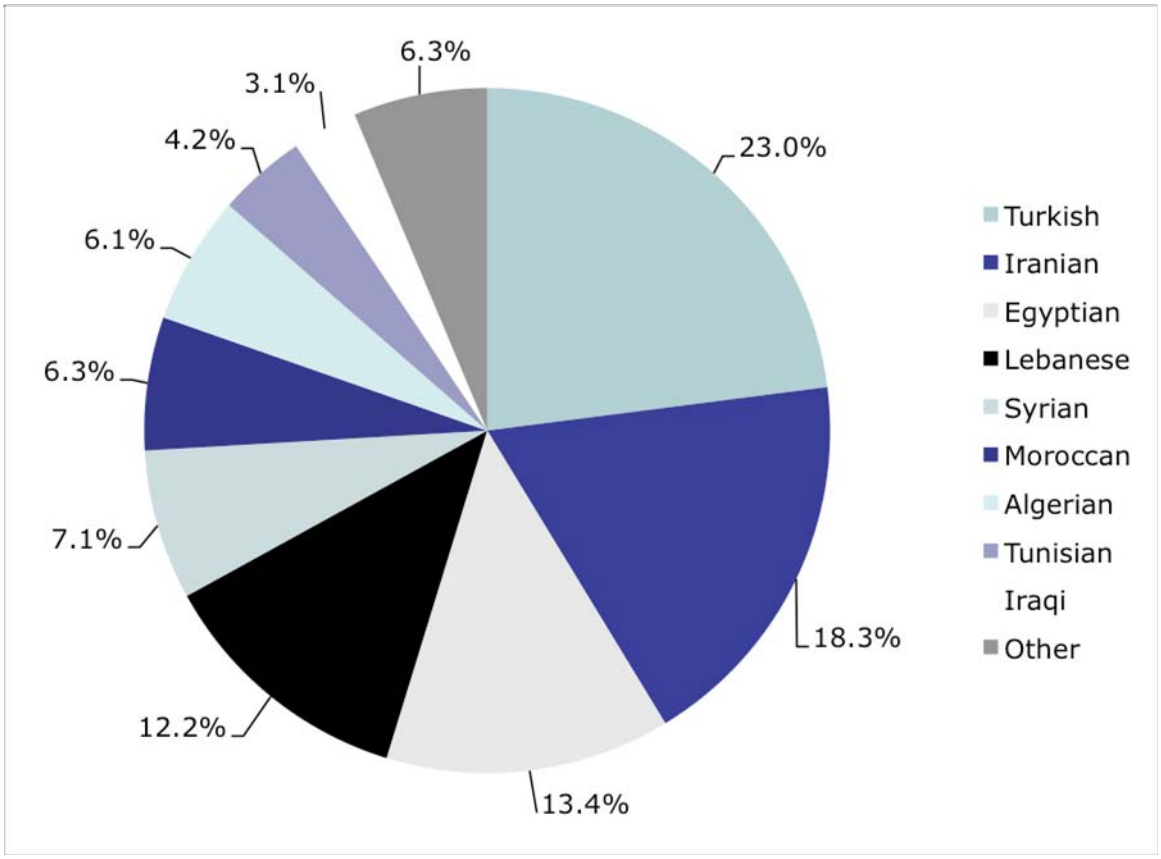

Figure 1. MENA Art Sales per Artist's Nationality, 2000-2012
This figure shows the distribution of paintings by different artist's nationalities. Our sample contains 663 individual artists who created 3,544 paintings sold at auction over the period 2000 to 2012.

