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Changes in the global art market

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Abstract

Research background: The dynamics of the art market are usually presented in terms of price fluctuations, price indexes and financial returns. This paper proposes the value and volume approach, which has not been considered in an aggregative way for a long time in the economic literature.

Purpose of the article: The aim of the paper is to present changes in the global art market in the period 2002–2015. The results of dynamic analysis of the art market are presented, including two approaches: value of transactions and volume of transactions. The impact of the global crisis on the art market is considered.

Methods: In order to present the changes on the global art market, statistical indexes of dynamics (single base and chain indexes) are used. Moreover, trend analyses have been conducted for the value and volume of transactions on the art market. The sources of data on the global art market are from Artprice, ArtTactic, and TEFAF (The European Fine Art Foundation).

Findings & Value added: In the analysed period of 2002–2015, sales on the global art market generally increased. The value and volume of sales peaked in 2007 and 2014. The art market was considerably affected by the economic recession in 2009, but in the next year it recovered. The trend analyses allow the changes on the market to be described by means of mathematical functions, and the countries with the largest share in the global art market can be identified. Particular attention has been paid to the existence of a triad on the art market consisting of Europe, the USA and China. It is noteworthy that Europe and the USA have rapidly lost market share to China.

Introduction

The paper has a cognitive character. Since finding scientific papers on changes in the art market over long periods is difficult, I decided to take up this issue. This paper presents the results of dynamic analysis of the art market for the 2002–2015 period. Analysis of values and volumes has been proposed, as this has not previously been considered in the literature in an aggregative way.

The aim is to present the results of dynamic analysis of the art market in 2002–2015, based on the available aggregated data for the art market. The results of dynamic analysis of the art market is presented, including these two approaches: value of sales and volume of transactions. Analysis of volume of sales allows separate treatment of each transaction closed on the market. Analysis of turnover considers both sales volume and the price of works of art on the market. Moreover, the impact of the global crisis on the art market is considered in the paper.

Methodologically, two types of statistical methods are used in the paper: dynamic indexes and time series analysis. Primary, simple dynamic indexes in both one-base and chain forms have been used. Although these are quite simple statistical analysis tools, they describe the dynamics of economic phenomena very well. Regression analysis, especially time series analysis, has been used to find a mathematical trend model that fits the empirical data.

The paper is organized as follows. The next section is devoted to a literature review of the art market. Next, the research methodology used in the paper is described. The article ends with a discussion, the most important conclusions resulting from the analysis, and suggestions for future directions of research in this area.

Literature review

Since the papers of R.C. Anderson (1974, pp. 13–26) and J.P. Stein (1977, pp. 1021–1035), there has been a growing amount of literature on issues related to the art market. Several directions of scientific research can be distinguished. The value and price of art is one of them (Holub *et al.*, 1993, pp. 49–69; Grampp, 1989; Velthuis, 2003, pp. 181–215; Witkowska, 2014, pp. 281–293; Ye *et al.*, 2016, pp. 1–12). Prices have been shown to differ depending on various artwork characteristics (Czujack, 1997, pp. 229–247; Locatelli-Biey & Zanola, 2002, pp. 65–78; Rengers & Velthuis, 2002, pp. 1–28).

Moreover, the construction of art indexes has been taken up by several authors (Candela & Scorcu, 1997, pp. 175–196; Ginsburgh *et al.*, 2006; Collins *et al.*, 2009, pp. 57–60). Additionally, the problem of risk and rates of returns from art investments can be distinguished as an important path of research (Goetzmann, 1993, pp. 1370–1376; Chanel *et al.*, 1994, pp. 7–21; de la Barre *et al.*, 1994, pp. 143–181; Matsumoto *et al.*, 1994, pp. 495–519; Renneboog & Spaenjers, 2013, pp. 36–53; Lucinska, 2015, pp. 67–79).

Another issue taken up in the economic literature is analysis of financial rates of return from art and comparison with other types of asset (Frey & Pommerenhe, 1989, pp. 396–409; Srivastava & Babu, 2016, pp. 5327–5341). It can be stated that, in fact, there is no consensus among authors about the level of profitability of investments in works of art. The efficiency of the art market is also discussed in the economic literature (David *et al.*, 2013, pp. 23–35; Botha *et al.*, 2016, pp. 358–368). Finally, papers on globalization of the art market should be indicated (Afonso, 2012, pp. 53–59; Munteanu & Pece, 2015, pp. 82–88; Schultheis *et al.*, 2016).

