The Impact of the *Droit de Suite* in the UK:

An Empirical Analysis

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The *Droit de Suite*, known in the UK as Artists' Resale Rights, provides an artist with the inalienable right to receive a royalty based on the resale price of an original work of art. This paper provides an empirical analysis of actual changes in the UK auction market for art that is newly subject to the *Droit de Suite* (DDS) because of a change in law. All changes are measured relative to changes for art not subject to the DDS and relative to changes in the auction markets for art in countries where there has been no change in law. We do a difference-in-difference analysis, differencing price growth and sales growth across market segments and across countries over the period 1993 to 2007. Our results suggest that the introduction of the DDS has not had a consistent negative impact on the UK art auction market during the period of study.

On 15 February 2006, the British government implemented the Artist's Resale Right, commonly known as the *Droit de Suite,* for the benefit of living artists.[2] The *Droit de Suite* (DDS) provides an artist with the inalienable right to receive a royalty based on the resale price of an original work of art.[3] The DDS is a controversial law. Proponents argue that it provides a fair return to an artist for his work; most economists argue that it lowers the price that an artist originally receives for his work and encourages sellers to market their works in venues that do not implement the DDS.

. This paper provides an empirical analysis of actual changes in the UK auction market for art that is newly subject to the *Droit de Suite* (DDS) because of a change in law. All changes are measured relative to changes for art not subject to the DDS and relative to changes in the auction markets for art in countries where there has been no change in law. We do a difference-in-difference analysis, differencing price growth and sales growth across markets and across countries over the period 1993 to 2007. To preview our results, we have not found consistent evidence of any negative change in the UK market for art subject to the DDS relative to changes in other markets.

Most previous discussions of the DDS have been theoretical in nature. Our approach is empirical. We begin in section 2 with a short analysis of the European directive on the DDS, a description of auction markets, and a review of the legal and economic literature regarding the DDS. In section 3, we describe our methodology. In section 4 we analyze auction results

[2] In French, *droit de suite* means "right to follow."
[3] The *droit de suite* is currently implemented in most European countries, with the exception of Switzerland. The *droit de suite* is not payable in the US or in Japan. On June 9, 2010, Australia implemented legislation providing for the *droit de suite*.

before and after the introduction of the DDS for the UK and a variety of countries. In section 5 we interpret our results and conclude our analysis.

2.0 The DDS and the European Directive

2.1 Description and History

The DDS was first proposed in France in 1893 and was implemented in the 1920's. A major impetus for its implementation was the view that artists (and their heirs) were struggling financially while their paintings were achieving record prices in auction houses. A story that is commonly cited as circulating at the time was that the widow of Jean-Francois Millet was selling flowers on the streets of Paris while the prices of her dead husband's paintings rose to new highs. In the mid-20th century, other common-law countries, including Belgium, Denmark, Finland, Germany and Sweden, followed France's lead in implementing the DDS. The state of California also implemented a version of the DDS in 1976, but this version was weak. The California law required payments only on increases in price, and few payments were actually made. Bays (2008) provides an analysis of the effects of the California law.

The UK implemented the DDS, known as the Artist's Resale Right (ARR) in the UK, to comply with required harmonization of laws across the EU. [4] Specifically, the Artist's Resale Right provides an artist with an inalienable right to receive a royalty based on the price obtained for any resale of an original work of art subsequent to the first transfer by the artist. The Right

[4] The UK adopted Directive 2001/84/EC of the European Parliament and of the Council on the resale right for the benefit of the author of an original work of art on 27 September 2001. The directive was published in the Official Journal of the European Communities on 13 October 2001: L272, Volume 44 (page 32). The UK implemented the Artist's Resale Right on 14 February 2006 by Statutory Instrument 2006 No. 346. This document can be accessed at http://www.opsi.gov.uk/si/si2006/20060346.

defines an original work of art as "works of graphic or plastic art such as pictures, collages, paintings, drawings, engravings, prints, lithographs, sculptures, tapestries, ceramics, glassware and photographs". It therefore implicitly excludes what are sometimes termed the "decorative arts", such as furniture and jewelry. The right does not apply to resale between individuals acting in their private capacity without the participation of an art market professional, or to resales by persons acting in their private capacity to museums that are not for profit and are open to the public.

The Artist's Resale Right in the UK currently applies only to works by living artists, in contrast to the DDS in other countries which generally applies to both living artists and their heirs, usually for 70 years after the death of the artist. The UK has considered extending the rights in 2012 to an artist's heirs for 70 years after the artist's death. The Artist's Resale Right only applies to artists who are European Economic Area nationals or who are permanently resident in the EEA. No single payment can exceed €12,500, and no royalties are payable on sales at prices less than €1,000. The royalties are set at the following rates: 4% for the portion of the sale price up to €50,000, 3% for the portion of the sale price from €50,000 to €200,000, 1% for the portion of the sale price from €200,000 to €350,000, 0.5% for the portion of the sale price from €350,000 to €500,000, and 0.25% for the portion of the sale price exceeding €500,000. Sale prices are net of tax and payments are gathered through an independent collecting society set up specifically for this purpose. The seller pays the royalty.

2.2 The Auction Market

The DDS is payable on works of art sold through dealers and through auction houses. We focus exclusively on the auction market because of the transparency of price and quantity sold.[5] The major auction houses are the English houses of Christie's and Sotheby's. Almost all art is auctioned in the "English" or "ascending price" format, in which bidding starts low and the auctioneer subsequently calls out higher and higher prices. When the bidding stops, the item is said to be "knocked down" or "hammered down", and the final price is the "hammer price." Not all items put up for sale and "knocked down" are sold. If the bidding does not reach the level of the secret reserve price set by the seller, the item will go unsold. Auctioneers say that an unsold item has been "bought-in." It may be put up for sale at a later auction, sold elsewhere, or taken off the market. Our data source, Hislop's Art-Sales-Index, tracks only artworks that were actually sold.

