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The concentration of power in the market for contemporary art: an empirical analysis of ArtReview's "Power 100"

Aloys Leo Prinz¹

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Abstract

Art experts and intermediaries play a crucial role in art markets. Artworks are goods whose quality is difficult to determine. Therefore, it seems necessary to restrict competition in the market for art experts to a certain extent, but not too much, in order to provide high-quality know-how. This paper contains an empirical analysis of the extent to which the market for art experts is concentrated. To this end, different methods for measuring the market concentration are applied, with an emphasis on the determination of the distribution function of a newly defined Power Index. The annual Power 100 ranking in the magazine ArtReview from 2002 to 2019 is used to study concentration in the art expert market. The results reveal not only several indications of a hierarchically tiered, but also highly concentrated market power in this market. First, the selection of nationalities of the so-called power members is biased, given that particularly Americans and western Europeans are overrepresented in relation to their world population shares, in contrast to underrepresented Asians, Africans, and Latin Americans. Second, although there is considerable variability in the low tiers of the ranking, the top positions in the rankings are very stable, as shown by the Power Dominance Index. Third, the main empirical result of this paper is that the Top 99 ranking positions follow an extreme value Fréchet distribution with a fat tail. This is interpreted as an indication of excessive concentration on the highest tier of art experts. Liberalizing the art expert market to a certain extent may provide more diversity and less dominance in high-end art markets.

Keywords ArtReview · Art intermediaries · Art expert rankings · Concentration of power · Extreme-value distributions

JEL Classification C13 · C46 · L15 · L82 · Z11

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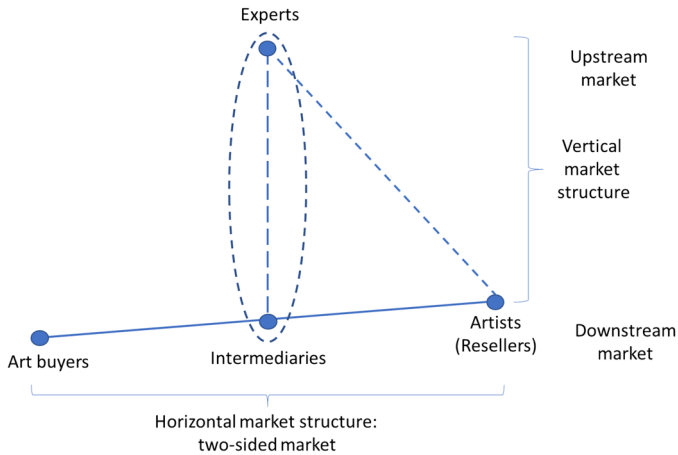
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Introduction

As Victor Ginsburgh (2003) put it, gatekeepers and other intermediaries, as well as art critics (Cameron 1995) and art dealers (Velthuis 2011b), in short ‘experts’, are very influential in defining the quality and value¹ of artistic works. Moreover, they exert considerable influence on the economic success of artists. Therefore, experts not only define and determine value but also the prices of art works (see, for instance, Ginsburgh et al. 2019) and earnings of artists (Fraiberger et al. 2018). The translation of an artist’s talent into value, as well as the artist’s fame as a determinant of the economic value of their artworks (Angelini and Castellani 2019) depend heavily on the opinion of those experts. This is particularly relevant for markets of contemporary art. Only these markets are the topic of this paper.

From an economics perspective, competition among experts is a crucial ingredient for art diversity. If gatekeepers and intermediaries gain too much power, i.e., if the judgment of artistic or esthetic value is concentrated in the hands of a small group of persons over time, power may not only constitute a restriction of competition in arts markets (Velthuis 2011a), but also a barrier to art diversity with the consequence of a loss of cultural value. Power is generally defined as the ability to bring about one’s preferred result, be it by coercion, money, attraction, or persuasion (Nye 2017). Gatekeepers in control of market entry have in this sense power to the extent that they are only a few, and there is no other ‘gateway’ through which to enter the market. They are required in contemporary art because of quality uncertainty (Esposito and Stark 2019) and an abundant supply of artworks and limited resources “... like exhibition space, capital, magazine pages, awards, professorships, scholarships, public and scholarly attention, art fair booths and collection shelves” (Buckermann 2021, p. 98). Guidance is in this market situation a valuable input for persons and institutions not only on the demand side but also on the supply side. Buyers of contemporary art are looking for lasting value of their investment (Korteweg et al. 2016), and artists want their artworks to be exhibited and sold. Both suppliers and buyers are not so much interested in competitive art markets since they can realize economic rents in non-competitive markets (Singer 1988). Nevertheless, the power of art experts can become so strong that the diversity of art and the competition in the marketplace suffer.

¹ The intention here is not to discuss the differences between the artistic and esthetic value or quality (value and quality are used synonymously in this context) of artworks. For instance, Kulka (1981, p. 338) defines the artistic value of art by its art-historical significance; in economic terminology, the art-historical value may consist in the innovation (e.g., art style) the respective artworks originated (see also Di Gaetano et al. 2019). By contrast, the esthetic value consists of the visual qualities of an artwork, again according to Kulka (1981, p. 338). The economic value of artworks is its price in the primary and secondary market for these works. However, the economic value depends—among others—on the historical, esthetic, social, symbolic, cultural, and spiritual value of artworks (Angelini and Castellani 2019, Fig. 1, p. 175). See Gamson (2017) on the construction of the valuation of art, based on Bourdieu’s (1986) forms of capital.



Source: Own depiction.

Fig. 1 Structure of the market for contemporary art. Source: Own depiction

Figure 1 shows the economic interpretation of the art market structure that will be used in this paper.² In the terminology of Bourdieu, it follows the “*heteronomous* principle of hierarchization” (Bourdieu 1983, p. 319, emphasis in the original text) that belongs to the “laws of the market” (Bourdieu 1983, p. 320), in contrast to “[t]he *autonomous* principle of hierarchization, which would reign unchallenged if the field of production were to achieve total autonomy with respect to the laws of the market” (Bourdieu 1983, p. 320; emphasis in the original text). The market of experts is economically considered as the upstream market, as in this market the esthetic and artistic quality of art is defined. Experts in this market have power because they are “... influencing what art gets circulated and what art gets produced” (ArtReview 2014). Therefore, the expert market is considered here as an upstream market. An upstream market precedes hierarchically the downstream market, as the downstream market producers and distributors depend on the input of the upstream market. Applied to contemporary art, expertise on contemporary art from the upstream market provides quality guidance for the downstream market.

The downstream market is one with a so-called two-sided structure (Di Caro et al. 2020; see also Rysman 2009 for general aspects of these markets). On its one side, there are the artists as creators of artworks, and on the other side, the buyers of artworks (private collectors, museums etc.). Although direct contacts between artists and buyers are possible, intermediaries provide network connections to potential buyers that individual artists do not have. This gives the intermediaries a salient economic justification, as well as market power. The reason for the latter is the high

² See Zorloni (2005) for a characterization of the art market as a pyramid: a broad base with free competition, followed by higher market concentration with barriers to entry, as one moves up to higher quality levels.

entry barriers to the intermediaries' market, for instance as an art dealer (Zorloni 2005). As shown theoretically by Di Gaetano et al. (2019), gatekeeping by galleries with monopolistic power may result in a segmented market with a negative influence on innovation. In addition, the downstream market has a vertical supply chain that extends from artists (and resellers in the secondary art market) to intermediaries to art buyers.³ The vertical supply chain structure of the (horizontal) downstream market is illustrated by a sloping line between the players.

For this paper, the vertical axis between experts and intermediaries, as well as artists, is relevant. In the downstream market, intermediaries play a crucial role because of the information asymmetry between buyers and investors in art on the demand side and the quality judgments of art insiders. To become a successful intermediary, large human capital investments are required. The very specific art knowledge is only of value in the art world. This means that these investments are economically sunk costs. A certain concentration of intermediaries in the horizontal market is, therefore, to be expected. Under these circumstances, competition in the upstream expert market becomes economically more important. If the expert market is also highly concentrated or even monopolistic, the risk is that a kind of 'double domination' (that resembles double marginalization in industrial economics; see Spengler 1950; Tirole 1995, pp. 174 ff.) occurs. The latter entails two monopolies existing in a chain, one in the upstream market of a value chain and another in the downstream market. Consequently, in manufacturing markets, prices are higher and quantities lower than in a one-firm monopoly. In art markets, double domination may occur in the form of extremely high prices for artworks of a small group of superstar artists, combined with too few innovations and less diversity.

