THE EFFICIENCY OF *DROIT DE SUITE*: AN EXPERIMENTAL ASSESSMENT

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ABSTRACT. *Droit de suite* entitles visual artists to a percentage share of the resale price every time their works are resold over a given time span. The legal systems of the world do not universally accept the concept of *droit de suite*, and its economic efficiency has been a matter of debate for a few decades. In this paper, we model a work of art as a lottery to investigate experimentally the impact of this right on the art market. We find evidence that a number of known behavioral biases in decisions under uncertainty affect a seller's willingness to accept. In light of our results, we conclude that the interaction of these biases and droit de suite can reduce the number of transactions in the art market to a larger extent than previously suggested in the literature.

1. INTRODUCTION

Attitude toward risk is important in decision making in regards to artistic endeavors. Whether deciding what to create, when to create it, how to create it, or whom to create it for, a work of art carries uncertain returns. In some cases, this uncertainty involves low probabilities of large payoffs. In other cases, this uncertainty involves unknown probabilities of payoffs, or ambiguity. In practice, the expected return of works of art and literature, upon inception and before the resolution of uncertainty about actual value, turns into a transferable property title, copyright, with a market-determined price.[1] As a result, the artist is able to exchange uncertain compensation for a sure sum of money, whereas the eventual buyer, usually a professional

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[1]Unlike patent and trademark, copyright does not require any formal or informal registration act on behalf of the artists to become effective and supported by the applicable law of the jurisdiction.

investor capable of pooling risks, assumes any associated risks. Although the artist must still evaluate risk when deciding to keep or sell a copyright, the institution creates an *option* for the artist to replace risky compensation with a sure sum of money.

The situation created by this institution is desirable because it provides an artist an opportunity to decide on the level of risk he or she is willing to bear at each point in time. Still, this copyright flexibility in managing inherent risks of an artistic undertaking does not benefit equally all copyrighted works because it is not possible to copy all copyrighted works. Although paintings and sculptures are subject to copyright prerogatives, these creations are embedded in their original material form with no possibility of disassociation without changing the medium of expression. Therefore, the copyright attribute that entitles an artist to receive the financial yields of the reproduction of the work is naturally inoperative.[2] Consequently, the principal means for visual artists to monetize their work amounts to selling its material form. The impact of this situation on an artist's revenue has been considered over the years by most legal systems leading to the regulation that is usually called *droit de suite* because of its French origin (meaning follow-up right), which translates to *visual artist's resale royalty.*

Droit de suite entitles the creator of an original work of visual arts to an economic interest in its successive sales in the form of a percentage of the price received by the owner of the work, subject to certain legal requirements. First recognized in France, the anecdote behind the creation of *droit de suite* goes as follows. After World War I, the French painter Jean-François Millet's

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[2]Copyright may be a misleading term to designate the artist's rights (called *droit d'author* in French). Copyright, in principle, incorporates a number of prerogatives. Mainly, the right to the proceeds of any copies (reproductions), adaptations, translations, performances, and displays whenever applicable (in line with the differences among a written symphony, a movie, and a painting). Although copyright laws around the world regulate the production of posters, lithographs, and the like from the visual arts' field, this is not reproduction in the legal sense as this involves a change in the medium of expression (which became possible in the latter part of 20th century). We use "reproduction" in this paper in its strict legal sense: The strict copying of the works that can be copied, such as photographs.

famous 1858 painting, *L'Angélus*, was resold in an auction at a considerable price although the artist's family was living in poverty and his daughter was selling flowers in the streets of Paris the very same day as the auction.[3] When the account of this reached the French Parliament, it approved the resale royalty right.

The law typically specifies this right as a percentage share of the resale price that decreases as the resale price of the work of art increases. It covers a period similar to the validity period of other copyrights. Moreover, the right is inalienable, which means that the artist cannot contractually, or otherwise, withdraw beginning with the first sale or later on. Not all paintings and sculptures are eligible for resale royalties. In general, the requirement is that the work must be resold in an auction or via a professional art dealer and its resale price must be higher than a legally specified threshold.

After France recognized this right, other countries in continental Europe gradually adopted a version of it with the exception of Switzerland. Legally speaking, *droit de suite* became a part of copyright dispositions in EU civil law regimes. In EU common law countries, after long debates, adoption finally came about because of a 2001 EU harmonization directive (Directive 2001/84/EC). This EU directive led to the recognition of this right in the UK and the Republic of Ireland. As for common law countries outside the EU, Australian artists have long argued that the lack of recognition of *droit de suite* disadvantages them in comparison with their counterparts in other countries. Finally, in 2009, Australia and New Zealand integrated *droit de suite* into their national legislations. In Canada, the resale royalty is not accorded. More details about the resale royalty in Europe can be found in

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[3]Jean-François Millet (1814–1875) spent his youth working on the land, but by 1837 he had arrived in Paris and eventually enrolled in the studio of Paul Delaroche. The peasant subjects from the early 1850s were Millet's principal concern; as a result, he periodically faced the charge of being a socialist. Important collections of Millet's pictures can be found in the Museum of Fine Arts in Boston and in the Louvre.

Dreier and Hugenholtz (2006) and references therein (for other parts of the world see for instance: Barker 2011 and Hudson and Waller 2004).