Research methodology

In the paper, one-base indexes and chain indexes are used to present the dynamics of changes on the art markets in the analyzed period. Base index is a number derived by relating the value in any given period to the value of the base constant period. A dynamic index with a fixed base is calculated by the following formula, expressed as a percentage (Anghelache & Manole, 2012, p. 81):

$$I_{i/0} = \frac{y_i}{y_0} 100 \quad (1)$$

Chain index (dynamic index with variable base) is a number derived by relating the value in any given period to the value in the previous period.

$$I_{i/i-1} = \frac{y_i}{y_{i-1}} 100 \quad (2)$$

Apart from dynamic indexes, time series analysis has been used in the paper, especially trend function analysis (see more: Agrawal & Adhikari, 2013). Trend analysis refers to the science of studying changes in economic patterns. It is a mathematical technique that uses historical data to predict the future level of economic phenomena. Time series analysis has two main

objectives: detecting the nature of a phenomenon (represented by a sequence of observations) and forecasting the future values of a time series. Particularly, trend analysis involves the collection of empirical data from multiple time periods and plotting the information on a horizontal line for further review. The best fit trend is the function for which the sum of the vertical distances between each n of empirical data and each n of theoretical data connected with the trend function is minimal (the ordinary least squares method — OLS). A mathematically useful approach is, therefore, to find the mathematical function with the property that the sum of the following squares is minimum:

$$\sum_{t=1}^n (\hat{y}_t - y_t)^2 \rightarrow \min \quad (3)$$

To measure how well the trend model explains the changes in empirical data, the coefficient of determination is usually used: denoted as R^2 (R-squared), this is used as a guideline to measure the accuracy of a model and is represented as a value between zero and one. The closer the value is to one, the better the fit of the model to the data¹.

The formula for computing the coefficient of determination for a linear regression model with one independent variable is given below:

$$R^2 = \frac{\sum_{i=1}^n (y_i^* - \bar{y})^2}{\sum_{i=1}^n (y_i - \bar{y})^2} \quad (4)$$

where:

- y_i – empirical value of the variable y in period of time i ,
- y_i^* – theoretical value of variable (based on the trend model),
- \bar{y} – arithmetic mean based on a set of empirical data y .

Results

The sources of data on the global art market are from Artprice, ArtTactic, and TEFAF (The European Fine Art Foundation). Data concerning sale values and volumes of transactions concluded on the global art market in the years 2002–2015 are listed in Table 1 and presented in Figure 1.²

¹ More detailed information on time series analysis can be found in Montgomery *et al.* (2008); Agrawal and Adhikari (2013).

² Value of transactions is presented in euros in current prices, volume means number of lots sold.

Turnover on the global art market in the years 2002–2014 ranged between 18.6 and 51bn EUR, with the lowest value in 2003 and the highest in 2014. Sales volume ranged between 25.4 and 49.8 million transactions, with the lowest value in 2003 and the highest in 2007. General trends of changes in values and volumes of art sales in the analysed period are convergent; noteworthy, in both cases is the growing trend from 22.3bn EUR in 2002, to 48bn EUR in the market boom of 2007, to 28.3bn EUR during the slump of 2009. It should be noted that the value of art sales very quickly (in the following year, 2010) regained its level from 2008 (42–43bn EUR) (Fig. 1). The following years, 2011–2014, brought an increase of sales value up to 51bn EUR, as well as a sales volume of 39 million transactions.

Single base indexes of dynamics indicated that in the analysed period the value of sales on the art market more than doubled, whereas the volume increased by about 50%. Chain indexes fell in value and volume in the years 2003, 2008–2009, and 2012, as compared with the respective preceding years. It should be noted that the recession on the art market was caused by the global crisis. Global sales of works of art in 2009 fell by 32.8% compared to 2008 and by 41.5% in relation to 2007. The decrease in sales volume in 2009 decreased by 29.5% compared to 2008 and 37.7% compared to 2007. The decrease in the value of sales was thus higher than the decrease in the global volume of sales of works of art. It is useful to note that turnover volume on the art market in 2009 (31 million transactions) did not recover to the level from before the crisis (43.7 million transactions) and in recent years has ranged between 35.1 and 39 million transactions. This allows the conclusion that transactions with lower prices were concluded during the crisis. The economic crisis had a direct impact on institutions, artists and collectors (Lerer & McGriggle, 2018, p. 7).

In the period 2011–2014 there was an increase of sales to 51 billion EUR and of the volume of sales to 39 million transactions. In 2015, the value of sales fell to 47.4 billion EUR, while trading volume dropped to 38.1 million transactions. Figure 2 presents calculated volume and value chain indexes in the period 2002–2015. Assuming the preceding year as the reference year, the fall of the index for value and volume in 2009 is clearly visible.