In terms of Nye's (2017) power concept, the form of market power in the downstream market could be described as "hard power" because it is exercised through money. In this market, works of art are sold and bought against payment. Artists and brokers earn money from these transactions, and ownership of the respective works of art is exchanged. In contrast, power in the upstream market could be called "soft power" because it works through persuasiveness (Nye 2017). Art literacy is based on trust in this expertise. But even experts—as for instance art critics—cannot impose their quality judgments on works of art on other people. In order to be successful, experts have to convince other actors in the art market of their quality assessment. However, it takes time and large investments in human capital to obtain this type of highly specialized expertise in the arts. As with intermediaries, these investments are economically sunk costs. Therefore, it is to be expected that the market for art experts is not very competitive.

Of particular interest, there are art experts who are active in both the upstream and downstream markets. Curators, gallery owners, and even artists are these respective art experts. By playing an important role in both markets, they can combine soft power as experts in the upstream market with hard power as intermediaries and actors in the downstream market. This combination can be called "smart power" (Wilson 2008). The strategic use of their expert knowledge in the

³ I owe this aspect to an anonymous reviewer.

downstream market can enable them to promote or even enforce their preferred art-works and artists.

Perfect competition in markets with high-quality uncertainty and unequal distribution of information between buyers and sellers is neither likely nor efficient (Darby and Karni 1973; Dulleck and Kerschbamer 2006). Experts and intermediaries can reduce quality uncertainty and information asymmetry. Nevertheless, the competition between experts and intermediaries can be ‘too loose’ or ‘too restricted’ (see also Geroski 2003, p. 165).⁴ An excessively restricted expert competition on the upstream art market reduces the variety of art styles, innovations, and can even (consciously or unconsciously) discriminate against artists based on gender and ethnicity. As the first bottleneck at the entrance to the high end of the art market, the respective people and institutions can dominate the definition and selection of contemporary art. This would have an impact on the downstream market. The number of intermediaries would presumably shrink as the question of quality selection by experts in the upstream market has been significantly reduced. Nevertheless, the remaining intermediaries became more powerful in the sense of hard power, as they could participate in the scarcity rent of the upstream experts. In addition, private art investors would benefit, as the quality uncertainty of the respective works of art decreases and the value retention increases (Korteweg et al. 2016). Ultimately, artists who are admitted to the high-end art market would also benefit from it (Singer 1988).

Too loose competition in the upstream art market for experts would take too many works of art and artists into the high-end art market. This would weaken the quality of the works of art and increase quality uncertainty. In contrast, diversity would be maximized. Experts would exercise a very low (actually too low) level of soft power, with further consequences for the downstream market. Since the quality selection criteria specified by experts provide access for a very large number of artists and works of art to the high-end art market, the hard power of the intermediaries would increase considerably. Since investors and buyers of contemporary art have a high interest in quality and lasting value, intermediaries have to take on this task. There would be a greater number of intermediaries representing the respective artists and competing for buyers. While it is likely that competition between intermediaries would restore high-quality selection processes, the efficiency of the process would be less than if there was a reasonable level of competition in the experts’ upstream market. Accordingly, all types of economic rents would be lower and more evenly distributed among artists and between buyers and sellers.

Putting these different aspects together, the bottom line is as follows. Art professionals increase the efficiency of the downstream market by providing art-related information that would otherwise not be available in that market. However, a highly concentrated art expert market becomes economically damaging when art experts in the upstream market are also players in the downstream market. Curators, gallery owners, and artists are such experts. They can act strategically in the downstream

⁴ I owe this differentiation to an anonymous reviewer.

market by promoting their favorite artworks and artists. In this way, as indicated above, double domination can result.

Rendering the market for experts more competitive, might bring about a liberalization of art markets, without reducing the quality of artworks, as happened when the government-controlled art Salon in Paris was abandoned in 1880. The latter led to the rise of the Impressionists (Etro et al. 2020).⁵

With respect to galleries, a small number of galleries in the market that select talented artists are economically beneficial, as long as these few galleries do not remain in place over a longer time period. The latter is an indication of competition for the market of galleries. As shown empirically by Prinz et al. (2015), the market for art galleries does not seem to be very competitive, as the positions of top galleries are entrenched over time. This appears to be a detrimental form of market power.

As demonstrated quantitatively by Zorloni and Ardizzone (2016), superstar (winner-take-all) effects exist in contemporary art markets, driven by focused attention on just a few artists as investments by curators/investors, combined with network effects. The downstream market, therefore, cannot be considered as competitive. The question raised in this paper is whether the upstream expert market may also be characterized by high market concentration, namely (economic) power. If power concentration is high in the market for experts, and if experts are also actors in the downstream market, this contributes to an artistic and economic double domination, as indicated above.

In a recent network analysis of half a million artists, Fraiberger et al. (2018) find that early contacts between artists and prestigious museums and other institutions were steppingstones to a lifelong relationship between artists and institutions that guaranteed success. Behind museums and other artistic institutions are those who contact and select artists. Fraiberger et al. (2018) demonstrate that the relationship between artists and the relevant people and institutions may be dubbed “symbiotic arrangements” (Schanze 1993; see also Cellini and Cuccia 2014). For this reason, the power positions of art world gatekeepers and intermediaries are crucial for the economic functioning of art markets. However, although the latter have power as experts, they presumably apply their power to select the best artists and artworks. Still, it remains an open question at which concentration of power it becomes detrimental for arts.

Braden and Teekens (2019) investigate “associative status networks” of artist-groupings concerning the question of whether artists of similar status flock together, or whether the status of individual artists can be increased by joining together with higher-status colleagues. Applying network analysis to the exhibition history of more than 1000 artist in three museums in the Netherlands, they find that joining up with higher-status artists increases individual status, but only up to a point. However, it is not clear whether or to what extent this effect is moderated or mediated by the museums. In another paper, Braden (2018) argues that museum curators and art historians play a crucial role in this respect, as these people are directly (curators) or indirectly (art historians) involved in selecting works for exhibitions. Hence,

⁵ I owe this aspect to an anonymous reviewer.

art intermediaries are seemingly also the initiators of “associative status networks” among artists.

The small number of powerful experts and intermediaries in art markets is determined by the fact that the market for art intermediaries is itself small. This paper analyzes whether competition for the upstream market of art experts is contestable. If it was contestable, the powerful people and institutions would change considerably over time. Put differently, if those with power remained the same, power would become entrenched and the market for art experts uncontestable.

To study the top positions of art gatekeepers and intermediaries, the unique data of the “Power 100” in ArtReview from 2002 to 2019 are used (see also Quemín 2015, as well as Quemín and van Hest 2015, who employ the Power 100 to study the impact of nationality on success for the years 2006–2012). The magazine annually asks artists, curators and art critics globally regarding the most powerful people of the previous year in the art world; the voters may also submit their own suggestions (Spiegel 2018). The Power 100 rankings, therefore, might be understood as perceived power rankings. However, the disadvantage of the procedure of ArtReview is that there is an endogeneity problem. The results of ArtReview’s ranking so far can influence the opinion of the voters and their own voting (Briñol et al. 2017, p. 228). This can create an anchoring effect⁶ for future votes. ‘Perceived power ranking’ may become self-enforcing (Magee and Galinsky 2008) over time in the ArtReview votings. The caveats of Espeland and Sauder (2007), and in particular of Buckermann (2018) and Moureau (2020), concerning the reactivity and commensuration triggered by rankings, must be taken seriously. The endogeneity problem therefore limits the scope of analysis in this paper.

The contributions of this paper to the literature consist of (1) the empirical analysis of a concentration of power in the market for art experts and (2) the measurement of this power concentration. In this manner, (3) it also contributes to the debate on costs and benefits of restricted competition in art markets.

The remainder of the paper is structured as follows. In Sect. 2, the theoretical basis for the estimations in Sect. 3 is developed. Data and the empirical analysis are presented in Sect. 3. Section 4 concludes.

Dynamics of art market experts

In this section, a theoretical model of the dynamics of art market experts is briefly presented. It follows the model of Prinz et al. (2015). The power of those on the Power 100-list—the so-called power members—is defined by their ranking on the list. The higher the ranking, the smaller the rank number and the higher the power. In the following analysis, P_i is the power of a power member i , $i = 1, \dots, N$, $N = 100$ (the number of available rankings) that depends on the power member’s ranking on the list, with the largest power for the best-ranked person and so on:

⁶ I owe this point to an anonymous reviewer.

$$P_1 > P_2 > P_3 > \dots > P_{100} \quad (1)$$

The ranking can be formalized, with r_i as the rank of person i , as follows (Stanley et al. 1995; Prinz et al. 2015):

$$\frac{r_i}{N} = 1 - F(P_i) \quad (2)$$

or equivalently,

$$\ln r_i = \ln [1 - F(P_i)] + \ln N, \quad (3)$$

with $F(P_i)$ as the cumulative distribution function of P_i .