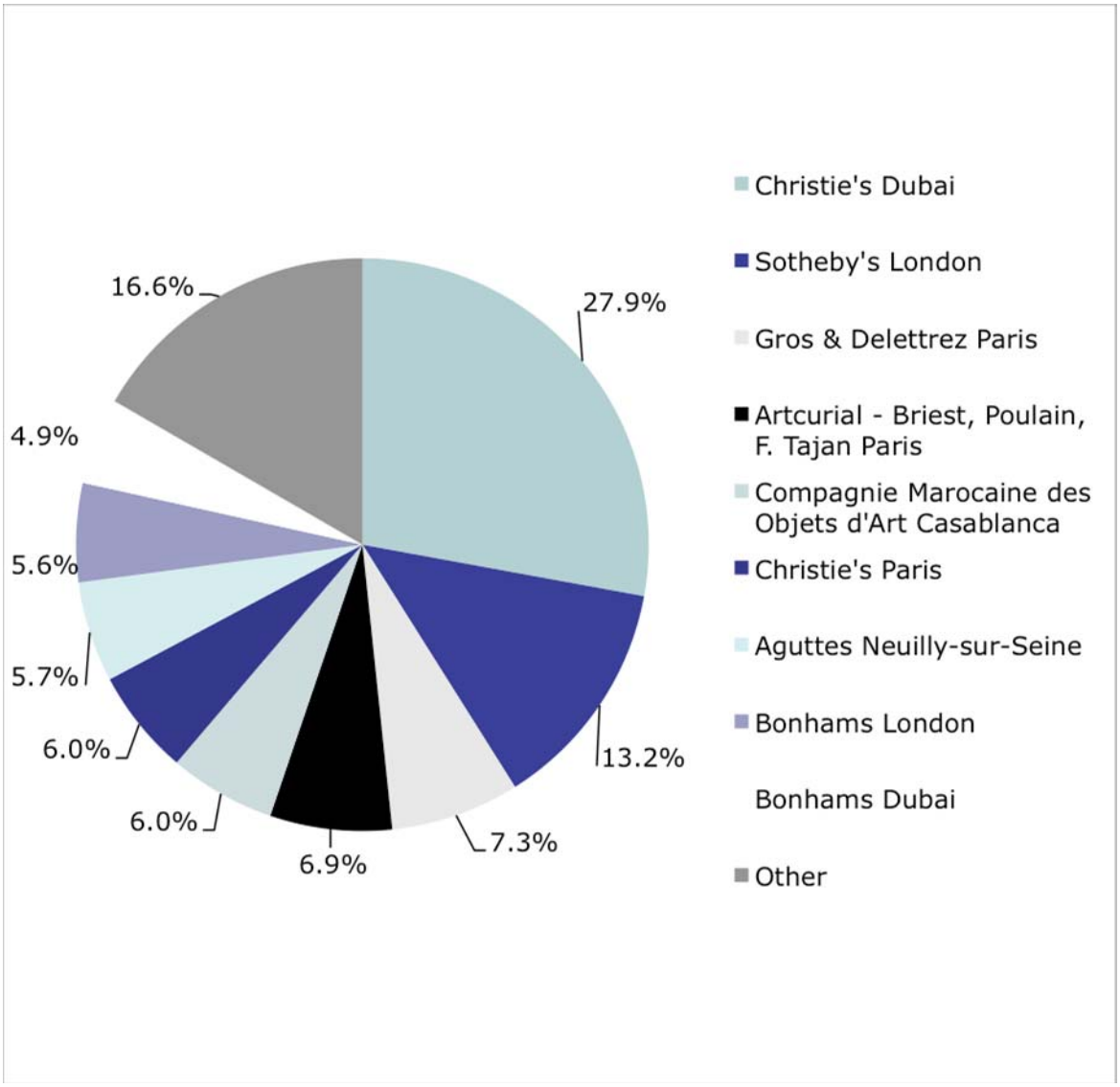

Figure 2. MENA Art Sales per Auction House, 2000-2012
This figure presents at which auction houses the 3,544 MENA artworks in our sample got sold.

