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Private pricing in the art market

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Abstract

This note investigates price-formation mechanisms at work in the private art market. An analysis is provided on pricing of new artwork for the first sale. In a model with five different types of agents using a bargaining game approach, the artist's preferred market channel is identified. The bargaining power of each agent emerges as the key element. This setting is also an ideal framework to test public interventions to support one or more agents and channels in the art market, such as Artist Re-sale Rights.

1 Introduction

The price of a given artwork is determined by the art market structure and the relationships between the agents who buy and sell the artwork. To investigate the price-formation mechanism, therefore, we need to understand how the art market functions and the behavior of both buyers and sellers. Following a bargaining game approach (Wu, 2004) and assuming that agents are price-maximizers with full information on the other agents' bargaining powers and reserve prices, we study the primary, secondary, and tertiary art markets. We specifically focus on the relationships between new artwork prices and the bargaining powers of the agents in each channel of the market, where bargaining is possible.

The primary market, as defined by Velthuis (2002), is where artworks are sold for the first time. Candela and Scorcu (2004) introduce distinctions where the primary market can be considered the artist's market, the secondary is the gallery market where artworks are resold, and the tertiary is the auction market where auction houses are the main dealers. Velthuis (2002) also introduces the distinction between public and private market, based on the availability of price information. Private information about gallery sales is essentially unavailable to unsophisticated collectors, as opposed to sales at auctions where prices are public and easily accessible. Therefore, trades mediated by auction houses will always have a public price, while sales by galleries will have a private price. Sales by the artist directly to collectors on the primary market, or resales by a collector to galleries on the secondary market will also have a private price. Gintis (2006, 2007) introduces private prices in evolutionary bargaining games, showing that, from an initial distribution of private prices, the economy evolves towards a quasi-public price structure and then to the market clearing price system. Mandel and Botta (2009) show that the stochastic stability of this general market equilibrium system depends on the fact that prices are private information. Flåm and Godal (2008) study private prices in repeated bilateral barters.[1] Building a theoretical framework of the relationship between the art market structure and private prices of artworks is the aim of this study.

There are many different studies on pricing mechanisms in the art market (Peterson, 1997; Rengers and Velthuis, 2002; Velthuis, 2002, 2007, 2011; Caves, 2003; Beckert and Rössel, 2004; Hutter et al., 2007; Beckert and Rössel, 2013; Candela, Castellani and Pattitoni, 2016). Focusing on the price-formation mechanism in art galleries, Velthuis (2003) identifies pricing scripts or the series of rules dealers use which never decreases the price but, at most, discounts it; Schönfeld and Reinstaller (2007) develop a model of competition among galleries which is consistent with these pricing scripts. Cellini and Cuccia (2014) analyze the price-formation mechanism in the primary market, considering the artist and art dealer as part of the same marketing channel. However, little attention has been paid to pricing mechanisms in the primary art market and to the role played by galleries and auction houses on price formation in secondary and tertiary markets.

To fill this gap and fully understand artwork pricing, in this note we model the private art market where a new artwork is sold for the first time by the artist. Given that "haggling for art" is a habit in the art market and bargaining is the most common sales method, we investigate why certain channels in the art market emerge rather than others and observe the equilibrium price of a new artwork in each channel.

The remainder of the note is organized as follows. In Section 2 we set and solve the

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[1]The role of private information has also been studied in two-sided markets such as the art market (Angelini, 2017) and in auctions (Chakraborty, 2005).

model, and in Section 3 we study the effect of the agents' bargaining power on bargaining prices. Section 4 concludes the note.

2   The model

In our model there are five types of agents: artists (a), galleries (g), auction houses (h), insider collectors (i), and outsider collectors (o). When a trade occurs, all agents involved in each transaction play a Nash bargaining game on the price of the artworks and have full information, except for outsiders, who are unsophisticated and imperfectly informed (Baumol, 1986; Bonus and Ronte, 1997). An artist can either the new artwork to an auction house, to a gallery, or to insider collectors. Insiders can resell the artwork either to a gallery or an auction house, while galleries can resell the artwork either to an outsider or an auction house. Thus, there are seven potential bargaining games between the following agent couples: artist and auction house (ah), artist and gallery (ag), and artist and insider (ai) in the primary market; insider and gallery (ig) and insider and auction house (ih) in the secondary market; gallery and outsider (go) and gallery and auction house (gh), in both secondary and tertiary market.[2]