The stability of power is determined in this paper by means of the distribution function, $F(P_i)$. If $F(P_i)$ follows a fat-tail or extreme value distribution function, the power of respective list-members is called solidified or entrenched. Put differently, it is tested empirically with the Power 100 data whether the distribution of power is heavily skewed.

As shown by Prinz et al. (2015) and the literature quoted therein, a (fat-tail) Pareto or power-law distribution originates from the following stochastic process (an inhomogeneous geometric Brownian motion; Zhao 2009):

$$dP_i(t) = \theta(\mu - P_i(t))dt + \sigma P_i(t)dW(t) \quad (4)$$

The stochastic differential Eq. (4) describes mathematically the dynamics of the power index P_i over time t . On the right-hand side of the equation, $\mu > 0$ denotes the mean value of P_i and $\sigma > 0$ the standard deviation of P_i . The term $dW(t)$ represents a standard Wiener process with zero mean and standard deviation $(dt)^{1/2}$. Note that the term $\sigma P_i(t)dW(t)$ contains the stochasticity of the process which determines the power index P_i . The economic content of the dynamic process lies in the remaining term, $\theta(\mu - P_i(t))dt$. In this term, $\mu - P_i(t)$ encompasses the deviation of a realization of P_i at time t from the mean value of all P_i 's, i.e., μ . If P_i converges quickly to the mean value of all P_i 's, this is an indicator of strong competition in the market. Imagine, for instance, a market for apples. With only a few suppliers, the prices charged by the individual suppliers may deviate greatly from each other. With an increasing number of suppliers, however, the prices quickly converge to a market price (on such a process, see Allen and Hellwig 1986)—the mean price—with only small standard deviation.

The parameter θ in Eq. (4) measures the speed with which deviations from the mean, $(\mu - P_i(t))$, return to the mean value of $P_i(t)$. In addition, The larger the speed value θ is, the higher becomes also the weight of the convergence-to-the-mean process, $\theta(\mu - P_i(t))$, in comparison to the stochasticity component in Eq. (4). Therefore, the intensity of competition in the art expert market can be measured with this parameter. If θ is very small or even zero, stochasticity dominates and there will be almost no or a very slow convergence to the mean, μ . Hence, there would be hardly any competition and the power of the respective persons would not be contestable. 'Very small' values of θ can be identified by the distribution which the stochastic

process described by Eq. (4) implies. With very small values of θ , the distribution of P_i is stationary with a Pareto or power-law tail (see Prinz et al. 2015 and the literature quoted therein). Put differently, a so-called extreme value distribution would result.

Stationarity ($\theta \cong 0$) implies that the ranking positions—i.e., the distribution of $P_i(t)$ —vary only randomly and not systematically. There is no ‘regression to the mean’, as one would expect from competitive markets. In relation to the art expert market, this means that the top positions are filled with the same people over time. In other words, a small group of art experts dominates each market.

To sum up, the theoretical basis of the investigation of the art market experts’ contestability of power is provided by a stochastic process that does or does not converge to its mean value. If it does not converge (or only very slowly), the power of the respective intermediaries is judged as non-contestable. This can be measured by the distribution of the power index, P_i . If it is best described by a heavily skewed, fat-tail distribution, power will be referred to as entrenched.

Empirical analysis of the rankings and the Power Index distribution

ArtReview “Power 100” ranking

ArtReview is a London based British art magazine, launched in 1949 as “Arts News and Review” (Wikipedia 2021). It was relaunched in 1993 and again in 2006. In 2013, ArtReview Asia was additionally established. The 2006 editor-in-chief, John Weich, defined the objective of the magazine as follows: “Not only do we cover the newest art and the newest artists, we cover contemporary art as it moves across cultural territories like design, architecture, film, fashion, even business” (Aalund 2006).

Since 2002, annually in November, the list of the most powerful people in the art world is published in ArtReview. According to Buckermann, to assess the quality of a ranking, the following questions must be answered (Buckermann 2021, p. 93):

1. “Who made the ranking?
2. What kind of data was used?
3. Which units and which criteria were selected for comparisons?
4. How are units and criteria defined?
5. How are criteria scaled and how are values assessed?”

Concerning the Power 100 ranking, the respective answers are as follows:

1. As indicated by ArtReview, the Power 100 ranking is compiled by a panel of 26 anonymous experts from all major cities of the art world (ArtReview 2014). No further information about the composition of the panel is available. However, the panelists cannot be in the power list of the respective year and it is forbidden that they talk to each other about the list (ArtReview 2014). The core criteria for

- the selection of the panelists are “the ability to influence the type of art that is being produced today; having been active during the past 12 months; having an international rather than an exclusively domestic influence; and playing a role in shaping the public perception of art” (ArtReview 2014).
2. The data consist of subjective judgments of the most powerful persons and institutions in contemporary art.
 3. The ranking is the result of the sum of subjective individual evaluations of the committee members.
 4. No unit and no additional criterion is defined.
 5. The scaling is seemingly the average ranking position provided by the members of the panels.

The procedure of ArtReview is a very special one. Applying the system theory of Niklas Luhmann, the power system in contemporary art is defined by self-observation (Luhmann 1985) of its dominant members. “Although the observer (the system) cannot identify herself (itself) as a system, it does identify herself (itself) as an observer.” (Krause 2001, p. 196, own translation from German). The “worldview” (Buckermann 2021) is that of the committee members, i.e., the distribution of power in contemporary arts as recognized by members of contemporary art.

The next Buckermann question refers to the intention of ArtReview to publish a ranking of the most powerful art people year by year. An answer was given in 2014: The ranking is “... merely a guide to those individuals who are influencing what art gets circulated and what art gets produced” (ArtReview 2014). For artists it demonstrates the “... network of interest and influence that this list attempts to lay bare” (ArtReview 2014)—because these people and networks decide whose artwork is shown.

This ranking is self-referential, and it reinforces the power positions in the ranking. Artists, curators, collectors, etc. perceive the ranking and, to be successful, they act in accordance with it. In network theory, this procedure is called “preferential attachment” (Barabási and Albert 1999) and in sociology, it is dubbed “Matthew effect” (Merton 1968). ArtReview describes the effect as follows: “Power still appears, in this year’s list, most concentrated in the hands of those we might expect to wield it—in the hands of the Western, mostly white (though not necessarily male) directors of the most powerful commercial galleries and public institutions” (Art Review 2019). This indicates that the intention of the ArtReview ranking is in stark contrast to other rankings of galleries (e.g., Quemin 2019) or artists (e.g., “Kunstkompass”, see Buckermann 2016). While the latter deal with the relevance of galleries and individual artists in contemporary art, ArtReview presents the perceived power of gatekeepers who define what high-quality contemporary art is and who will get access to the high-end art market.

Descriptive statistics of the Power 100 rankings

Rankings are ubiquitous. From universities (for instance, the so-called Shanghai “Academic Ranking of World Universities,” <http://www.shanghairanking.com/>) to

Table 1 Classification of the power members in the Power 100^a. Source: ArtReview (diverse years), own calculations

Classification of the power member	Shares 2002 in %	Shares 2019 in %
Curator	22	20
Gallerist	16	14
Artist	28	30
Collector	11	10
Philanthropist	1	1
Art Critic	1	3
More than one classification	8	9
Other classifications	13	13
Sum	100	100

^aBasis for percentages: 489 power members

scientific journals (e. g., <https://www.scimagojr.com/journalrank.php>) to artists (e. g., <https://artfacts.net/>), to name but a few, almost everything is ranked in some way or other. Much information is concentrated (and thereby partially lost) mostly in single numbers that pretend exactness. As Moureau (2020) puts it, these numbers are a kind of “magic index on the wall.” The numbers are decontextualized, depersonalized (Espeland and Sauder 2007, p. 18), and can easily be communicated in all kinds of media. They may become self-fulfilling prophecies that reinforce their own consequences via reactivity and adaptation (Espeland and Sauder 2007; Buckermann 2018; Moureau 2020). Nevertheless, a positive side effect of rankings is that they enable scrutinizing the rankings for information that is otherwise difficult to obtain. The latter is the reason why a ranking of “power members”⁷ in art is used to study the concentration of people at certain positions within the ranking. An extreme concentration of power in the rankings, as defined in the previous section, is interpreted as indicating incontestability in the art expert market. The endogeneity problem of the Power 100 mentioned above nevertheless restricts the scope of the empirical analysis.

