What Drives the Chinese Art Market? The Case of Elegant Bribery

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1. Introduction

"Art's New Pecking Order" is the title of the latest Wall Street Journal article covering the meteoric rise of the Chinese art and antiques market over the past decade. Indeed, from its humble beginnings in 1994, the Chinese market has grown to $8.2BN in sales in 2010, becoming the second-largest art market in the world, and accounting for 23% of the global art sales by value[2]. In 2011, three of the ten most expensive artworks sold at auctions were by Chinese artists. In particular, "Eagle Standing on Pine Tree" (1946) by Qi Baishi topped the list when it was auctioned for $65MM at China Guardian in May. And now China has seven of the ten largest auction houses in the world by sales revenue, with the largest two both preparing to open offices in New York by the end of 2012[3]. More importantly, China has developed a large art investment trust market, totalling an estimated $320MM in AUM by the first half of 2011[4]. In addition, China is also a leading force in establishing exchanges to trade shares of artworks, with six already in operation and thirty in the pipeline[5].

Given such phenomenal growth, this study hopes to understand what are the underlying forces that drive the Chinese art and antiques market. To do so, we first construct an index using a Hedonic Regression approach on a novel dataset containing 651,907 lots of paintings and calligraphy works auctioned in China from January 2000 to September 2011. Then, using the constructed art market index, we examine the risk and return characteristics of the Chinese art market, as well as its correlation with macroeconomic variables and returns to other asset classes.

Finally, we explore the impact of corruption on the Chinese art auction market. More specifically, the Chinese have coined the term "elegant bribery" to describe bribery cases that involve cultural objects. The most common scenario of such transactions is as follows: The briber first presents a forged artwork as a gift to the official being bribed, which does not violate the Chinese

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[2] "The Global Art Market 2010 - Crisis and Recovery" by TEFAF, Maastricht, March 2011.

[3] "Big Chinese Auction House Looks to Open Office in New York", by Forbes, 5 May 2011.

[4] "Art and Finance 2012", by Deloitte and ArtTactic, December 2011.

[5] *Ibid.*

anti-corruption laws since such artworks have very low monetary value. Then, the official auctions the painting via an auction house. Finally, the briber attends the auction and purchases the artwork back for a very high price, as if he mistook the work for an original. Since bribery, rather than investment or personal appreciation, is the purpose of such purchases, "elegant bribery" is a significant source of inelastic demand for works of art in the Chinese auction market, driving prices beyond what can be explained by observable characteristics. In this research project, we construct a model to illustrate the mechanisms of "elegant bribery"in the context of an English auction. Then, using data on the amount and the severity of prosecuted corruption cases in various provinces in China from 2000 to 2010 as a proxy for the strength of local enforcement of anti-corruption laws, we test whether bribery is an important function of artworks in China and hence a driving force of the market prices of art.

The paper is organized as follows. In Section 2, we discuss the two relevant literatures, one on the art market and one concerning the economic impact of corruption. Section 3 then discusses our empirical data and details the construction of an index for the Chinese art market using a Hedonic Regression approach. In Section 4, we use the index to conduct further analysis on the driving forces of art prices, including those that have been well documented by the literature on art markets, namely GDP, disposable income, income inequality, and the performance of alternative asset classes. In addition, we present a model of "elegant bribery" and empirically test the impact of corruption on the Chinese art market. Finally, Section 5 concludes.

2. Literature Review

This paper ties together two strands of literature, that on the art market and that on the economic impacts of corruption. In this section, we first review each literature separately and then discuss our contribution.

Since Anderson (1974) and Stein (1977), there has been a growing literature on the art market. In particular, the focus has been to assess the risk and return structure of art investments so that a comparison can be made with other asset classes. To do so, however, one must first construct an index for the art market since, unlike equity and fixed income securities, art is a highly heterogeneous and illiquid asset. In other words, the prices for artworks, especially in tertiary markets such as auction houses, are driven by the marginal buyer rather than the forces of aggregate demand and supply.

In the literature, there are two dominant methodologies to construct an index, Repeat-Sales Regression (RSR) and Hedonic Regression (HR). Repeat-Sales Regression considers only those works that have been sold at least twice. An index is constructed based on the annualized pair-wise returns. Assuming the characteristics of an object is the same over time, this method bypasses the problem of heterogeneity. However, since majority of the artworks auctioned appear only once on the market, this method significantly reduces the sample size. And since most of the works that have been auctioned more than once are often works of higher calibre, this method inherently introduces sample selection bias. In addition, a smaller sample often makes it difficult to construct market indexes for sub-markets and/or sub-periods.

In contrast, the Hedonic Regression approach regards artworks as a bundle of characteristics with implicit prices. This method regresses the art prices on a set of characteristics of the artworks and the associated artists. This allows for the inclusion of all observations, hence making it possible to construct indexes for sub-samples. The main difficulty of this method is the determination of the set of characteristics to be included in the regression. And thus, as argued by Ginsburgh et al. (2006), the results are often highly dependent on the researcher's arbitrary choice of variables.

In the studies that have employed the Hedonic Regression approach, researchers have identified a few observable characteristics that are important in determining art prices. They include characteristics of the artwork itself, information of the artist, features of the auction, and external factors. First of all, in terms of the artwork, researchers have found that art prices correlate positively with 1) the size of the work (to a certain extent), 2) the presence of the artist's signature or some other signs of authenticity, 3) the prestige of the work's provenance, 4) the rarity in terms of its medium, style or subject matter, and 5) its involvement in major exhibitions or publications. In addition, oil paintings often auction for higher prices than other media such as watercolor or pastel works, presumably because of its superior durability. Moreover, other factors such as the topic of the artwork and its time of creation are also significant. However, they are often subject to the taste and the trend of the art market at the time of auction.

Secondly, in terms of the characteristics of the artist, the literature finds that the price of artworks correlate positively with 1) the historical significance of the artist, 2) the participation of the artist in major exhibitions, 3) the prestige of the gallery that represents the artist, 4) the popularity of the subject matter that the artist specializes in at the time of auction, and 5) whether the artwork was produced during the best period of the artist's career. Furthermore, the nationality of the artist, the artistic style that the artist identifies with are also important drivers.

Thirdly, past studies have also discovered that features of the auction itself, including the prestige of the auction house, the location of the sale, the time of the sale, the ordering of the lots, etc., are important determinants of sales prices as well. In addition, researchers such as Ashenfelter and Graddy (2003) and Mei and Moses (2002) have found that the estimated price range provided by auction houses have an anchoring effect on the buyers and hence positively impact the hammer prices. Furthermore, characteristics of the buyers are also significant drivers of prices. More specifically, different buyers vary in behavior, purchase motives, valuations, art historical knowledge, and information sets regarding an artwork, and hence have different willingness to pay. For example, Pommerehne and Feld (1997) have argued that public museums often purchase artworks at above-average prices because they tend to target works whose calibre and historical significance are often not in question. As a result, such works have lower risk and require a higher premium.

Finally, external forces are at play. Spaenjers (2011) have identified economic growth, disposable income (especially of the wealthy class), and lagged equity returns, as important determinants of art prices. As a luxury good, art market is heavily dependent on a strong economy and the presence of a class of wealthy individuals with spare cash to spend. In addition, legislations and favorable tax structures are also important. As pointed out by Plattner (1996), the tax benefits associated with donations to cultural institutions in the US may play some role in art price formation. Finally, Frey and Pommerehne (1989) have argued that art performs well during high inflationary periods because it acts as a good store of value. As a result, we expect CPI and other measures of price levels to be positively correlated with art market performance as well.

There are, of course, major shortcomings to the existing analysis of art markets using auction prices. Industry reports suggest that auctions only account for less than 50% of the artworks transacted in the market, with the rest taking place in galleries and via dealers. However, since the dealer market is highly segmented and not very transparent, it is difficult to obtain comparable data. Moreover, as Goetzmann (1996) argues, auction data have inherent survivorship bias as only works that do not fall out of fashion or are acquired by museums and major private collectors can appear on the auction market. In addition, auction houses (especially the large players) often select only the works of the highest calibre, resulting in a selection bias in the auction data sample. These issues are also present in our study, and hence we need to keep them in mind when interpreting the results.

Next, we turn to the literature on the economic impact of corruption. [To be completed]

3. Chinese Art Market Index

In this section, we first discuss our data and then construct an index for the Chinese art market using a Hedonic Regression approach.

