To fake or not to fake: An empirical investigation on the fine art market

Published Version:
To fake or not to fake: An empirical investigation on the fine art market / Scorcu A.E.; Vici L.; Zanola R.. - In: JOURNAL OF CULTURAL ECONOMICS. - ISSN 0885-2545. - STAMPA. - 45:1(2021), pp. 143-152. [10.1007/s10824-020-09394-0]

Availability:
This version is available at: https://hdl.handle.net/11585/864975 since: 2022-02-23

Published:
DOI: http://doi.org/10.1007/s10824-020-09394-0

Scorcu, A. E., Vici, L., & Zanola, R. (2021). To fake or not to fake: An empirical investigation on the fine art market. ***Journal of Cultural Economics*, *45*, 143-152.**

https://doi.org/10.1007/s10824-020-09394-0

To fake or not to fake:
An empirical investigation on the fine art market[♥]

Antonello E. Scorcu (University of Bologna, Italy)
Laura Vici (University of Bologna, Italy)
Roberto Zanola (University of Eastern Piedmont)[+]

ABSTRACT

Although carefully debated in the legal, aesthetic, and philosophical perspectives, the impact of fakes on the art market has been often overlooked by the economic literature. This paper offers a novel perspective on this issue by investigating the effects of the detection of several Alberto Giacometti's forged sculptures. Using this exceptional quasi-experiment, the aim of the paper is to analyse whether a specific fake detection persistently influences the prices of a market segment or only exerts a short-run effect. The Interrupted Time Series Analysis (ITSA) is adopted to evaluate the impact of fakes across percentiles of the return distribution, accounting for the overall trend in sculpture sales over the period 2000-2015. The empirical evidence shows that in the short run different dynamics emerge across percentiles, but in the medium run fake effects on returns are neutralized.

JEL Classification: Z1; C6

Keywords: art fakes; counterfeiting; Giacometti; ITSA.

[♥] We are grateful to anonymous referees for their comments and suggestions. The usual disclaims apply.
[+] *Corresponding author:* DIGSPES, University of Eastern Piedmont, Via Cavour 50, 15100 Alessandria, e-mail: roberto.zanola@uniupo.it

1. Introduction

Art market practitioners are publicly reluctant to acknowledge that a large number of artworks circulating on the market is likely to be forged or misattributed,[1] particularly in the most expensive segments. Over 50 percent of art is forged or misattributed, as suggested by the Fine Art Experts Institute (Artnet News, 2014).

Even more surprising is the lack of a thoughtful debate on art fakes from the economic point of view (Day, 2014). Before the pioneering paper by Frey (2000), the discussion on art fakes was mainly dominated by the legal, aesthetic and philosophical perspectives. Frey overlooked the several subtle legal or aesthetic differences and focussed instead on the economic consequences of forgery, concluding that the beneficial effects of fakes on both demand and supply are likely to overweight the negative effects. In fact, Frey suggests that, although consumers ignore the true nature of fakes, they experience a utility gain from viewing artworks. At the same time, on the supply side, fakes raise artistic capital and support creativity, keeping the arts lively.

Frank (2005) evaluated whether fakes were as expensive as originals. Having obtained from German police departments specialized in art and antiques crimes a list of forged fine arts sold in 1987-88 and 1995, he compared the (hedonic) return from fakes with the return accruing from control samples drawn from public auctions. He identified the determinants of prices for both originals and fakes and concluded that there was no significant price difference between (undisclosed) fakes and originals. In line with Frey, he suggested that fakes are not harmful to the art market as a whole.

Bocart and Oosterlinck (2011) constructed a high-quality sample of 720 cases of forgery[2]. They investigated the impact of the discovery of fakes on art market returns and on the probability to sell a painting, suggesting that fake detection exerts a temporary effect on the market, as prices recovery is almost completed within a year after the shock.