On the basis of the collected data on the sales of works of art on the global market, the trend line function of the form $y = 2158,7x + 22026$ has been set and the coefficient of determination $R^2 = 0.66$ has been estimated (the trend model explains 66% of variability in the value of sales of works of art). The slope of the linear function indicates average yearly changes in the analyzed variable (in units). In turn, the intercept shows the theoretical

level of the value in the previous period before the time series begins, i.e. in 2001. In turn, the volume of global sales designated the power function of the trend, taking the form of $y = 24,449x^{0,1816}$, with the coefficient of determination, $R^2 = 0.49$ (the trend model explains 49% of variation in the volume of sales of works of art). The trend functions fit the empirical data, as presented in Fig. 4 and Fig. 5. Based on the empirical data, many trend functions were fitted, but the line function and the power function were the best. Figures 4 and 5 show outliers (observations that deviate from other observations) over and under the trend function. They could be related to cyclical fluctuations that can be estimated for the data over a longer period of time.

In order to illustrate the relationship between the volume and the value of sales, bubble graphs of the volume and value of sales on the global art market in the years 2002–2015 were prepared (Fig.6, Fig. 7). The sizes of the bubbles correspond to the value of sales on the global art market. The graphs clearly indicate that 2007 and 2008 stand out as outliers, being characterized by high volumes of sales.

The sizes of the bubbles correspond to the value of sales on the global art market. Fig. 6 and Fig. 7 indicate that in the years 2007 and 2008, the art market saw high volumes and values of sales.

Art markets retain their individual characteristics related to cultural circumstances, level of economic development and local laws (Melnyk, 2013, pp. 62–70). In order to identify the geographical structure of the art market, Table 3 presents the share of selected countries in art turnover at auctions in the years 2002–2014.

Based on the collected data it is possible to identify the triad of countries with the largest art markets:

- the United States (New York),
- Europe (London, Paris, Zurich),
- China (Beijing, Hong Kong, Shanghai, Guangzhou, Hangzhou, Nanjing).

Fig. 8 clearly indicates the tendency of changes in the shares between the three main geographical markets of the value of art auction sales: the falling share of the USA and European countries and the rapidly increasing share of China.

The value of sales on the art market in China in the 2004–2014 period (Table 3) increased from 860 million USD in 2004 to 10 billion USD in 2014. The highest value of 13.7 billion was reached in 2011. Single-base indexes show that the value of sales of works of art doubled in 2005–2006 compared to 2004, tripled in 2007–2009, increased nine times in 2010 compared to 2004, and increased sixteen times in 2011 compared to 2004.

In total, when cumulatively calculated the base dynamic indexes show more than an eleven-fold increase in the market within the decade 2004–2014. It is noteworthy that on the art market in China there was no increase in value in 2007 — the growth in China occurred in 2011. The economic recession caused a 5.2% decrease in sales in the Chinese art market in 2009 in comparison with 2008; this was a much smaller fall compared to the global market (decrease in turnover of 32.8%). The high indexes of dynamics of the Chinese art market could be caused by a range of factors and further detailed studies are needed on changes in the political situation, attraction of FDI (foreign direct investments), the growth in the number of private art museums, social changes, etc.

Using the data on the value of sales of works of art in China, the power function of the trend $y = 712,91x^{1,1251}$ was set. The coefficient of determination for the trend model $R^2 = 0.87$ (the model explains 87% of the volatility of the value of sales of works of art). More detailed information on the art market in China can be found in the literature (Ma, 2015, pp. 1492–1498; Zhou & Sensel, 2016, pp. 1508–1511; Wang, 2017, pp. 44–53).

Three emerging markets are indicated in the literature: Russia, China, and India (Kraeussl & Logher, 2010 pp. 301–318). The shares of countries in the global art market in the last year of analysis (2015) are presented in Fig. 12; the shares of selected European Community countries in the European Community art market in 2015 are presented in Fig. 13.

The US had the largest share in global art sales in 2015 (43%), followed by the United Kingdom (21%) and China (19%). If only ECC countries are considered, the United Kingdom had the largest share (64%), followed by France (19%), Germany (5%) and Italy (3%). The next positions were taken by the following countries: Spain (2%), Austria (2%), Sweden (1%) and Netherlands (1%). Other ECC countries represent only about 3% in the market's geographical structure.

Discussion

Turnover on the global art market in the years 2002–2015 ranged between 18.6 and 51bn EUR and generally had an increasing trend. The volume of sales fell by 25.4–49.8 million transactions. The value and volume of sales peaked in 2007 and 2014. Single-base indexes of dynamics indicated that in the analysed period, the value of sales on the art market grew more than two-fold, whereas the volume grew by about 50%. Chain indexes of dynamics show that the value and volume of sales fell in value and volume in the years 2003, 2008–2009, and 2012 as compared to the respective preced-

ing years. It is worth remembering that the global crisis affected the art market in 2008–2009, causing a decrease in art value and volume sales. Global art sales in 2009 fell to 32.8% of the 2008 level and to 41.5% of the 2007 level. In 2009 the volume of transactions decreased by 29.5% compared to 2008 and 37.7% compared to 2007. In the following year the art market recovered.