3.1 www.artron.net Database

We obtain auction data from www.artron.net, one of the largest online databases covering auctions of Chinese artworks and antiques. The database contains catalogue information from 6,978 individual auction sessions that took place in China (including Hong Kong, Macau and Taiwan) from its inception in May 1994 to September 2011, totaling 1,994,178 individual lots and over RMB 200BN in sales turnover. The catalogue information provided by the database include the following:

1. Characteristics of the artwork
    - Title[6]
    - Classification of the artwork
    - Size (if available)
    - Medium (if available)
    - Artist (if available)
    - Time when the artwork is produced (if available)
    - Authentication (including presence of signature, artist's stamp, collector's stamp, artist's inscription, collector's inscription, and letter of authentication by art historians)
    - Inclusion in major publications and exhibitions (if available)
2. Auction results
    - Auction house
    - Date of auction
    - Estimated price (upper and lower estimates)
    - Hammer price (if the lot is sold)

[6]Note: Chinese artworks and antiques have titles that are largely descriptive.

Table 1 presents the summary statistics on the database. In particular, we note that by classification, classical-style paintings represent over 47% of the entire sales turnover. Oil paintings and Chinese porcelains are the next two largest groups, each accounting for roughly 11%. In terms of the location of sale, the largest domestic auction houses are concentrated in Beijing, which accounts for over 54% of the total sales. The largest foreign-operated auction houses, namely Sotheby's and Christie's, operate from Hong Kong, which accounts for 19% of overall sales. Furthermore, the Chinese art auction market is concentrated in very few auction houses, with the largest five accounting for over 47% of all sales.

3.2 Our Sample

In this paper, we focus on the works of Chinese artists in the following classifications only: Calligraphy, Classical-style painting, Oil painting, Watercolor and Pastel, and Drawing. These segments together account for 1,235,681 individual lots, and over RMB 126BN in sales, or 63% of the total sales turnover of the entire Chinese art and antiques auction market.

Among the 1,235,681 individual lots in our sample, the database does not report sales price for 540,578 lots, which we assume is an indication that the items were not sold. These observations are removed from our sample. In addition, another 9,940 lots and 29,580 lots are removed because they do not have information on the artist and the size of the work, respectively. Finally, in the resulting in 655,583 lots in our sample, we focus on the 651,907 lots that were auctioned after January 1, 2000. That is because the coverage of the database is much more universal after 2000. Prior to 2000, there are only 613 lots sold per year on average in our sample, compared with an average of 54,326 afterwards. In addition, the average number of auction houses that the database covers is only 2.8 in the years prior to 2000, compared with an average of 75 afterwards.

Table 2 presents the summary statistics on our reduced data sample. We note that in our subsample, classical-style paintings represent 73% of the total sales, followed by oil paintings (16%) and calligraphy (10%). In terms of the composition of our sample by the location of sale and by the auction house, it is largely consistent with the overall www.artron.net database.

3.3 Art Market Price Index

In this section, we use a Hedonic Regression approach to construct price indexes for the Chinese art market. The method was used by Frey and Pommerehne (1989), Buelens and Ginsburgh (1993), Chanel et al. (1996), Renneboog and Spaenjers (2011), among many others. We apply this

methodology because our sample does not identify repeat sales, and it is also difficult to locate repeat sales manually since the titles of Chinese artworks are largely descriptive and hence can be very generic.

3.3.1 Aggregate Market Index

Following Chanel et al. (1996), we use the an OLS regression specification

$$p_{it} = \alpha + \sum_{k=1}^{K} \beta_k b_{ik} + \sum_{\tau=1}^{t} \sum_{j=1}^{J} \gamma_{j\tau} c_{ij\tau} + \sum_{\tau=1}^{T} \delta_\tau d_{i\tau} + \epsilon_{it}, t = 0, ..., T, i = 1, ..., I$$

where p_{it} is the natural log of the price of the item i sold in year t, b_{ik} is the value of item i's time-invariant characteristic k, $c_{ij\tau}$ is the value of item i's time-variant characteristic j at time τ, and $d_{i\tau}$ is 1 if item i is sold in year τ and is 0 otherwise. The coefficients β_k and $\gamma_{j\tau}$ can be interpreted as the implicit prices of the time-invariant and time-variant characteristics at time τ, respectively. Finally, δ_τ is the implicit price of a "characteristic-free" item at time τ, and hence we can derive an annual art market index $Index_\tau = \exp[\delta_\tau + \frac{1}{2}(\sigma_\tau^2 - \sigma_0^2)]$, where $\tau = 1, ..., T, I_0 = 1$ for the initial period, and σ_τ is the standard deviation of the regression residuals in year τ. The second term in constructing the index is important because it corrects for the time-variation in the residuals of the regression, assuming that they are normally distributed.

Given that we do not have information on any time-variant characteristics, and that our sample covers auctions from 2000 to 2011, we modify the regression specification to

$$p_{it} = \alpha + \sum_{k=1}^{K} \beta_k b_{ik} + \sum_{\tau=2001}^{2011} \delta_\tau d_{i\tau} + \epsilon_{it}, t = 2000, ..., 2011, i = 1, ..., 651, 907.$$

And Table 3 presents the summary statistics on the characteristics, b_k, that are included in the regression.

The base-line regression results can be found in Table 4. We report the regression coefficients, standard errors and their significance level. In addition, following Spaenjers (2011), we present an interpretation of the regression coefficients, β_k, in column four. More specifically, since the prices are logged prices, we can calculate the implied incremental impact of the characteristic k on sales prices as $exp(\beta_k) - 1$. We find that, consistent with industry reports, there has been strong market growth in 2004 and 2005, slow to no growth through 2008, and rapid recovery since 2009. In addition, consistent with existing literature findings, our results show that the market performs the best in the second and the fourth quarter, and is the slowest during the first quarter, which usually coincides with the Chinese New Year holidays. In terms of characteristics of the artworks,

oil paintings perform the best, larger paintings sell for a higher price than smaller paintings (but only to a certain extent), and indications of quality (signatures, stamps, inscriptions, exhibition history and publication records) enhance the sales price substantially.

Using the regression results, we then proceed to construct an index for the aggregate Chinese art market. The result can be found in Figure 1. During the period of 2000 to 2011[7], the arithmetic mean rate of return is 20.67% with a standard deviation of 0.3578. The cumulative average growth rate (CAGR) is 15.56% per year. Therefore, the Chinese art market generates a much higher return than its western counterparts, but also at a much higher risk level.

In addition, for robustness check, we also repeat the same procedure using nominal sales prices, and using a semi-annual basis. The results can be found in Figures 2 and 3, respectively. They are largely consistent with the base-line regression results and market price index. Going forward, we will use the semi-annual real-price market index as the basis for analysis.

3.3.2 Sub-market Indexes

For various segments of the art market, we construct additional sub-market indexes, using a semi-annual basis. First of all, based on classification, the results are presented in Figure 4. We note that while the various classes of artworks have largely moved in tandem prior to 2009, calligraphy works have achieved higher growth rates than the others since the crisis.

Similarly, we construct index based on various schools of artists. More specifically, www.artron.net provides a list of artists who are representative of each of the five major schools of painting in China. We use this information to form sub-samples consisting of works only by each particular school of artists, which we then use to conduct regression analysis and compile a market index. The result is in Figure 5. Again, while the indexes have moved in tandem, there is considerable disparity in terms of growth rates in prices. In addition, we also form groups of artists based on the sales price of their most expensive single piece of artwork. More specifically, for all the contemporary artists, we identify the ones who have auctioned the one hundred most expensive pieces of artworks from 1994 to 2011. We do the same for modern artists, classical artists, and artists specialized in oil paintings. Then, we construct an index for each of the artist groups. The results are presented in Figure 6. We find that works by classical artists have achieved the most substantial growth throughout our sample period.

[7]Throughout this paper, the price index and the returns for 2011 are based only on auction results from January to September 2011.

4. Drivers of Art Prices

In this section, we first follow the existing literature and present the correlation of art market returns with macroeconomic variables and the returns on other asset classes. Then, we present evidence on the correlation between local corruption intensity and the art market price index. In addition, we conduct a regression analysis to systematically investigate the relationship.

4.1 Macroeconomic Variables

[To be completed]

4.2 Equity Returns

[To be completed]

4.3 Elegant Bribery

[To be completed]

4.3.1 Model

4.3.2 Regression Analysis and Results

5. Conclusion

[To be completed]

References

Adler, Moshe, 1985, "Stardom and Talent", *American Economic Review*, 75(1): 208-212.

Agnello, Richard J., 2006, "Do U.S. Paintings Follow the CAPM? Findings Disaggregated by Subject, Artist, and Value of the Work", Working Paper, University of Delaware.

Ait-Sahalia, Yacine, Johnathan A. Parker, and Motohiro Yogo, 2004, "Luxury Goods and the Equity Premium", *Journal of Finance*, 59(6): 2959-3004.