By using heterogeneous samples of fakes from different artists, the mentioned studies conclude that fakes do not affect market prices in the medium or long run. However, heterogeneous samples do not allow to analyze adjustments in specific segments of the art market. To overcome this limitation, our paper analyses the effects of fake detection from a novel perspective, using a homogenous sample of artworks based on a single artist, Alberto Giacometti (AG), one of the greatest sculptors of the past century, ranked 69th in the 2016 Artprice Selling List. The choice of a single artist allows us to analyze the price effects of fake detection on different percentiles, capturing whether fakes have a

[1] In the legal jargon, a forgery is an item, or a modification of an existing one, produced to exploit illegally its market power; a fake is an item misattributed or forged. See Lazzaro *et al*. (2004). In line with the empirical literature, in what follows the terms forgery and fake are used interchangeably.

[2] These cases were collected from The Art Newspaper, Le Journal Des Arts for the period 1997-2006, and from Artsjournal.com for the period 1996-2006.

homogeneous impact on the whole return distribution or there exist ~~a~~ grey areas where fakes are traded.

The recent market history of AG's sculptures is peculiar and constitutes a quasi-experiment, which sheds some light on the role of fakes in the art market. In November 2008, the German police accused an art dealer who tried to sell 13 forged AG sculptures. In August 2009, a larger scale fraud was discovered, organized by the same dealer and his accomplices. The police discovered about 1,000 Giacometti style sculptures, more than those presumably produced by the master during his whole life (no more than 500 items). The art dealer and his accomplices were finally served a prison sentence in 2011.

We have no detailed information about number, types and offer prices of the disclosed fakes. However, the nature and timing of the shocks are clearly identified, allowing the evaluation of their effects both in terms of values and compositions of sculptures sold. Does the art market sterilize the effects of fake discovery on prices or is it persistently influenced by the shock? Using a sample of 453 AG sculptures sold worldwide over the period 2000-2015, we perform a multiple control group Interrupted Time Series Analysis (ITSA) to analyze some of the characteristics of the AG market *before, during, and after* the detection of fakes and the Court sentence, accounting for the trend over time in the sculpture art market index (Linden, 2015).

2. Methodology and Data

In this study, we apply the Interrupted Time Series Analysis to test whether AG fake detection had any effect on his art market prices. ITSA is a robust quasi-experiment design commonly used to measure whether one or more interventions (or shocks, such as the case here) had distinct effects on data from any underlying exogenous trend, when a randomized controlled trial is not available (Ewusie et al., 2017). In our case, the singularity of the art market – illiquid, opaque, with high transaction costs – makes the use of randomized controls difficult. Using aggregate data, ITSA compares data trends before and after one or more interventions: an intercept change captures a one-time baseline effect, while a difference in slope between two periods suggests a change in the trend. Defined Y_t the outcome variable, the multiple-group ITSA is defined as (Linden, 2015):

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z X_t + \beta_7 Z X_t T_t + \varepsilon_t \qquad (1)$$

where the coefficients β_0 to β_3 refer to the control group; T_t is the time trend; X_t is a set of dummy variables representing the (expected) interruptions of the series; $X_t T_t$ is a set of interaction terms; the coefficients β_4 to β_7 refer to the treatment group, Z, with ZT_t be the slope difference between treatment and control group, ZX_t, the difference in the level of outcome between treatment and control group immediately after intervention, and ZX_tT_t the trend difference; finally ε_t is a random disturbance. The use of a control group is adopted to reduce concerns for time-varying confounding (i.e. economic crisis, exchange rate fluctuations, etc.), which could undermine the validity of the analysis. The basic assumption is that confounding omitted variables have a similar impact on both treatment and control groups so that the level and the trend in the outcome are expected to be similar before treatment for both groups.

In this paper, we use a sample of 453 AG sculptures sold at auctions worldwide over the period 2000-2015 to generate an annual hedonic AG sculpture price indexes (Chanel et al. 1996; Collins et al. 2009). Data related to AG sculptures sold, their hammer prices, period and place of sale, auction houses involved, have been provided by Artprice©, a company specialized in art market information and analysis. This hedonic price index is used as dependent variable, Y_t, in our ITSA specification. The case of AG sculpture fakes constitutes a quasi-experiment to be investigated with the ITSA approach. Whereas AG is one of the most successful and expensive sculptors on the auction market, with three sculptures sold above the \$100 million, the AG share on the whole sculpture market turnover is relatively low and ranges between 1.0% and 7.4% in the period under scrutiny.