Auctioneers charge commissions to buyers and sellers for the works that they sell. Sellers' commissions are negotiable and are kept secret, but buyers' commissions are known. Buyers' commissions at Sotheby's in London in 2008 were 25% on the first £25,000 and 20% on £25,000- £500,000. Above £500,000, buyers' commissions are 12%. The royalty rates imposed by the DDS are small compared to standard buyers' commissions.

2.3 A Literature Review

There have been numerous economic and legal discussions of the merits of the *droit de suite*. Many of the very early papers, such as Hauser (1962), discuss the DDS in the context of whether or not it should be implemented in the United States. In a subsequent legal analysis,

[5] The dealer market is opaque and its size is unclear. One study estimated that the art market in the UK is evenly split between auctions and dealers (Kusin and Company, 2002). However, in another measure, undocumented sources indicated that collection houses in the UK were collecting less than 20% of droit de suite revenue from dealers. Unless droit de suite has impacted on the decision to sell through a dealer rather than an auction house, the omission of prices from dealers should not have a material effect on our results.

Price (1968) concluded that the administrative burden of the DDS would outweigh any benefits conferred, but that the US should improve the economic security of artists through engaging in educational and arts policies. Asimow (1971, p. III-12) concluded that the DDS "interferes seriously with the market, produces negligible revenue, is costly to administer, and is poorly accepted by the market." Colonna and Colonna (1982) provide an assessment of the California Resale Royalities Act of 1976. They view resale rights as an indirect tax that discriminates against younger artists who are not "grandfathered".

Bolch et. al. (1978) present one of the first economic models of the DDS, a straightforward model that demonstrates that an artist who sells his work will have less discounted compensation with the DDS than without; they conclude that a likely impact of the statute will be to reduce the original bid prices for art works once buyers adjust to the existence of the resale royalty. Filer (1984) comes to an identical conclusion: the DDS reallocates property rights: thus, the value of a work of art without full property rights is less than the value with full rights. Karp and Perloff (1992) also develop an economic model of the DDS. While they present both benefits and drawbacks of such a scheme, overall they conclude that young artists (and dealers) may be harmed by a resale royalty because buyers will reduce their willingness to pay for a work of art, if they know that they must pay a royalty on resale. With the exception of Solow (1998), most recent economists have concurred with the results of the models of Bolch et. al (1978) and Karp and Perloff (1992). [6] As Ginsburgh (2005a, 2005b) details, economic theory predicts the DDS should reduce the competitiveness of markets where it

[6] Solow (1998) presents an interesting argument for the droit de suite: there may be some rise in subsequent prices because of the increased incentive to maintain the value of their work in the future (i.e. they will not overproduce, as predicted by the Coase conjecture), though this is a second-order effect.

is implemented (relative to markets without the DDS) and also reduce prices obtained by the artist on the original sale. Finally, Bays (2008) argues that the California law has had the negative impact of moving sales outside of the state.

Much of the literature on the DDS deals more specifically with legal and copyright issues. Within a broader discussion of Artists' Moral Rights, Hansmann and Santilli (1997) discuss the view that the US has been slow to incorporate moral rights legistlation because it has historically been an importer of art. They also conclude that moral rights legislation could potentially be useful in the display of original works of paintings, an area where copyright law is not applicable. Tepper (2007) is sympathetic to the historical rationale of the *droit de suite*, but he is critical of the requirement under the European directive that the right cannot be waived by the artist. In a legal analysis, Merryman, Elsen, and Urice (2007) provide a reprint of droit de suite laws in various countries. They also argue that the two primary arguments in favor of droit de suite -- that artists create value and so should share in price appreciate and that royalties are relatively valueless for artists -- are not without criticism. Artists do share in appreciation through appreciation of their inventories, and artists do have a copyright in their works as they can bargain for royalties in reproductions. They further state that the economic arguments cited above are difficult to criticize.

Thus, in sum, much of the literature concludes that an artist will receive a lower price for his work after implementation of the DDS because buyers will pay less given that fact that they must pay a royalty on resale. Furthermore, previous work has recognized that the DDS is likely to encourage movement of sales to other markets where it is not implemented

Rather than presenting our own theoretical model, we extend the logic of this previous literature. Just as the DDS should lower the price of sale that an artist receives for his work, ceteris paribus, the DDS should lower the price at resale relative to paintings that are not subject to the DDS if the buyer of these paintings expects to pay royalties in the future. For the return to be less, there must be a new expectation regarding payment of the DDS. If payment of the royalty is already expected at the first sale, even if the DDS has not been implemented, then the first sale price will already be reduced by the expected amount of payment. It is not clear that the returns to buying and selling paintings under a regime of the DDS are less than the returns to buying and selling paintings without the DDS, unless there has been a change in expectation between the purchase and the sale. Therefore, if we look at the return to holding paintings over a time period in which buyers newly adjust to the existence of a resale royalty as in the UK during the 1990s and 2000s, the return to holding these paintings should be less than the return to holding paintings when there is no change in expectation of payment of the DDS. Furthermore, there is likely to be a movement out of the UK for paintings subject to the DDS and into markets where the droit de suite is not payable. We empirically examine these two predictions below.