In the US, *droit de suite* was only recognized in the State of California (see Bays, 2008).[4] In October 2011, the law was challenged in three class-action suits involving artists Chuck Close, Laddie John Dill, and Robert Graham who claimed that Sotheby's, Christie's, and eBay were not paying royalties. On May 17, 2012, U.S. Circuit Judge of the U.S. District Court of the Central District of California, held that the Act has "the practical effect of controlling commerce occurring wholly outside the boundaries of California," and thus violates the Commerce Clause of the US Constitution. The Court struck down the entire law.[5]

Given the United States' considerable share in the visual arts market, US recognition of this right at the federal level is a consequential issue. This difference in regulation also can induce the artists (dealers) to prefer selling or auctioning their works in jurisdictions where this right is recognized, such as Paris or London, as opposed to where it is not recognized, such as New York, thus creating a form of art auction haven. Harmonization of the laws internationally could stimulate trade by providing comparable financial returns regardless of the jurisdiction in which the sale takes place in addition to eliminating the legal complications that can arise because of a Conflict of Laws (the legal term for the involvement of multiple jurisdictions in a judicially disputed case).[6]

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[4]See: "Artists File Lawsuits, Seeking Royalties", The New York Times, November 1st , 2011. web: http://www.nytimes.com/2011/11/02/arts/design/artists-file-suit-against-sothebys-christies-and-ebay.html?_r=1&pagewanted=2&sq=copyright&st=cse&scp=4.

[5]See: Calif. Royalties Act Struck Down As Unconstitutional, Law360, May 18th, 2012. web: http://www.law360.com/articles/341891/calif-royalties-act-struck-down-as-unconstitutional/

[6]The Conflict of Laws is a set of procedural rules that determine which legal system, and the law of which jurisdiction, applies to a given dispute. The rules typically apply when a legal dispute has a foreign element from the standpoint of the judicial system in which the dispute is being resolved (such as a contract agreed upon by parties located in different countries). The jurisdiction in which the dispute is being resolved impacts the national law that will be ultimately applied. If the contents of national legislations are different, then this jurisdiction becomes important for the outcome of the dispute.

The main reason behind the lack of universal acceptance of this right is that most economists have concluded that it is inefficient. This paper contributes to the literature examining the efficiency of *droit de suite* using an experimental approach. We conjecture that *droit de suite* may interact with the endowment effect. Moreover, because it is common knowledge that the degree of risk aversion is affected by the magnitude of the stakes, *droit de suite* does precisely this. Our experimental results are supportive of these conjectures. In light of our results, we conclude that fixing a high threshold for *droit de suite* to take effect can mitigate the adverse impact of the institution on the number of transactions in addition to providing extra incentive for the most promising artists. We also examine the ability of a non-expected utility model to fit the experimental data, further providing evidence that the resale royalty regime induces behaviors not adequately foreseeable by the rational choice framework.

In the next section, we elaborate on the institution's legal and economic commentaries. Section 3 elaborates on our conjectured behavioral impact on artists' decisions. Section 4 explains the design of the experiment. The analysis of experimental data and the results of our estimations follow. The last section concludes.

2. Resale Royalty in Law and Economics

Overall, the interventionist nature of *droit de suite* has motivated more criticism than support among economists. Historically, economic efficiency was not among the legislators' motivations for the conception of this right. Increasing artists' revenues and fairness have been the main culprits behind its conception. Given the inability to copy visual arts, the revenue of these artists can be modest, especially at the beginning of their careers. Furthermore, it is usual that the price of a piece of art substantially increases over time because of the artist's later reputation. In economic terms, there is a

positive externality instigated by the artist to the benefit of the subsequent owners of this artist's works, and *droit de suite* is a way to internalize this externality. *Droit de suite* also can be interpreted as a means to protect the weaker party of the transaction (artist) against the party with higher bargaining power (art dealer). However, the positive impact of *droit de suite* on an artist's revenue comes into question due to its supposed negative impact on the number of transactions in the art market since the last half of 20th century (see Hauser, 1962; Price, 1968; Asimow, 1971; Bolch, Damon and Hinshaw, 1978).

Let us ask the question again. What is the effect of *droit de suite* on market equilibrium values; that is, will resale royalty affect the number of transactions and the price? In a system that enforces *droit de suite*, both willingness-to-pay (WTP) and willingness-to-accept (WTA) for a painting (or sculpture) in its first sale should decrease. The reasoning is straightforward: the selling artist may receive extra compensation through resale in the future, while the buyer (dealer or private owner other than the artist) will have to pay a percentage of the price received in a future transaction to the artist. These two effects act on the WTA (WTP) of the artists (dealers) towards an overall higher (lower) price received than the first sale price. Thus, the market equilibrium first sale price is expected to decline but not necessarily the number of transactions. The extension of this analysis to the number of transactions requires further assumptions such as risk aversion of the artists and risk neutrality of the dealers.

Greffe (2005) found evidence that *droit de suite* reduced the number of transactions in the market as well as the first sale's price, resulting in an adverse economic effect on artists, especially young artists. Using a model of optimal risk sharing, Solow (1998) reached the conclusion that *droit de suite* resulted in inefficient risk taking by a risk-averse artist contracting with a

risk-neutral dealer. Stanford (2003) argued against the administrative costs of implementing *droit de suite*. Other researchers emphasized the market structure in their analyses of the impact of *droit de suite*: Perloff (2003) discussed the uneven bargaining power between artists and art dealers and concluded that the dealers earned excess profits at the expense of the young artists hence *droit de suite* was a desirable remedy (see also Filer, 1984 and 1986). Banternghansa and Graddy (2011), after the recognition of the right, found no evidence for its impact on the market values (see also: Becker and Walton, 1975; Ginsburgh and Throsby, 2006; and Heilbrun and Gray, 2001).