The estimated functional form for the hedonic regression is:[3]

$$\ln p_{it} = a_0 + a_1 dim_{it} + a_2 chri_{it} + a_3 soth_{it} + a_4 korn_{it} + a_5 US_{it} + \sum_{t=1}^{T} \delta_t D_{it} + \varepsilon_{it} \qquad (2)$$

where p_{it} is the logarithm of hammer price of sculpture i at time t; *dim* is the dimension of sculptures; *chri, soth,* and *korn*, are dummy variables for respectively Christie's, Sotheby's, and Kornfeld's, the most relevant auction houses for AG market; *US* is a dummy variable, which assumes value 1 if the sculpture is sold in US, 0 otherwise, introduced to capture the non-European sculpture market; D_t is the year dummy equal to 1 if the item has been sold in year t, 0 otherwise; and ε is a normally distributed error term.

Descriptive statistics are summarized in Table 1.

[TABLE 1 ABOUT HERE]

[3] A parsimonious specification has been adopted, distinguishing between European and extra-European (US) markets.

3. Empirical Evidence

Before proceeding with the ITSA, we need to estimate the AG sculpture price index to be used as dependent variable in the ITSA.

AG was a multi-faceted artist, exploring different genres, media and techniques, and his sculpture market is characterized by an extensive production, ranging from extremely expensive artworks to more affordable sculptures, resulting in different market segments. Figure 1 shows both the mean and the 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles of AG hammer prices in the period analysed.

[FIGURE 1 ABOUT HERE]

To account for this heterogeneity, simultaneous quantile regressions with bootstrapped standard errors have been estimated for the 25^{th}, 50^{th}, 75^{th}, and 90^{th} percentiles (Scorcu and Zanola, 2011; Hand, 2018). Table 2 reports the AG sculpture price indexes (2000=100) to be used for the ITSA analysis.

[TABLE 2 ABOUT HERE]

Table 3 displays the multiple-group ITSA with Newey-West standard errors. Two sources of interruption were identified: *2009,* when the detection of fakes cast doubts about the authenticity of AG' sculptures on sale or already sold; and *2011,* when the judicial process ended, with the overall evaluation of the fraud and the condemnation of the accused art dealers[4]. Quite naturally, the shock begins with the detection of a series of fakes and ends with the expected eradication of the fakes from the market. Autocorrelation was detected and the Cumby-Huizinga test suggested the use of 5 lags.

[TABLE 3 ABOUT HERE]

A potential limitation of the single-group ITSA is that other factors concurrent with the treatment may influence the dependent variable. As discussed before, we circumvent the problem by using the multiple-group ITSA, which requires a comparable control group to account for major sources of bias

[4] In the empirical literature, there is no golden rule about the minimum number of data points to be used before and after the intervention. As a rule of thumb, depending on available data, nine data points pre-intervention and post-intervention are suggested (Jandoc *et al.*, 2015). In our sample, such a rule is basically guaranteed. Moreover, data points to be used in ITSA come from a sample of 453 observations, which reduces the variability within time series analysis.

and confounding factors. Since the AG fake detection coincided with the world economic crisis and the subsequent collapse of the art market, to reduce the concerns for time-varying confounding, the Artprice Sculpture Index – a well-known index built on worldwide sculpture transactions edited by Artprice© – was adopted as control group.

To evaluate the appropriateness of the control, the differences in mean levels and slopes between treatment and control groups should not be statistically different before the shock (Linden, 2015). This implies that confounding omitted variables affect similarly both treatment and control groups. As shown in Table 3, the initial mean differences between the AG price index and the Artprice Sculpture Index are not statistically different from zero for all percentiles. Analogously, the differences in slopes are not statistically different from zero for the 25th and 90th percentiles, whereas they turned to be significant and positive for the 50th and 75th percentiles. Hence, while the treatment is comparable with the control on both the level and the trend for the 25th and 90th percentiles, it does not hold for the 50th and 75th percentiles.

To test for the robustness of the selected control group, we ran pre-processing procedures (match and permutation tests) to identify variables, not exposed to the intervention, to be used as potential control groups in our ITSA specification (Linden, 2018). In addition to the Artprice sculpture index, we tested the Artprice global index, the Artprice postwar art index, and the Artprice contemporary art index. Results confirm that the 25th and the 90th percentiles have comparable control groups (all the four variables can be used as control groups), whereas no control works properly for the 50th and 75th percentiles. Although findings are also robust to the use of these alternatives, in this paper we adopt the Artprice sculpture index as the most natural control group.