3. Methodology

Ideally, we would like to observe the exact counterfactual: what would have happened in the UK if the DDS had not been implemented. Since this is not observable, we compare our treatment group – works sold by auction in the UK between August 1st 1993 and July 31st 2007 that would be subject to the DDS after its implementation – first with all paintings in the UK that would not be subject to the DDS and next with works that would have been subject to the DDS if sold in the UK, but were sold in other countries.[7] We have chosen to go back to July of 1993

[7] A different approach would compare price growth in the period when the DDS was under consideration in the UK with a previous period, such as 1986-1996, before implementation of the DDS was given serious consideration in the UK. However, the volatility of the art market was very high during this period due to the run-up in prices in 1989 (see Ashenfelter and Graddy (2003) or Mei and Moses (2002)) and the volatility of Contemporary Art, even relative to Impressionist and Modern Art, was especially high during the end of the 1990s. Furthermore, due to taste

as there were few expectations before this point that droit de suite would be implemented in the UK. Indeed the EU directive, adopted in 2001, was not discussed in European Parliament until 1996 (McAndrew and Dallas-Conte (2002)), and the Arts Council of England did not commission McAndrew Dalls-Conte study until early 2000. It is very unlikely that buyers and sellers in the UK would have incorporated expectations about the implementation of droit de suite by 1993, before this was even discussed in the European parliament, much less proposed or adopted by the UK. [8]

Note that this difference-in-difference approach as applied to art can be considered controversial. Unlike real estate, art can move around. Specifically, the price of art in one of our "control groups" – paintings that would be subject to the DDS if sold in the UK but are not subject to the DDS if sold in another country – could still be affected by the DDS if the prospective owner plans to subsequently sell the work in the UK. More likely, paintings that are currently subject to the DDS in the UK could be moved to a country that is not subject to the DDS for resale. This movement would likely reduce, but not eliminate, any impact of the droit de suite as some paintings will undoubtedly remain in the country of original sale, both because movement of paintings is costly, for marketing considerations, and for other reasons. Furthermore, we can examine the changes in number of paintings sold in each market and each country to gauge the extent of movement between countries.

For each country and art market segment -- the art market segments being art that would be subject to the DDS in the UK after the law change and art that would not be subject to the

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changes for art over time, cross-country and cross-market comparisons are more likely to be valid than comparisons over 10 year time periods.

[8] In an earlier version of the paper (Graddy and Banterghansa (2009)) we use data from 1996 to the present. We find very similar results with both data sets.

DDS-- we construct an index of prices. Using these indices, we then compare returns over time. We also do simple comparisons of quantities of artworks sold in each country and each market segment to look for evidence of possible changes in venue driven by the change in the UK law regarding the DDS. Hereafter, "subject to the DDS" denotes works of art that would be subject to the DDS in the UK after its implementation. These are works of art by living artists who are EEA nationals or permanent residents of the EEA.

We gather data on prices and quantities sold at auction from Hislop's art sales index for six yearly periods of sales of art: August 1, 1993-July 31st 1994, August 1, 1996 – July 31st, 1997; August 1st, 2000 through July 31st, 2001; March 1st, 2003 – February 29th, 2004; August 1st, 2004 – July 31st, 2005; and August 1st, 2006 through July 31st, 2007. [9] [10] [11] For these periods, we downloaded and analyzed all sales of paintings at prices over 1000 euros, as paintings must be above 1000 euros to be eligible for the DDS.

Although the schedule of the percentage amount payable varies by the painting's price, we do not distinguish paintings by price group, as the price group in which a painting falls at the time of sale would depend upon the growth rate for the individual painting. Instead, we look for an overall effect on prices.

[9] The art market in the UK can be divided into two segments, art sold by public auction and art sold by dealers. Public art auctions are controlled by a small number of auction houses, and the public nature of the transactions make it easy to analyze this segment in some detail. Sales by dealers are not publicly verifiable.

[10] Hislop's Art Sales Index is a widely used and respected source of data on fine art sales. Specifically, it covers sales of paintings, prints, works on paper, sculptures, miniatures, and photographs by all of the major auction houses worldwide.

[11] The dates for periods four, five and six were used as part of a study for the UK patent office on the implementation of the DDS in the UK. Please see Graddy and Szymanski (2005) and Graddy, Horowitz and Szymanski (2008). Periods one through three were chosen in order to present two periods before the 2001 EU directive on the DDS.

4. Analysis of Art Sold at Auction

4.1 Summary Statistics

Table 1 presents summary statistics on average auction prices and number of observations for France, Germany, Switzerland, the UK, and the US. The observations are broken down into art that would be subject to the DDS in the UK after the law change ("subject to the DDS"), and other observations, meaning art that would not be subject to the DDS in the UK. These are artworks either by non-EU artists or by deceased artists. The DDS was collected in France and Germany over the entire period, but the DDS is not collected in Switzerland and the US. These four countries were chosen for comparison because they have a larger well-documented auction market for art. In addition, we also present data on other countries, excluding these five. Some of these countries, such as the European countries, collected DDS over the entire period, whereas other countries, such as Japan, did not. Our rationale for pooling these countries is that there has been no change in DDS status and therefore no change in expectations of payment over the time period of study for any of these countries, as there has been in the UK.

The US and UK were by far the largest individual art markets over the period. More expensive art was generally sold in the United States, with the UK coming second. As would be expected, the number of artists that would be subject to the DDS under UK rules is lower in the US, as the artists must be living EEA artists.[12] The sample presented in Table 1 is the sample

[12] Original sales of art by the artist are not subject to the DDS. Only after the first transfer of ownership does the DDS come into force. It is very, very rare that the first sale of a work of art takes place at auction (an unusual exception was the Damien Hirst single-sale auction that took place in the autumn of 2008). We do not control for original sales by the artist, but due to the rarity of this event, this omission should not at all affect our results.

used in the regression analysis. A little over 10% of the paintings did not have observations on size or medium -- 79,150 out of 670,533 total observations.