Analysis of the geographical structure of art market indicates that three markets have the biggest shares: the USA, the ECC countries and China. The United Kingdom, France, Germany and Italy are the most significant among the ECC art markets. It is worth underlining the changes in the geographical structure of art markets: the decreasing share of the USA in auction turnover of art (drop from 46.3% in 2004 to 32% in 2014), the falling share of European countries (the UK, France, Germany), and finally the surging share of China in global art sales value in recent years (4.9% in 2006; 7.2% in 2007; 17.4% in 2008; 23% in 2010, 25% in 2012 and 37.2% in 2014).

Conclusions

The paper contributes to the economic literature on cultural economics, presenting the results of a dynamic analysis of the global art market. It is noteworthy that in the analysed 2002–2015 period, Europe and the USA rapidly lost their market share to China. The results suggest that the value and volume of transactions on the art market displayed a growing trend. Empirical evidence for the crisis on the art market in 2008–2009 is provided in the text.

Certain research limitations of the paper can be indicated. Namely, the data on which the dynamic analysis was based is restricted to the years 2002–2015. There is little that can be done to lengthen this period because the availability of data for earlier years is not available. The time series for analysis starts in 2002 and there are no comparable data for the earlier periods. In addition, only selected countries and regions of the world are presented due to lack of data.

Several directions for future research can be distinguished. First, using global and local approaches it is interesting to compare the art market with the stock exchange market. Secondly, it is worth analyzing the circumstances influencing the changes on the Chinese art market. An important future direction of research involves deeper qualitative research on the art markets in particular countries and regions. Finally, dynamic analysis over

a longer period of time could reveal cyclical changes on the global art market.

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Annex

Table 1. Value and volume of transactions on the art market and total volume of transactions on the global art market in the years 2002–2015

Year	Value in m EUR	Dynamic base index 2002 =100%	Dynamic chain index previous year = 100%	Volume in m	Dynamic base index 2002 =100%	Dynamic chain index previous year = 100%	Value/ volume
2002	22,264	100.00	100.00	25.8	100.00	100.00	862.95
2003	18,631	83.68	83.68	25.4	98.45	98.45	733.50
2004	24,385	109.53	130.88	26.6	103.10	104.72	916.71
2005	28,833	129.51	118.24	28.2	109.30	106.02	1022.45
2006	43,331	194.62	150.28	32.1	124.42	113.83	1349.87
2007	48,065	215.89	110.93	49.8	193.02	155.14	965.16
2008	42,158	189.36	87.71	43.7	169.38	87.75	964.71
2009	28,335	127.27	67.21	31.0	120.16	70.94	914.03
2010	42,951	192.90	151.58	35.1	136.05	113.23	1223.67
2011	46,137	207.23	107.40	36.8	142.64	104.84	1253.72
2012	44,091	198.04	93.20	35.5	137.60	96.47	1242.00
2013	47,419	212.98	107.54	36.5	141.47	102.81	1299.15
2014	51,000	229.07	107.55	39.0	151.16	106.85	1307.69
2015	47,430	213.03	93.00	38.1	147.67	97.69	1244.88

Source: author's own work based on data provided by *The Global Art Market in 2010...* (2011), *The International Art Market 2011....*(2012), *TEFAF Art Market Report 2013...* (2013), *TEFAF Art Market Report 2014...* (2014), *Art Market Report TEFAP* (2016).

Table 2. Shares (%) of countries in value of art auction sales in 2002–2014

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2012	2014
USA	41.9	41.6	46.3	43.1	45.9	41.7	35.6	27.9	29.9	27.0	32.1
Great Britain	15.2	28.0	26.9	28.4	26.9	29.7	35.7	21.3	19.4	18.0	18.9
France	8.6	9.3	7.2	6.6	6.4	6.4	6.0	13.9	5.1	4.0	3.3
Italy	2.9	3.7	3.7	3.6	2.8	2.4	2.7	3.2	1.5	n.a.	0.8
Germany	2.7	3.4	2.9	3.6	2.9	2.9	2.4	3.2	1.9	2.0	1.4
Hong Kong	1.1	1.2	1.9	3.7	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
China	n.a.	n.a.	n.a.	n.a.	4.9	7.3	7.2	17.4	23.0	25.0	37.2

Source: author's own work based on the data provided by: *Art Market Trends. Tendencias du marche de l'art* (2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2012, 2014).