Moving to the visual inspection of Figure 2, the initial trajectory of the sculpture market price index rises less rapidly than the AG price index, but these differences are limited (in fact, not statistically significant) both in the level and the slope for the 25th and 90th percentiles. As far as the 50th and 75th percentiles, differences are relevant, but the treatment is not comparable with the control, as discussed above. After the detection of fakes (2009), AG price index sharply decreases in the 25th, 50th, and 75th percentiles, while it increases in the 90th percentile.

In the AG auction market, where items are officially certified, a sort of flight-to-originality (Lazzaro, 2006) and flight-to-quality (Baur and Brian, 2009) effects seem to emerge. In the 25th percentile, the judicial seizure initially increased the confidence about the quality (and the price) of artworks auctioned, but the full awareness about AG fakes diffusion finally induced a price drop. In line with the literature, this effect was short-lived, and the segment moved toward its previous pre-shock trend. When the contagion of fakes spread on the low/middle price AG segment, wealthy collectors and investors tended to increase the demand for the high-price and high-quality AG sculptures, artworks of indisputable originality, certified and historicized, characterized by a low expected forgery risk. As a consequence, prices on the 90th percentile then increased. The overall post-2011 rebound in the AG sculpture price indexes suggests a market purged from fakes, with collectors ready to invest again.

[FIGURE 2 ABOUT HERE]

4. Conclusion

The existence of a relevant share of forged artworks is one of the distinctive feature of the fine art market. Theoretically, in a context of low and asymmetric information or even symmetric disinformation, a market is likely to collapse (Akerlof, 1970). However, and quite surprisingly, in the fine art market, most collectors, galleries and critics do not consider forgeries a serious threat and are likely to tolerate them, just because of their alleged large diffusion.

Empirically, assessing the effects of fake detection on the art market is difficult, due to the lack of both reliable data on forgeries and of adequate econometric methods able to assess these effects.

The detection of a large number of counterfeited sculptures of Alberto Giacometti allows us to partially overcome the lack of reliable data and to analyze the adjustment mechanisms at work on the art market when fakes are revealed. In fact, although the weight of Giacometti on the whole sculpture market is limited, the prominent status of the master makes this case study of particular interest for art collectors and financial investors, both exposed to the risk of counterfeiting. Differently from previous studies on this topic, which combine occasional fake detections involving heterogeneous artists, in this paper we focus on a single artist and on a specific shock on his production.

Giacometti is characterized by an extensive production, ranging from extremely expensive artworks to more affordable sculptures. We exploit the large number of AG items auctioned and investigate the impact of fakes across different market segments, highlighting distinct adjustment mechanisms. To this aim, we adopt the Interrupted Time Series Analysis to evaluate the effects of fake detection, across different percentiles. In line with the scant empirical evidence available, our results suggest that even non-negligible idiosyncratic shocks tend to remain confined to specific art market segments and exert only temporary, short-run effects.

This paper focuses on the effects of fake detection on prices. A complementary issue to focus on is the effect of fakes on market volumes. Since prices and quantity are someway strictly connected, it is plausible to expect that an analogous short-run quantity effect occurs. However, such an issue is beyond the scope of this paper and constitutes a direction for future research.

References

Akerlof, G.A. (1970), The Market for "Lemons": Quality Uncertainty and the Market Mechanism, *Quarterly Journal of Economics*, 84(3): 488-500.

Artnet News (2014), Over 50 Percent of Art is Fake, https://news.artnet.com/market/over-50-percent-of-art-is-fake-130821.

Baur, D.G., & Brian, M.L. (2009), Flights and contagion. An empirical analysis of stock-bond correlation, *Journal of Financial Stability,* 5(4): 339-352.

Bocart, F., & Oosterlinck K. (2011), Discoveries of fakes: their impact on the art market, *Economics Letters*, 113(2): 124-6.

Chanel, O., Gérard-Varet, L.A., & Ginsburgh V. (1996), The relevance of hedonic price indices. The case of paintings, *Journal of Cultural Economics*, 20(1): 1–24.