The number of power members in the ArtReview ranking is limited to 100. However, the total number of power members ranked from 2002 to 2019 is 489. In addition, according to Resch (2016), there are around 19,000 galleries in 124 countries and 3,533 cities. In the respective market, both low-ranking and many never-ranked art experts take part. They can change the perception of the value of artworks and artists proposed by the Power 100, but they can also be influenced by the high-level experts.⁸ Which effect is the more important is unclear. If the first effect were to

⁷ In the ArtReview rankings, more than one person can constitute one unit of power member. For instance, two gallerists who own a gallery, as well as a small group of artists, are considered as one power member. Therefore, throughout this paper, the notion of power member(s) is used instead of people. Moreover, the #MeToo movement was the first (and only) institution to be ranked in the Power 100 in 2018.

⁸ I owe this aspect to an anonymous reviewer.

Table 2 Spearman rank-order correlations of Power 100 rankings. Source: ArtReview (diverse years), own calculations with Eviews 12

Period	Spearman rank-order correlation
2003–2002	0.07
2004–2003	0.30
2005–2004	0.43
2006–2005	0.34
2007–2006	0.55
2008–2007	0.47
2009–2008	0.48
2010–2009	0.64
2011–2010	0.64
2012–2011	0.72
2013–2012	0.61
2014–2013	0.71
2015–2014	0.72
2016–2015	0.76
2017–2016	0.71
2018–2017	0.74
2019–2018	0.76

All correlations are statistically significant at the 0.001 error level, except the correlation 2003–2002 that is statistically insignificant

dominate, the power of the Power 100 would be overestimated in the rankings. If the latter effect were stronger, the respective power of the Top 100 would be underestimated. Finding this out is a topic for future research.

The empirical analysis employs data collected from the homepage of the British magazine ArtReview on the “Power 100” from 2002 to 2019. The data used in this section come exclusively from the ArtReview ranking itself, in contrast to the Power Index which is defined in the next Sect. 3.3. Table 1 presents the ranking share of power members according to professional categories for the years 2002 and 2019. If there is a general trend, it seems that the share of artists in the rankings increased somewhat, whereas the share of curators and gallerists decreased. Moreover, art critics also increased their share.

There have been several ‘shooting stars’ in the Power 100 ranking. However, only ten power members started their presence with a position in the Top 10 (without the first ranking in 2002). For instance, the #MeToo movement jumped straight away to third place in the 2018 ranking. In contrast, around 5% of the 489 power members dropped out of the ranking because they passed away.

To analyze whether the 18 rankings from 2002 to 2019 are related to each other, the respective Spearman rank-order correlations with rolling windows are calculated and presented in Table 2. All correlations are highly statistically significant at an error level of less than 0.001, except the first correlation coefficient for 2003–2002 (0.07) which is statistically insignificant. The correlations increase over time but at a decreasing rate. The estimated trend line for the rank

Table 3 Distribution of the Power 100 ranks according to continents. Source: Own calculations with data from ArtReview (diverse years)

Continent	Year 2002 Rank shares in %	Year 2019 Rank shares in %	Direction of change
Africa	1.0	2.0	↑
America	30.0	36.0	↑
Asia	7.0	12.0	↑
Europe	57.0	43.0	↓
Oceania	0.0	1.0	↑
NA	5.0	6.0	↑
Sum	100.0	100.0	

Table 4 Appearances of power members in the Power 100 rankings, 2002–2019. Source: Own calculations with data from ArtReview (diverse years)

times in the ranking	# power members	% of all ranked power members	Cumulative %
1	205	41.9	41.9
2	79	16.2	58.1
3	46	9.4	67.5
4	30	6.1	73.6
5	20	4.1	77.7
6	25	5.1	82.8
7	10	2.0	84.8
8	17	3.5	88.3
9	10	2.0	90.3
10 and more	47	9.6	99.9*

*Difference to 100% is due to rounding

correlation over the periods is $0.2882 + 0.035 \cdot \text{year}$ (adjusted $R^2 = 0.79$, F -statistic: 61.74, $p = 0.000$). This implies that the rank correlations increase on average by 3.5% per period. This may indicate that the ranking positions become more stable over time. One reason for this could be the aforementioned endogeneity of the rankings. The ranking of the previous year could even form an anchor point for the ranking in the current year. The panelists are not allowed to speak to each other, but they know the rankings of the past year. This can also explain the low correlation of the rankings in the period 2003–2002 and 2004–2003 in Table 2.

In Table 3, the 2002 and 2019 distribution of ranks by continent in the Power 100 is shown. Remarkably, the European power member shares declined considerably, whereas the share all other continents increased. Nevertheless, Africa and Asia are still underrepresented, at least with respect to their global population shares. In 2019, Europe and America together occupied 79% of all ranks, in comparison to 87% in 2002.

A total of 489 power members was ranked in the Power 100 from 2002 to 2019. Table 4 shows, how often these power members were ranked. A majority were ranked only once or twice (58.1%). Moreover, only around 10% were ranked ten and more times. In contrast, a small minority was ranked very often.

Power Index distribution

Power Index: definition and ordinary concentration measures

To analyze the power implied by the ArtReview rankings, a Power Index is calculated. It is assumed that the power of a power member is the higher the lower the average rank of the member in the rankings. The Power Index, P_i , of power member i in the Power 100 is calculated as follows:

$$P_i = \frac{n - y}{\sum_t r_{i,t} + y}, \quad 0 < P_i \leq 1, \quad (5)$$

n : maximum number of years a power member can be ranked in the Power 100, here: $n = 18$, y : the number of years a power member is not ranked in the Power 100, $r_{i,t}$: the rank of power member i , $i = 1, \dots, 100$, in year t , $t = 2002, \dots, 2019$.

In words, the power of a power member is defined by the reciprocal value of the average position in the rankings. An adjustment is made to correct for the years a power member was not ranked in the Power 100. To do this, the nominator encompasses the number of years in the ranking, i.e., $n - y$, and the denominator consists of the sum of ranks plus the number of years a respective power member was not ranked. The reason for this adjustment is that ranks of zero (“not ranked”) would otherwise bias the power measure in favor of those with few rankings only.⁹

The Power Index ranges between zero and unity. For instance, a power member who is ranked at # 1 in all 18 rankings would have the Power Index $P_i = 1$. Accordingly, a power member who always held ranking position 50 (100) would have $P_i = 0.02(0.01)$. The maximum value of the Power Index is 0.2143 or 21.43% of the maximum possible value. To evaluate this value, consider a power member who was represented in all rankings and achieved position five each time. According to Eq. (5), this would yield a Power Index of $P_i = 0.2$. The minimum value of 0.008547 is attained if a power member was ranked once only at position 100. Since all 489 power members had been once in the ranking at least and because the lowest ranking is at position 100, 0.008547 is indeed the lowest feasible value of P_i .

The Top 10 power members in the ArtReview rankings 2002–2019 according to the Power Index are shown in Table 5. It is worth noting that these are the most powerful people over time, as calculated with the Power Index defined in Eq. (5) above. Since it is necessary to apply more than one dimension to measure concentration and diversity with respect to culture (Benhamou and Peltier 2007; Moieni et al. 2017; Nijkamp and Poot 2017), in Table 5, the professional role of

⁹ Of course, other solutions for this issue are possible. For instance, each period without occurrence in the ranking reduces the nominator of P_i but does not change the denominator: $P_i^0 = \frac{n-y}{\sum_t r_{i,t}}$. However, this index would put too much weight on high one-time ranking positions. Nevertheless, this does not change much the distribution of the Power Index. In particular, the Fréchet distribution remains the best-fitting one for the Top 30, Top 50, and Top 99 positions. The best-fitting distribution for all positions with P_i^0 index is the Fréchet distribution.