We define P_j^k as the price bargained between the couple of agents k in the channel j, and P_R^a and P_R^o as the artists's and the outsider's reserve prices. In order to assure the existence of the market, we assume that $0 \leq P_R^a \leq P_R^o$. We also assume that there are no bargaining costs and there is no arbitrage on the artwork's price in the secondary and tertiary markets, so that the gallery's posted price and the auction price are equal to P_R^o. Bargaining price between the couple k in the channel j comes from the following optimization problem:

$$\max_{P_j^k} \left[\left(P_j^k - y \right)^{\rho_k} \left(x - P_j^k \right)^{1-\rho_k} \right] \tag{1}$$

Since the bargaining power of each agent is the relative ability to influence the other, we define $\rho_k \in (0,1)$, $k = hl$, as an exogenous measure of agent h's relative bargaining power over the bargaining between h and l, assuming that l's bargaining power is its complement to 1. The solution of the problem in (1) is:

$$P_j^k = (1 - \rho_k)y + \rho_k x \tag{2}$$

In Table 1, we present the bargaining prices of each couple k in all studied channels, resulting from the maximization problem in (1).

Combining the results in Table 1, we obtain the a series of equilibrium prices. From the *aigo* path we have:

$$P_{aigo}^{go} = \frac{(1-\rho_{go})(1-\rho_{ai})(1-\rho_{ig})P_R^a + \rho_{go}\left[1-\rho_{ai}(1-\rho_{ig})\right]P_R^o}{1-\rho_{ai}(1-\rho_{ig})-\rho_{ig}(1-\rho_{go})} \tag{3}$$

$$P_{aigo}^{ig} = \frac{(1-\rho_{ig})(1-\rho_{ai})P_R^a + \rho_{ig}\rho_{go}P_R^o}{1-\rho_{ai}(1-\rho_{ig})-\rho_{ig}(1-\rho_{go})} \tag{4}$$

$$P_{aigo}^{ai} = \frac{(1-\rho_{ai})[1-\rho_{ig}(1-\rho_{go})]P_R^a + \rho_{ai}\rho_{ig}\rho_{go}P_R^o}{1-\rho_{ig}(1-\rho_{go})-\rho_{ai}(1-\rho_{ig})} \tag{5}$$

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[2]Among the possible bargaining games, we omit the repurchases (i.e. the *aigi* chain), and we assume that the insider can avoid trading with the gallery (we omit the *agi* chain) and the outsider can only buy from a dealer.

Table 1: Bargaining prices from the solution in (2)

P_j^k	y	x	ρ_k
P_{aigh}^{gh}	P_{aigh}^{ig}	P_R^o	ρ_{gh}
P_{aigo}^{go}	P_{aigo}^{ig}	P_R^o	ρ_{go}
P_{agh}^{gh}	P_{agh}^{ag}	P_R^o	ρ_{gh}
P_{ago}^{go}	P_{ago}^{ag}	P_R^o	ρ_{go}
P_{aih}^{ih}	P_{aih}^{ai}	P_R^o	ρ_{ih}
P_{aigh}^{ig}	P_{aigh}^{ai}	P_{aigh}^{gh}	ρ_{ig}
P_{aigo}^{ig}	P_{aigo}^{ai}	P_{aigo}^{go}	ρ_{ig}
P_{ah}^{ah}	P_R^a	P_R^o	ρ_{ah}
P_{aih}^{ai}	P_R^a	P_{aih}^{ih}	ρ_{ai}
P_{aigh}^{ai}	P_R^a	P_{aigh}^{ig}	ρ_{ai}
P_{aigo}^{ai}	P_R^a	P_{aigo}^{ig}	ρ_{ai}
P_{ago}^{ag}	P_R^a	P_{ago}^{go}	ρ_{ag}
P_{agh}^{ag}	P_R^a	P_{agh}^{gh}	ρ_{ag}

The equilibrium prices in the *aigh* path are:

$$P_{aigh}^{gh} = \frac{(1-\rho_{gh})(1-\rho_{ai})(1-\rho_{ig})P_R^a + \rho_{gh}\left[1-\rho_{ai}(1-\rho_{ig})\right]P_R^o}{1-\rho_{ai}(1-\rho_{ig})-\rho_{ig}(1-\rho_{gh})} \tag{6}$$

$$P_{aigh}^{ig} = \frac{(1-\rho_{ig})(1-\rho_{ai})P_R^a + \rho_{ig}\rho_{gh}P_R^o}{1-\rho_{ai}(1-\rho_{ig})-\rho_{ig}(1-\rho_{gh})} \tag{7}$$

$$P_{aigh}^{ai} = \frac{(1-\rho_{ai})[1-\rho_{ig}(1-\rho_{gh})]P_R^a + \rho_{ai}\rho_{ig}\rho_{gh}P_R^o}{1-\rho_{ig}(1-\rho_{gh})-\rho_{ai}(1-\rho_{ig})} \tag{8}$$