Collins, A., Scorcu, A.E. & Zanola, R. (2009) Reconsidering hedonic art price indexes, Economics Letters, 104(2): 57-60

Day, G. (2014), Explaining the Art Market's Thefts, Frauds, and Forgeries (And Why the Art Market Does Not Seem to Care), *Vanderbilt Journal of Entertainment & Technology Law*, 16(3): 457-495.

Ewusie, J.E., Blondal, E., Soobiah, C., Beyene, J., Thabane, L., Straus, S.E., Hamid, J.S (2017), Methods, applications, interpretations and challenges of interrupted time series (ITS) data: protocol for a scoping review, *BMJ Open*, 7(6): e016018, https://bmjopen.bmj.com/content/7/6/e016018.full.

Frank, B. (2005), *Art price research for fakes and imitation*, in Mossetto G. and Vecco M. (eds.), *The Economics of Copying and Counterfeiting*, Milano, Franco Angeli.

Frey, B.S. (2000), Art fakes – What fakes?, in Frey B.S, *Arts & Economics. Analysis & Cultural Policy*, Springer Berlin, 191-204.

Hand, C. (2018), Do the arts make you happy? A quantile regression approach, *Journal of Cultural Economics,* 42(2): 271-286.

Jandoc, R., Burden, A.M., Mamdani, M., Lévesque, L.E., & Cadarette, S.Z. (2015), Interrupted time series analysis in drug utilization research in increasing: Systematic review and recommendation, *Journal of Clinical Epidemiology*, 68(8): 950-956.

Lazzaro, E. (2006), Assessing Quality in Cultural Goods: The Hedonic Value of Originality in Rembrandt's Prints, *Journal of Cultural Economics*, 30(1): 15-40.

Lazzaro, E., Moureau, N., & Sagot-Duvauroux, D. (2004), From the Market of Copies to the Market of Fakes: Adverse Selection and Moral Hazard in the Market of Paintings, in G. Mossetto and M. Vecco (eds.), *The Economics of Copying and Counterfeiting*, Franco Angeli, Milan.

Linden, A. (2015), Conducting interrupted time-series analysis for single- and multiple-group comparisons, *Stata Journal*, 15(2): 480–500.

Linden A. (2018), Using permutation tests to enhance causal inference in interrupted time series analysis, *Journal of Evaluation in Clinical Practice*, 24: 496-501.

Scorcu, A.E., & Zanola, R. (2011), The "Right" Price for Art Collectibles: A Quantile Hedonic Regression Investigation of Picasso paintings, *Journal of Alternative Investments*, 14(2): 89-97.

TABLE 1. Descriptive Statistics (N=453)

Variable	Description	type	*mean*	*sd*	*p25*	*p50*	*p75*	*p90*
p	Hammer price (,000 USD)	C	2,408.6	9,425.8	69,833	188,532	1,412,355	4,200,000
Dim	AG sculpture heigth (cm)	C	70.90	54.70				
Chri	Christie's	D	0.42	0.49				
Soth	Sotheby's	D	0.35	0.48				
korn	Kornfeld	D	0.04	0.19				
US	US sales	D	0.47	0.50				
	(time dummy variables)							

Note: C= continuous variable; D=dummy variable

TABLE 2. AG hedonic price indexes (2000=100)