Table 3. Value of sales at art auctions in China in m USD in 2004–2014

Year	Value of sales	Dynamic base index 2004 =100	Dynamic chain index previous year=100
2004	860	100.00	100.00
2005	1,890	219.77	219.77
2006	1,960	227.91	103.70
2007	2,757	320.58	140.66
2008	3,166	368.14	114.83
2009	3,000	348.84	94.76
2010	7,914	920.23	263.80
2011	13,660	1,588.37	172.60
2012	9,518	1,106.74	69.68
2013	9,954	1,157.44	104.58
2014	10,083	1,172.44	101.29

Source: author’s own work based on TEFAF Report 2015, Art Economics and AMMA (Art Market Monitor of Artron).

Figure 1. Value and volume of sales on the global art market in 2002–2015

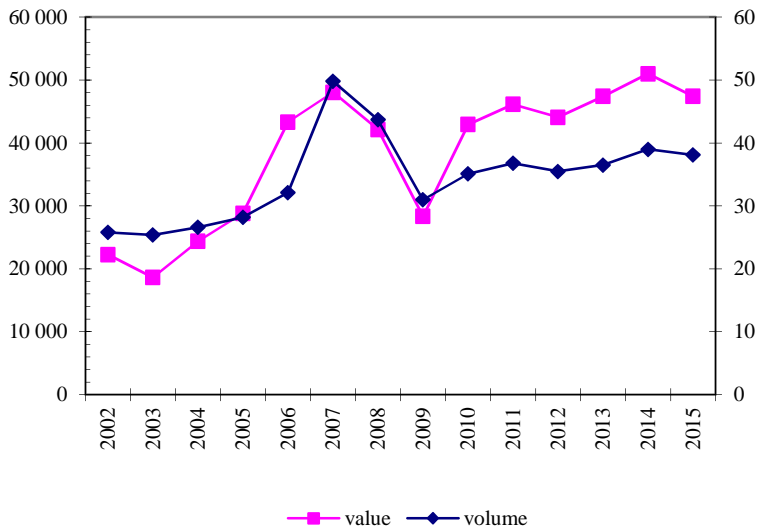


Figure 2. Base indexes for the volume and value of sales on the global art market in the years 2002–2015

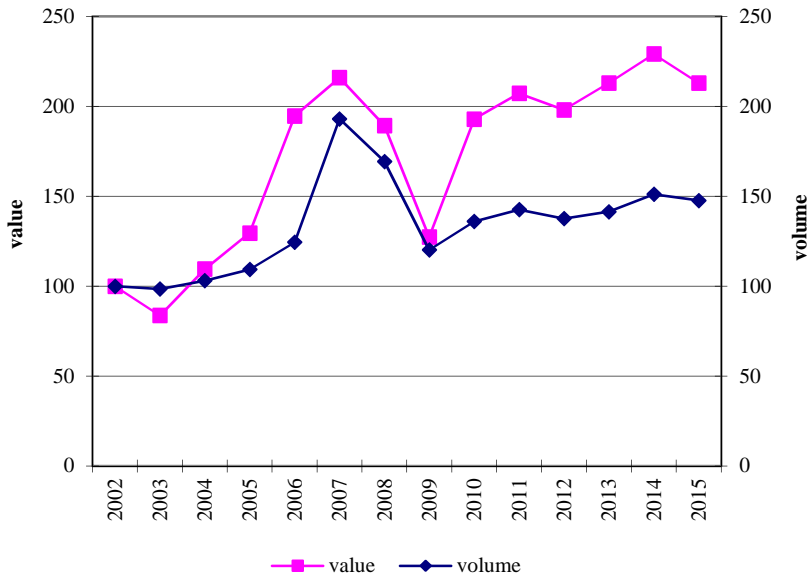


Figure 3. Chain indexes for the volume and value of sales on the global art market in the years 2002–2015