Anderson, Robert C., 1974, "Paintings as an Investment", *Economic Inquiry*, 12(1): 13-26.

Ashenfelter, Orley, 1989, "How Auctions Work for Wine and Art", *Journal of Economic Perspectives*, 3(3): 23-36.

Ashenfelter, Orley, 2003, "Art auctions", in Towse, Ruth (ed.), *A Handbook of Cultural Economics*, Edward Elgar, Cheltenham, UK and Northampton, MA, USA: 32-39.

Ashenfelter, Orley, and Kathryn Graddy, 2003, "Auctions and the Price of Art", *Journal of Economic Literature*, 41(3): 763-787.

Ashenfelter, Orley, and Kathryn Graddy, 2011, "Sale Rates and Price Movements in Art Auctions", *American Economic Review*, 101(3): 21216.

Atukeren, Erdal, and Aylin Sekin, 2007, "On the valuation of psychic returns to art market investments", *Economics Bulletin*, 26(5): 1-12.

Baumol, William J., 1986, "Unnatural Value: Or Art Investment as Floating Crap Game", *American Economic Review, Papers and Proceedings*, 76(2): 10-14.

Becker, Howard S., 1982, *Art Worlds*, University of California Press, Berkeley.

Beggs, Alan, and Kathryn Graddy, 1997, "Declining Values and the Afternoon Effect: Evidence from Art Auctions", *RAND Journal of Economics*, 28(3): 544-565.

Beggs, Alan, and Kathryn Graddy, 2005, "Testing for Reference Dependence: An Application to the Art Market", *CEPR Discussion Paper No. 4982.*

Beggs, Alan, and Kathryn Graddy, 2006, "Failure to Meet the Reserve Price: The Impact on Returns to Art", *CEPR Discussion Paper No. 5811.*

Beggs, Alan, and Kathryn Graddy, 2009, "Anchoring Effects: Evidence from Art Auctions", *American Economic Review*, 99(3): 1027-1039.

Bryan, Michael F., 1985, "Beauty and the Bulls: The Investment Characteristics of Paintings", *Economic Review*, Federal Reserve Bank of Cleveland, 1: 2-10.

Buelens, Nathalie, and Victor Ginsburgh, 1993, "Revisiting Baumols art as floating crap game", *European Economic Review*, 37(7): 1351-1371.

Burton, Burton J., and Joyce P. Jacobsen, 1999, "Measuring Returns on Investments in Collectibles", *Journal of Economic Perspectives*, 13(4): 193-212.

Candela, G. and A.E. Scorcu, 1997, "A Price Index for Art Market Auctions: An Application to the Italian Market of Modern and Contemporary Oil Paintings", *Journal of Cultural Economics*, 21(3): 175-196.

Candela, G. and A.E. Scorcu, 2001, "In Search of Stylized Facts on Art Market Prices: Evidence from the Secondary Market for Prints and Drawings in Italy", *Journal of Cultural Economics*, 25(3): 219-231.

Cannon-Brookes, Peter, 1996, "Art Investment and the British Rail Pension Fund", *Museum Management and Curatorship*, 15(4): 406-407.

Cevik, Serhan, and Tahsin Saadi Sedik, "A Barrel of Oil or a Bottle of Wine: How Do Global Growth Dynamics Affect Commodity Prices?", IMF Working Paper No. 11/1.

Chanel, Olivier, 1995, "Is art market behaviour predictable?", *European Economic Review*, 39(3-4): 519-527.

Chanel, Olivier, Louis-Andr Grard-Varet. and Victor Ginsburgh, 1996, "The Relevance of Hedonic Price Indices: The Case of Paintings", *Journal of Cultural Economics*, 20(1): 1-24.

Coffman, Richard B., 1991, "Art Investment and Asymmetrical Information", *Journal of Cultural Economics*, 15(2): 8394.

Collins, A., Scorcu, A.E. and Zanola, R. (2007), "Sample Selection Bias and Time Instability of Hedonic Art Price Indices", Working Paper, Dipartimento Scienze Economiche, Universit di Bologna.

Cowan, Robin, William Cowan, and Peter Swan, 1997, "A model of demand with interactions among consumers", *International Journal of Industrial Organization*, 15: 711-732.

Czujack, Corinna, 1997, "Picasso Paintings at Auction, 1963–1994", *Journal of Cultural Economics*, 21(3): 229-247.

Czujack, Corinna, and Maria F. O. Martins, 2004, "Do art specialists form unbiased pre-sale estimates? An application for Picasso paintings", *Applied Economics Letters*, 11(4): 245-249.

D'Souza, Clare , and David Prentice, 2002, "Auctioneer strategy and pricing: evidence from an art auction", *Marketing Intelligence Planning*, 20(7): 417-427.

Edwards, Sebastian, 2004, "The Economics of Latin American Art: Creativity Patterns and Rates of Return", NBER Working Paper No. 10302.

Ekelund Jr., R.B., Rand W. Ressler, and John K. Watson, 2000, "The Death-Effect in Art Prices: A Demand-Side Exploration", *Journal of Cultural Economics*, 24(4): 283-300.

Flores, Renato, Victor Ginsburgh, and Philippe Jeanfils, 1999, "Long- and Short-Term Portfolio Choices of Paintings", *Journal of Cultural Economics*, 23(3): 193-210.

Frey, Bruno S., 1997, "Art Markets and Economics: Introduction", *Journal of Cultural Economics*, 21(3): 165-173.

Frey, Bruno S., and Reiner Eichenberger, 1995, "On the Return of Art Investment Return Analyses", *Journal of Cultural Economics*, 19(3): 207-220.

Frey, Bruno S., and Reiner Eichenberger, 1995, "On the Rate of Return in the Art Market: Survey and Evaluation", *European Economic Review*, 39: 528-537.

Frey, Bruno S., and Werner W. Pommerehne, 1989, "Art Investment: An Empirical Inquiry", *Southern Economic Journal*, 56(2): 396-409.

Galenson, David W., 1999, "Quantifying Artistic Success: Ranking French Painters and Paintings from Impressionism to Cubism", NBER Working Paper No. 7407.

Galenson, David W., 2000, "The Careers of Modern Artists: Evidence from Auctions of Contemporary Art", *Journal of Cultural Economics*, 24(2): 87-112.

Galenson, David W., 2005, "Anticipating Artistic Success: Lessons from History", NBER Working Paper No. 11152.

Galenson, David W., and Bruce A. Weinberg, 2000, "Age and the Quality of Work: The Case of Modern American Painters", *Journal of Political Economy*, 108(4): 761-777.

Ginsburgh, Victor, and Philippe Jeanfils, 1995, "Long-term comovements in international markets for paintings", *European Economic Review*, 39(3-4): 538-548.

Ginsburgh, Victor, and Sheila Wyers, 2006, "Creativity and life cycles of artists", *Journal of Cultural Economics*, 30(2): 91-107.

Goetzmann, William N., 1993, "Accounting for Taste: Art and the Financial Markets over Three Centuries", *American Economic Review*, 83(5): 1370-1376.

Goetzmann, William N., and Matthew Spiegel, 1995, "Private value components, and the winners curse in an art index", *European Economic Review*, 39: 549-555.

Goetzmann, William N., Luc Renneboog, and Christophe Spaenjers, 2010, "Art and Money", *American Economic Review*, 2011, 101(3): 222-226.

Heilbrun, James. and Charles M. Gray, 2001, *The Economics of Art and Culture*, Second edition, Cambridge University Press, Cambridge.

Hiraki, Takato, Akitoshi Ito, Darius A. Spieth, and Naoya Takezawa, 2005, "How Did Japanese Investments Influence International Art Prices?", Yale ICF Working Paper No. 03-09.

Hodgson, Douglas J., and Keith P. Vorkink, 2004, "Asset Pricing Theory and the Valuation of Canadian Paintings", *Canadian Journal of Economics*, 37(3): 629-655.

Holub, H.W., M. Hutter, and G. Tappeiner, 1993, "Light and Shadow in Art Price Computation", *Journal of Cultural Economics*, 17(1): 49-69.

Hutter, Michael, Christian Knebel, Gunnar Pietzner, and Maren Schfer, 2007, "Two games in town: a comparison of dealer and auction prices in contemporary visual arts markets", *Journal of Cultural Economics*, 31(4): 247-261.

Keen, Geraldine, 1971, *Money and Art: A Study Based on the Times-Sothebys Index*, Putnam, New York.

Krussl, Roman, and Niels van Elsland, 2008, "Constructing the True Art Market Index—A Novel 2-Step Hedonic Approach and its Application to the German Art Market", CFS Working Paper No. 2008/11.