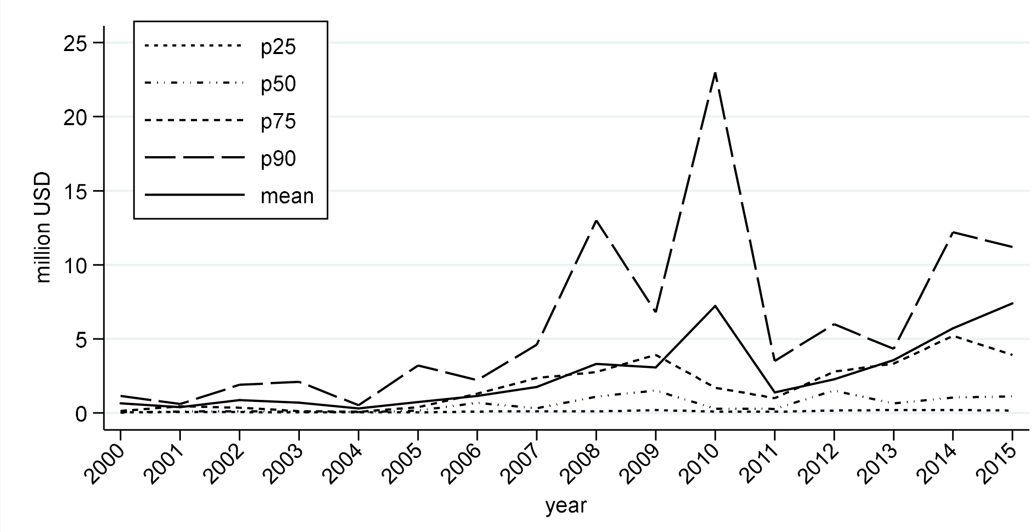
year	AG price index			
	25th percentile	**50th percentile**	**75th percentile**	**90th percentile**
2000	100.0	100.0	100.0	100.0
2001	218.1	374.3	246.0	123.4
2002	166.5	322.2	263.8	118.5
2003	98.0	164.9	104.1	128.4
2004	81.1	141.9	163.2	47.2
2005	201.4	381.9	274.6	44.9
2006	227.0	1048.6	117.1	143.3
2007	385.7	1518.0	1091.3	374.3
2008	297.4	1694.5	816.6	335.3
2009	824.8	2242.1	2069.7	332.0
2010	189.6	738.9	401.5	541.9
2011	176.8	623.4	525.9	140.5
2012	319.0	2132.8	1124.6	297.4
2013	385.7	958.3	1387.4	769.1
2014	452.7	1644.5	1799.3	695.9
2015	312.7	1346.4	1346.4	471.1

TABLE 3. Multiple-group ITSA (breaks in 2009 and 2011)

	25th percentile			50th percentile			75th percentile			90th percentile		
	Coef.		**New-West Std- Err.**	**Coef.**		**New-West Std- Err.**	**Coef.**		**New-West Std- Err.**	**Coef.**		**New-West Std- Err.**
T	11.55	***	1.99	11.55	***	1.99	11.55	***	1.99	11.55	***	1.99
X_{2009}	-24.19	***	13.38	-24.19	*	13.38	-24.19	*	13.38	-24.19	*	13.38
X_{2011}	-33.00	***	8.61	-33.00	***	8.62	-33.00	***	8.61	-33.00	***	8.62
$X_{2009}\ T$	15.45	***	1.99	15.45	***	1.99	15.45	***	1.99	15.45	***	1.99
$X_{2011}\ T$	-34.30	***	4.55	-34.30	***	4.55	-34.30	***	4.55	-34.30	***	4.55
Z	*-3.11*		*45.00*	*-226.03*		*254.11*	*-98.26*		*132.96*	*-52.66*		*56.64*
ZT	*13.73*		*9.03*	*179.77*	***	*52.73*	*76.45*	**	*32.50*	*16.12*		*13.49*
$Z\ X_{2009}$	525.35	***	53.44	671.23	**	315.98	1300.97	***	212.15	60.56		86.81
$Z\ X_{2011}$	726.83	***	54.02	1946.81	***	288.53	2073.35	***	184.03	-456.03	***	125.22
$ZX_{2009}\ T$	-675.91	***	9.03	-1709.97	***	52.73	-1711.68	***	32.50	166.81	***	13.49
$ZX_{2011}\ T$	710.01	***	26.34	1633.27	***	102.09	1934.10	***	90.79	-69.66		59.88
Cons	99.24	***	5.82	99.24	***	5.81	99.24	***	5.81	99.24	***	5.81