In the *ago* path, the equilibrium prices are the following:

$$P_{ago}^{go} = \frac{(1-\rho_{go})(1-\rho_{ag})P_R^a + \rho_{go}P_R^o}{1-\rho_{ag}(1-\rho_{go})} \tag{9}$$

$$P_{ago}^{ag} = \frac{(1-\rho_{ag})P_R^a + \rho_{ag}\rho_{go}P_R^o}{1-\rho_{ag}(1-\rho_{go})} \tag{10}$$

In the *agh* path, we have the following equilibrium prices:

$$P_{agh}^{gh} = \frac{(1-\rho_{gh})(1-\rho_{ag})P_R^a + \rho_{gh}P_R^o}{1-\rho_{ag}(1-\rho_{gh})} \tag{11}$$

$$P_{agh}^{ag} = \frac{(1-\rho_{ag})P_R^a + \rho_{ag}\rho_{gh}P_R^o}{1-\rho_{ag}(1-\rho_{gh})} \tag{12}$$

In the *aih* path, the equilibrium prices are:

$$P_{aih}^{ih} = \frac{(1-\rho_{ih})(1-\rho_{ai})P_R^a + \rho_{ih}P_R^o}{1-\rho_{ai}(1-\rho_{ih})} \tag{13}$$

$$P_{aih}^{ai} = \frac{(1-\rho_{ai})P_R^a + \rho_{ai}\rho_{ih}P_R^o}{1-\rho_{ai}(1-\rho_{ih})} \tag{14}$$

Finally, the equilibrium price in the *ah* path is:

$$P_{ah}^{ah} = (1-\rho_{ah})P_R^a + \rho_{ah}P_R^o \tag{15}$$

3 Results

In this Section, we present the main results on bargaining prices for tertiary, secondary and primary markets.[3]

Lemma 1 *In the tertiary market, whatever price the gallery pays for the artwork, the gallery will prefer to sell it:*

- *to the auction house rather than to the outsider (gh $\succ$ go) if and only if:*

$$\rho_{gh} > \rho_{go} \tag{16}$$

- *to the outsider rather than to the auction house (go $\succ$ gh) if and only if:*

$$\rho_{gh} < \rho_{go} \tag{17}$$

Proof. See Appendix A.1. ∎

The gallery's choice is based only on its ability in the bargaining process with potential buyers. It is more likely that the gallery can effectively exploit its bargaining power with an outsider as opposed to an auction house. Thus, an artwork held by galleries is more likely to be sold to an outsider than to an auction house.

Lemma 2 *In the secondary market, whatever price the insider pays for the artwork, he will prefer to sell it:*

- *to the auction house rather than to the gallery (ih $\succ$ ig) if and only if:*

$$\rho_{ih} > \frac{\rho_{ig} \max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ig}\left(1 - \max\{\rho_{gh}, \rho_{go}\}\right)} \tag{18}$$

- *to the gallery rather than to the auction house (ig $\succ$ ih) if and only if:*

$$\rho_{ih} < \frac{\rho_{ig} \max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ig}\left(1 - \max\{\rho_{gh}, \rho_{go}\}\right)} \tag{19}$$

Proof. See Appendix A.2. ∎

The insider's choice to bargain or auction depends on the insider's bargaining power against the auction house as compared to his bargaining power over the gallery. Given that the insider collector is not a professional agent, it would be reasonable to expect that the auction house has the higher ability when bargaining with an insider. Thus, it is likely that the insider will sell the artwork to the gallery.

Proposition 1 *In the primary market, the artist chooses between selling the artwork to the auction house, to the insider, or to the gallery, depending on the conditions on Lemmata 1 and 2 and on the conditions that follow.*
When (18) holds:

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[3]In the Lemmata and Propositions of this note, we will not consider the cases of indifference between the choices of the agents.