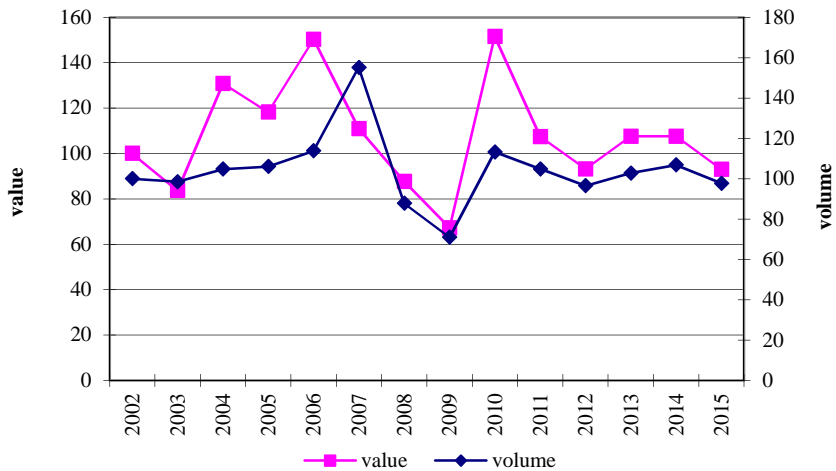


Figure 4. Value of sales on the art market with linear trend function

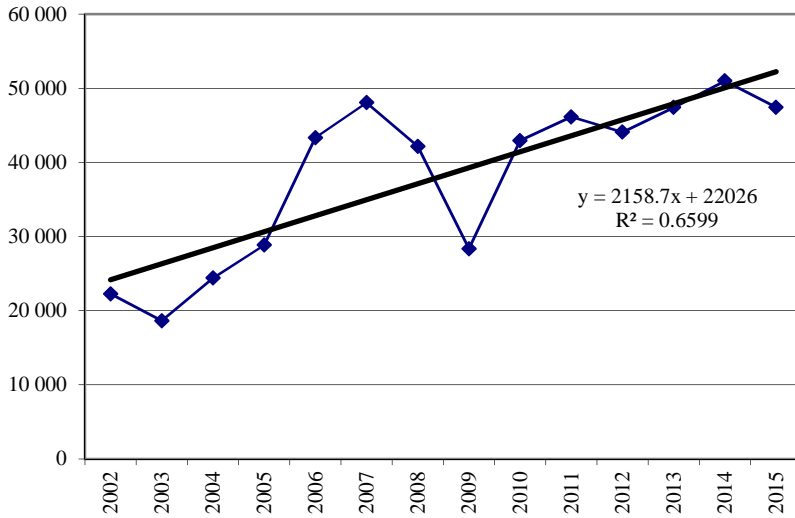


Figure 5. Volume of sales on the word art market with power trend function

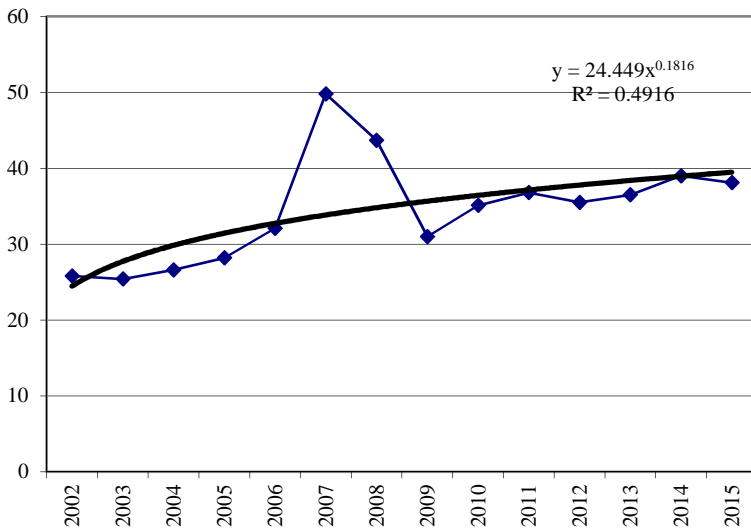


Figure 6. Value and volume of transactions on the global art market in 2002–2015

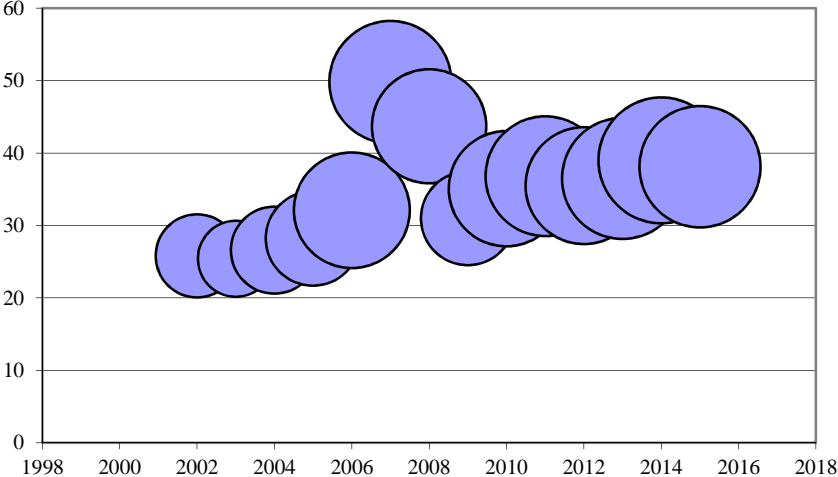


Figure 7. Volume and value of transactions on the global art market in 2002–2015

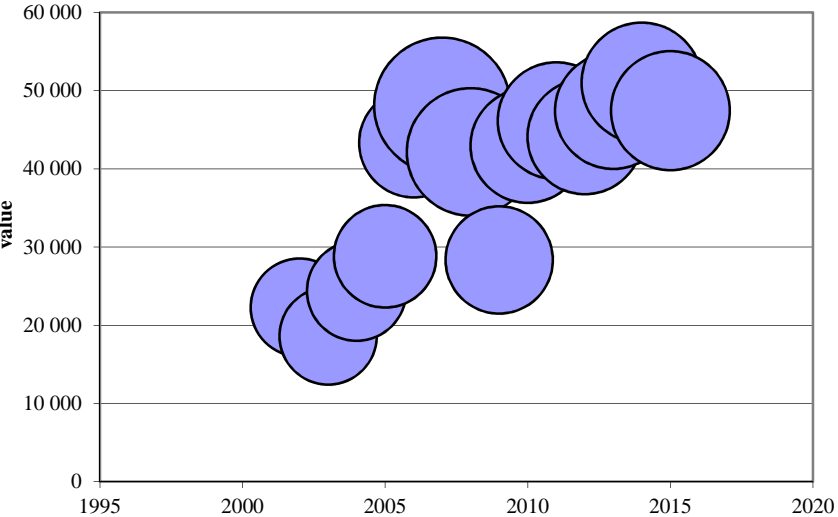
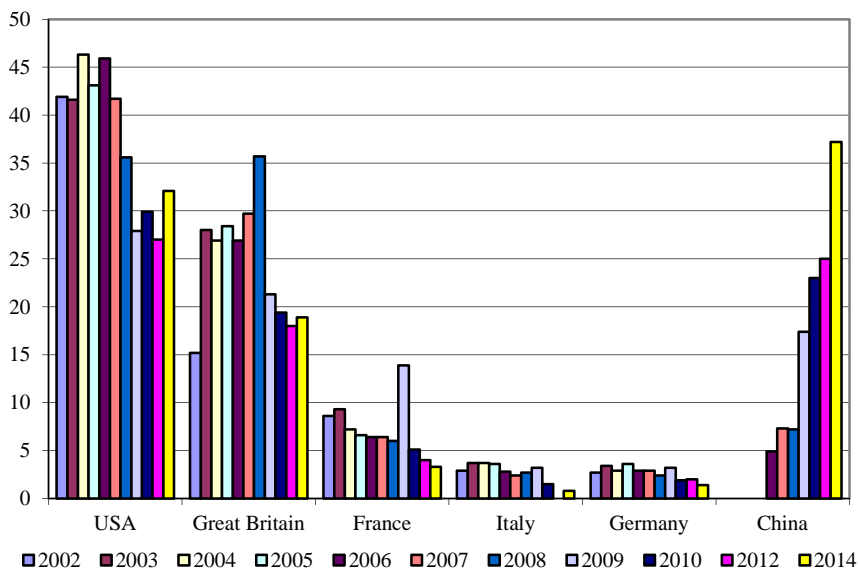