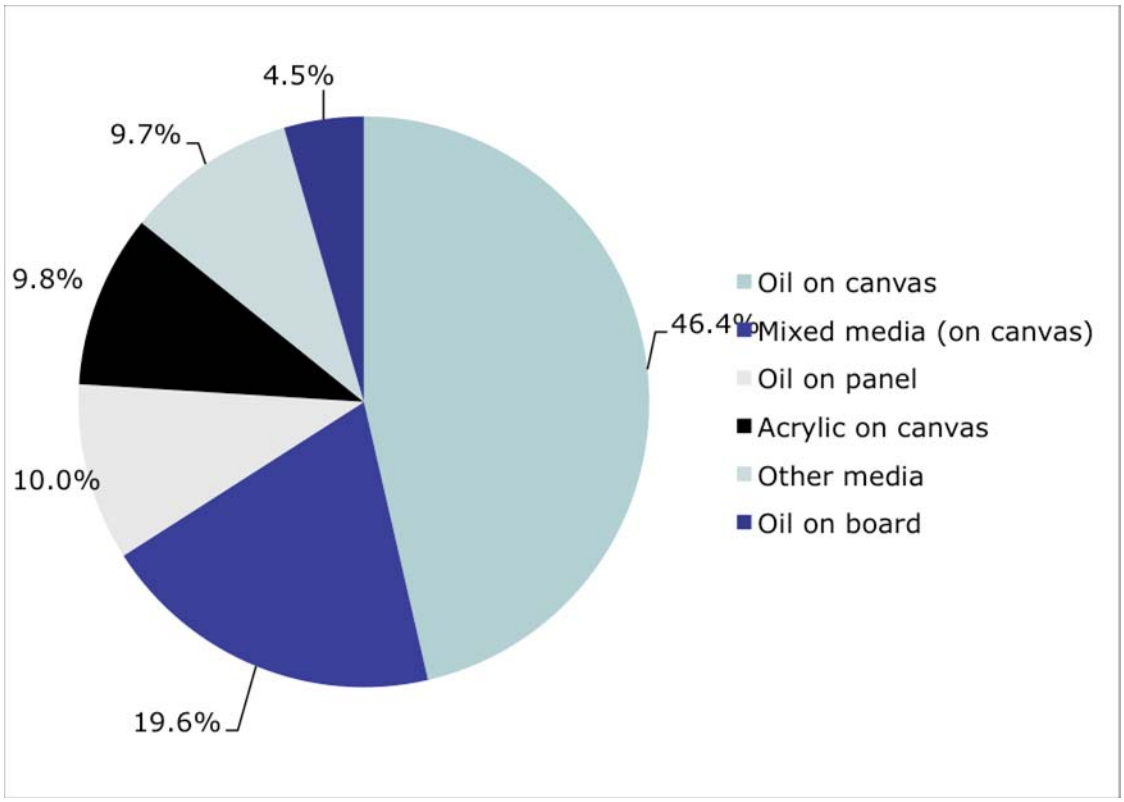

Figure 3. MENA Art Sales per Medium, 2000-2012

This figure shows the media distribution of the 3,544 MENA paintings in our sample. We differentiate between oil on canvas, oil on panel, oil on board, acrylic on canvas, mixed media (on canvas), and other media.

