

# Status multiplexity in contemporary art price formation: quantile mediation model

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## ABSTRACT

This paper examines how the artist's status works as the quality signal in determining the price of artwork in contemporary art market. A further distinction of market status from professional status is made based on the concern of the emergence of lay investors in nowadays contemporary art market. We argue that the relationship between professional status and price is mediated by market status. The mediation analysis of 10,270 auction records and status data from 195 contemporary artists in 1999-2014 shows that market status partially mediates between professional status and price. More specifically, the total effect of professional status on price is decomposed into indirect effect and direct effect. The positive indirect effect of professional status on price via market status indicates the *logic of concordance* in the market sphere. The negative direct effect of professional status on price implies the *logic of contradiction* in the culture sphere. To address the limitation of conditional mean estimation in classic mediation analysis, the quantile mediation approach is employed. The results show that the mediation effect of market status holds for low-priced artwork as well as the high-priced artwork. The positive indirect effect is always accompanied with a negative direct effect, resulting a moderate total effect across the whole distribution of price.

**Keywords** contemporary art, status signal, status multiplexity, quantile mediation

**JEL Classification** Z130

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## 1 Introduction

Prior studies have demonstrated that professional status can significantly influence the artwork price, but the effect directions are confusing. The status signaling theory and the symbolic pricing studies provides theoretical as well as empirical evidence that professional status signals the quality of artwork thus has positive effect on price (Velthuis, 2003; Bonus & Ronte, 2009; Yogeve, 2010; Beckert, 2011; Beckert & Rössel, 2013). Contrasting to the alignment of professional status and price, empirical studies on Korean neoliberal art auction (Shin et al., 2014) and American film industries (Allen & Lincoln, 2004) show the negative association of professional status and market success. The breach of art and commerce is explained by the logic of art autonomy (Bourdieu, 1993) and the theory of social identity (Shrum, 1991; Wijnberg & Gemser, 2000; Shin et al., 2014). The contradicted empirical results motivate us to examine carefully the model design and bring in the mediation framework in our study to address the limitations of naïve regression in the existing price formation studies.

The mediation framework enables us to introduce a third variable into a two variable relation that the third variable mediates in between and transmits the effect from one variable to the other (Judd & Kenny, 1981; Baron & Kenny, 1986; Holbert & Stephenson, 2003). Mediation analysis is prevalent in psychological and social studies in understanding the mechanism and process of how the independent variable influences the dependent variable (Vinokur, 1997; Holbert & Stephenson, 2003; Zhang et al., 2009; Chen et al., 2007; Author et al., 2008). However, no research has employed the mediation framework in studying the relation of status and price in art market. With the concern of the predominance of lay investor in contemporary art market, we propose that market status, as a specific set of artist status related to the market reputation, is a proximal market mechanism that can account for the distal relationship between professional status and price. Specifically, we argue that the positive relationship between professional status and price is explained by the chain effect that higher professional status is associated with higher market status and higher market status leads to higher artwork price. The effect of professional status exerts on price though market status reflects the logic of condolence in the market sphere. When the change of professional status dose not trigger out the up raise of market status, professional status is expected to be negatively associated with artwork price due to the logic of contradiction in the cultural sphere. Furthermore, in considering the skewness of the price distribution, quantile analysis incorporating the convention mediation analysis is proposed to address the limitation of conditional mean estimation of standard mediation method. The quantile mediation analysis is intended to tests whether the mediation holds in for low-end market and high-end market and if it does how the effect size varies across the distribution of price.

This is the first study employing mediation analysis in art market. The paper contributes to understand the relationship of professional status and price based on the mediation establishment. More importantly, the mediation model connecting professional status, market status and price sheds light on a reversed functioning logic in art field and market, reflecting the intersection and independence of two economies. We construct the remainder article as follows: we will begin by examining the limitation of existing empirical studies on the relation of professional status and artwork price before reasoning the conjecture of the mediation role of market status. Next, we test out hypothesis with the classic mediation model and further extend it to quantile mediation model.

Lastly, we conclude with contribution of this study and discuss the implication for the direction of further research.

## **2 Theoretical background and hypotheses**

### **2.1 Artist status and artwork price**

economic sociologies have long argued that confronted with exceptional high quality uncertainty in art market, consumers tend to seek the status of the artist as quality signal so as to orientate the willingness to pay (Velthuis, 2003; Bonus & Ronte, 1997; Podolny, 2005; Yogev, 2010;Beckert, 2011; Beckert & Rössel, 2013). As the quality of art is aesthetic with no objective basis to rely on (Beckert, 2011), the assessment of art quality is largely counted on the consensus of art experts who enjoy specific knowledge (Bonus & Ronte, 1997). The differentiated degree of credibility of the consensus confers different status of the artist. The status is perceived as the quality signal and subsequently forms the economic basis of the art price. Based on the unique datasets comprised of 53 contemporary artists' biographical data and sales records from the gallery and auction, Beckert & Rössel (2013) have demonstrated that the artist status, as measured by a series of reputational indicators, places an important role in determining price. More specifically, the artworks of artists with higher recognition in legitimating institutions will realized higher price in both primary market and the secondary market.