Table 5 Top 10 positions with the highest Power Index value, 2002–2019. Source: Own calculations with data from ArtReview (diverse years)

Ranking position	Name(s)	Function	# of occurrences	Nationality
1	Nicholas Serota	Director Tate Art Museums and Galleries (until 2017)	15	British
2	Glenn Lowry	Director of the Museum of Modern Art, New York	16	American
3	Iwan & Manuela Wirth	Gallerists	17	Swiss
4	Larry Gagosian	Art dealer and owner of the Gagosian galleries	18	American
5	David Zwirner	Gallerist	17	German
6	Eli Broad	Collector and founder of The Broad	15	American
7	Ronald Lauder	Collector and president of the Museum of Modern Art, New York	5	American
8	Nan Goldin	Photographer	2	American
9	François Pinault	Collector and founder of the Pinault Collection	18	French
10	Maria Balshaw	Director of Tate galleries	3	British

Table 6 Power Index value in relation to function and nationality; Panel Least-Squares estimation. Source: Own estimations with Eviews 12 with data from ArtReview (diverse years)

Variable	Dependent variable: Power Index value		
	Coefficient	<i>t</i> statistic	Probability
C	0.0019	17.0680	0.0000
Curator	0.0004	7.0258	0.0000
Gallerist	− 6.53E−05	− 1.0223	0.3067
Collector	5.53E−05	0.8467	0.3972
Philanthropist	0.0011	7.3354	0.0000
Critic	0.0008	4.6250	0.0000
US–American	0.0004	3.5400	0.0004
British	− 0.0002	− 1.2099	0.2264
German	− 0.0001	− 0.8047	0.4210
French	0.0007	4.8521	0.0000
Italian	− 0.0005	− 2.7322	0.0063
Spanish	0.0008	3.8097	0.0001
Swiss	0.0009	6.0266	0.0000
Russian	8.50E−05	0.3836	0.7013
Australian	− 0.0008	− 3.2515	0.0012
Chinese	− 0.0005	− 3.2717	0.0011
African	− 0.0006	− 3.4507	0.0006
Other European	− 0.0007	− 4.7283	0.0000
Other Asian	− 0.0005	− 3.6568	0.0003
Other American	− 0.0008	− 4.9836	0.0000
Total observations	8802		
Adj. R^2	0.0684		
<i>F</i> -statistic	35.0029		0.0000

the power members, as well as their nationality, and the number of their occurrences in the Power 100 rankings, are shown.

Table 5 demonstrates that the professional functions of the most powerful people in the art world are mostly collectors, gallerists, and directors of renowned museums. This seems to confirm the view of Quemín (2020) who points to increasingly powerful collectors and high-end galleries, although high-end museums also play a crucial role. The only artist in the Top 10 list is the photographer, Nan Goldin. The expert gatekeepers at the entry of art markets are accordingly recognized as the most powerful people in the market. Galleries are such a group of gatekeepers, and they are represented in the Top 10 of the Power 100.

The nationalities of the Top 10 power members according to the Power Index are also not very diversified. Half of the Top 10 are Americans, the other half are from Western European countries. This means that no one from Africa, Asia, Oceania, and South America is represented at all, although these continents and subcontinents account for 82.8% of the world population (World Population Review 2020; note that Russia and Canada are not included in the 82.8%). Moreover, among the eleven individuals in the Top 10 list of power members, only three

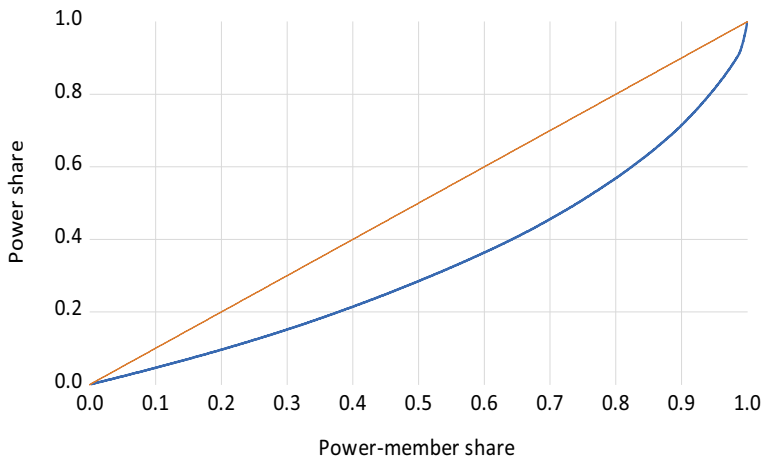


Fig. 2 Lorenz curve of the Power Index distribution. Solid line: Lorenz curve; straight line: uniform distribution line. Power member share: power members ordered according to their power shares; one power member = 1/489. Power share: relative power of the respective power member(s) according to the Power Index. Source: Own depiction based on data from ArtReview (diverse years)

(27.3%) are women (Manuela Wirth, Nan Goldin and Maria Balshaw). Finally, seven out of ten positions are represented in 15 and more (out of 18) rankings. This means that the length of stay in top positions is quite pronounced. However, three of the Top 10 positions are held by power members who were ranked twice, three times, and five times, respectively. This shows that getting into top ranks is not impossible.

To study the relationship between the Power Index value and professional roles, as well as nationality, of the power members in the Power 100, a Panel Least-Squares estimation is run. The results are shown in Table 6.

The professional role of the respective power members are curator, gallerist, collector, philanthropist, and art critic. To avoid multicollinearity, the omitted category is ‘artist’. With respect to nationality, ‘more than one nationality’ and ‘nationality not indicated’ are the omitted categories. In both cases, the estimated values are interpreted with respect to the omitted categories. Concerning the professional role, curators, philanthropists, and critics are stronger positively (and statistically significantly) correlated with the Power Index value than artists. From the viewpoint of nationality, US–American, French, Spanish, and Swiss nationality is stronger positively and statistically significantly correlated with Power Index value than the omitted nationality categories. The correlation is negative and statistically significant for power members from Italy, Australia, China, Africa and the ‘Other European,’ ‘Other Asian,’ and ‘Other American’ countries. The latter are countries that are not listed individually in Table 6. From the perspective of professional roles, as well as nationalities, the Power Index value is biased due to an overrepresentation of curators, philanthropists, and critics, as well as power members from the U.S., France, Italy, Spain, and Switzerland. Power members from Africa, Australia, China, Latin America, Eastern Europe,

and other Asian countries are underrepresented (see also Quemin 2015, as well as Quemin and van Hest 2015).

Lorenz curve, diversity, and dominance index

Below, three ordinary measures are applied to determine the concentration of the Power Index: the Lorenz curve with the Gini coefficient, a diversity index, and a dominance index. These measures describe concentration by a single number. Moreover, the values these indices produce are (monotonically transformed) deviations of the respective index values from the uniform distribution. In the context of this paper, the latter requires each power member to have a share of $1/489 = 0.002045$ of the respective power.

Figure 2 shows the Lorenz curve (see, for instance, Nijkamp and Poot 2017, pp. 30 f.). The value of the Gini index for the concentration of the Power Index is 0.33, which is not very high. The reason will become clear if the distribution is analyzed more thoroughly.

To further check the concentration of power numerically, a Power Diversity Index and a Power Dominance Index are defined and calculated for the values of the Power Index. First of all, the Power Diversity Index (PowDivInd) uses the Shannon–Weaver entropy measure (Rao 1982; Moieni et al. 2017; Nijkamp and Poot 2017):

$$\text{PowDivInd} = - \sum_i p_i^{\text{adj}} \cdot \log(p_i^{\text{adj}}) = 5.96 \quad (6)$$

with $p_i^{\text{adj}} = \frac{p_i}{\sum_i p_i}$ as the relative power of power member i .

To evaluate the above numerical result, the same index is calculated for the density of the uniform distribution of power, i.e., $p_{i,\text{uniform}}^{\text{adj}} = \frac{1}{489}, \forall i$: $\text{PowDivInd}(\text{uniform distribution}) = 6.19$.

According to these values, power diversity deviates from the uniform distribution of power. Nonetheless, power diversity of the uniform distribution is only 1.039 times the power diversity measured by the Power Index.

To complement these values, a so-called Power Dominance Index (PowDomInd; for the notions of “diversity” and “dominance” see, e.g., Thukral et al. 2019) is defined and calculated (Simpson 1949; Nijkamp and Poot 2017, p. 28; it is identical with the Herfindahl–Hirschman Index in economics) for the values of the Power Index:

$$\text{PowDomInd} = \sum_i (p_i^{\text{adj}})^2 = 0.0037 \quad (7)$$

In order to evaluate this numerical value, the respective index for a uniform distribution of power is determined:

$$\text{PowDomInd}(\text{uniform distribution}) = 0.0020.$$

The comparison of these values reveals that Power Dominance is about 1.85 times the value of power equality.