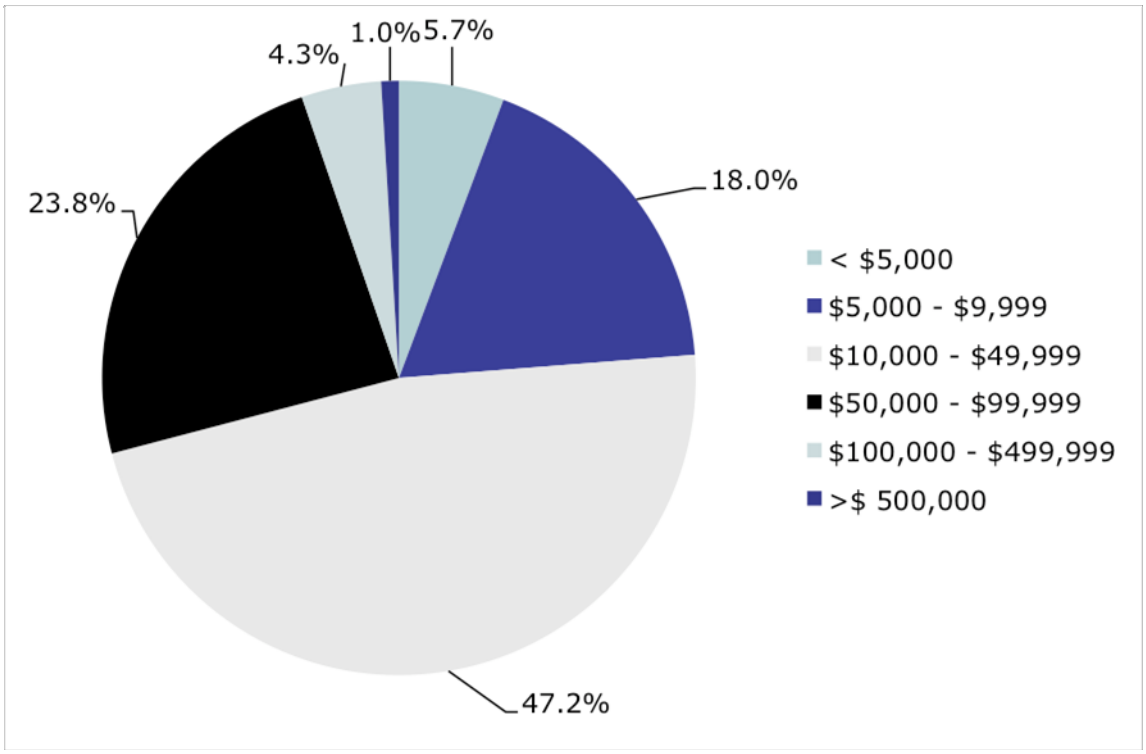

Figure 4. MENA Art Sales Price Range, 2000-2012

This figure indicates the distribution of the price range in which the 3,544 MENA paintings in our sample got sold for over the years 2000 to 2012.

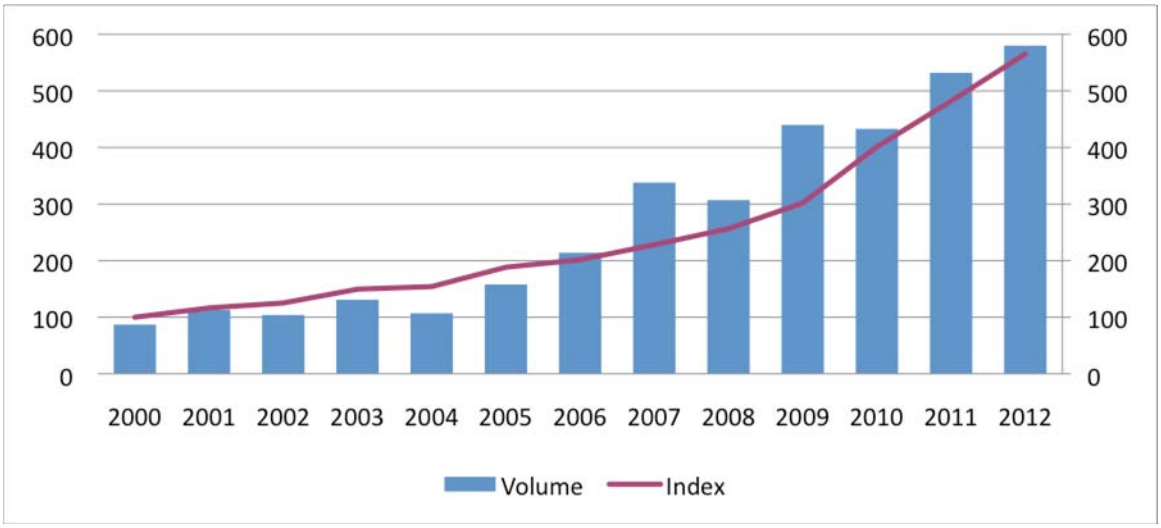

Figure 5. The MENA Art Price Index, 2000-2012

This figure shows the MENA art price index over the sample period 2000 to 2012. The hedonic index is based on 3,544 auctioned paintings by 663 individual artists. The bars indicate the volume, i.e. the number of MENA paintings sold at auction in a specific year.

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