Table 1
Summary Statistics
Art Sold at Auction

	France	Germany	Switzerland	UK	US	Other Countries
			All observations			
Average Price	£8,585	£6,633	£9,545	£22,534	£39,051	£7,441
Standard Deviation	£51,211	£30,202	£52,610	£191,400	£377,532	£30,841
No. of Obs.	85,428	51,205	18,715	160,682	136,292	218,211
			Subject to the DDS			
Average Price	£5,620	£5,312	£3,931	£20,549	£33,846	£4,365
Standard Deviation	£19,090	£18,570	£8,163	£143,528	£147,845	£11,833
No. of Obs.	9,506	4,479	522	13,255	4,929	30,845
			Not subject to the DDS			
Average Price	£8,956	£6,759	£9,706	£22,712	£39,246	£7,948
Standard Deviation	£53,889	£31,086	£53,333	£195,129	£383,481	£32,907
No. of Obs.	75,922	46,726	18,193	147,427	131,363	187,366

4.2 Hedonic Price Indices

We begin by constructing a hedonic price index for each country (France, Germany, Switzerland, the UK and the US) and each market segment. We perform country-specific regressions where we regress ln p_{it}, the natural log of the price for painting i at time t, on painting characteristics $\mathbf{X}_i$ and time dummies, $\boldsymbol{\delta}_t$ We separate the sample into a DDS sample that includes paintings that would be subject to the DDS in the UK after its implementation, whether or not the DDS was currently in effect in the country or at the specific time of sale, and a non-DDS sample.

Specifically, for each country, our equation is as follows:

(1) $$\ln p_{it} = \boldsymbol{\delta}_{\mathbf{t}}\boldsymbol{\gamma}_{\mathrm{i}} + \mathbf{X}_{\mathbf{i}}\boldsymbol{\beta} + \varepsilon_{it}$$

The parameters to be estimated are $\boldsymbol{\gamma}$, and $\boldsymbol{\beta}$ and ε_{it} is an error term.

We use all of the painting characteristics that we have been able to easily download from Art Sales Index. The painting characteristics, $\mathbf{X}_{\mathbf{i}}$, are height and width of the artwork (in natural logs), the auction house, and five dummy variables for the medium used in the artwork. [13] Instead of explicitly including artist dummy variables (because of the large number), we demean the regressor (ln price) by subtracting the mean of ln price by artist. This produces equivalent coefficients on the time dummy variables as if we had used dummy variables for each of the artists. [14] [15]

We also run one pooled regression for all other countries excluding France, Germany, Switzerland, the UK and the US. We use dummy variables for the different countries (country fixed effects) but restrict the effects on painting characteristics to be identical across countries.

[13] We downloaded the painting date, but that was only available for about half of the observations. Furthermore, this variable was not significant when it was included in a regression using the subsample for which the variable was available. The insignificance is not surprising, as the prices are demeaned by artist.

[14] Note that we use all of the characteristics that were used in Chanel, Gerard-Varet, and Ginsburgh (1996). In addition, we include medium of painting. While other hedonic analyses have been able to include other characteristics such as sign or stamped and lot number (e.g. see Beggs and Graddy (1997)), we were not able to easily download these characteristics from Art Sales Index.

[15] Kraeussl and van Elsland (2008), as implemented in Kraeussl and Lee (2010), have proposed an alternative method for dealing with the problem of too many artist dummy variables. However, as we are interested only in the indices for this study, and not the coefficients on the individual artist dummies, demeaning the regressors is a sufficient correction, especially as it results in an identical index as if artist dummy variables had been included as regressors.

4.2.1 Hedonic Regression Results

Our regression results for equation 1 are presented in Tables 2 and 3 below.[16] Table 2 presents results using the sample of paintings subject to the DDS, and Table 3 presents results using the sample of paintings not subject to the DDS. On average, we are able to account for about 40% of the variation in price of the demeaned-by-artist ln price regressor. By looking at the coefficient on period 6, we can see that all countries have had statistically significant price growth from 1993 through 2007 in the non-DDS sample, and all countries except for Switzerland and Germany (which have relatively small DDS samples) have had statistically significant price growth in the DDS sample. By looking at the coefficients on ln height and ln width, we can see that as expected, larger paintings achieve higher prices. Paintings sold at Christie's and Sotheby's go for higher prices than paintings sold at other auction houses.

[16] As is usual when constructing price indices, all analysis in both the hedonic and repeat sales regressions is in nominal terms.

Table 2
Regression Results for Hedonic Regressions
Paintings Subject to the Droit de Suite
Dependent Variable: ln Price (demeaned by artist)