Landes, William M., 2000, "Winning the Art Lottery: The Economic Returns to the Ganz Collection", John M. Olin Law and Economics Working Paper No. 76.

Lazarro, Elisabetta, 2006, "Assessing Quality in Cultural Goods: The Hedonic Value of Originality in Rembrandts Prints", *Journal of Cultural Economics*, 30(1): 15-40.

Locatelli, Marilena, and Roberto Zanola, 2005, "The Market for Picasso Prints: A Hybrid Model Approach", *Journal of Cultural Economics*, 29(2): 127-136.

Louargand, M.A., and J. R. McDaniel, 1991, "Price Efficiency in the Art Auction Market", *Journal of Cultural Economics*, 15(2): 53-65.

Mandel, Benjamin R., 2010, "Art as an Investment and Conspicuous Consumption Good", *American Economic Review* 99(4): 1653-1663.

Martin, Benedicte, 2007, "How Visual Artists Enter the Contemporary Art Market in France: A Dynamic Approach Based on a Network of Tests", *International Journal of Arts Management*, 9(3): 16-32.

McAndrew, Clare, and Rex Thompson, 2007, "The Collateral Value of Fine Art", *Journal of Banking and Finance*, 31(3): 589-607.

Mei, Jianping, and Micheal Moses, 2002, "Art as an Investment and the Under-performance of Masterpieces", *American Economic Review*, 92(5): 1656-1668.

Mei, Jianping, and Micheal Moses, 2002, "Are Investors Credulous? Some Preliminary Evidence from Art Auctions", Working Paper, Stern School of Business, New York University.

Mei, Jianping, and Micheal Moses, 2005, "Vested Interest and Biased Price Estimates: Evidence from an Auction Market", *Journal of Finance*, 60(5): 2409-2435.

Mok, Henry M. K., Vivian W. K. Ko, Salina S. M. Woo, and Katherina Y. S. Kwok, 1993, "Modern Chinese Paintings: An Investment Alternative?", *Southern Economic Journal*, 59(4): 808-816.

Pesando, James E., 1993, "Art as an Investment: The Market for Modern Prints", *American Economic Review*, 83(5): 1075-1089.

Pesando, James E., and Pauline M. Shum, 1999, "The Returns to Picassos Prints and to Traditional Financial Assets, 1977 to 1996", *Journal of Cultural Economics*, 23(3): 183-192.

Pesando, James E., and Pauline M. Shum, 2007, "The law of one price, noise and irrational exuberance: the auction market for Picasso prints", *Journal of Cultural Economics*, 31(4): 263-277.

Pesando, James E., and Pauline M. Shum, 2008, "The Auction Market for Modern Prints: Confirmations, Contradictions, and New Puzzles", *Economic Inquiry*, 46(1): 149-159.

Pommerehne, Werner, and Lars P. Feld, 1997, "The Impact of Museum Purchase on the Auction Prices of Paintings", *Journal of Cultural Economics*, 21(3): 249-271.

Reitlinger, Gerald, 1961, *The Economics of Taste, Vol. I: The Rise and Fall of Picture Prices 1760–1960*, Barrie and Rockliff, London.

Reitlinger, Gerald, 1963, *The Economics of Taste, Vol. II: The Rise and Fall of Picture Prices 1760–1960*, Barrie and Rockliff, London, reissued 1982 by Hacker Art Books, New York.

Reitlinger, Gerald, 1970, *The Economics of Taste, Vol. III: The Art Market in the 1960s*, Barrie and Rockliff, London, reissued 1982 by Hacker Art Books, New York.

Renneboog, Luc, and Christophe Spaenjers, 2011, "Buying beauty: On prices and returns in the art market", Working Paper, Tilburg University.

Renneboog, Luc, and Tom van Houtte, 2002, "The monetary appreciation of paintings: from realism to Magritte", *Cambridge Journal of Economics*, 26(3): 331-357.

Rosen, Sherwin, 1981, "The Economics of Superstars", *American Economic Review*, 71(5): 845-858.

Schnfeld, Susanne, and Andreas Reinstaller, 2007, "The effects of gallery and artist reputation on prices in the primary market for art: a note", *Journal of Cultural Economics*, 31(2): 143-153.

Singer, Leslie P., 1978, "Microeconomics of the Art Market", *Journal of Cultural Economics*, 2(1): 21-40.

Singer, Leslie P., 1981, "Rivalry and Externalities in Secondary Art Markets", *Journal of Cultural Economics*, 5(2): 39-57.

Singer, Leslie P., 1990, "The Utility of Art versus Fair Bets in the Investment Market", *Journal of Cultural Economics*, 14(2): 1-13.

Singer, Leslie P., and Gary A. Lynch, 1997, "Are Multiple Art Markets Rational?", *Journal of Cultural Economics*, 21(3): 197-218.

Spaenjers, Christophe, 2011, "Returns and Fundamentals in International Art Markets", Working Paper, HEC Paris.

Stein, John P., 1977, "The Monetary Appreciation of Paintings", *Journal of Political Economy*, 85(5): 1021-1036.

Stoller, M. A., 1984, "The Economics of Collectible Goods", *Journal of Cultural Economics*, 8(1): 91-104.

Swann, Peter, 2001, "Is the world flat or round? Mapping changes in the Taste for Art", MERIT-Infonomics Research Memorandum Series No. 2001-009.

Tucker, Michael, Walter Hlawischka, and Jeff Pierne, 1995, "Art as an Investment: A Portfolio Allocation Analysis", *Managerial Finance*, 21(6): 16-24.

Ursprung, Heinrich W., and Christian Wiermann, 2008, "Reputation, Price and Death: An Empirical Analysis of Art Price Formation", CESifo Working Paper No. 2237.

Valsan, Calin, 2002, "Canadian versus American Art: What Pays Off and Why", *Journal of Cultural Economics*, 26(3): 203-216.

Velthuis, Olav, 2005, *Talking Prices: Symbolic Meanings of Prices on the Market for Contemporary Art*, Princeton University Press, Princeton and Oxford.

Watson, Peter, 1992, *From Manet to Manhattan: The Rise of the Modern Art Market*, Random House, New York.

Worthington, Andrew C., and Helen Higgs, 2004, "Art as an investment: risk, return and portfolio diversification in major painting markets", *Accounting and Finance*, 44(2): 257-271.

Worthington, Andrew C., and Helen Higgs, 2006, "A Note on Financial Risk, Return and Asset Pricing in Australian Modern and Contemporary Art", *Journal of Cultural Economics*, 30(1): 73-84.