If the status theory and market signaling theory discussed above are the mechanisms that produce concordance between price and relative status, what then explains the phenomenon that some artists are highly praised in art field but fail to reach the comparable price in the market? Studies on modern visual artists and American film industry have shown that there exists systematic misalignment between professional status and market sales (Lang & Lang, 1988; Allen et al., 2004). It's suspected that besides the professional status constructed by art experts there exists other array of status to work as the quality signal in the art market.

### **2.2 Decoupling the status**

As status is a relational property with deference between the ego and alter and the domain's boundaries to be pre-defined, it can be perceived differently under different conditions (Bourdieu 1984; Podolny, 2005; Lena & Pachucki, 2013). When the artworks of the artist have been put onto the market, the realized sales will become a price signal for predicting the future price. If the status in art field is defined as the standing of the artistic prominence agreed by art experts, the status in market represents the market standing based on the past market performance. It measures an artist's market reputation in the hierarchy order (Patterson et al., 2014). According to Bourdieu's bipartite model of status orders in cultural production, two types of status orders are found in art and commerce (Bourdieu 1984;Bourdieu &Jonson 1993). In the culture domain where "art for art sake" reigns, the intra-professional status is accorded by cultural capital. In the economic domain where the culmination of economic capital is prized, the extra-professional status is deferred to economic capital (Lena & Pachucki, 2013). It's expected that the extra-professional status dominates the intra-professional status in the marketization of art world since the lay investors are flushing into the art market and becomes the main audience group (Shin et al, 2014). In the study of price formation in Korean art auction in 1998-2007, Shin et al. (2014)

distinct market status from professional status in their price formation model. The results show that artist's market status is positively associated with the artwork price while the professional status is negatively associated with. The negative effect is then concluded as the evidence that artistic status moves at odds with the price in the neoliberal marketization of art world where the social identity of art professionals is threatened by the marketization.

Comparing with the price formation model in the study of Beckert & Rössel (2013), Shin et al (2014) have their advancement in decoupling the market status effect from professional status effect in price formation. The negative professional effect on price becomes the empirical evidence in supporting the argument of the conflicting nature of the central structuring mechanism between art and commerce (Franssen & Kuipers, 2013). However, according to the naïve regression model established by Shin et al (2014) in the study, the negative price effect of professional status only represents the change of artwork price due to the change of professional status when the market status is held constant. The naïve regression implicitly ignores the association between professional status and market status in the price model. Consequently, the price effect due to the change of market status triggered by the change of professional status fails to be noted. We argue that the inattention to the price change due to the influence of professional status on market status is either inappropriate or misleading in understanding the relationship of professional status and price. On one hand, market status is hardly independent from professional status but proceeds from professional status. Studies on artist career trajectory have demonstrated that certain level of professional status is needed to be established long before the artist enters into marketplace (Craig & Dubois, 2010; Petterson, 2014). Market status does not pop up itself but has its root in professional status. On the other hand, the negative professional status effect on price without clearly stating the constraint of market status creates confusion in employing the theory of status signal in practices.

As the statistics of Pearson correlation in the study of Shin et al (2014) shown, there is a positive and significant correlation between professional status and market status. It gives the preliminary evidence that professional status has positive impact on market status. In view of this, we conjecture that professional status is not only directly associated with price but also indirectly related to price through market status.

### 2.3 Market status as the mediator

In addressing the limitation of simple two-variable relations in the naïve regression performed by previous research, we propose a mediation framework in understanding the relation of status and price in our study. Mediation represents the introduction of the third variable into a two-variable relationship with the purpose in understanding the process of how one variable influence the other through the third variable (Judd & Kenny, 1981; Baron & Kenny, 1986; Holbert & Stephenson, 2003; Mackinnon, Fairchild, & Fritz, 2007; Gelfand, et.al, 2009). We posit that the relation between professional status is mediated by market status.

The mediation relation is depicted in the lower diagram in Figure1. As the diagram shown, professional status is associated with price via two paths: the indirect path  $a$  and  $b$  through market status and the direct path  $c'$ . Compared with the simple two-variable model depicted in the upper

diagram, the mediation model provides more insight of the total effect  $c$  by decomposing it into indirect effect  $a$ ,  $b$  and direct effect  $c'$ . We argue that the indirect effect of professional status on price via market status is positive due to the logic of concordance in the market sphere. The indirect effect reflects a chain effect that higher professional status leads to higher market status and higher market status results in higher artwork price. The chain effect represents the process of how economic value of art is created within the art market ecosystem (Pettersen, 2014). The professional status is first built in the process of endorsement by tastemakers in the art field. The difficulty of assessing the quality by consumers initiates the lockstep of institutional valuation and market valuation, in which the institutional endorsement lays the foundation of market status (path a). As soon as the artworks of artist are regularly featuring in the market, the market validation becomes more dependent on “track records” (Dowd & Blyler, 2002; Lena & Pachucki, 2013). Market status based on observable price is seen as the indication of quality. The “Veblen effect” takes place and market status becomes the ultimate arbiter of economic value (path b) (Rengers & Velthuis, 2002; Velthuis, 2005; Pettersen, 2014). In a word, the combine effect of path  $a$  and path  $b$  (or indirect effect  $ab$ ) mirrors the convergence of valuation in art and commerce.