	France	Germany	Switzerland	UK	USA	Other
period 2	-0.091*	-0.136*	-0.122	0.140*	-0.085	0.164*
	(0.025)	(0.038)	(0.101)	(0.029)	(0.047)	(0.015)
period 3	0.019	-0.215*	0.017	0.504*	0.347*	0.344*
	(0.024)	(0.039)	(0.104)	(0.029)	(0.048)	(0.014)
period 4	0.145*	-0.034	-0.178	0.512*	0.299*	0.578*
	(0.027)	(0.040)	(0.117)	(0.029)	(0.049)	(0.014)
period 5	0.284*	-0.017	0.050	0.680*	0.339*	0.648*
	(0.025)	(0.037)	(0.101)	(0.028)	(0.047)	(0.014)
period 6	0.433*	0.224*	0.116	0.962*	0.541*	0.857*
	(0.024)	(0.039)	(0.134)	(0.028)	(0.046)	(0.014)
ln height	0.470*	0.457*	0.278*	0.480*	0.481*	0.419*
	(0.017)	(0.025)	(0.092)	(0.019)	(0.029)	(0.010)
ln width	0.332*	0.322*	0.507*	0.370*	0.435*	0.430*
	(0.016)	(0.024)	(0.080)	(0.018)	(0.027)	(0.010)
Christie's	0.317*		0.262	0.210*	0.266*	0.214*
	(0.039)		(0.212)	(0.019)	(0.031)	(0.013)
Sotheby's	0.460*	0.606*	-0.640	0.268*	0.316*	0.258*
	(0.071)	(0.130)	(0.351)	(0.019)	(0.032)	(0.014)
constant	0.000	-0.000	0.004	-0.001	-0.003	-0.053
	(0.006)	(0.008)	(0.019)	(0.006)	(0.010)	(0.073)
N	9506	4479	522	13255	4929	30845
r2	0.413	0.460	0.383	0.444	0.512	0.440
media	5*	5*	5*	5*	5*	5*
countries						35*

Notes: All regressions variables have been demeaned by artist.
Standard errors in parentheses * $p<0.05$

Table 3
Regression Results for Hedonic Regressions
Paintings NOT Subject to the Droit de Suite
Dependent Variable: ln Price (demeaned by artist)

	France	Germany	Switzerland	UK	USA	Other Countries
period 2	0.004	-0.002	-0.012	0.218*	0.096*	0.166*
	(0.012)	(0.013)	(0.021)	(0.008)	(0.010)	(0.007)
period 3	0.180*	-0.032*	0.024	0.488*	0.557*	0.281*
	(0.011)	(0.013)	(0.021)	(0.008)	(0.010)	(0.006)
period 4	0.282*	0.062*	0.037	0.474*	0.435*	0.385*
	(0.012)	(0.013)	(0.021)	(0.008)	(0.010)	(0.006)
period 5	0.271*	0.104*	0.056*	0.487*	0.472*	0.435*
	(0.011)	(0.013)	(0.020)	(0.008)	(0.009)	(0.006)
period6	0.443*	0.211*	0.153*	0.699*	0.657*	0.603*
	(0.011)	(0.013)	(0.022)	(0.008)	(0.009)	(0.006)
ln height	0.244*	0.338*	0.389*	0.376*	0.427*	0.422*
	(0.006)	(0.011)	(0.018)	(0.007)	(0.007)	(0.005)
ln width	0.430*	0.309*	0.444*	0.448*	0.408*	0.417*
	(0.007)	(0.010)	(0.017)	(0.007)	(0.007)	(0.005)
Christie's	0.166*		0.589*	0.303*	0.532*	0.210*
	(0.016)		(0.027)	(0.006)	(0.007)	(0.007)
Sotheby's	0.324*	0.422*	0.471*	0.349*	0.605*	0.277*
	(0.023)	(0.037)	(0.022)	(0.006)	(0.007)	(0.007)
constant	0.000	0.001	0.007	0.000	0.001	0.005
	(0.003)	(0.003)	(0.005)	(0.002)	(0.002)	(0.022)
N	75922	46726	18193	147427	131363	187366
r2	0.303	0.278	0.364	0.329	0.388	0.331
media	5*	5*	5*	5*	5*	5*
countries						35*

Notes: All regressions variables have been demeaned by artist.
Standard errors in parentheses * p<0.05

We are interested in price growth, which is a function of the differences in coefficients. However, we do not know the path of expectations regarding the DDS. For example, if expectations of the DDS were fully incorporated during the early periods, we would expect different results in price growth during the early periods than if expectations of the DDS were only incorporated in the later periods. For this reason, we focus on price growth over the entire period.

Table 4 calculates the price growth for the treatment group –art subject to the DDS in the UK --the price growth for the control groups, and F-statistics for art over the entire period.[17] We believe that in 1993 there were no (or very few) expectations that the UK would implemented the DDS, but by 2007, it had already been implemented.[18] As is evident in the first panel of Table 4, the data show no evidence of a decrease in growth for paintings subject to the DDS. In fact, the price growth for art subject to the DDS in the UK – the treatment group -- is higher than for any another other country and higher than the average total market growth. Furthermore, as the lower panel in the Table shows, prices for paintings that are subject to the DDS have increased relatively more in the UK than in any other country. This increase is statistically significant for the US, France and Germany.

If everything else were equal other than the introduction of the DDS, what would we have expected? If we go back to our discussion above, theory predicts that returns to art in our treatment group should be less than in any of our control groups, assuming there was no or little

[17] The price growth per year is calculated as $\exp(\text{coef[period 6]}^{1/10}) - 1$.

[18] In any earlier version of the paper (see Graddy and Banterghansa (2009)) we started in 1996. At the request of a referee, we have now extended our data back to 1993, with very similar results.

expectation of the implementation of the DDS in 1993. Theoretically, *ceteris paribus*, given the average price of a painting was just under €50,000 in 2007, the average tax payable would be about 4% or €2000. If paintings were resold every twenty years and expected to be resold twice in an artist's lifetime, we would expect returns per year in the UK to be on average about 0.8% less per year – not 2.3% more per year as our results indicate when compared with the US. [19] So far, we find no empirical evidence that the DDS has had the predicted small negative impact on price.

[19] Depending on how the dataset is constructed, time between sales can range from 3 years to 28 years (see Beggs and Graddy (2009)). The 20 year period was chosen arbitrarily, but it does give some feel for the magnitude of the impact on returns that should be felt with the introduction of the DDS.