Table I Summary Statistics of www.artron.net Database

	# of Lots Auctioned	# of Lots Sold	% Sold	Total Turnover (RMB)	% of Total Turnover	Average Price per Lot (RMB)
Total	1,994,178	1,119,747	56.15%	200,436,322,891	100.00%	179,001
By Classification						
Calligraphy	246,919	137,494	55.68%	13,606,964,415	6.79%	98,964
Classical-style Painting	917,923	509,940	55.55%	95,145,859,680	47.47%	186,582
Oil Painting	65,211	44,065	67.57%	22,655,012,195	11.30%	514,127
Watercolor & Pastel	4,223	2,739	64.86%	319,385,953	0.16%	116,607
Drawing	1,405	865	61.57%	129,774,422	0.06%	150,028
Porcelain	148,386	70,796	47.71%	21,918,024,793	10.94%	309,594
Furniture	20,388	10,910	53.51%	3,806,704,526	1.90%	348,919
Carving	55,995	28,717	51.28%	3,947,188,904	1.97%	137,451
Jade & Jewelry	126,103	58,191	46.15%	12,907,947,861	6.44%	221,820
Books	67,058	39,728	59.24%	2,361,607,966	1.18%	59,444
Buddhist Artworks	21,500	11,018	51.25%	3,429,821,361	1.71%	311,293
Other	319,067	205,284	64.34%	20,208,030,815	10.08%	98,439
By Location						
Beijing	1,034,411	611,510	59.12%	108,721,075,987	54.24%	177,791
Shanghai	298,149	174,628	58.57%	18,317,693,737	9.14%	104,896
Tianjin	48,844	27,573	56.45%	2,241,204,398	1.12%	81,283
HK, Macau, Taiwan						
Hong Kong	126,701	76,640	60.49%	37,908,572,162	18.91%	494,632
Macau	3,499	1,782	50.93%	2,118,677,786	1.06%	1,188,933
Taiwan	7,175	5,410	75.40%	2,790,691,993	1.39%	515,840
Total	137,375	83,832	61.02%	42,817,941,941	21.36%	510,759
East						
Anhui	17,523	2,466	14.07%	222,223,610	0.11%	90,115
Jiangsu	63,872	28,095	43.99%	4,200,419,599	2.10%	149,508
Shandong	23,733	14,387	60.62%	2,099,858,761	1.05%	145,955
Zhejiang	114,750	58,335	50.84%	9,497,035,182	4.74%	162,802
Total	219,878	103,283	46.97%	16,019,537,152	7.99%	155,103
South						
Fujian	18,355	8,568	46.68%	537,617,203	0.27%	62,747
Guangdong	112,333	53,987	48.06%	6,014,224,490	3.00%	111,401
Hainan	893	163	18.25%	36,878,490	0.02%	226,248
Total	131,581	62,718	47.66%	6,588,720,183	3.29%	105,053
Central						
Henan	42,461	21,216	49.97%	1,656,111,942	0.83%	78,060
Hubei	212	167	78.77%	25,390,400	0.01%	152,038
Hunan	800	236	29.50%	6,353,484	0.00%	26,922
Total	43,473	21,619	49.73%	1,687,855,826	0.84%	78,073
Northwest						
Gansu	2,764	1,859	67.26%	516,322,436	0.26%	277,742
Ningxia	414	115	27.78%	2,602,600	0.00%	22,631
Shan1xi	18,659	2,996	16.06%	38,707,138	0.02%	12,920
Shan3xi	17,304	8,895	51.40%	1,459,711,104	0.73%	164,105
Total	39,141	13,865	35.42%	2,017,343,278	1.01%	145,499
Northeast						
Heilongjiang	298	-	0.00%	-	0.00%	-
Jilin	1,791	929	51.87%	83,192,730	0.04%	89,551
Liaoning	17,264	11,318	65.56%	1,220,528,307	0.61%	107,840
Total	19,353	12,247	63.28%	1,303,721,037	0.65%	106,452
North						
Hebei	476	-	0.00%	-	0.00%	-
Inner Mongolia	283	-	0.00%	-	0.00%	-
Total	759	-	0.00%	-	0.00%	-
Southwest						
Chongqing	3,153	1,835	58.20%	118,841,596	0.06%	64,764
Guangxi	359	-	0.00%	-	0.00%	-
Sichuan	6,248	3,438	55.03%	276,673,868	0.14%	80,475
Yunnan	11,454	3,199	27.93%	325,713,888	0.16%	101,817
Total	21,214	8,472	39.94%	721,229,352	0.36%	85,131
By Auction House						
China Guardian	235,942	175,909	74.56%	24,851,014,521	12.40%	141,272
Beijing Poly International	79,434	56,022	70.53%	21,555,438,711	10.75%	384,767
Sothebys HK	26,375	19,557	74.15%	18,573,049,088	9.27%	949,688
Christies HK	30,906	22,300	72.15%	17,699,129,138	8.83%	793,683
Beijing Hanhai	102,641	68,429	66.67%	10,826,096,050	5.40%	158,209
Others	1,518,880	777,530	51.19%	106,931,595,383	53.35%	137,527
By Auction Year						
1994	1,426	176	12.34%	57,478,129	0.03%	326,580
1995	2,111	503	23.83%	52,573,930	0.03%	104,521
1996	4,335	2,084	48.07%	201,691,456	0.10%	96,781
1997	2,233	895	40.08%	61,040,100	0.03%	68,201
1998	2,127	1,293	60.79%	101,240,050	0.05%	78,299
1999	1,831	674	36.81%	39,237,761	0.02%	58,216
2000	6,775	2,733	40.34%	196,634,613	0.10%	71,948
2001	16,313	7,169	43.95%	476,369,509	0.24%	66,449
2002	22,306	12,093	54.21%	443,876,972	0.22%	36,705
2003	51,076	26,725	52.32%	677,737,400	0.34%	25,360
2004	120,434	79,053	65.64%	5,835,537,776	2.91%	73,818
2005	180,981	107,695	59.51%	14,157,193,356	7.06%	131,456
2006	210,803	101,196	48.01%	14,459,393,284	7.21%	142,885
2007	204,977	117,686	57.41%	20,687,635,926	10.32%	175,787
2008	208,386	107,652	51.66%	16,698,218,255	8.33%	155,113
2009	231,654	141,800	61.21%	21,084,049,395	10.52%	148,689
2010	389,672	229,558	58.91%	54,850,890,328	27.37%	238,941
2011	336,738	180,762	53.68%	50,355,524,651	25.12%	278,574

Table II Summary Statistics of Our Sample				
	# of Lots Sold	Total Turnover (RMB)	% of Total Turnover	Average Price per Lot (RMB)
Total	651,907	126,472,862,911	100.00%	194,005
By Classification				
Calligraphy	132,058	13,027,476,858	10.30%	98,650
Classical-style Painting	475,968	92,145,167,792	72.86%	193,595
Oil Painting	40,665	20,920,897,103	16.54%	514,469
Watercolor & Pastel	2,456	274,037,088	0.22%	111,579
Drawing	760	105,284,070	0.08%	138,532
By Location				
Beijing	322,361	74,294,728,183	58.74%	230,471
Shanghai	108,181	13,922,160,888	11.01%	128,693
Tianjin	16,540	1,348,238,338	1.07%	81,514
HK, Macau, Taiwan				
Hong Kong	28,425	14,023,240,708	11.09%	493,342
Macau	623	293,515,397	0.23%	471,132
Taiwan	3,596	2,131,238,991	1.69%	592,669
Total	32,644	16,447,995,096	13.01%	503,860
East				
Anhui	2,098	200,657,410	0.16%	95,642
Jiangsu	18,253	2,029,455,298	1.60%	111,185
Shandong	11,755	1,932,166,465	1.53%	164,370
Zhejiang	42,280	7,143,781,319	5.65%	168,964
Total	74,386	11,306,060,492	8.94%	151,992
South				
Fujian	6,404	197,740,584	0.16%	30,878
Guangdong	45,250	4,523,706,676	3.58%	99,971
Hainan	136	29,196,530	0.02%	214,680
Total	51,790	4,750,643,790	3.76%	91,729
Central				
Henan	20,461	1,604,362,056	1.27%	78,411
Hubei	164	25,342,240	0.02%	154,526
Hunan	219	5,925,084	0.00%	27,055
Total	20,844	1,635,629,380	1.29%	78,470
Northwest				
Gansu	972	349,812,810	0.28%	359,890
Ningxia	113	2,532,200	0.00%	22,409
Shan1xi	2,865	38,156,434	0.03%	13,318
Shan3xi	8,448	1,433,733,544	1.13%	169,713
Total	12,398	1,824,234,988	1.44%	147,139
Northeast				
Jilin	910	81,032,680	0.06%	89,047
Liaoning	6,155	579,146,358	0.46%	94,094
Total	7,065	660,179,038	0.52%	93,444
Southwest				
Chongqing	1,280	74,870,146	0.06%	58,492
Sichuan	2,766	130,080,546	0.10%	47,028
Yunnan	1,652	78,042,026	0.06%	47,241
Total	5,698	282,992,718	0.22%	49,665
By Auction House				
China Guardian	71,375	15,103,950,230	11.94%	247,070
Beijing Poly International	25,938	17,634,602,722	13.94%	582,310
Sothebys HK	5,189	6,345,533,519	5.02%	1,222,882
Christies HK	7,208	6,922,190,264	5.47%	960,348
Beijing Hanhai	36,676	6,529,350,466	5.16%	178,028
Others	505,521	73,937,235,710	58.46%	146,259
By Auction Year				
2000	2,464	178,811,908	0.14%	72,570
2001	3,886	212,850,755	0.17%	54,774
2002	7,981	289,332,753	0.23%	36,253
2003	14,633	389,372,954	0.31%	26,609
2004	51,661	4,025,217,550	3.18%	77,916
2005	75,947	10,978,163,181	8.68%	144,550
2006	68,618	9,130,679,248	7.22%	133,065
2007	68,119	11,293,171,519	8.93%	165,786
2008	59,002	8,219,807,550	6.50%	139,314
2009	72,374	12,667,982,733	10.02%	175,035
2010	125,599	35,190,103,387	27.82%	280,178
2011	101,623	33,897,369,373	26.80%	333,560