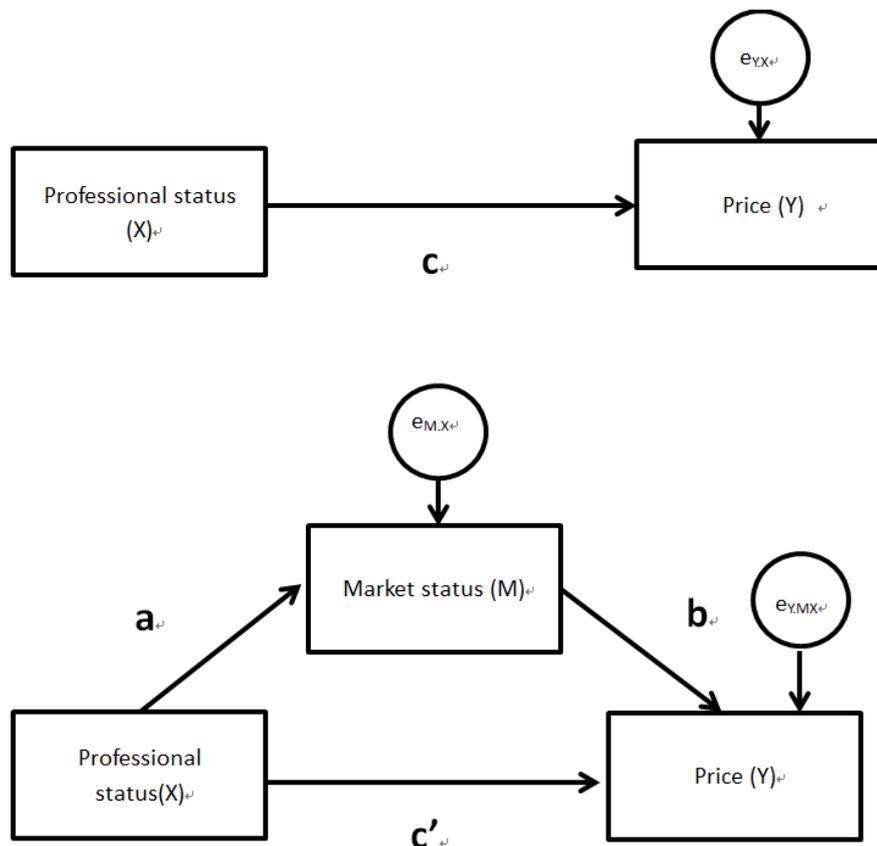


Figure 1. Diagram of two models. The mediation model (lower) in which the professional status effect on price is mediated by market status versus the model without mediator (upper).

Since the direct effect  $c'$  represents the price effect of professional status in the circumstance that the changes of professional status do not affect the market status, it's expected that the direct effect is negatively associated with price due to the logic of contradiction in the culture sphere. The

process of artistic legitimation or as Bourdieu calls “autonomy” is argued as the major force contributing to the discrepancy of evaluation in market and art field, as the economic success is seen as being antithetical to the building of artistic status order (Bourdieu and Jonson, 1993; Lena & Pachucki, 2013). Groys (2008) in his book argue that art world (including market and art field) is by nature constructed with the logic of contradiction to create balance power for inequalities so as to maintain the diversity and innovation. Shin et al. (2014) explains the inverse relationship of art and commerce from the perspective of social identity of art professionals. They argue that positive assessment of cultural value is often accompanied by negative assessment of market performance by art professionals in order to distance their stance from the market. By doing so, their status order within art field is reproduced and reinforced. To sum up, the negative direct effect of professional status on price represents the divergence of valuation in art and commerce.

***Hypothesis:** market status mediates the relationship between professional status and artwork price. More specifically, (hypothesis a) professional status has positive indirect effect on price via market status; (hypothesis b) professional status has negative direct effect on price with market status held constant.*

### **3 Data and model**

#### **3.1 Data and measurement**

The scope of the research is restricted to the international living contemporary visual artists with the nationality of northern America and European countries where the core contemporary artistic and market activities are held in order to ensure the validity of artistic assessment and limit the market inefficiencies. The original research dataset are composed of targeted artists ranked in Artfacts.net and their auction sales recorded on Mutualart.com during the year of 1999 and 2014. Only two-dimensional artworks are considered. Incomplete auction records are left out. Artists with less than 10 trading records are excluded from the database in order to ensure the sufficient observations to trace the price pattern of each artist (Shin et al. 2014). Consequently, the final dataset used in the following analysis contains 10,270 auction records by 195 artists.