Table 7 Descriptive statistics of the Power Index. Source: Own depiction based on data from ArtReview (diverse years) with Eviews 12

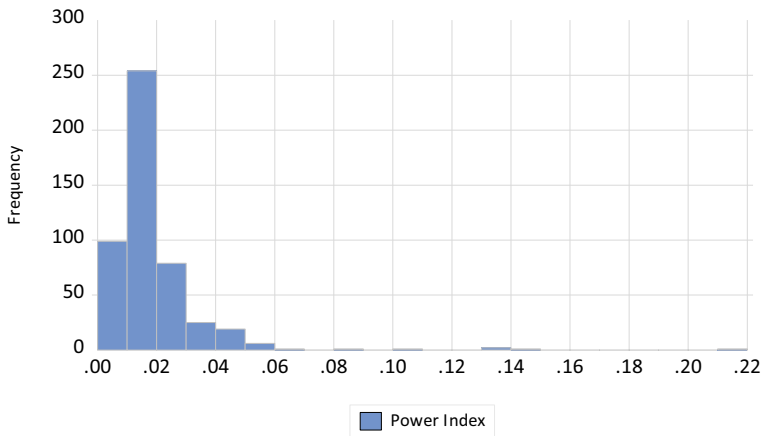
Statistics	Values
Mean value	0.018956
Median value	0.014085
Maximum value	0.214286
Minimum value	0.008547
Standard deviation	0.016966
Skewness	5.896296
Kurtosis	53.50839
Number of observations	489

To sum up, there are indications that the concentration of power may be quite high at the top positions of the power members in the Power 100. However, according to the Gini coefficient and the diversity index, the concentration of power does not seem to be very high. In contrast, the dominance index indicates a higher concentration than the preceding measures. These results point to a tiered hierarchy in the rankings. The disadvantage of the above indices is that they concentrate the entire distribution of the Power Index into one number. To obtain a deeper understanding of the concentration and the presumed tiered ranking hierarchy, the Power index distribution will be estimated next.

Power Index distribution

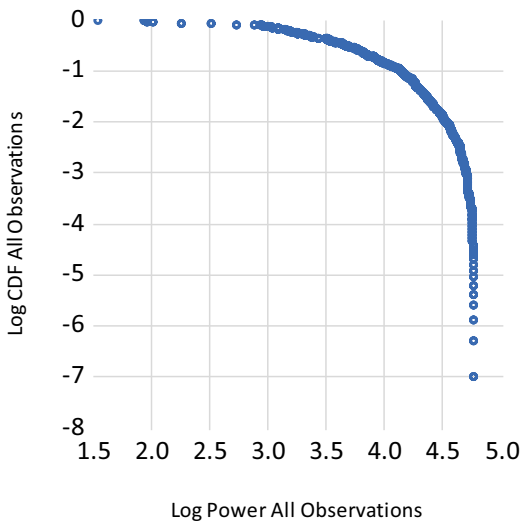
Among the highly skewed distributions, the so-called Pareto or ‘power-law’ distribution occupies an exposed position, particularly in economics and econophysics (Gabaix 1999, 2016; Growiec et al. 2008; Sinha et al. 2011, Chapter 5). In the analysis of arts, it was applied by Etro and Stepanova (2018) who showed that average auction art prices per artist over time follow a Pareto distribution. Moreover, Gaffeo et al. (2008) found that book sales in Italy over three years could be represented by a power-law distribution. Etro and Stepanova (2018) conjectured that the distribution of prices was driven by the highly skewed distribution of talent. Gaffeo et al. (2008) suppose that communication between book buyers was the reason for the distribution of sales. This is comparable to the results of Prinz (2017) who considered the ranking distribution of pop songs in the Netherlands. In the context of the current paper, it is hypothesized that the ranking of power members over time is also characterized by an extreme value distribution function.

As indicated by Table 7, the Power Index is highly skewed with a skewness of almost six; accordingly, the median value of about 0.0141 is smaller than the mean value of about 0.0190. Moreover, both values are quite small. These results seem to confirm the conjecture that power is highly concentrated in the Power 100 ranking. This impression is substantiated by the histogram in Fig. 3. According to the Jarque–Bera test (the value of the Jarque–Bera test statistic is 54812.06 that gives



Source: Own depiction based on data from ArtReview (diverse years) with Eviews 12.

Fig. 3 Distribution histogram of the Power Index. Source: Own depiction based on data from ArtReview (diverse years) with Eviews 12

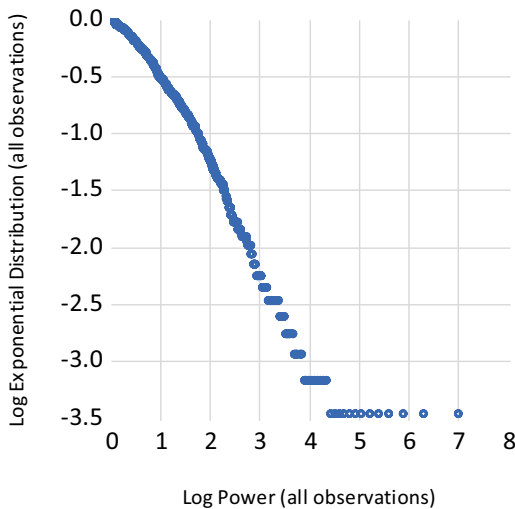


Source: Own depiction based on data from ArtReview (diverse years) with Eviews 12.

Fig. 4 Log-log diagram of the empirical cumulative distribution of the Power Index, all available values. Source: Own depiction based on data from ArtReview (diverse years) with Eviews 12

an error probability of $p=0.0000$),¹⁰ the Power Index does not follow a normal distribution.

¹⁰ The Jarque–Bera test statistic (JB) is calculated by Eviews as follows: $JB = \frac{N}{6}(S^2 + \frac{(K-3)^2}{4})$, with N : number of observations, S : skewness and K : kurtosis of the Power Index distribution; see Table 7 for the respective values. The error probability $p=0.0000$ indicates that the null hypothesis of a normal distribution is rejected.



Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12.

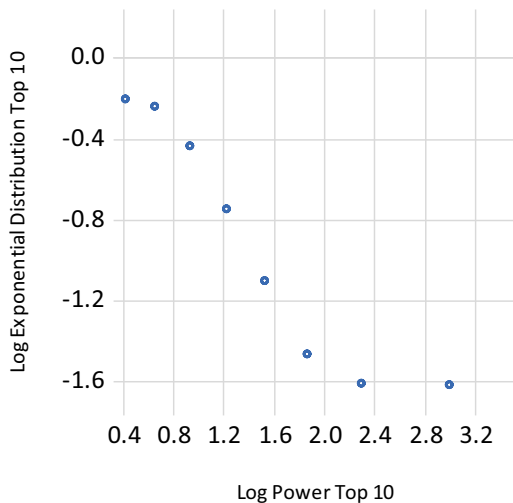
Fig. 5 Log-log of values calculated with the asymptotic exponential distribution (Poisson type) and observed power values: All available values. Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12

The skewedness of the distribution is verified with a log-log diagram of the cumulative distribution of the data in Fig. 4. It is worth noting that the tail of the distribution in Fig. 4 is close to a straight line.

For a perfectly competitive market of art experts, one would expect the Power Index to follow a uniform distribution. However, this is an ideal that is almost impossible to attain if the market dynamics for art experts can be described by the stochastic differential in Eq. (4) above. The reason is that even in a strongly competitive market, the stochastic element would create deviations from the uniform distribution. Given that stochasticity is relevant in the market for art experts, a normal distribution of the Power Index should be the outcome if the market were competitive.

Figure 5 below shows the cumulative frequency¹¹ of all available power values, calculated with the estimated asymptotic exponential (Poisson type) distribution. Note that the Power Index of the lowest ranked power members is the same ($p=0.008547$). Therefore, the log of the exponential distribution of all available values is a straight line at the bottom of the log-log graph. The Poisson-type exponential distribution is the best-fitting distribution among a large number of

¹¹ In order to fit the distribution functions, the software CumFreq (n.y.) is used.



Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12.

Fig. 6 Log-log of values calculated with the asymptotic exponential distribution (Poisson type) and observed power values: Top 10 power positions. Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12

single distribution functions.¹² The average absolute value of the difference between observed and calculated cumulative frequency values is 1.12%. The asymptotic exponential distribution deviates substantially even from the lognormal distribution, as the absolute value of the difference between observed and calculated cumulative frequency values is 5.07%. Measured by the proposed Power Index, it may be concluded that there is not much competition between art experts.