Table III Summary Statistics of Characteristics included in Base-line Regression				
	Number of Observations	Mean	Number of Observations==0	Number of Observations==1
Auction Characteristics				
Auction House Dummies (310 Auction Houses in our sample)	651,907			
Year Dummmies				
2000	651,907	0.003780	649,443	2,464
2001	651,907	0.005961	648,021	3,886
2002	651,907	0.012243	643,926	7,981
2003	651,907	0.022447	637,274	14,633
2004	651,907	0.079246	600,246	51,661
2005	651,907	0.116500	575,960	75,947
2006	651,907	0.105257	583,289	68,618
2007	651,907	0.104492	583,788	68,119
2008	651,907	0.090507	592,905	59,002
2009	651,907	0.111019	579,533	72,374
2010	651,907	0.192664	526,308	125,599
2011	651,907	0.155886	550,284	101,623
Month Dummies				
January	651,907	0.070909	605,681	46,226
February	651,907	0.004886	648,722	3,185
March	651,907	0.055391	615,797	36,110
April	651,907	0.064690	609,735	42,172
May	651,907	0.087378	594,945	56,962
June	651,907	0.162907	545,707	106,200
July	651,907	0.100060	586,677	65,230
August	651,907	0.049102	619,897	32,010
September	651,907	0.072148	604,873	47,034
October	651,907	0.037676	627,346	24,561
November	651,907	0.120488	573,360	78,547
December	651,907	0.174365	538,237	113,670
Characteristics of the Artwork				
Artist Dummies (39,975 Artists in our sample)	651,907			
Time of Production Dummies (107 classifications)	651,907			
Classification Dummies				
Calligraphy	651,907	0.202572	519,849	132,058
Classical-style Painting	651,907	0.730116	175,939	475,968
Drawing	651,907	0.001166	651,147	760
Oil Painting	651,907	0.062379	611,242	40,665
Watercolor & Pastel	651,907	0.003767	649,451	2,456
Size				
Height (cm)	651,907	70.33		
Height^2 (cm^2)	651,907	9,595.85		
Width (cm)	651,907	89.47		
Width^2 (cm^2)	651,907	10,393.98		
Medium Dummies				
Metal Powder and Metal Leaf	651,907	0.010368	645,148	6,759
Acrylic	651,907	0.003010	649,945	1,962
Pastel	651,907	0.002217	650,462	1,445
Ink	651,907	0.185571	530,932	120,975
Oil	651,907	0.094099	590,563	61,344
Support Dummies				
Xuan Paper	651,907	0.001008	651,250	657
Silk	651,907	0.052040	617,982	33,925
Panel	651,907	0.006789	647,481	4,426
Canvas	651,907	0.061311	611,938	39,969
Paper	651,907	0.807262	125,647	526,260
Other Characteristic Dummies				
Signed	651,907	0.003809	649,424	2,483
Stamped	651,907	0.383394	401,970	249,937
Inscribed	651,907	0.016027	641,459	10,448
Authenticity	651,907	0.010327	645,175	6,732
Exhibited	651,907	0.039159	626,379	25,528
Published	651,907	0.051179	618,543	33,364

Table IV Baseline Regression Results			
	Coefficient	Robust Standard Error	Incremental Impact on Prices
Variables			
Auction Characteristics			
Auction House Dummies	[Included]		
Year Dummmies			
2000	[Left out]		
2001	0.289 ***	0.029	33.50%
2002	-0.462 ***	0.029	-37.02%
2003	0.054 **	0.027	5.53%
2004	0.637 ***	0.026	89.11%
2005	1.174 ***	0.026	223.40%
2006	1.123 ***	0.026	207.27%
2007	1.027 ***	0.026	179.37%
2008	0.956 ***	0.026	160.07%
2009	0.999 ***	0.026	171.54%
2010	1.339 ***	0.026	281.54%
2011	1.676 ***	0.026	434.29%
Month Dummies			
January	[Left out]		
February	-0.387 ***	0.020	-32.06%
March	-0.054 ***	0.009	-5.24%
April	0.055 ***	0.009	5.70%
May	0.434 ***	0.008	54.33%
June	0.404 ***	0.007	49.81%
July	0.250 ***	0.008	28.40%
August	0.052 ***	0.009	5.38%
September	0.120 ***	0.008	12.79%
October	0.066 ***	0.011	6.80%
November	0.505 ***	0.008	65.66%
December	0.454 ***	0.007	57.46%
Characteristics of the Artwork			
Artist Dummies	[Included]		
Time of Production Dummies	[Included]		
Classification Dummies			
Calligraphy	[Left out]		
Classical-style Painting	0.730 ***	0.009	107.60%
Drawing	0.818 ***	0.049	126.50%
Oil Painting	2.099 ***	0.031	715.93%
Watercolor & Pastel	1.382 ***	0.041	298.33%
Size			
Height (cm)	0.007 ***	0.000	0.67%
Height^2 (cm^2)	0.000 ***	0.000	0.00%
Width (cm)	0.005 ***	0.000	0.47%
Width^2 (cm^2)	0.000 ***	0.000	0.00%
Medium Dummies			
Metal Powder and Metal Leaf	0.174 ***	0.013	19.06%
Acrylic	-0.183 ***	0.031	-16.73%
Pastel	-0.027	0.035	-2.62%
Ink	0.237 ***	0.005	26.69%
Oil	-0.167	0.022	-15.40%
Support Dummies			
Xuan Paper	0.452 ***	0.046	57.10%
Silk	0.279 ***	0.012	32.16%
Panel	0.091 ***	0.020	9.54%
Canvas	0.488 ***	0.017	62.87%
Paper	0.223 ***	0.008	25.01%
Other Characteristic Dummies			
Signed	0.248 ***	0.025	28.12%
Stamped	0.058 ***	0.003	5.93%
Inscribed	0.798 ***	0.014	122.14%
Authenticity	0.499 ***	0.013	64.73%
Exhibited	0.386 ***	0.009	47.05%
Published	0.346 ***	0.007	41.40%
Constant	7.655 ***	0.074	
Observations	651,907		
R-squared	0.684		
Adjusted R-squared	0.663		

*** p<0.01, ** p<0.05, * p<0.1

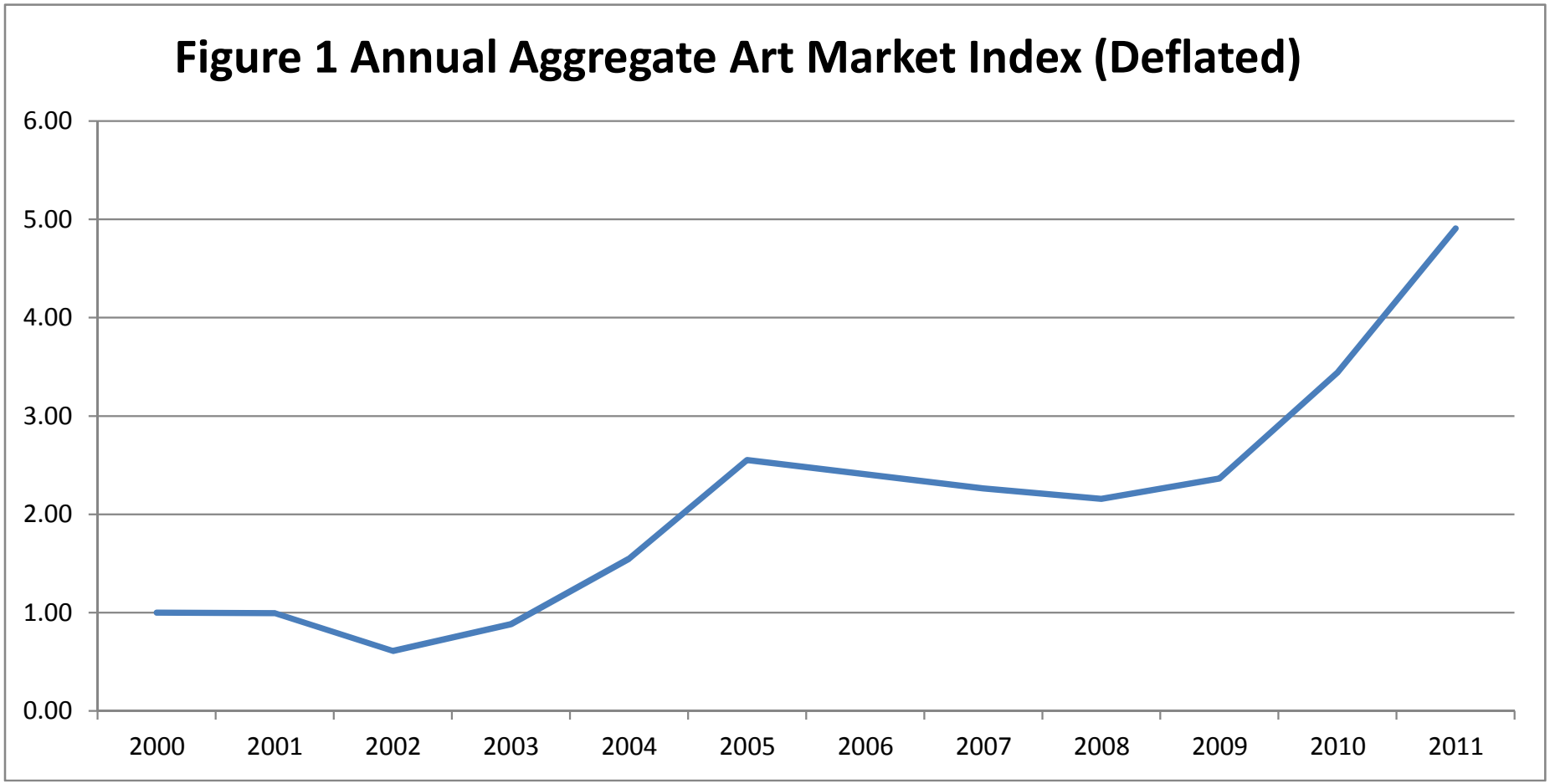
Figure 1 Annual Aggregate Art Market Index (Deflated)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