- *The artist sells to the insider ($aih \succ agh \wedge aih \succ ah$ or $aih \succ ago \wedge aih \succ ah$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} < \frac{\rho_{ai}\rho_{ih}}{1 - \rho_{ai}(1 - \rho_{ih})} \wedge \rho_{ag} < \frac{\rho_{ai}\rho_{ih}}{\rho_{ai}\rho_{ih} + \max\{\rho_{gh}, \rho_{go}\}(1 - \rho_{ai})} \quad (20)$$

- *The artist sells to the gallery ($agh \succ aih \wedge agh \succ ah$ or $ago \succ aih \wedge ago \succ ah$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} < \frac{\rho_{ag}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ag}(1 - \max\{\rho_{gh}, \rho_{go}\})} \wedge \rho_{ag} > \frac{\rho_{ai}\rho_{ih}}{\rho_{ai}\rho_{ih} + \max\{\rho_{gh}, \rho_{go}\}(1 - \rho_{ai})} \quad (21)$$

- *The artist sells to the auction house ($ah \succ aih \wedge ah \succ agh$ or $ah \succ aih \wedge ah \succ ago$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} > \frac{\rho_{ag}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ag}(1 - \max\{\rho_{gh}, \rho_{go}\})} \wedge \rho_{ah} > \frac{\rho_{ai}\rho_{ih}}{1 - \rho_{ai}(1 - \rho_{ih})} \quad (22)$$

When (19) holds:

- *The artist sells to the insider ($aigh \succ agh \wedge aigh \succ ah$ or $aigo \succ ago \wedge aigo \succ ah$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} < \frac{\rho_{ai}\rho_{ig}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ai}(1 - \rho_{ig}) - \rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\})} \wedge$$
$$\wedge \rho_{ag} < \frac{\rho_{ai}\rho_{ig}}{1 - \rho_{ai}(1 - \rho_{ig}) - \rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\}) + \rho_{ai}\rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\})} \quad (23)$$

- *The artist sells to the gallery ($agh \succ aigh \wedge agh \succ ah$ or $ago \succ aigo \wedge ago \succ ah$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} < \frac{\rho_{ag}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ag}(1 - \max\{\rho_{gh}, \rho_{go}\})} \wedge$$
$$\wedge \rho_{ag} > \frac{\rho_{ai}\rho_{ig}}{1 - \rho_{ai}(1 - \rho_{ig}) - \rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\}) + \rho_{ai}\rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\})} \quad (24)$$

- *The artist sells to the auction house ($ah \succ aigh \wedge ah \succ agh$ or $ah \succ aigo \wedge ah \succ ago$), when either (16) or (17) holds, if and only if:*

$$\rho_{ah} > \frac{\rho_{ag}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ag}(1 - \max\{\rho_{gh}, \rho_{go}\})} \wedge \rho_{ah} > \frac{\rho_{ai}\rho_{ig}\max\{\rho_{gh}, \rho_{go}\}}{1 - \rho_{ai}(1 - \rho_{ig}) - \rho_{ig}(1 - \max\{\rho_{gh}, \rho_{go}\})} \quad (25)$$

Proof. See Appendix B. ∎

Once the artwork has been created, the artist chooses the channel for the artwork maximizing the difference between the selling and her reserve price. The choice of a particular channel over the others depends on the artist's relative bargaining power, discounted by the bargaining powers of all agents operating in each channel compared to the fall-back positions she faces. Thus, a set of equilibrium prices depends on the artist's choice and the bargaining powers of the agents involved in each channel.

4   Conclusions

In this note, we present a Nash bargaining model of the private art market where new artworks are traded. In the model, the artist creates the artwork and sells it on the primary market where auction houses, insider collectors, and galleries operate; insiders can resell the artwork to the gallery on the secondary market, and galleries can resell it, both on secondary and tertiary markets, to outsider collectors, depending on which market the artwork was purchased; both insiders and galleries can also sell the artwork on the public market, through an auction house intermediary.

Our setting provides an ideal framework of the private art market that could be used to test the efficiency of Artist Re-sale Rights (the royalties an artist might receive when her artwork is resold through a dealer), as well as other public interventions in the art market to support one or more agents/channels. Since the choice to create a new artwork can depend on its potential selling price (Candela, Castellani, Pattitoni and Di Lascio, 2016), an artist's creativity might be stimulated by her financial gain. Thus, policy-makers could increase artists' financial gains by funding exhibitions for the lesser known yet more creative among them (i.e. public exhibitions), changing the regulation and the structure of the market (i.e. innovation channels), and opening public galleries to support artists' income, thereby fostering innovation by fixing high posted prices for new artworks.

Following Xie (2013), our model can be extended to consider uncertainty about value distributions. Our framework can also be adopted to analyze two-sided markets such as the patent market, where the inventor would take the role of the artist, the patent broker the place of the gallery and the insider and the outsider would be replaced respectively by a more and a less informed firm. As with the intellectual property market, agents often sell the patents at auction[4]

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[4]For an analysis of patent brokerage firms, intellectual property auctions, and other intermediaries in the intellectual property market, see Hagiu and Yoffie (2013).

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