It is noteworthy that the interventionist nature of the right also has a bright side. The ex-ante uncertainty of the artists' compensation was one of the reasons behind the prevalence of the *patronage* system before the democratic era (for compatible considerations see: Frey and Eichenberger, 1995; and Hansmann and Santilli, 2001). In the absence of financial support by the members of the aristocracy, the creation of works of art would be greatly undermined. In some sense, the patron acted as the principal and the artist as the agent. The transition of social institutions into their modern visage eliminated the patronage system and allowed laws and other social institutions to take the place of private patrons. As such, one would expect these institutions to provide a set of comparable incentives for the creation of visual arts. It has been shown that droit de suite is, in fact, an efficient tool when the policy maker intends to promote the production of visual arts due to its compatibility with the optimal contract for the context (see Dilmaghani, 2008).

3. Behavioral Impact of Resale Royalty

Droit de suite not only affects the total revenue of visual artists but also the distribution of their revenue over time. Hence, it is susceptible to triggering the usual behavioral phenomena identified as affecting risky and intertemporal choices. This study is the first to investigate the impact of *droit de suite* on market equilibrium values, thus accounting for some of the behavioral biases in decision making in such contexts.

Our first conjecture is a possible impact of the *endowment effect*. The endowment effect postulates that agents tend to demand more money for an object that they already own than when they do not own it. It is documented through the larger sum elicited as WTA than WTP for the same object (see, e.g., Brookshire & Coursey, 1987; Hammack & Brown, 1974; Knetch, 1989; Knetch & Sinden, 1984; Rowe et al. 1980).

One version of the endowment effect can be explained by economic theory itself predicting this phenomenon for goods with no close substitutes (Hanemann, 1991; Shogren *et al.* 1994). However, the main explanation of this phenomenon is psychological. Although the endowment effect must be present with or without resale royalty, we conjecture that the institution can exacerbate the bias. *Droit de suite* legally, hence psychologically for the selling artist, extends the ownership relationship of the artist with the work in time by allowing the artist to receive a percentage from each resale price. Therefore, *droit de suite* can intensify the endowment effect, thus pushing the WTA in the first sale upward.

Second, there is evidence that the larger the stake the greater the degree of risk aversion (Engle-Warnick, Escobal, & Laszlo, 2007; Holt & Laury, 2002). The existence of resale royalty makes risky stakes smaller; therefore, resale royalty is capable of pushing risk aversion downward, thus causing the artist to ask for a higher price in the first sale.

Third, both risk and time preferences would operate on decisions in a marketplace involving *droit de suite*, and these two concepts are associated with behavioral biases as well. Simply put, risk aversion would lead to a lower acceptance price on the part of the artist (swapping a sure payment for a gamble). However, although economic theory makes a straightforward prediction, actual behavior may be different. Kahneman and Tversky (1979) provided the first evidence with their prospect theory that people appear to give more weight to the small probabilities of good outcomes in gambles. The extent to which an artist may believe that there is a small probability of a large payoff for the artwork may have an important effect on the price the artist expects to receive.

Again, this bias must be present with or without resale royalty, but the interaction of this bias and resale royalty can work to actually, all else equal, diminish the WTA for the work in the first sale. The reasoning is straightforward: If the small probability of a subsequent resale is given too much weight by the artist, then the expected future payoffs through resale royalty are overvalued and this brings the artist's WTA in the first sale down.

Time discounting and its associated behavioral phenomena are also likely to come into play given that resale royalty is granted for a significant period of time (e.g., Anderson, Harrison, Lau, and Ritstrom, 2008; Behabib and Bisin, 2004; Engle-Warnick, Heroux, and Montmarquette, 2009; Rubinstein, 2003; see also Frederick, Loewenstein, and O'Donoghue, 2002, for a survey of previous studies). Setting aside the issue of time preferences for the current research and supposing that the work of art produced by a visual artist (i.e., either a painting or a sculptor) is analogous to a lottery. Based on the experimental evidence and behavioral findings, we can put forward three behavioral conjectures about the impact of resale royalty on an artist's WTA.

(1) All else being equal, an artists' (experiment subjects') valuations elicited through their WTA for a lottery (standing for a work of art) will be *higher* in the presence of *droit de suite*. This conjecture relies on assuming the existence of an emotional attachment, an idiosyncratic "sense of ownership", between an artist and her work; and that the resale royalty institution acts to extend this emotional attachment further in time (for behavioral considerations in the case of the visual artists, see: Frey and Eichenberger, 1995; Andre and Eichhorn, 2009).

(2) As resale royalty makes the stakes of risk taking smaller, the artists should become less risk averse. Lowered risk aversion affects the WTA upward as the expected utility gets closer to the expected value (Holt and Laury, 2002).

(3) All else being equal, an artists' (experiment subjects') WTA will be higher for the lotteries with low probabilities of high outcomes. This pattern in combination with the fact that resale royalty only covers works priced higher than a legally specified threshold means that the artists may state a relatively lower WTA in the presence of a resale royalty institution. The reason is that overestimating the low probability of a future high price for a work results in a higher expected future payoff hence *lowering* the WTA in the first sale.

Putting (1), (2), and (3) together (two effects toward a higher WTA and one toward a lower one), we conjecture that the WTA will decline less than proportionally with the resale royalty, that is, less than how the WTA would have fallen in the absence of these behavioral biases (inclusive of risk aversion as postulated by neoclassical theory). This implication of *droit de suite* may lead to a decrease in the number of transactions, especially if the

professional art dealers are more prone to decide based on rational choice principles without being subject to behavioral biases.