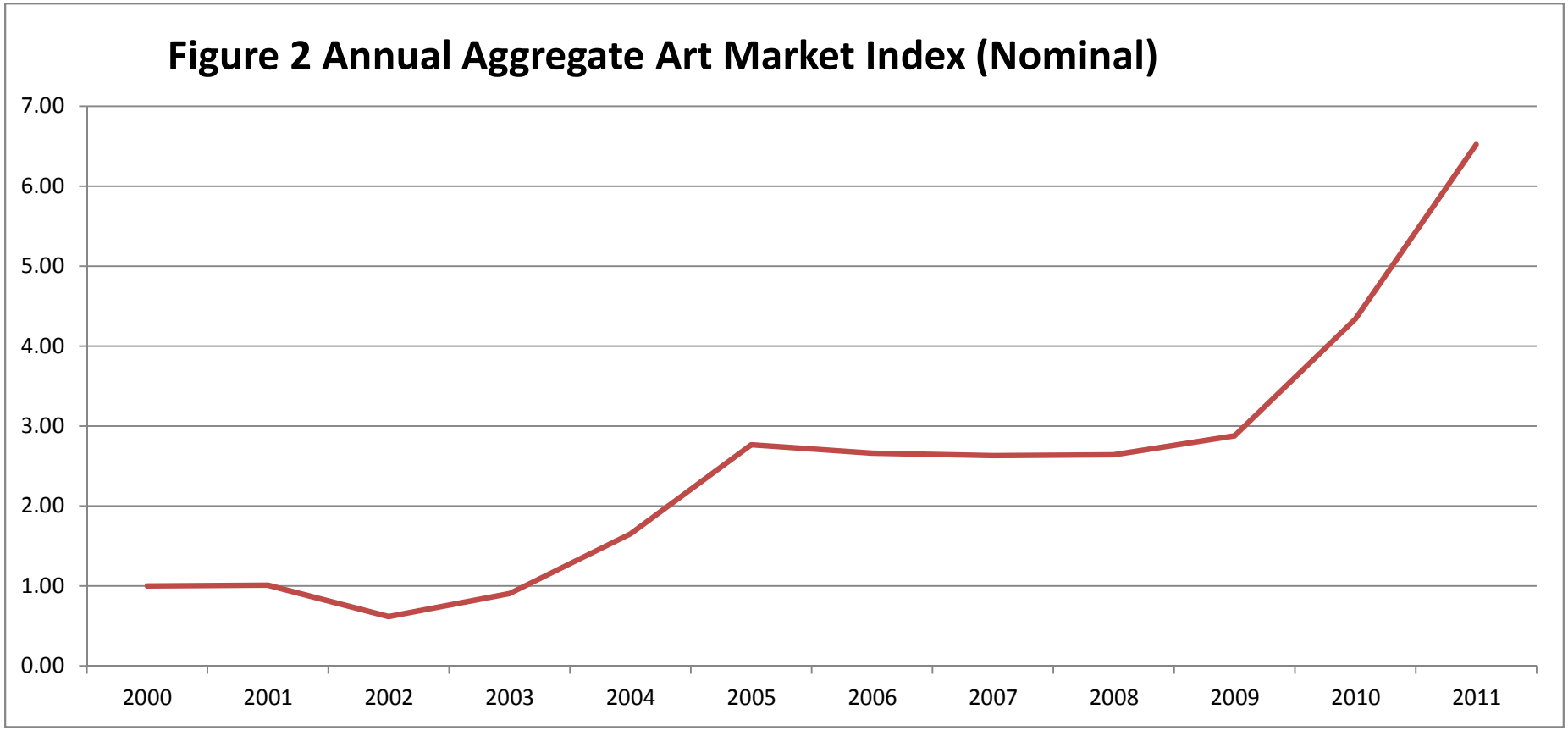
Figure 2 Annual Aggregate Art Market Index (Nominal)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

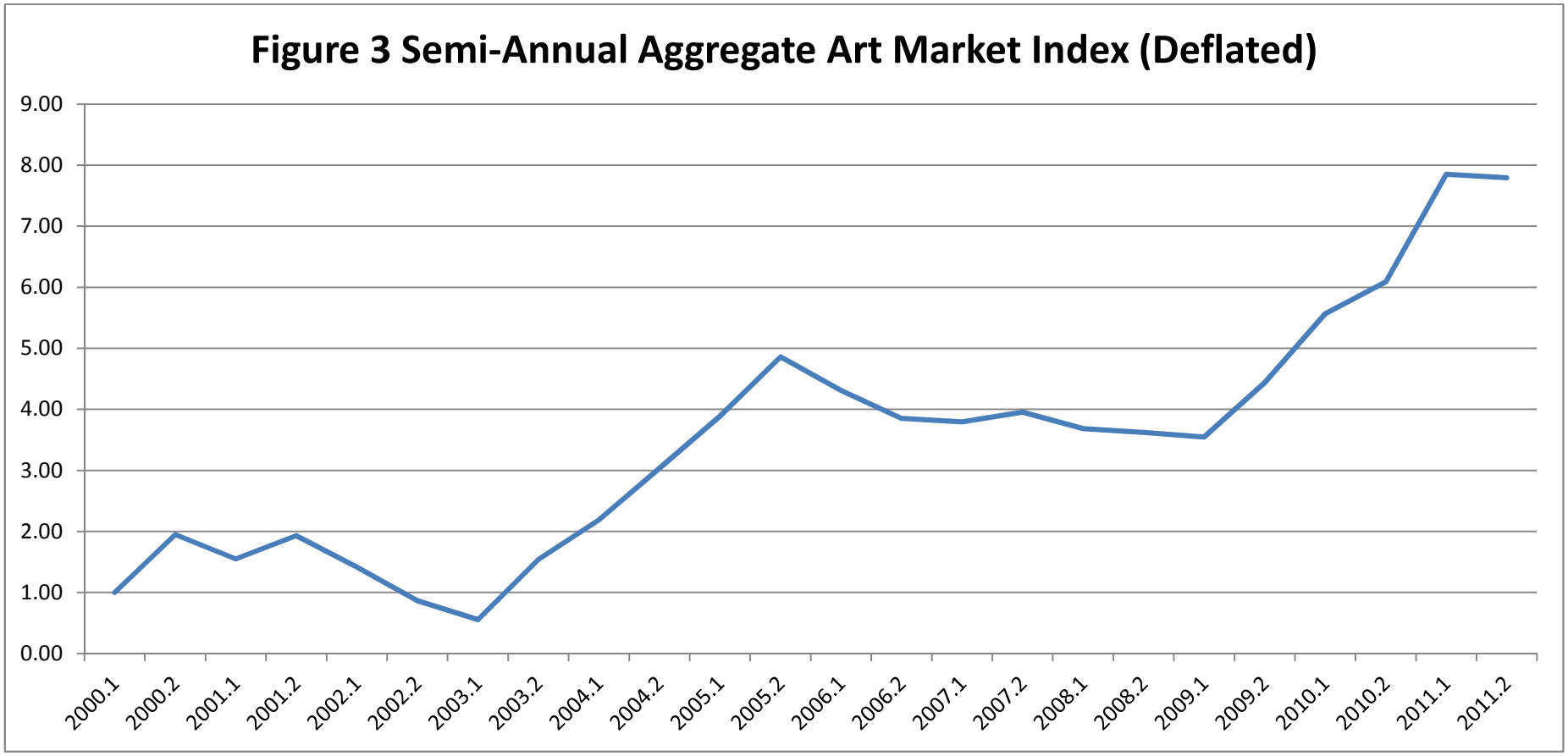
Figure 3 Semi-Annual Aggregate Art Market Index (Deflated)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2000.1
2000.2
2001.1
2001.2
2002.1
2002.2
2003.1
2003.2
2004.1
2004.2
2005.1
2005.2
2006.1
2006.2
2007.1
2007.2
2008.1
2008.2
2009.1
2009.2
2010.1
2010.2
2011.1
2011.2