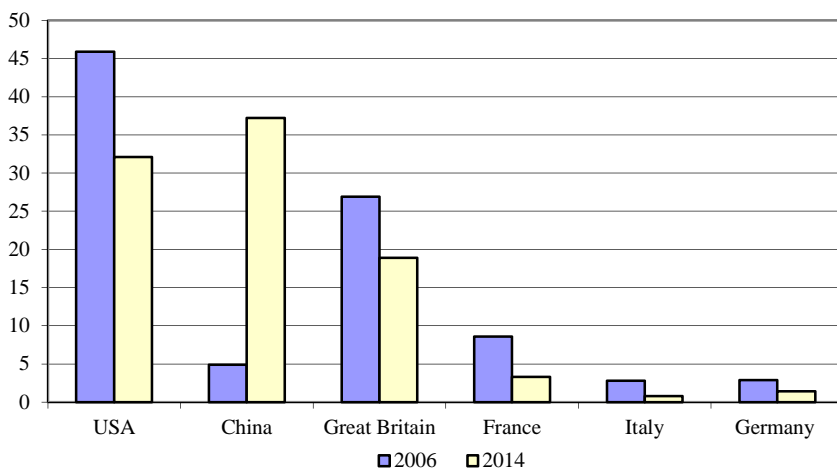


Figure 8. Shares in art auction value in 2002–2014 in selected countries



Source: author's own work based on data provided by *Art Market Trends. Tendencias du marche de l'art...* (2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2012, 2014).

Figure 9. Shares in the value of art auction sales in the world in 2006 and 2014



Source: author's own work based on the data provided by *Art Market Trends. Tendencias du...* (2006); *Art Market Trends. Tendencias du...* (2014).