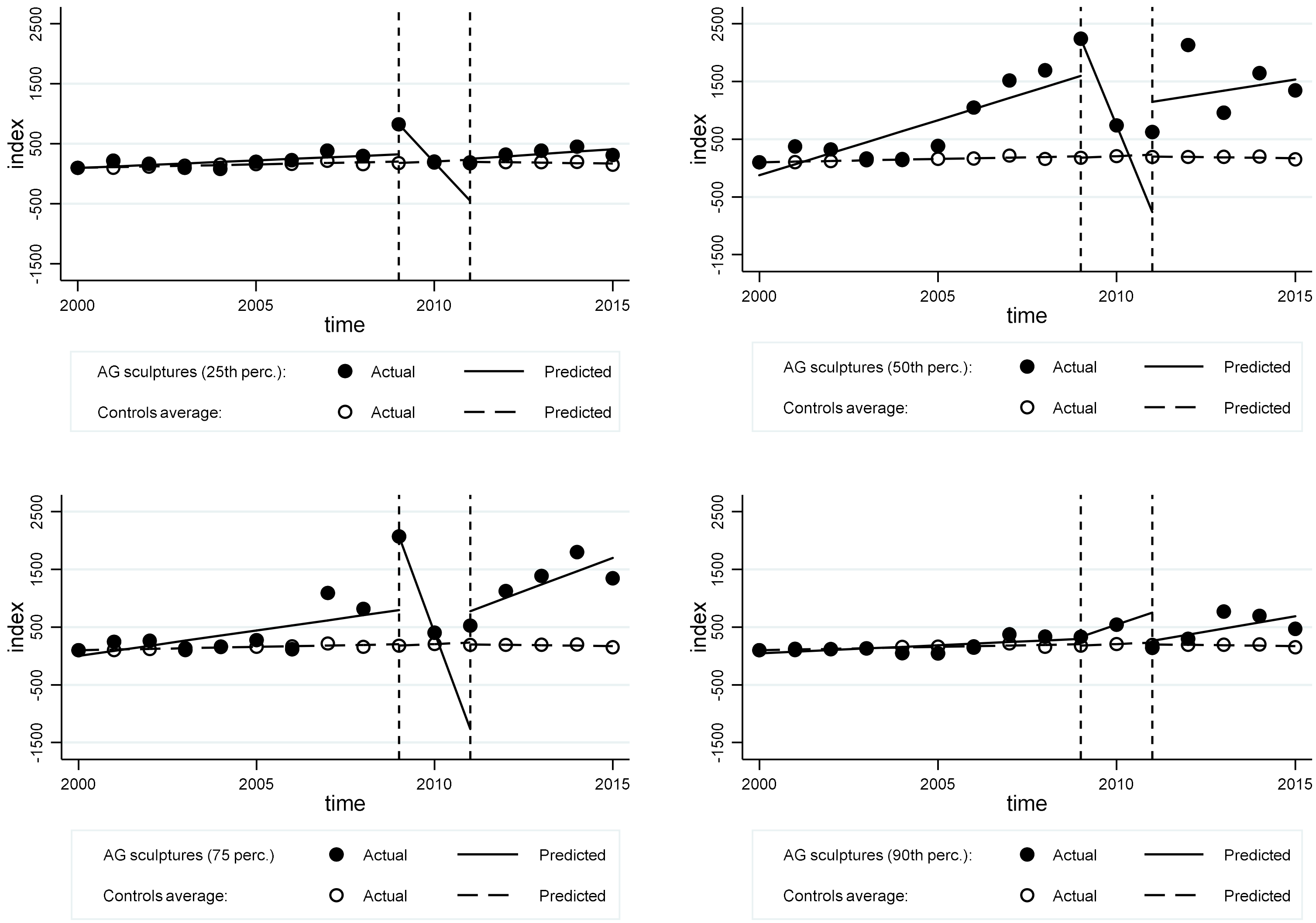
Note: Newey-West standard errors, with 5 lags. X_{2009} and X_{2011} represent the interruptions; $X_{2009}T$ and $X_{2011}T$ are interaction terms with time trend T; Z and ZT represent the level and slope differences between treatment and control group; ZX_{2009} and ZX_{2011} are differences in outcome levels between treatment and control groups after interventions in 2009 and 2011, respectively; $ZX_{2009}T$ and $ZX_{2011}T$ represent trend difference between treatment and control groups after interventions in 2009 and 2011, respectively.

FIGURE 1. Mean and percentile prices for AG sculptures sold at auctions (2000-2015)



Source: own elaboration based on Artprice© data

FIGURE 2. Multiple-group ITSA (breaks in 2009 and 2011)



Note: Newey-West standard errors, with 5 lags