4. Design of the Experiment

We are interested in the impact of *droit de suite* on the reservation price of artists for their works, taking as a given their risk preferences. More precisely, the design is set to test our behavioral conjecture that *droit de suite* is susceptible to diminishing risk aversion. Thus, our experiment embeds a standard design to reveal risk preferences by way of incentive-compatible elicitation of WTA.[7]

We model the art produced by an artist as a lottery whose risky payoffs capture the inherent uncertainty of the artist's revenue. The subjects were endowed with 30 lotteries that were divided into two categories: (1) safe gambles whose payoffs were either \$15 or \$25, and (2) risky gambles whose payoffs were either \$1 or \$40. Skill-dependant types of works of art were modeled by safe gambles, whereas original works whose value may differ tremendously according to the state of the world were captured by risky gambles with their high variance of payoffs.[8] We constructed five risky and five safe gambles by varying the probability of the low outcome as follows: 0.1, 0.3, 0.5, 0.7, leading to 10 basic gambles in the design.

Recall that under resale royalty the artist retains a fraction of the realized value of all work for all future resales for a legally determined period of time. In the absence of resale royalty, the artist forfeits any pecuniary right over any future yield of the piece. To replicate the compensation scheme created by *droit de suite* in our experiment, we created two sets of replica

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[7]A copy of the experiment instructions, and a decision sheet is available upon request from the authors.

[8]One may argue that the uncertainty seen by the artist is endogenous in the sense that, for example, the artist may be making an effort to build a reputation. The advantage of the experimental laboratory is that one may abstract from such issues and focus, as we do here, directly and solely on the effect of retaining a fraction of the property being sold. Issues such as time and endogeneity remain open questions for future studies.

of the original gambles in which a partial sale took place. In these 20 extra questions, subjects were asked to express their WTA for 95% and 80% of the lotteries' payoff, retaining the remaining portion of the gambles. As such, we were able to compare the subjects' responses under the standard elicitation of risk preferences (0% royalty) with their responses when a resale royalty was granted by law of 5% and 20%. We observed 10 decisions for each category per subject, allowing the comparison of the risk preferences.

The decision tasks were provided to the subjects in six randomly arranged separate sheets, each containing the five gambles associated with the five configurations of the probability of the outcomes. The gambles were presented as pie charts, and probabilities of outcomes were communicated as "chances out of 100." The pie charts were ordered in descending order with respect to the probability of the good outcome (see Hey & Orme, 1994; and Wilcoxon, for such design concerns).

Table 1: Expected value (WTA for a risk-neutral utility maximizing agent) for the Experiment's Lotteries

	Risky gamble $1 or $40			Safe gamble $15 or $25		
	Royalty %			Royalty %		
probability	0%	5%	20%	0%	5%	20%
0.1	36.10	34.30	28.88	24.00	22.80	19.20
0.3	28.30	26.89	22.64	22.00	20.90	17.60
0.5	20.50	19.48	16.40	20.00	19.00	16.00
0.7	12.70	12.07	10.16	18.00	17.10	14.40
0.9	4.90	4.66	3.92	16.00	15.20	12.80

Table 1 presents the gambles featured in the experimental design along with their expected values, the WTA of a risk-neutral expected utility maximizer. The table is divided into two halves for risky ($1 or $40) and safe ($15 or $25) gambles. Each half of Table 1 is subdivided into three columns. The

column labeled 0% represents the absence of resale royalty. The columns labeled 5% and 20% represent situations where, upon the sale of the lottery, the subject retains these fractions of the lotteries' payoffs.

To elicit the true WTA of the subjects, we implemented the incentive compatibility mechanism proposed by Becker, Degroot, & Marschak (1964), hereafter the BDM mechanism. The application of the BDM mechanism in our setting meant that the exchange of the lottery for cash would only take place if the random draw (between $0 and $50 Canadian dollars) was above the WTA declared by the subject. In the event of the exchange, the price received by the subject was equivalent to the random draw. To make sure that the subjects understood the rationale for the BDM mechanism and how it worked, after providing the instructions and examples, the subjects passed a quiz to test their understanding of the BDM mechanism prior to the experiment. The session continued only after the experimenters had corrected the subjects' answers.

Sixty-four subjects participated in the experiment; 30 were men, all of whom were drawn from the standard subject pool consisting primarily of undergraduates and recent graduates of universities located in the province of Québec, Canada. Thirty-one subjects reported themselves as students, whereas the rest were self-employed, employed in the private or public sector, or unemployed. The average age of the subjects was 26.

The subjects were paid for one decision, randomly chosen from all 30 decisions that they made in the experiment, plus a $10 Canadian dollar show-up fee that is standard at our experimental laboratory. Overall, 33 subjects actually exchanged their lottery for cash, and the average payment was $45 Canadian dollars, including the show-up fee. The payoff calculation and the payment were done privately.

We have two distinct arguments for the external validity of our experiment. First, the question we address is about the decisions made by young, debuting artists who share many characteristic with the subjects of our experiment, mainly young students. Second, our intention was to compare the impact of two different institutional settings on risk preferences, taking as a given the individual fixed effects. In other words, the intention was to learn about the relative impact of the institution. Therefore, although the two populations' risk preferences may differ, we expected that the relative impact of the institution must be qualitatively comparable across the populations (see King, 1974; Caves, 2003).

5. Results

In this section, we discuss the estimation results' from the experimental data. In the first subsection, we report the descriptive statistics obtained from our experimental data. In the next subsection, we assume various latent decision-making models and we estimate the parameters of these models.