The dependent variable is the hammer price of an artwork sold at an auction converted to US dollars. As the diagrams in Figure 1 shown, professional status is designated as the independent variables and market status is hypothesized as the mediator between dependent and independent variable. The setup of these two status variables in the model is to quantify the relative standings of an artist in a hierarchical order of market and artistic assessments during a given time span. Therefore, taking the similar idea of Dobrev et al. (2003) and Shin et al. (2014), market status is measured as the ratio of the average price of all recorded auction transactions by the focal artist prior to the observing year to the highest price of all artworks sold in the auction prior to the observing year. The yearly average auction price of the artist is extracted from Artfacts.net in the “Analysis” section of the artist’s page. The highest price records are collected from Mutualart.com. Similarly, professional status is assessed as the artistic assessment of benchmarked to the highest level in the observing year. We employ the Artfacts points as the proxy of the artistic assessment. Artfacts points are calculated as the total exposure of an artist in the selected exhibitions in a calendar year in which not only the number of exhibitions but the importance of the exhibitions are accounted for. The calculation method is designed to reflect the artistic judgments from the art

professionals to the focal artist which is disconnected to the economic performance (Artfacts, 2005). In this research, professional status is calculated as the ratio of the artist's yearly Artfacts points to the highest Artfacts points of the observing year when the artwork is traded. As such, the variables professional status and market status are artist-by-year datasets.

The control variables are divided into artwork level and artist level. In artwork level, the data of size, material, auction year, auction house and auction location are collected. The variable size is measured as the square centimeter (cm<sup>2</sup>). Variables such as material, auction year, auction house and auction location are categorical variables. In the artist level, artist variables such as nationality, age and gender are extracted. Likewise, the nationality and gender are categorical variables. The composition of the categorical variables and some selected statistics of continuous variables are shown in Table 1. In order to show a scale-free relation between variables in the mediation model, all the continuous variables are standardized before entering into the regression model (Bobko & Rieck, 1980; Raykov et al., 2008; Preacher & Kelley, 2011).

Table 1. Descriptive statistics of the dataset

	Mean	S.D.	Max	Min
<b>Features of work</b>				
Hammer price <sup>†</sup>	45,076	103,013	997,500	1,000
Size	14,059	207,18	542,902	51
Material:				
Painting	0.42			
Print	0.33			
Drawing	0.14			
Other	0.10			
Auction year:				
1999	0.002			
2001	0.004			
2002	0.002			
2003	0.002			
2004	0.008			
2005	0.005			
2006	0.034			
2007	0.111			
2008	0.091			
2009	0.072			
2010	0.115			
2011	0.137			
2012	0.130			
2013	0.168			
2014	0.119			
Auction house:				

	Mean	S.D.	Max	Min
Christie's	0.26			
Phillips	0.24			
Sotheby's	0.13			
Other	0.38			
Location:				
Europe	0.30			
Northern America	0.36			
Other	0.33			
<b>Features of artist</b>				
Age	54.36	9.83	69	25
Professional status *	0.27	0.85	2.36	-3.79
Market status *	-0.25	0.94	2.32	-3.41
Nationality:				
Europe	0.47			
Northern America	0.53			
Gender:				
Male	0.82			
Female	0.18			

<sup>†</sup> hammer price is in US dollar

\* values shown are standardized

### 3.2 Mediation model

This section describes the methods used in estimating and inferencing the mediation for normal mediation model as well as quantile mediation model.

#### 3.2.1 Test for mediation and estimation of indirect effect

In this research, the mediation analysis is based on the following three OLS regression equations.  $Y_i$  represents the price of artwork  $i$ ;  $X_i$  represents the artist's professional status of artwork  $i$ ;  $M_i$  represents the mediator, which is the artist's market status of artwork  $i$ ;  $d$  denotes the intercept in each equations and  $e$  denotes the error term.

$$Y_i = d_{Y.X} + cX_i + e_{Y.Xi} \quad (1)$$

$$M_i = d_{M.X} + aX_i + e_{M.Xi} \quad (2)$$

$$Y_i = d_{Y.MX} + c'X_i + bM_i + e_{Y.MXi} \quad (3)$$

In Equation 1 and 3, all control variables are introduced while only artist level control variables are introduced in question 2 since the mediator is an artist attribute related variable. It should be noted that the artist name is used in three regressions as the fixed effect estimator to account for the unobserved individual artist related variance. Parameter  $c$  in Equation 1 represents the total effect of professional status on price without the presence of the mediator. Equation 2 is the

mediator equation, where maker status is seen as the function of professional status. Accordingly, parameter  $a$  captures the effect of professional status on average market status. In Equation 3, parameter  $b$  represents the effect of market status on average price adjusted for the effect of professional status. The combined effect  $a$  and  $b$  represents the indirect effect of professional status on average price through the mediator market status. Parameter  $c'$  is the direct effect on professional status on price when the market status is controlled for. Each of the parameter is also presented as the path effect in Figure 1.

There are several ways to test the statistical significance of the mediation. The most widely-used approach is the causal steps proposed by Baron and Kenny (1986). This approach requires to pass the significance test of effect  $c$ ,  $a$  and  $b$  in the regressions from 1 to 3 sequentially before claiming the establishment of mediation (Baron & Kenny, 1986 ; Judd & Kenny, 1981). Then a statistical  $z$ -test for the indirect effect  $ab$  called Sobel test is supplemented to attest the validity of the conclusion of mediation. However, Baron and Kenny approach is criticized by leading to the most Type II errors due to its prerequisite significance of total effect  $c$  (MacKinnon et al., 2002). An simpler and alternative way called *joint significance* is therefore proposed in which the test of total effect  $c$  is abandoned ( Shrout & Bolger, 2002; Hayes, 2009; Shrout & Bolger, 2002; Rucker et al., 2011; Zhao et al., 2010). Apart from the above causal steps test, other statistical test for mediation effect fall into two categories according to the form of the estimator: difference in coefficients ( $c-c'$ ) and product of coefficient ( $ab$ ). For a comprehensive review and test power comparison of different statistical test of mediation please refer to the study of MacKinnon et al.( 2002).