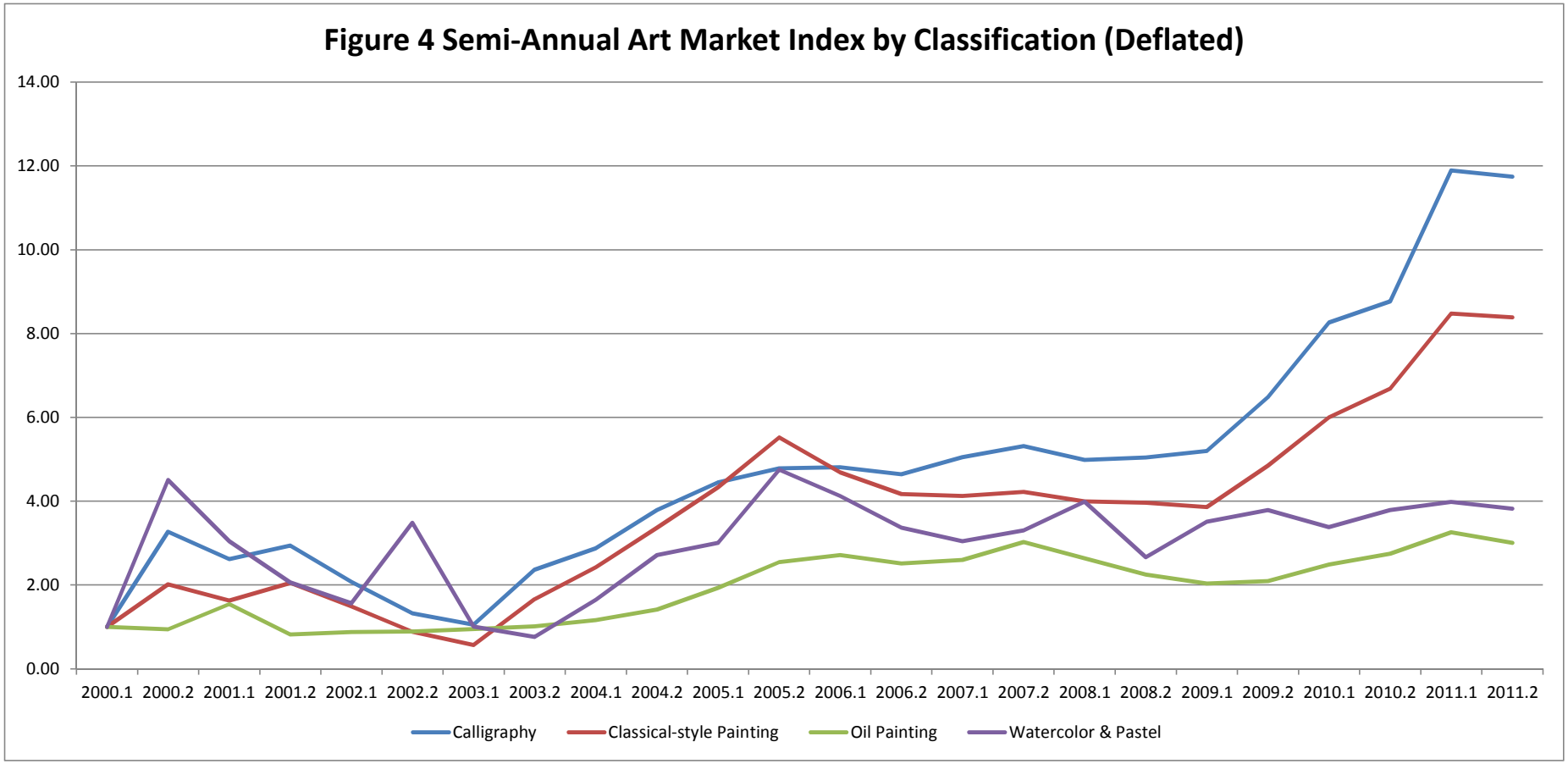
Figure 4 Semi-Annual Art Market Index by Classification (Deflated)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
2000.1 2000.2 2001.1 2001.2 2002.1 2002.2 2003.1 2003.2 2004.1 2004.2 2005.1 2005.2 2006.1 2006.2 2007.1 2007.2 2008.1 2008.2 2009.1 2009.2 2010.1 2010.2 2011.1 2011.2
Calligraphy
Classical-style Painting
Oil Painting
Watercolor & Pastel

Figure 5 Semi-Annual Art Market Index by Artist Schools (Deflated)

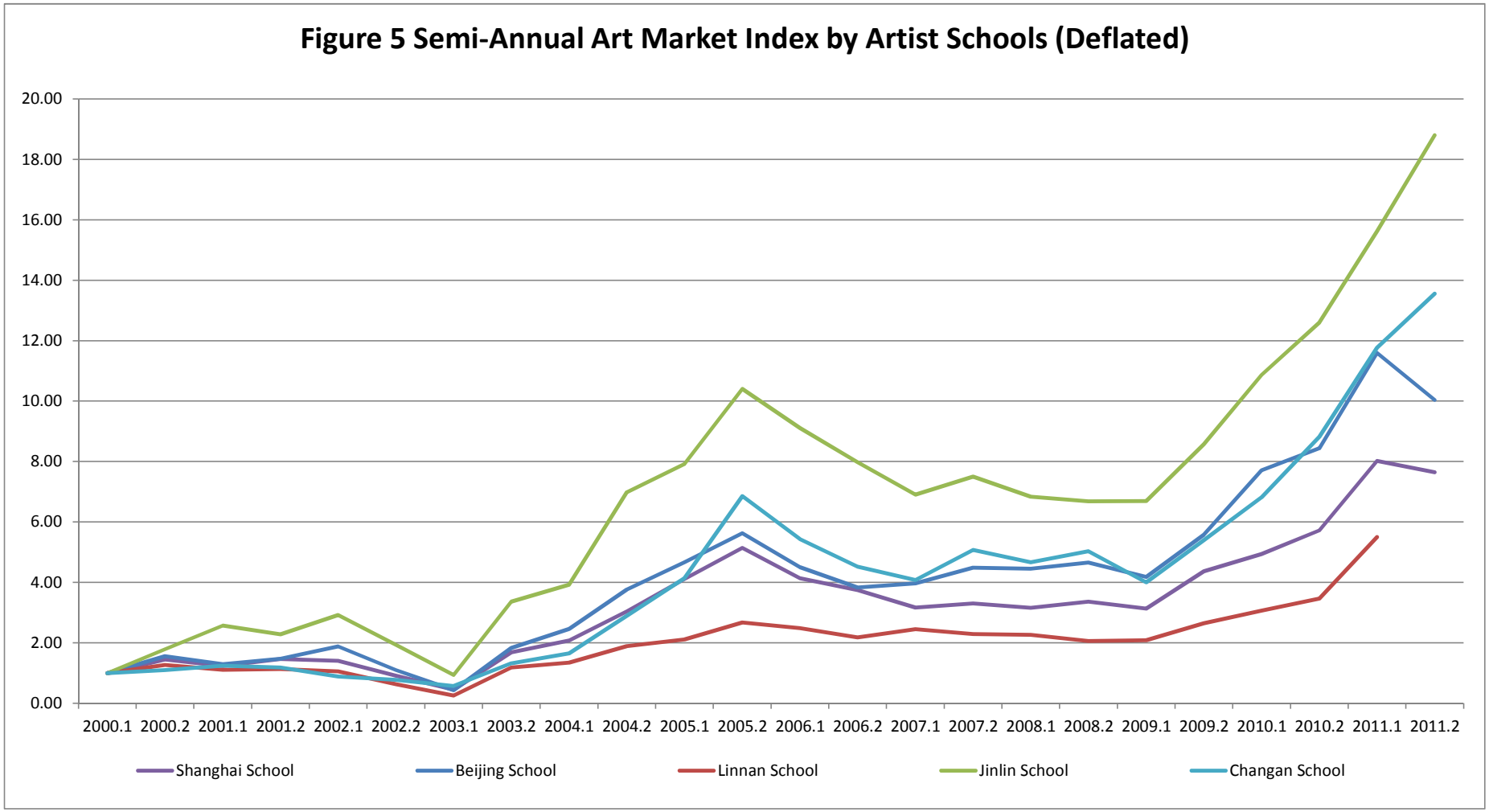

Figure 6 Semi-Annual Art Market Index by Artist Ranking Groups (Deflated)