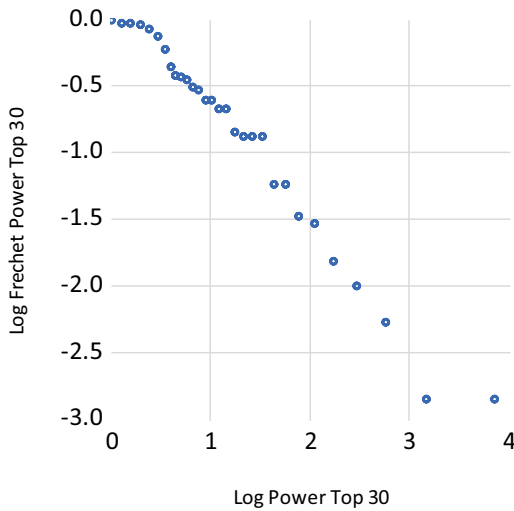
However, there might be differences in the Power Index distributions for subsamples of the Power Index. In the following analysis, the best-fitting distributions for the Top 10, Top 30, and Top 99¹³ of the Power Index are determined and shown.

Figure 6 presents the asymptotic exponential distribution for the Top 10 Power Indices.¹⁴ The average absolute value of the difference between observed and calculated cumulative frequency values is 4.39%. In comparison, the absolute difference from the lognormal distribution is 7.01%. The difference between the fit of the lognormal distribution and the best-fitting asymptotic exponential distribution is higher than in the case of all Power Index values. The conclusion is, therefore, that the

¹² To simplify the presentation, all power index numbers of Eq. (5) are multiplied by 10^5 . For the values of the power index ($x = P_i \cdot 10^5$), the cumulative density function (CDF) of the asymptotic exponential distribution (Poisson type) reads: $G(x) = 1 - \exp\{-(0.381 \cdot x^{0.34} - 3.75)\}$.

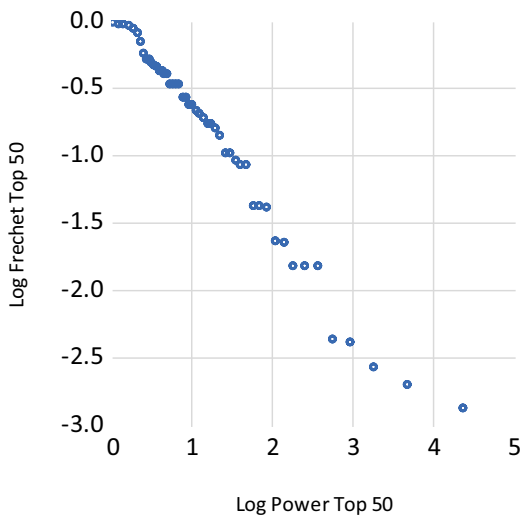
¹³ Since the Power Index values of the power member positions 100 to 102 are the same, either 99 or 102 power members had to be selected, instead of the intended Top 100.

¹⁴ For the values of the power index ($x = P_i \cdot 10^5$), the cumulative density function (CDF) of the asymptotic exponential distribution (Poisson type) for the Top 10 Power Indices is given by: $G(x) = 1 - \exp\{-(8.0601 \cdot 10^{-5} \cdot x^{1.05} - 0.452)\}$.



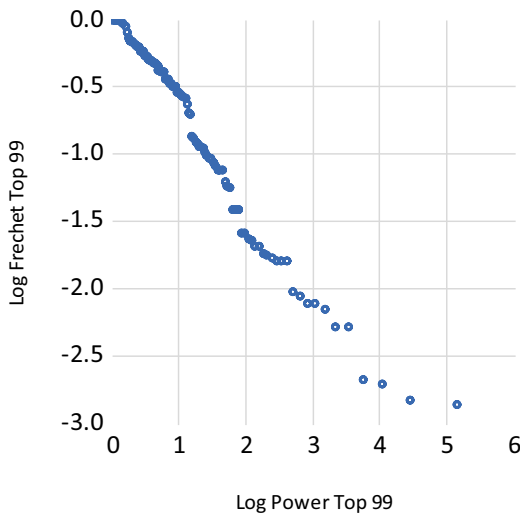
Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12.

Fig. 7 Log–log of values calculated with the Fréchet distribution and observed power values: Top 30 power positions. Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12



Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12.

Fig. 8 Log–log of values calculated with the Fréchet distribution and observed power values: Top 50 power positions. Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12



Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12.

Fig. 9 Log–log of values calculated with the Fréchet distribution and observed power values: Top 99 power positions. Source: Own depiction based on data from ArtReview (diverse years), estimated with CumFreq (n.y.) and depicted with Eviews 12

Table 8 Comparison of the fit of the Fréchet distribution and the lognormal distribution. Source: Own calculations based on data from ArtReview (diverse years) with CumFreq (n.y.)

Included observations	Average of absolute differences ^a : Fréchet distribution	Efficiency coefficient ^b : Fréchet distribution	Average of absolute differences ^a : Lognormal distribution	Efficiency coefficient ^b : Lognormal distribution
Top 30 ^c	2.67%	0.9843	12.24%	0.7249
Top 50 ^d	2.59%	0.9863	11.24%	0.7831
Top 99 ^e	2.44%	0.9900	7.98%	0.9034

^aAverage of absolute differences between calculated and observed frequencies

^bEfficiency coefficient of calculated and observed cumulative frequencies (R^2)

^cFor the values of the Top 30 power index ($x = P_i \cdot 10^5$), the cumulative density function (CDF) reads:
 $G(x) = \exp[-\{(x - 3909)/\exp(\frac{5.58}{0.876})\}^{-0.876}]$

^dFor the values of the Top 50 power index ($x = P_i \cdot 10^5$), the cumulative density function (CDF) reads:
 $G(x) = \exp[-\{(x - 3055)/\exp(\frac{8.42}{1.25})\}^{-1.25}]$

^eFor the values of the Top 99 power index ($x = P_i \cdot 10^5$), the cumulative density function (CDF) reads:
 $G(x) = \exp[-\{(x - 1575)/\exp(\frac{13.3}{1.84})\}^{-1.84}]$

Top 10 power positions are more unequally distributed than all power positions as a whole.

The distributions of the Top 30, Top 50, and Top 99 power positions are different from the distributions of all available values, as well as to the distribution of Top 10

Table 9 Characteristics of the estimated Fréchet distributions, $G(x) = e^{-x^{-\alpha}}$. Source: Own calculations based on data from ArtReview (diverse years) with CumFreq (n.y.)

Included observations	Fréchet CDF ^a	Shape parameter, α
Top 30	$G(x) = e^{-\left(\frac{x-3009}{584}\right)^{-0.876}}$	$\alpha_{30} = 0.876$
Top 50	$G(x) = e^{-\left(\frac{x-3055}{842}\right)^{-1.25}}$	$\alpha_{50} = 1.25$
Top 99	$G(x) = e^{-\left(\frac{x-1575}{1378}\right)^{-1.84}}$	$\alpha_{99} = 1.84$

^aCDF: cumulative density function

positions. For the Top 30, Top 50, and Top 99 positions, the best-fitting distribution is the Fréchet one. Figure 7, 8, and 9 present the respective log–log diagrams. The quantitative comparison of the Fréchet distribution and the lognormal distribution is shown in Table 8.

The differences between the Fréchet distribution and the lognormal distribution are substantial, as the values in Table 8 demonstrate. The conclusion is that the power positions in the Top 99 demonstrate that there is not much competition, and the positions are seemingly entrenched. The reason for a rather moderate Gini inequality in the power position and for substantial diversity, as documented above, is the competition for positions after the Top 99. Over the 18 years of the rankings, a total of 489 power members competed successfully for the Power 100 positions. This is almost five times the number of available positions. In this respect, there is competition in the lower tiers of the ranking, as well as diversity.

The first 99 positions, however, are best described by a Fréchet distribution, one of the so-called extreme value distributions. In extreme value theory, extreme and rare events are of interest (Friedrichs 2007): Given that $M_n = \max\{X_1, \dots, X_n\}$, M_n follows a Generalized Extreme Value distribution for $n \rightarrow \infty$ (Friedrichs 2007). In the context of this paper, this reads $M_n = P_n = \max\{P_1, \dots, P_n\}$, but with a finite (but large) $n = 489$. This number of observations may nevertheless be sufficiently large for a convergence of the P_i values to an extreme value distribution. As shown by Fisher and Tippett (1928), there are only three types of extreme value distributions that vary only in terms of a shape parameter (Friedrichs 2007). The Fréchet distribution belongs to Type II of these distributions; it is given by (Pfeifer 1989, p. 18)

$$G(x) = e^{-x^{-\alpha}}, \quad x > 0, \quad \alpha > 0. \quad (8)$$

In the context of this paper, note that $x = P_i$, i.e., $G(x) = G(P_i)$.