With the development of modern computational technique, researchers are no longer just satisfied with finding answer to “is the effect different form zero?” They are more concerned with the precision of the estimation. Consequently, the inference of mediation shifts from merely significance testing to constructing confidence intervals for statistics (MacKinnon et al., 2002; Fritz & Mackinnon, 2007; Hayes, 2009; Biesanz et al., 2010). Among these modern approaches, broad three classes are found: bootstrapping (Bollen & Stinet, 1990; Shrout & Bolger, 2002; Mackinnon et al., 2004; Hayes, 2009), Monte Carlo method ( Mackinnon et al., 2004; MacKinnon et al., 2007a) and Hierarchical Bayesian method (Biesanz et al., 2010). Each method has its own pros and cons and it’s up to the researcher to choose the appropriate approach according to the attributes of the data and research condition. A nice comparison of different methods in test power can be found in the simulation study of Biesanz et al.(2010).

In this research, we choose partial posterior method to obtain  $p$  value of indirect effect and use the Hierarchical Bayesian method to estimate the confidence intervals of the indirect effect because the simulation study by Biesenz et al. (2010) shows that the  $p$  value and the confidence intervals obtained by above approaches is considered to adequately control Type I error rate and provide the most accurate confidence intervals for the product of two coefficients comparing with the other methods.

Once the significance test of mediation is passed, the indirect effect size or mediation effect size is about to report. As the indirect effect is the combined effect of  $a$  and  $b$ , the simplest way to express the indirect effect size is to report the multiple value of effect  $a$  and  $b$ . Noted that variables are standardized in order to overcome the problem of different measurement scale in the mediator

model (equation 2) and outcome model (equation 3), the indirect effect size we report in this research is the product of standardized effect  $a$  and  $b$ .

### 3.2.2 Quantile mediation model

One limitation of the mediation analysis based on OLS regressions is that it is actually estimating the conditional mean functions. Therefore, the mediation test and the reported indirect effect size only apply to the mean of the dependent variable (Koenker, 2005; Shen et al., 2014; Imai et al., 2015). It's believed that the price distribution in art market is strongly skewed. Therefore, it's logical to assume that the mediation relation and estimated indirect effect might not necessarily indicative for other points of the distribution of dependent variable beyond the mean.

Quantile mediation model circumvents the limitation of traditional OLS regression mediation model by allowing for the explicit examination of indirect effect at different distribution point of the dependent variable (Shen et al., 2014). Through simulation study and empirical data analysis, Shen et al. (2014) demonstrate that a simple adaptation of regression-based mediation model for quantile mediation can be operated through the following equations:

$$\text{Mediator Model: } M_i = d_{M,X} + aX_i + e_{M,Xi} \quad (2)$$

$$\text{Quantile Outcome Model: } Q_Y(\tau | X, M) = d_{Y,MX} + b(\tau)M + c'(\tau)X \quad (4)$$

One can first estimate the regression equation for the mediator and then conduct the quantile regression to estimate the parameters of outcome model in equation 3. Statistical inference of quantile mediation can be extended from conventional mediation inference by putting the null hypothesis of  $ab=0$  in the quantile setting where  $ab(\tau)=0$ . In this research, we use the quantile analogue of joint significance as the inference. We test the significance of parameter  $a$  and  $b(\tau)$  separately and conclude with the mediation when both parameters are statistical significant different from 0 (MacKinnon, 2002; Shen et al., 2014). The advantage of quantile version of joint significant is that it's simple and straightforward, without presuming the probability distribution of the product  $ab(\tau)$ . In the simulation study of Shen et al (2014), Joint significant exhibits comparative statistic power across different quantiles with product- $z$  test (Mackinnon et al., 2004) and Goodman test (Goodman, 1960). However, Type I error rate of joint significance test is relatively high at the tails of quantiles and it provides no information of precision of the estimation. Therefore, to further justify the conclusion of joint significance, PRODCLIN method is used as the supplement approach to construct the confidence intervals of quantile meditation effect  $ab(\tau)$ . PRODCLIN method is notable as a better suited method in quantile mediation test because it doesn't not falsely assume the normal distribution of the product of two coefficients (MacKinnon et al., 2007b; Shen et al., 2014). Finally, the definition of indirect size is extended to the quantile setting where  $ab(\tau)$  is reported as the size of indirect effect at the  $\tau^{\text{th}}$  quantile of the outcome distribution.

## 4 Results and analysis

This section will be divided into two parts. In the first part, we will discuss the results of

conventional mediation analysis with conditional mean estimation. In the second part, we will extend our mediation analysis to the quantile setting, in which the results of quantile mediation model will be presented and addressed.