5.1. **Elicited WTA and Resale Royalty.** We start with a brief formalization of the framework assumed to be behind the reported WTAs. Let us denote the lotteries endowed by the subjects by $\widetilde{x}$ and the WTA, by q. Then, we have:

$$EU(w + \widetilde{x}) = U(w + q)$$

where $U(.)$ is the utility function, $EU(.)$ the expected utility and w is the initial wealth of the subject. And we also have:

$$EU(w + \widetilde{x}) = U(w + E\widetilde{x} - \pi)$$

where π is the risk premium associated with the lottery $\widetilde{x}$ at wealth level w, given the risk preferences of the decision maker. Together, these two

equations imply that:

$$q = E\widetilde{x} - \pi$$

Therefore, estimating q using the experimental data is equivalent to identifying the risk premium π.

Now, let us denote the resale royalty by λ, in this case the WTA solves:

$$EU(w + \widetilde{x}) = EU(w + \lambda\widetilde{x} + q')$$

where the WTA is now denoted by q'. And again, we also have:

$$EU(w + \lambda\widetilde{x} + q') = U(w + \lambda E\widetilde{x} + q' - \pi')$$

where now π' is the risk premium associated with lottery $\lambda\widetilde{x}$ (lottery $\widetilde{x}$ subject to a resale royalty of λ) at the wealth level of $w + q'$. Now, putting the above equations together, we get:

$$U(w + \lambda E\widetilde{x} + q' - \pi') = U(w + q)$$

and again, doing the algebra, we reach:

$$q = \lambda E\widetilde{x} + q' - \pi'$$

This means that eliciting q and q' using the experimental data, the risk premium, π', is obtained.

Only risk neutral expected utility maximizers are expected to end up with a null risk premium. Theoretically, besides informing about the qualitative aspects of the risk preference (aversion, neutrality and favouring), we can also gain information about its quantitative aspects. However, to learn about the quantitative aspects of the risk preference, we need to assume specific functions for the choice framework instead of the general function $U(.)$. In this subsection, we examine the experimental data, assuming a general function with no restriction other than the essential requirements of expected utility theory. The following subsection reports the estimations made when restricting the utility function to be a specific functional form.

To show the impact of resale royalty on the qualitative aspects of the risk preferences, non-parametric estimation of the distribution of the risk premium is made and reported in Tables 2 and 3, as well as the Figures 1, 2 and 3. We report the mean of the experimental WTAs of our 64 subjects in Table 2.[9] First, comparing Table 2 with the risk-neutral predictions reported in Table 1, subjects appear to be risk loving. This result, though compatible with WTA elicitation field experiments (see for instance: Harrison *et al.*, 2007; Bellemare and Shearer, 2010; and the references therein), is in contrast with results as in Holt and Laury (2002), where the behavior of the subjects was found to be typically risk averse. However, Holt and Laury's experiment differs from ours in eliciting risk preferences through binary choices rather than WTA.

Table 2: Mean WTA from the Experimental Data

	Risky gamble $1 or $40			Safe gamble $15 or $25		
	Royalty %			Royalty %		
probability	0%	5%	20%	0%	5%	20%
0.1	36.99	37.45	35.89	27.29	26.02	25.01
0.3	32.34	30.81	30.21	24.67	24.33	23.45
0.5	24.36	24.12	22.84	21.84	20.64	20.92
0.7	17.55	17.45	16.32	18.33	18.46	17.79
0.9	12.84	12.60	11.50	16.55	16.80	17.04

The results reported in Table 2 are consistent with our first prediction of the effect of WTA on revealed risk preferences. More precisely, we can see that the subjects' WTAs were not declining proportionally with the increase in the percentage of the lotteries they retained. For example, for the risky

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[9]We dropped two subjects from the sample as their answers revealed they did not understand the experimental protocol. Because the maximum amount that the computer could draw under the BDM procedure was $50, reported WTA's above this amount convey no information consistent with incentive compatibility of the experiment. Therefore, the WTAs are truncated at $50. This truncation did affect quantitatively or qualitatively the estimation results.

gamble of 0.1 probability of the best outcome, $37.45, the mean reported WTA for a 5% royalty was not a 5% discount applied to $36.99, which was the mean WTA reported for a 100% sale of the gamble. The same applied to the next cell ($35.89 is more than 80% discount applied to $36.99). Also, Table 2 is consistent with our second behavioral prediction that subjects appear to overvalue the lotteries with a 0.1 probability (the lowest) of the good outcome, compared with gambles of the higher probability of the good outcome.

The t-test results of the comparison of the mean WTA of the subjects across the experiment's configurations, are reported in Table 3. No statistically significant difference was detected at the usual significance levels. Table 3, however, cannot be interpreted as meaning the absence of a statistically significant impact of resale royalty on risk preferences if the subjects were not assumed risk neutral.