Figure 10. Dynamic indexes (base and chain) for value of art sales in China in the period 2004–2014

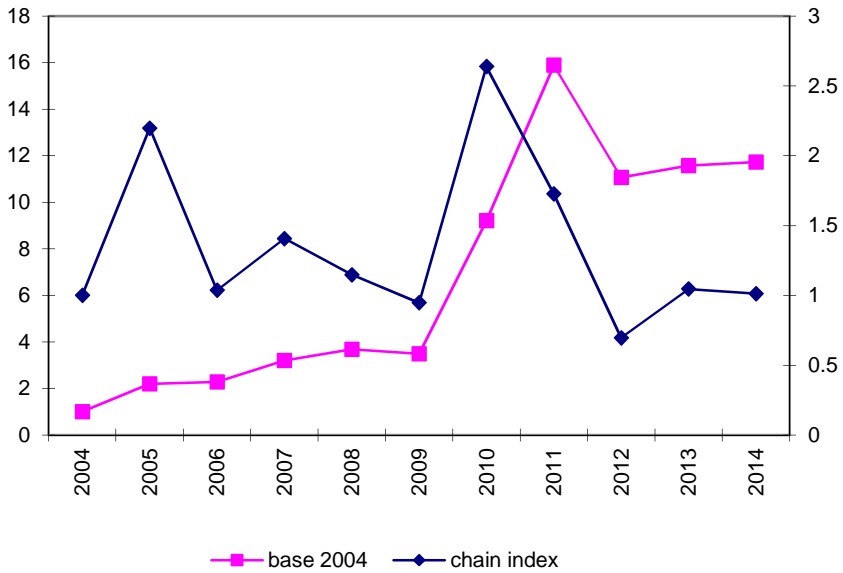
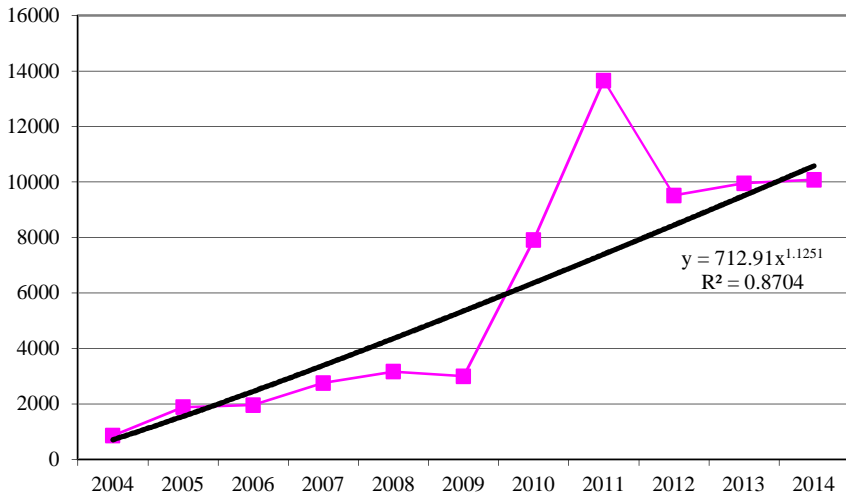
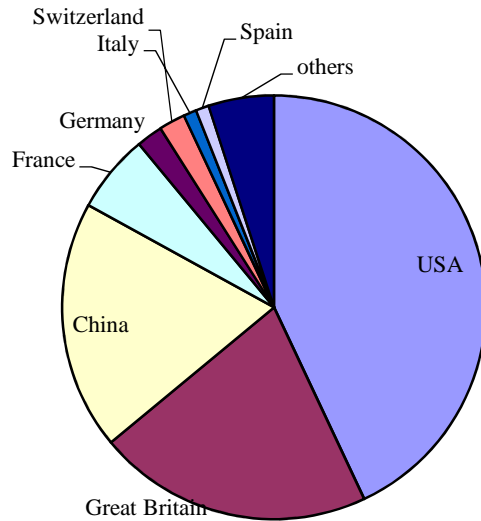


Figure 11. Value of auction sales of works of art in China in m USD in 2004–2014 with trend function



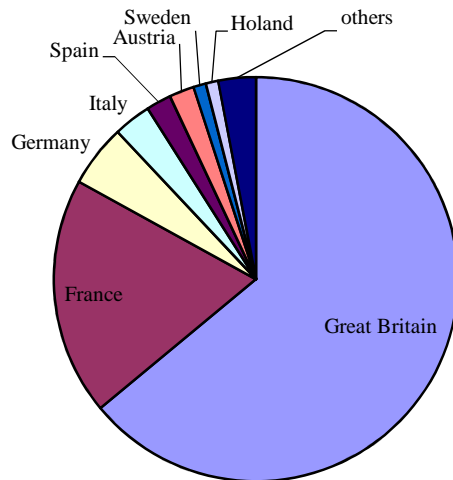
Source: author's own work based on data provided by TEFAF Report (2015), Art Economics and AMMA (Art Market Monitor of Artron).

Figure 12. The shares of countries in the global art market in 2015



Source: author's own work based on data provided by Art Economics (2016).

Figure 13. The shares of selected European Community countries in the European Community art market in 2015



Source: author's own work based on data provided by Art Economics (2016).