#### 4.1 Convention mediation analysis

The OLS regression results for testing mediation are summarized in Table 2. PS (Professional status) is the independent variable X, MS (Market status) is the mediator M and Price is the dependent variable Y. Regression coefficients  $a$ ,  $b$ ,  $c$  and  $c'$  corresponded to Equation 1, 2 and 3 are illustrated in Figure 1. Since all the continuous variables are standardized before entering into the regression model, all the parameters in this table are standard coefficients. In the model of no mediator corresponded to Equation 1, the estimated total effect of professional status on price is 0.04, indicating that every 1 unite of standard deviation change in professional status is associated with an average 0.04 unite of standard deviation increase in price with all other variables are held constant. With a  $p$  value less than 0.001, this total effect  $c$  demonstrates the statistical significance of positive association of professional status and price. This finding is consistent with similar empirical research done by Beckert & Rössel (2013).

Table 2. Regression results and the statistical test of mediation effect

Model	Estimate	SE	$p$	CI(lower)	CI(upper)
<b>Model without mediator</b>					
PS-> Price ( $c$ )	0.040	0.01102	<.001	0.018	0.062
$R_{Y.X}^2$	0.162				
<b>Model with mediator</b>					
PS -> MS ( $a$ )	0.328	0.01006	<.001	0.308	0.348
MS -> Price ( $b$ )	0.340	0.01052	<.001	0.320	0.360
PS ->Price ( $c'$ )	-0.056	0.01091	<.001	-0.077	-0.034
Indirect effect ( $ab$ )	0.112		<.001	0.102	0.121
$R_{M.X}^2$	0.179				
$R_{Y.MX}^2$	0.240				

Note: Regression coefficients  $a$ ,  $b$ ,  $c$  and  $c'$  are illustrated in Figure 1.  $p$  value of indirect effect ( $a^*b$ ) is obtained using partial posterior method (Biesanz et al., 2010). The 95% confidence interval for indirect effect ( $ab$ ) is obtained by hierarchical Bayesian approach (Biesanz et al., 2010). PS (Professional status) is the independent variable X, MS (Market status) is the mediator M, and Price is the dependent variable Y. CI (lower) is the lower bound of a 95% confidence interval; CI (upper) is the upper bound ;-> means affect.

In the model with mediator, the hypothesis of market status mediates between professional status and price is confirmed as the indirect effect is statistical significant with  $p$  value less than 0.001 and 95% confidence intervals excluding 0. One advancement of mediation model is that with the introduce of mediator, the model enables us to decomposed the total effect of the independent variable on the dependent variable into effect through the mediator and effect does not through the mediator. With the market status detected as the mediator between professional status and price, the total price effect of professional status is further decomposed into indirect effect and direct

effect, representing the price effect through market status and the price effect does not go through the market status.

As seen in Table 2, the indirect effect size is 0.112, implying that the average price is expected to increase by 0.112 unite of standard deviation for every one unit increase of standard deviation of professional status via market status. Specifically, this indirect effect is the product of two positive effects identified from the effect chain, in which the change of professional status transmits an effect of 0.328 to market status and market status exerts an impact of 0.340 on artwork price. The positive indirect price effect of professional status reinforces previous findings of the alignment of professional judgment and market assessment in art market (Schneider & Pommerehne, 1983; Rozenbaum, 2007; Ginsburgh & Weyers, 2008; Hutter & Frey, 2010; Graddy, 2013; Olckers et al., 2015;)

In line with the study of Shin et al., (2014), a significant negative direct effect of professional status ( $c'$ ) on price is found under the circumstance that the change of professional status dose not trigger out the change of market status. The negative effect size of 0.056 means that one unite of standard deviation increase of professional status is associated with an average 0.056 unite of standard deviation decrease of price, holding market status constant. The direct effect goes opposites with the direct effect and cancels out half of the effect size, leaving a moderate total positive effect on the mean of price.

The empirical data and statistical test confirm our hypothesis that the effect of professional status on price is mediated by market status, wherein the total price effect of professional status is the combined effect of the positive indirect effect and negative direct effect, represented by the reversed logic functioning in the art and commerce. The decomposition of the price effect is of theoretical and empirical implication because it demonstrates that the relation of professional status and artwork price is not determined by one logic or the other, but a combined effect of two logics.

#### 4.2 Quantile mediation analysis

The quantile regression results of professional status and market status is illustrated in Figure 2. Horizontal axis represents the percentage quantile of the distribution of the outcome variable price and the vertical axis represents the value of estimated coefficient. The dots represent the point estimate of standard coefficients of professional status and market status on different quantiles of the dependent variable. The shaded grey area depicts the 95% pointwise confidence intervals. The red line represents the mean OLS regression coefficient, with the two dash lines representing the 95% confidence intervals.