Table 4
Average Price Growth per Year

UK		US	
Subject to the DDS	0.077*	Subject to the DDS	0.042*
Not subject to the DDS	0.055*	Not subject to the DDS	0.052*
France		Switzerland	
Subject to the DDS	0.034*	Subject to the DDS	0.009
Not subject to the DDS	0.035*	Not subject to the DDS	0.012*
Germany		Other Countries	
Subject to the DDS	0.017*	Subject to the DDS	0.068*
Not subject to the DDS	0.016*	Not subject to the DDS	0.047*

(Difference in Difference in Average Price Growth per Year)

[$UK_{\text{subject to the DDS}}$-$UK_{\text{not subject to the DDS}}$-($Country_{i\text{ subject to the DDS}}$- $Country_{i\text{ not subject to the DDS}}$)]

US	France	Switzerland	Germany	All
0.031*	0.022*	0.024	0.021*	0.001

*indicates that the P-values of the underlying coefficients (or the F-statistics for the differences in the underlying coefficients) are significantly different from zero

4.2.2 Robustness Checks

4.2.2.1 Excluding UK Artists

Could a preference for paintings by living UK artists be driving these results? For example, if an increase in the taste for paintings by living UK artists had occurred over the period, and since more living UK artists were being sold in the UK, then the price growth for art that is subject to the DDS would consequently increase faster in the UK than in other countries. As a robustness check, we reran our regressions by excluding all British artists from all countries. A summary of our results from these regressions is presented in Table 5.

Table 5
Average Price Growth per Year
Excluding British Artists

UK		US	
Subject to the DDS	0.079*	Subject to the DDS	0.047*
Not subject to the DDS	0.059*	Not subject to the DDS	0.053*
France		Switzerland	
Subject to the DDS	0.034*	Subject to the DDS	0.010
Not subject to the DDS	0.035*	Not subject to the DDS	0.012*
Germany		Other Countries	
Subject to the DDS	0.017*	Subject to the DDS	0.067*
Not subject to the DDS	0.017*	Not subject to the DDS	0.047*

(Difference in Difference in Average Price Growth per Year)

$[UK_{\text{subject to the DDS}} - UK_{\text{not subject to the DDS}} - (Country_{i \text{ subject to the DDS}} - Country_{i \text{ not subject to the DDS}})]$

US	France	Switzerland	Germany	All
0.026*	0.021*	0.022	0.020*	0.000

*indicates that the P-values of the underlying coefficients (or the F-statistics for the differences in the underlying coefficients) are significantly different from zero

As seen in the first panel of Table 4, the price growth for the market subject to the DDS in the UK – the treatment group -- is again higher than for any other country. Furthermore, as the second panel shows, the difference-in-difference results remain significant for the U.S, France and Germany. Hence, it does not appear that an increase in the preference for living UK artists is driving the results.

4.2.2.2 Including Artists' Heirs

In our initial regression results in Tables 2 and 3, we compared art that would have been eligible for the DDS in the UK as of February 2006 with all other art. However, as the UK government had considered extending the implementation of DDS to the heirs of artists from the European Economic Area for 70 years after the artist's death, we ran further regressions that included both living EEA artists and their heirs for 70 years in the group eligible for the DDS. Table 6 below presents a summary of these results from our regressions. These results are consistent with our previous results.

Table 6
Average Price Growth per Year
(Living EEA artists and their heirs for 70 years are subject to the DDS)

UK		US	
Subject to the DDS	0.062*	Subject to the DDS	0.033*
Not subject to the DDS	0.056*	Not subject to the DDS	0.057*
France		Switzerland	
Subject to the DDS	0.035*	Subject to the DDS	0.002
Not subject to the DDS	0.033*	Not subject to the DDS	0.014*
Germany		Other Countries	
Subject to the DDS	0.014*	Subject to the DDS	0.050*
Not subject to the DDS	0.021*	Not subject to the DDS	0.052*

(Difference in Difference in Average Price Growth per Year)
[$UK_{\text{subject to the DDS}}$-$UK_{\text{not subject to the DDS}}$-($Country_{i\text{ subject to the DDS}}$- $Country_{i\text{ not subject to the DDS}}$)]

US	France	Switzerland	Germany	All
0.030*	0.004	0.018*	0.012*	0.008*

*indicates that the P-values of the underlying coefficients (or the F-statistics for the differences in the underlying coefficients) are significantly different from zero

4.2.3 Price Growth By Age

As an additional test, we split out the paintings that were subject to the DDS by artists who are over the age of 65 and artists who are under the age of 65. The motivation for this test is that since the DDS at the time of implementation was not extended to heirs, it is less likely that an older artist's painting will resale during the artist's lifetime, and hence less likely that DDS will have to be paid on resell. Hence, we would expect that with the imposition of the DDS, price growth for younger artists would be impeded more than price growth for older artists. At the time the DDS was implemented, there was some expectation that the UK government might extend the right to artists' heirs in the near future -- which complicates the motivation.

As shown in Table 7 below, when we split the sample, we found that price growth for artists over the age of 65 in the UK was greater than price growth for artists under the age of 65. Moreover, the difference in the UK was greater than the difference in any other country, as shown by the lower panel in the table below, and this difference in difference is significant for the US, France, and Germany. This result contradicts our earlier results -- it could be the case that the DDS is lowering the price of paintings by younger artists at auction because these items are more likely to be resold under a regime of droit de suite.