Table 3: Mean WTA Comparison between Whole Sales and Partial Sales[10]

	t-statistic risky gamble		t-statistic safe gamble	
probability	$0\% - 5\%$	$0\% - 20\%$	$0\% - 5\%$	$0\% - 20\%$
0.1	0.903	1.674	0.311	0.728
0.3	0.274	0.978	0.120	1.146
0.5	1.262	0.845	0.120	0.781
0.7	0.142	0.613	0.055	0.642
0.9	0.272	-0.474	0.120	0.679

To more precisely verify the impact of *droit de suite* on risk preference and the "risk premium", the difference between the subjects' WTAs and the expected value of the gambles (theoretically denoted by π and π' above), we proceed to a non-parametric probability density function estimation. The results are reported in the Figures 1, 2, and 3. In these figures, we compare

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[10]This table contains cross tabulation of the t-statistics for the null hypothesis of the equality of means of the subjects' WTA, as reported in lower panel of Table 2.
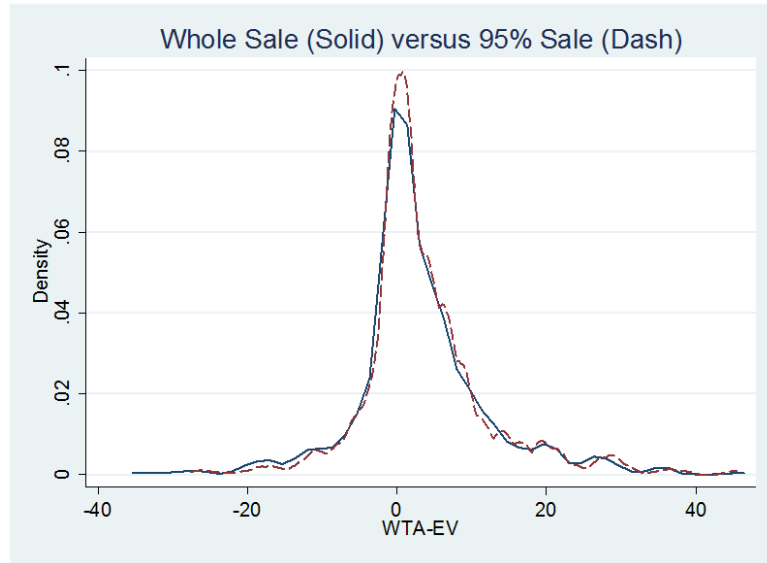
FIGURE 1. Risk Premium: Whole Sale vs. 5% Royalty (K-density estimates of the subjects' WTA)

the distribution of the risk premium across the different configurations of the experiment. Figure 1 compares the distribution of the risk premia (π and π') for a royalty rate of 0% and 5%, and Figure 2 shows the same for royalty rates of 0% and 20%. Notice that there is no discernable difference between the two plots in Figure 1, but Figure 2 reveals a consistently higher premium above the expected value for a royalty rate of 20%. A Kolmogorov-Smirnov test rejects the null hypothesis of the equivalence of the distributions in Figure 2, but it does not reject it for Figure 1. The Wilcoxon-Mann-Whitney test fails to reject in either case.

Figure 3 presents the nonparametric density estimation of the difference between the subjects' WTA and the expected value of the gamble, comparing safe versus risky gambles. Here, too, distributions are not identical, and the mean of premium is noticeably higher for risky gambles (although both means are strictly positive values). A Kolmogorov-Smirnov test rejects the
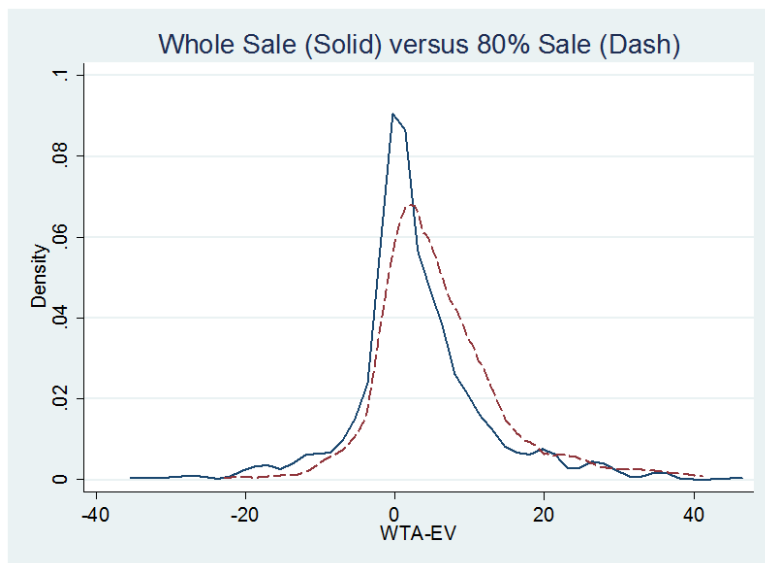
FIGURE 2. Risk Premium: Whole Sale vs. 20% Royalty (K-density estimates of the subjects' WTA)

null hypothesis of the identity of the distributions, as does the Wilcoxon-Mann-Whitney test. Thus, these figures support our conjecture that resale royalty impacts the decision makers' risk preferences in a way that can be translated into a change of parameters of an expected utility model, as examined below.

5.2. **Parametric Estimations.** We fit an expected utility model to the aggregate data assuming Constant Relative Risk Aversion (CARA) using nonlinear least squares as the estimation method. Denoting the outcomes by x_i and the corresponding probabilities by p_i, expected utility can be written as:

$$EU(x) = \sum_{i=1}^{2} p_i \frac{1}{1-r} x_i^{1-r} \tag{1}$$

Note that the assumptions made about the utility function impact the theoretical WTA. Theoretically, under CARA, there is no wealth effect, while assuming Decreasing Absolute Risk Aversion (DARA), risk aversion decreases with the initial wealth. We fit the experimental data to a CRRA
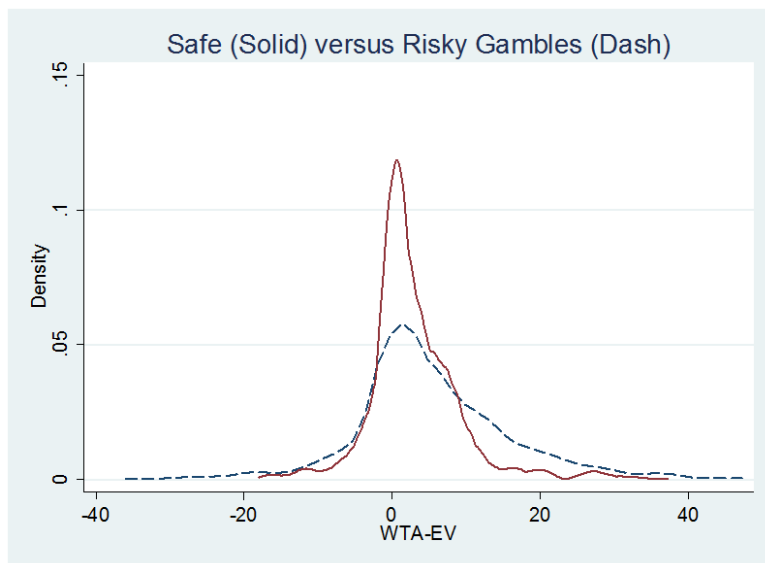
FigURE 3. Risk Premium: Safe Lotteries vs. Risky with Pooled
Data (K-density estimates of the subjects' WTA)

utility function. Besides the popularity of CARA in the literature, the absence of a wealth effect motivates our choice. Given the impossibility of reliably accounting for the initial wealth of the subjects, assuming a CARA utility function is an attractive option. Assuming a CARA utility function removes all concerns about the impact of the subjects' initial wealth on the estimated parameters of the utility function and the subsequent conclusions (for the implications of the utility function on the properties of risk preferences, see for instance Grossman and Stiglitz 1980, Broner, Gelos and Reinhart 2006).

We estimated the parameter r by pooling the experimental data, as well as for each subject separately, using the 30 observations that we had for each subject. The results are presented in Table 4. The first row reports the results of the pooled dataset, and the second row reports the mean estimate of the parameter when we fit the model subject-by-subject. As the results in

Table 4 suggest, the subjects appear to be slightly risk loving, given that the estimated value of the parameter r is statistically significant and negative.

Table 4: Expected Utility (CRRA) Parameter Estimates: Pooled vs. Individual

	pooled regression	individual regressions
parameter r	-0.037** (0.002)	-0.030 (0.062)
adjusted R^2	0.8689	–
N^o of observations	1920	1920

Note: The indication ** means the estimate is significant at 5% level; standard errors are in parentheses.

Next, we allowed the parameter of the utility function to vary with the type of gamble (safe or risky). We did this by splitting the sample and estimating the coefficient of relative risk aversion separately for each type of our lotteries.[11] The underlying model is shown in (2) and the results are reported in Table 5.

$$\begin{cases} \text{if safe} & EU = \sum_{i=1}^{2} p_i \frac{1}{1-r_1} x_i^{1-r_1} \\ \text{if risky} & EU = \sum_{i=1}^{2} p_i \frac{1}{1-r_2} x_i^{1-r_2} \end{cases} \qquad (2)$$

Table 5: Expected Utility (CRRA) Parameter Estimates: Safe vs. Risky

	safe lotteries	risky lotteries
parameter r	-0.035** (0.002)	-0.037** (0.003)
adjusted R^2	0.9169	0.8378
N^o of observations	960	960

Note: The indication ** means the estimate is significant at 5% level; standard errors are in parentheses.

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[11]We also estimated this model for females and males separately. We found that females were slightly less risk loving (approximately risk neutral) compared to males as it was also found in Eckel, Grossman, Lutz, and Padmanabhan (2003). The results are reported in Table 9.

The results in Table 5 show that the subjects' responses were just very slightly closer to risk neutral in the safe gambles, whereas for both risky and safe gambles the estimate showed a slight level of risk-loving behavior. More precisely, the parameter r turned out to be -0.035 in safe gambles versus 0.037 for risky ones. The results reported in Table 5 do not make a case, however, for a statistically significantly different behavior across the two types of gambles.

Table 6: Expected Utility (CRRA) Parameter Estimates Across Royalty Rates

	0% royalty	5% royalty	20% royalty
parameter r_i	-0.023** (0.003)	-0.032** (0.003)	-0.066** (0.004)
adjusted R^2	0.873	0.877	0.871
N^o observations	640	640	640

Note: The indication ** means the estimate is significant at 5% level; standard errors are in parentheses.

To verify our behavioral conjectures, we considered the case in which the parameter of the utility function, as specified at the end of this paragraph, varied according to the type of sale. The results are presented in Table 6, where each column of the table represents the estimated parameter for each of the three different royalty rates (inclusive of 0% royalty or the absence of *droit de suite*).

Again, risk-loving behavior is exhibited in all three cases, and consistent with the intuition gleaned from Table 3 the degree of risk-loving indecisions increases, which means expressing higher WTAs with the increase in the royalty rate in accordance with our behavioral conjecture (the parameter r turns out to be -0.023, -0.032, and -0.066 in 0%; 5%, and 20% royalty,

respectively). The underlying model is provided in (3).

$$\begin{cases} \text{if } 100\% \text{ sale } (0\% \text{ royalty}) & EU = \sum_{i=1}^{2} p_i \frac{1}{1-r_1} x_i^{1-r_1} \\ \text{if } 95\% \text{ sale } (5\% \text{ royalty}) & EU = \sum_{i=1}^{2} p_i \frac{1}{1-r_2} x_i^{1-r_2} \\ \text{if } 80\% \text{ sale } (20\% \text{ royalty}) & EU = \sum_{i=1}^{2} p_i \frac{1}{1-r_3} x_i^{1-r_3} \end{cases} \tag{3}$$