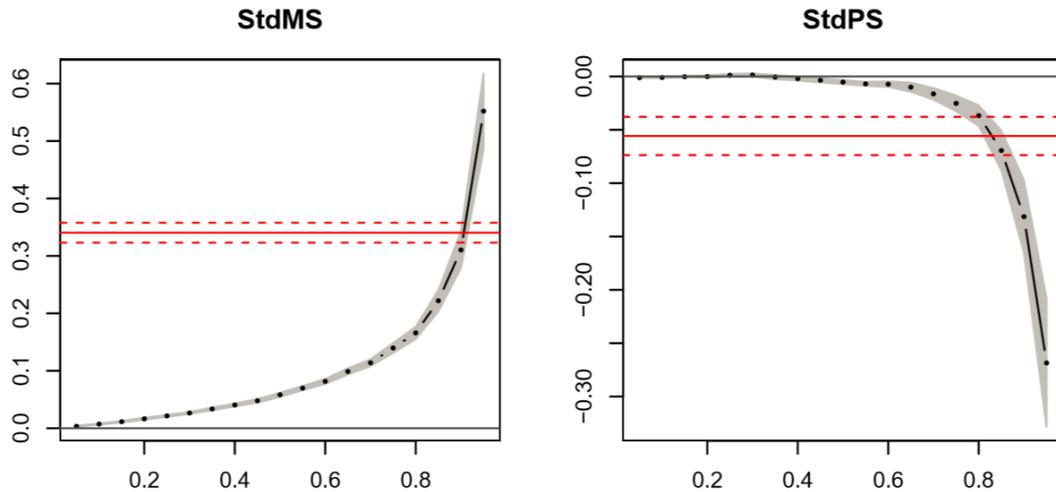


Figure 2. Quantile regression for professional status and market status. The dots represent the point estimate of standard coefficients of professional status and market status on different quantiles of the price. The shaded grey area depicts the 95% pointwise confidence intervals. The red line represents the mean OLS estimate of the price effect, with the two dash lines representing the 95% confidence intervals.

As shown two panels, quantile regression results significant different coefficients from OLS regression except the point estimation around 0.9<sup>th</sup> quantile where the confidence intervals of two estimators overlap. This justifies the necessity of applying quantile regression in this research. More specifically, the positive effect of market status starts slightly above 0 from the lower tail and gradually increases to around 0.1 by the point of 0.7<sup>th</sup> quantile before it rises rapidly at the upper tail (above 0.8<sup>th</sup> quantile). The sharper effect of market status at upper tail of the price distribution demonstrates the “Veblen effect” in the high end market of contemporary art (Velthuis, 2005). The direct effect of professional status is seen as a similar pattern of change as market status but in a negative sign. The steep change of effects of market status and professional status in the upper tail of the price distribution indicates that in the higher end of the contemporary market, price is very sensitive to the changes of the status of artist. Both market status and professional status impose higher impact on price at higher quantile. However, the opposite sign of the effect of market status and professional status show that the growth of market status effect across different quantiles of price distribution is always accompanied with a proportional opposite direct professional effect.

Table 3 reports the results of quantile mediation model. Two types of information should be noted: results of the statistical test of mediation and different effect sizes at reported quantiles. As we can see, the null hypothesis of  $ab_{\tau}=0$  is rejected under the joint significance test and the PRODCLIN method, indicating that the establishment of mediation holds at least at reported quantiles. In other words, market status as the mediator between professional status and price holds for the low-end, median and high-end buyers, represented by 0.05<sup>th</sup> quantile, 0.5<sup>th</sup> quantile and 0.95<sup>th</sup> quantile of the price distribution. In terms of the effect size, indirect effect ( $ab_{\tau}$ ) of professional status on price exhibits a tendency to increase from the lower tail to the upper tail. Professional status shows substantial negative direct effect ( $c_{\tau}$ ) on price in the upper tail, which is roughly 10 to 50 times

greater than the median price.

Table 3. Indirect effect, direct effect and total effect by quantiles

$\tau$	$b_{\tau}$	$p$	$ab_{\tau}$	$ab_{\tau} \neq 0^*$	$c_{\tau}'$	$p$	$c_{\tau}$	$p$
0.05	0.003	<.001	0.001	yes	-0.001	<.001	0.001	0.029
0.15	0.011	<.001	0.004	yes	0.000	0.477	0.003	<.001
0.50	0.058	<.001	0.019	yes	-0.005	<.001	0.004	<.001
0.85	0.222	<.001	0.073	yes	-0.069	<.001	0.005	0.152
0.95	0.552	<.001	0.181	yes	-0.268	<.001	-0.004	0.855

\* The significance of quantile indirect effect is concluded via joint significance test and PRODCLIN method. In joint significance test, both  $a$  and  $b_{\tau}$  are statistically different from 0. The 95% confidence intervals of  $ab_{\tau}$  estimated via PRODCLIN method do not include 0.

In order to have a clear picture of how direct, indirect and total effect change across the quantile of the price, we draw them out in Figure 3. Both indirect effect and direct effect of professional status show much higher impact on price at the higher end of the price distribution. Indirect effect is always at odds with the direct effect. The comparative opposition of indirect effect and direct effect cancel out each other, maintaining a flat and minor positive total effect across different quantiles of price. This graph sheds light on the coexistence of concordance and contradiction of art and commerce in contemporary art world. This finding is corresponded to the art pyramid in the work of Bull (2011). By constructing the axis of Artfacts and Artprice ranking which reflecting the evaluation scheme in art field and market respectively, the author plot the scatter points of artists ranked both top 500 in Artfacts and top 1000 in Artprice in the year 2008. The scatter point shows a pyramid shape distribution. A small number of artists are found at the apex of the pyramid where they are ranked top by Artfacts and Artprice while large number of artists are resting along either side of the axis indicating a contradicting evaluation scheme in art field and market.