Table 7
Average Price Growth per Year
Subject to the DDS

UK		US	
Under 65	0.056*	Under 65	0.050*
Over 65	0.095*	Over 65	0.042*
France		Switzerland	
Under 65	0.037*	Under 65	0.037*
Over 65	0.030*	Over 65	-0.001
Germany		Other Countries	
Under 65	0.032*	Under 65	0.063*
Over 65	0.010*	Over 65	0.075*

(Difference in Difference in Average Price Growth per Year)
[$UK_{\text{subject to the DDS}}$-$UK_{\text{not subject to the DDS}}$-($Country_{i\text{ subject to the DDS}}$- $Country_{i\text{ not subject to the DDS}}$)]

US	France	Switzerland	Germany	All
-0.047*	-0.047*	-0.077	-0.061*	-0.027*

*indicates that the P-values of the underlying coefficients (or the F-statistics for the differences in the underlying coefficients) are significantly different from zero

4.3 Repeat Sales Price Indices

We were able to construct a repeat sales dataset by sorting paintings by title, size, medium, and artist. The methodology used to put together the dataset (matching paintings by title and artist after all paintings are downloaded from an art sales database , and then excluding paintings with ambiguous titles) is similar to that used in Goetzmann, Renneboog, and Spaenjers

(2010). As there are many different paintings with identical titles, we dropped paintings with very ambiguous titles to avoid mistaking different paintings for identical paintings. We were able to find 56, 17, 100, and 72 repeat sales of art subject to the DDS for France, Germany, the UK, and the US, respectively; and 475, 393, 968, and 2276 repeat sales of art not subject to the DDS for France, Germany the UK, and the US, respectively, for which the title, medium and artist matched.[20]

Our repeat sales model is based on the regression,

(2) $$\ln\left(\frac{P_{is}}{P_{ib}}\right) = \sum_{t=1}^{T} \beta_t \delta_t + \varepsilon_{it}$$

β_t is the average return in period t of paintings in our dataset, the δ_t are dummy variables for each of the periods in the dataset, and $\varepsilon_{i,t}$ is an error term. The observed data consist of purchase and sales of auction price pairs, P_{ib} and P_{is} of the individual paintings that comprise the index, as well as the dates of purchase and sale, which are designated b_i and s_i. We use the Case and Shiller correction in order to control for known heteroskedasticity.[21] We estimate each country and each market segment separately. In Table 8 below, we report our repeat sales regressions.

[20] Mei and Moses (2002, 2005) construct their database by searching through auction catalogues from 1950 to 2000 for sales that list a prior sale in their provenance, and then going back to the catalogues for the sale in which the provenance was listed. While the Mei and Moses dataset is excellent in its size, scope, and accuracy, assembling such a dataset is very time consuming and expensive. Given our database, we have proceeded with the matching method described above.

[21] This methodology was developed by Bailey, et al. (1963) and used by Case and Shiller (1987) and Hosios and Pesando (1991) for the real estate market, and subsequently used by Goetzmann (1993), Pesando (1993), Mei and Moses (2002), Goetzmann and Spiegel (2003) and Beggs and Graddy (2008) for the art market.

Table 8
Regression Results for Repeat Sales
Dependent variable: ln p_{sale} -ln$p_{purchase}$

	France	Germany	UK	US
Subject to the DDS				
period 1 -period 2	-0.385*	-0.49	-0.272	
	-0.189	-0.661	-0.257	
period 2 - period 3	0.306*	0.223	0.231	0.338*
	-0.159	-0.451	-0.197	-0.123
period 3 - period 4	0.339*	0.0338	0.240*	-0.111
	-0.174	-0.277	-0.143	-0.0924
period 4- period 5	0.0515	0.403	0.223*	0.1
	-0.16	-0.233	-0.124	-0.0786
period 5-period 6	0.166	0.377*	0.297*	0.194*
	-0.124	-0.155	-0.1	-0.0743
Growth:				
Period 1-period 6	0.478*	0.5468	0.719*	0.521*
F-statistic	5.4	2.9	12.24	6.05
Observations	56	17	100	72
Not subject to the DDS				
period 1 -period 2	0.00218	0.0365	0.184*	0.0665
	-0.0873	-0.128	-0.0717	-0.0604
period 2 - period 3	0.310*	0.129*	0.238*	0.373*
	-0.0657	-0.0679	-0.0566	-0.0359
period 3 - period 4	0.00921	0.0114	-0.00702	-0.064*
	-0.0551	-0.056	-0.0475	-0.0292
period 4- period 5	0.0172	0.174*	0.097*	0.063*
	-0.0511	-0.0481	-0.0404	-0.0239
period 5-period 6	0.236*	0.00941	0.204*	0.163*
	-0.0464	-0.0465	-0.036	-0.0208
Growth:				
period 1- period 6	0.575*	0.360*	0.716*	0.602*
F-statistic	16.04	7.88	27.9	56.81
Observations	475	393	968	2276

Standard errors are in parentheses. * $p<0.05$

Table 8 shows price growth through the overall period is significantly different from zero for all countries and all markets. However, in no country is DDS price growth significantly different from non-DDS price growth. Hence, from the repeat sales regressions, the primary information to take away is that there is no difference in price growth in any country, UK included, between paintings subject to the DDS and those paintings not subject to the DDS.[22] The number of repeat sales of paintings subject to the DDS is notably small -- there were no observations in the US for the first period starting in July of 1993 for the US -- and the small sample may be driving these results.

4.4 Comparison of Quantities Sold at Auction

Table 9 lists the number of paintings sold each year at auction in each of the countries studied above for both the segment of the market subject to the DDS in the UK and the segment of the market not subject to the DDS in the UK. From the UK column in the upper panel of Table 9, it is clear that the growth in the number of artworks sold at auction that are subject to the DDS moved steadily upward compared with other countries and with artworks not subject to the DDS in the UK.