We also used a non-expected utility framework looking for evidence of the bias of overweighting small probabilities of good outcomes. Following Loomes, Moffat, and Sugden (2002), we estimated a specification based on a rank-dependant utility (RDU) model. The version of the model that corresponds to our estimation is as follows.

$$EU(x) = \sum_{i=1}^{2} p_i(1 - \delta b) \frac{1}{1-r} x_i^{1-r} \tag{4}$$

The variable δ is a dummy that takes the value of 1 if p_i is the smallest probability of the good outcome of the set of lotteries and zero otherwise. A negative value of b indicates that the subjects overweighed the lowest probability of the good outcome. Note that, here again, we estimated this model both on aggregate data and separately for each type of gamble (safe and risky). The results of the estimations are reported in Table 7.

Table 7: Rank Dependant Utility Parameter Estimates

	pooled regression	risky gambles	safe gambles
parameter r	-0.035** (0.003)	-0.032** (0.003)	-0.049** (0.003)
parameter b	-1.184** (0.154)	-1.169** (0.154)	0.33* (0.193)
adjusted R^2	0.826	0.784	0.899
N^o observations	1920	960	960

Note: The sign ** Indicates significant at 5% level; * indicates significant at 10% level; standard errors are in parentheses below the parameters.

Two items were revealed by the results reported in the left panel of Table 7 (pooled regression). First, the estimated degree of risk-loving behavior slightly decreased when we changed from the expected utility specification

to this specification (from -0.037 to -0.035) meaning that the subjects may be deemed less risk loving if this bias in the perception of the probabilities is accounted for. Second, as has been found in other experiments, the estimated value of b was negative (-1.184), which provides evidence for the conjecture that subjects overweigh the lowest probability of the good outcomes in deciding about the magnitude of the expected payoffs. The adjusted R^2 slightly declined as we changed from the expected utility specification to the RDU model proposed by Loomes (2006).

Looking at the right panel of Table 7 containing the split-sample estimations of the parameters r and b, we notice that the parameter b is positive for safe gambles (0.33) and the subjects are found to be more risk loving compared to their outcome of risky gambles. This counterintuitive result can be explained by recalling that the RDU model is not an appropriate framework of analysis when the good outcome does not substantially differ from the bad outcome. This is the case with our safe gambles ($15 versus $25), and we believe that is why the RDU model does not lead to plausible values for the parameters b and r here.

Using the rank-dependant utility framework, we also treated the three types of sales (whole, 95%, 80%) as separate samples. The results are presented in Table 8. Here, we find that the differences among our three subsamples follow the same direction as in the split-sample estimations resulting from expected utility model frameworks: We find again that as the resale royalty percentage increases the subjects become more risk loving. The differences in the parameter b were negligible (-1.113; -1.120, and -1.121 for 100%, 95%, and 80%, respectively). In this case, as well, the adjusted R^2 slightly declined compared to the expected utility model estimations.

Table 8: Rank Dependant Utility With Sample Split Along Royalty Rates

	0% royalty	5% royalty	20% royalty
parameter r	-0.022** (0.007)	-0.030** (0.003)	-0.065** (0.004)
parameter b	-1.113** (0.247)	-1.120** (0.220)	-1.121** (0.224)
adjusted R^2	0.831	0.833	0.829
N^o observations	640	640	640

Note: The sign ** Indicates significant at 5% level; * Indicates significance at 10% level; standard errors are in parentheses below the parameters.

6. Conclusion

Visual artists' resale royalties, recognized in the EU countries, Australia, and New Zealand, create a shared ownership of a copyrighted work's financial yield from its successive resale. In the United States and Canada, there is no federal recognition of the visual artists' resale royalty right. Examining the question of the economic efficiency of this institution can contribute to the harmonization of national copyright laws among developed countries.

We examined the implication of the resale royalty regime thorough an experiment replicating the decision-making context with and without resale royalty. We modeled visual art works as lotteries. Our experiment allowed us to elicit the subjects' risk preferences and to observe the impact of *droit de suite* on risk-taking behavior. We found that in the setting intended to replicate resale royalty institution the subjects' risk aversion declined. Simply put, the subjects did not discount their WTA fully in line with the size of the royalty. We also found that this effect was enhanced when there was a relatively small probability of a relatively large payoff.

This finding implies that with a resale royalty institution, the number of transactions in the market for visual arts could decline as result of *droit de suite*, provided art dealers are more prone to decide in accordance with the rational choice framework and are risk neutral. We also used a non-expected

utility model to fit the experimental data, further providing evidence that the resale royalty regime induces behavioral outcomes not adequately predicted by neoclassical theory.

How might this affect the artists' welfare? Definitive answers can only be determined by further study involving both sides of the market. However, if we assume a difference in bargaining power between the artist (seller) and the dealer (buyer) and if a fraction of the artists must sell their work at any offer for their subsistence, then the artists are not likely to receive the prices they desire for their art at the time of the first sale, which lowers their welfare. In any case, our results suggest that a resale royalty regime may leave sellers dissatisfied with the prices they receive in the marketplace even if those prices would have been deemed reasonable to them prior to a resale royalty regime.

We believe that increasing the legal threshold of the resale price required for the applicability of the resale royalty right can limit its impact on the first sale price to exceptionally promising artists who are likely to be the beneficiaries of the resale royalty later in their career. We believe this amendment can mitigate the above-described adverse effect of the institution on other (especially young) artists while promoting the continuation of artistic endeavors among more promising ones.

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