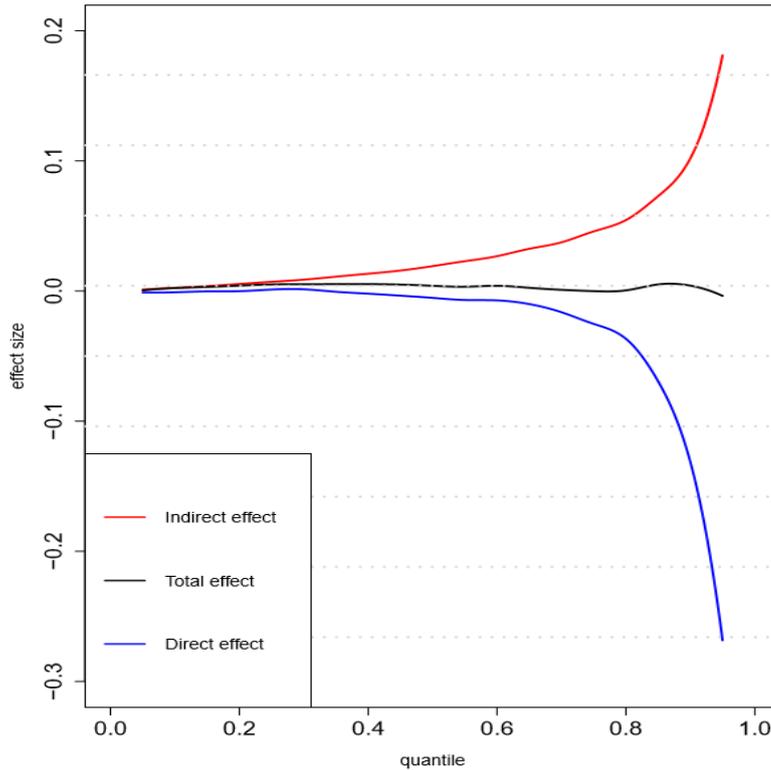


Figure 3. comparison of three types of effect size by quantiles of price

## 5 Conclusion

In this paper, I critique the fuzzy causal logic about artist's professional status and the artwork price in contemporary art market by bringing in the mediation framework to better understand the effect processes. With a dataset comprising with 10,270 auction records and status data from 195 Northern American and European contemporary artists, we demonstrate that the mediation establishment of market status between professional status and price accommodates the contrasting logic in culture and market sphere. More specifically, the total effect of professional status on price is the net effect from two reversed paths: the indirect path in which the professional status influences positively on price by triggering out the change of market status; and the direct path in which the professional status is associated negatively with price without changing the market status. The reversed direction of indirect effect and direct effect represent the logic of concordance in market and the logic of contradiction in art field. The sign of total effect of professional status on price is depended on the relative strength of the reversed power. To further address the impact of the skewness of the price distribution on our mediation model, we test our data with quantile mediation analysis. The results show that the mediation establishment of market status between professional status and price is statistically significant for the low-end market as well as the high-end market.

The contribution of this study is twofold. Firstly, from the theoretical point of view, the mediation framework helps to enhance our existing understanding of how professional status influences the art price. Market status, as a specific artist status distinguished from professional status, has been ignored or confounded with professional status in the studies of relationship of status and price in

art market. Consequently, these studies could only detect and reasoning the correlation but fail to identify the mechanisms that actually transmit the effect from one to another. The mediation mechanisms offered here highlights the vital role of market status in connecting and processing the influence of professional assessment on artwork price in market sphere. Furthermore, the mediation model bridges the art and market by accommodating two reversed logics functioning within the art and market. Distinguished from the dichotomy perspective of art and commerce, our mediation model shows the coexistence of intersection and independence of art and commerce. Secondly, from the methodological point of view, the adjustment of the mediation of market status in the regression model provides more precise estimation on the professional effect. As shown in the mediation analysis, neither of the price model used in Shin et al.(2014) and Beckert & Rössel (2013) is appropriate in estimating the price effect of professional status. As it's shown in our mediation model, the price effect estimated by Shin et al.(2014) only shows the direct effect of professional status. Without taking the consideration of market status, the model of Beckert & Rössel (2013) could only able to detect the total effect or the net effect. Compared with the three-variable relation in mediation model, the simple two-variable relation in the naïve regression used in the previous research tends to generate either one-sided or overgeneralized conclusion.

Noted that the effects found in this study are limited to a specific context where only European and northern American contemporary artists are selected, the mediation role of market status should not be generalized to other contexts without further empirical examination. We suggest testing the mediation model in other context such as artists from emerging market to see how the mediation model works. One limitation of this study is that the mediation analysis based on the OLS regression is limited to single level data. In order to ensure the efficient and unbiased estimation, the OLS regression assumes all individual observations are independent. However, in our research the individual price and status are nested within artist. The dependency of the data clustered within the same artist will cause identical errors which violates the independence assumption. Consequently, Type I error rate is much higher in the clustered dataset ( Krull & MacKinnon, 1999; MacKinnon et al., 2007). Further development of this study can focus on employing the multilevel mediation analysis, in which the issue of correlated errors inherent in the hierarchical data can be addressed ( Krull & MacKinnon, 1999; 2001; Chen et al., 2007).

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