[22] The average return per year is calculated as $\exp(\mu)^{1/13}$, where μ is the sum of the coefficients on each period. This is a lower bound to the average per period growth rate, as the average return per year is calculated as $\exp(\mu+\sigma^2/2)^{1/13}$, where σ^2 is the variance in the error term of the repeat sales regressions (2) above. Goetzman (1993) and Mei and Moses (2002) use the coefficient on the second stage Case and Shiller regressions as an estimate of σ^2, but this requires an i.i.d assumption on the errors of the repeat sales regressions. We prefer to note the growth rate as a lower bound.

Table 9
Quantity Sold at Auction
(Number of Observations)

	France	Germany	Switzerland	UK	US	All Other
Subject to the DDS						
Period 1	1,671	673	96	1,346	654	4,029
Period 2	1,234	639	103	1,538	583	3,190
Period 3	1,506	715	109	1,755	655	4,466
Period 4	1,125	628	57	2,070	721	5,677
Period 5	1,629	905	107	2,829	1,016	6,698
Period 6	2,341	919	50	3,717	1,300	6,785
Not Subject to the DDS						
Period 1	9,959	7,443	3,121	25,939	17,520	25,964
Period 2	8,776	7,320	2,789	24,414	18,865	25,955
Period 3	14,380	7,929	3,243	23,737	18,030	29,807
Period 4	12,185	7,078	2,653	20,959	20,718	32,391
Period 5	14,732	9,492	3,656	23,654	26,644	38,974
Period 6	15,890	7,464	2,731	28,724	29,586	34,275

In Table 10 we present the percentage growth numbers over the entire period for each country and market segment. As is shown, the percentage growth in the number of artworks sold in the UK subject to the DDS is greater than for any other market presented. Furthermore, we difference the UK difference in the quantity of artwork sold in the two segments of the art market is with each other country's difference in the quantity of artwork sold in the two segments. The results indicate that the UK's relative growth in the DDS segment is greater than each other country's relative growth in the DDS segment.

Table 10
Percentage Quantity Growth over Period
(Difference in Quantity Sold at Auction)

UK		US	
Subject to the DDS	176.15%	Subject to the DDS	98.78%
Not subject to the DDS	10.74%	Not subject to the DDS	68.87%
France		Switzerland	
Subject to the DDS	40.10%	Subject to the DDS	-47.92%
Not subject to the DDS	59.55%	Not subject to the DDS	-12.50%
Germany		All	
Subject to the DDS	36.55%	Subject to the DDS	68.40%
Not subject to the DDS	0.28%	Not subject to the DDS	32.01%

Difference in Difference in Percentage Quantity Growth over Period

$[UK_{\text{subject to the DDS}} - UK_{\text{not subject to the DDS}} - (Country_{i\text{ subject to the DDS}} - Country_{i\text{ not subject to the DDS}})]$

US	France	Switzerland	Germany	All
1.355	1.849	2.008	1.291	1.290

In contrast to the theoretical predictions, the results do not provide support for a movement of art auction sales from the UK to non-DDS countries over the period from 1993 to 2007 despite the price decrease in art subject to the DDS in the UK that theory predicts once implementation of the DDS is anticipated. There is no evidence that owners of art subject to the DDS have changed venues of sale.

5. Discussion and Conclusion

The worst predictions regarding the effect on the UK art market from the implementation of the DDS have not been realized. We have not seen a general reduction in price growth for art subject to the DDS in the UK relative to other countries or other markets and we have not found evidence of a movement of paintings from the UK to other venues where the DDS would not be applied. In our hedonic regressions, we have found that over the period 1993 to 2007 the total price growth in the UK market segment subject to the DDS has increased significantly relative to other countries and relative to the segment of the market that is not subject to the DDS, despite introduction of the DDS in the UK. In our repeat sales regressions we have found no difference in the price growth in the two segments. Only when we split the DDS eligible art into two samples by artist age did we find some evidence that younger artists, whose paintings should have a longer exposure to the DDS, achieved lower price growth than older artists.

Our failure to find consistent evidence confirming the theoretical predictions regarding artists' resale rights could be due to identification issues. It is still possible that the art market for living artists in the UK was simply "hot" relative to other markets and relative to the overall market during this same period. In this case and without the introduction of the DDS, we might have seen even more paintings sold in the UK and even greater price growth for the market segment subject to the DDS in the UK. That our results still hold up when British artists are removed from the sample points somewhat away from this theory, but not completely.

Alternatively, our results may indicate that artists' resale rights may not have had an effect on price or quantity. Buyers may not calculate the effect that future sales in a venue that supports the DDS may have on their current value. Alternatively, the effect may be too small to measure. Given the difficulty of pricing art in the first place, the relatively large commission rates, and the small payments for the DDS, this would not be surprising.

The UK government was considering extending the Artist's Resale Right to heirs for 70 years after the artist's death. If this were to occur, the DDS will cover a much larger portion of the market. In 2007, approximately 11% of sales over €1000 in the market were subject to the DDS. If these rights had been extended to artists' heirs for 70 years, approximately 34% of the market would have been subject to the DDS. With this extension, because of the potential for a greater number of resale, the impact of the DDS is likely to be greater. It may become harder for buyers to ignore the impact and the DDS may increasingly be factored into their valuations. Thus, these current findings are not necessarily a good indication of the effects on the art market from a further extension of coverage, and the UK authorities should proceed with caution when further extending the rights.

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