As shown generally by Kabluchko (2015, p. 7), for a Pareto-distributed random variable X (with $\alpha > 0$):

$$F(x) = 1 - x^{-\alpha}, \quad x \geq 1 \quad \text{and} \quad F(x) = 0, \quad x < 1 \quad (9)$$

the random variables $n^{\frac{-1}{\alpha}} \cdot M_n$ converge for $n \rightarrow \infty$ to $G(x) = e^{-x^{-\alpha}}$ for $x > 0$ and $G(x) = 0$ for $x \leq 0$. Hence, a special feature of the Fréchet distribution is a so-called *fat tail* (Friedrichs 2007). Applied to the distribution of the Power Index defined by Eq. (5), this index can be described

as a Pareto-distributed random variable that follows a Fréchet-type distribution. In particular, the shape parameter α in Eq. (8) is of relevance as it describes the form of the extreme value distribution. The estimated distribution functions, $G(x)$, for the Top 30, Top 50, and Top 99 observations of the Power Index are presented in Table 9. This table supplements Table 8, with a focus on the shape parameter of the distribution functions.

The values of the shape parameter indicate the level of inequality in the respective data. Therefore, the shape parameter of extreme value distributions can be used to compare the inequality in datasets from very different areas. For instance, Etro and Stepanova (2018) find shape values of $\alpha=2.07$ for the distribution of the average price per artist in the primary market for Italian Renaissance paintings at the time, 1285–1550, and $\alpha=2.50$ for British paintings at the time, 1780–1840. Compared with these shape values, the Power Index of the Top 99 is somewhat less unevenly distributed than the average price of top artists' works in Italian Renaissance and the British Golden Age.

According to Mandelbrot (1960, p. 86), a distribution is stable if $0 < \alpha < 2$. Stability of a distribution is defined as follows: "A random variable X is stable (...) if for X_1 and X_2 independent copies of X and any positive constants a and b , $[aX_1 + bX_2 = cX + d]$ (A.P.) holds for some positive c and some $d \in \mathbb{R}$. The random variable is strictly stable (...) if $[aX_1 + bX_2 = cX + d]$ (AP) holds with $d=0$ for all choices of a and b " (Nolan 2004, p. 4). The equality sign means that the expressions on both sides of the sign follow the same probability law. In plain words, the shape of the distribution X is preserved under linear transformation (Nolan 2004, p. 4). This is typical for the distribution of data with fat tails. Moreover, Mandelbrot provides the stricter definition of "positive stable" distributions with $1 < \alpha < 2$ and names them "Pareto-Lévy distributions" (Mandelbrot 1960, p. 87). For $\alpha=3/2$, the "strongest Pareto-law" implies that the distribution is represented by a straight line in a double-logarithmic diagram (Mandelbrot 1960, p. 81). These definitions suggest that the Power Index distribution for the Top 30, Top 50 and Top 99 positions is stable. Furthermore, the Top 50 and Top 99 positions follow a Pareto-Lévy distribution since the values of α , $\alpha=1.25$, and $\alpha=1.84$, respectively, are in the range of positive stable distributions. As Figs. 7, 8 and 9 show, the double-logarithmic diagrams of the distributions are not exactly straight lines, but they get close to them. In addition, the tail of the distribution of all occurrences in Fig. 4 is also close to a straight line.

To briefly sum up the distributional analysis, the Top 99 power positions in the Power Index seem to be entrenched and stable. The best-fitting distribution for the top positions is a Type II extreme value distribution, the Fréchet distribution, which has a fat tail. This is in accordance with a substantially slow—if at all—mean-reverting stochastic process.

The stability of the top positions can have consequences for the upstream market and the downstream market for contemporary art. As mentioned in the Introduction, high-ranking art experts in the upstream market first reduce the quality uncertainty for art collectors and art buyers in the downstream market by disseminating relevant information about art based on their art knowledge. This increases the efficiency of the downstream art market. However, a number of these art experts are also active players in the downstream market, as shown in Fig. 1. In ArtReview's Power 100,

curators, gallerists, and artists are those art experts who are also active in the downstream market. According to Table 1, the proportion of these experts in the ArtReview's ranking was 66% in 2002 and 64% in 2019. Thus, the majority of art experts is active in the downstream art market at the same time. Art professionals can strategically leverage their downstream market expertise to promote their preferred artwork. However, as the above analysis has shown, influential high-profile art experts are few in number, and these elite experts hold their top positions for quite a long time. Since most of these experts are also in the downstream market, it gives them power in that market as well. As suggested in the introduction, this situation can be described as double domination. The position of power in the upstream market creates power in the downstream market. Although art experts reduce uncertainty on the downstream market, they distort and reduce competition in that market as well. The latter reduces the efficiency of the downstream market.

Conclusion

Art markets operate with a high level of uncertainty. The value of artworks (in all respects) is difficult to determine objectively, if it is possible at all. Therefore, diverse experts and intermediaries, from art dealers to art critics, play a crucial role. Although it seems necessary to restrict entry into and competition within the market for art experts, the question is whether these restrictions are too strong. It could be that a rather small group of experts gains high levels of influence. To analyze this, the art market is separated into an upstream and a downstream market, with an upstream art expert market, and a two-sided downstream market. Although the focus of this paper is on the upstream market of art experts, too much, as well as too little, competition on the upstream market will have consequences for the downstream market. A lack of competition, but also too much competition, would have negative consequences for quality, diversity and innovations in art. Still, the combination of market power in both markets is seen as detrimental for market efficiency and the arts.

This paper contributes to the literature on the structure and functioning of art markets. Accordingly, (1) it is empirically analyzed whether and to what extent the market of art experts is concentrated. To this end, (2) various methods for measuring the concentration of market power are applied, with an emphasis on determining the distribution of a newly defined Power Index. (3) It is also concluded that there are signs of a combination of market power upstream and downstream.

The basis for the empirical investigation is the annual Power 100 ranking in the magazine ArtReview from 2002 to 2019. The results of this paper show that there are several indications of a high concentration of market power in the art expert market. First, the selection of nationalities of the so-called power members over all years is biased, because in particular, U.S.-Americans and western Europeans are overrepresented in relation to their world population shares. In this respect, Asians, Africans, and Latin Americans are underrepresented. Secondly, although there is considerable variability among the power members, the top positions in the rankings are barely characterized by competition. The Power Dominance Index shows

a substantial concentration of the positions. Nevertheless, there is also tough competition for placement in the Power 100, as shown by the high proportion of power members who are only ranked once or twice. Therefore, the ranking is hierarchically tiered. Third, the main empirical result of this paper is that Power Index of the Top 99 positions follows an extreme value Fréchet distribution with a fat tail. The latter is a strong indicator of an entrenchment of the top positions in the ranking. This extreme value distribution is shown to be different from a lognormal distribution of ranking positions. With a reasonable degree of competition for the top positions, a normal distribution of the positions is to be expected. The distribution of Top 99 positions' Power Index implies that there is almost no regression to the mean. This is interpreted as a sign for excessive concentration among top-level art experts. As in all markets, too high a concentration of power can be potentially detrimental for market outcome. This is especially true if there is a combination of power upstream and downstream.

Nevertheless, the above results have their limitations. The most important is that the ArtReview ranking suffers from endogeneity. This means that the rankings over time are self-enforcing, i.e., high-ranking positions breed more high-ranking positions. Rankings become conducive for the next rankings as focal points for people who vote to provide the rankings. However, although such endogeneity cannot be excluded, another explanation of the rankings is that those power members are in the top positions, who are also the leading figures in the downstream market for artworks. Further research is required to disentangle these effects within the rankings.

Another limitation is the criterion for deciding whether there is excessive restriction of competition in the art expert market. Free entry into this market would probably endanger the downstream market for artworks, as art buyers need to draw on expertise to make their buying decisions. In this paper, concentration in the art expert market is either compared with a uniform distribution or with a (log)normal distribution. These distributions are arguably suitable benchmarks for the economically acceptable level of concentration. Nevertheless, an extreme value distribution of the Top 99 positions' Power Index hardly seems compatible with a viable level of competition in the top-level art expert market, although there is tough competition for getting ranked. Further research seems necessary in this respect too.

Artists and artworks represent cultures. Commercialization of arts with established arts markets and their particular institutional and organizational structure has brought about an emergence of expert professionals. The upside of this development is that a relatively large number of artists can earn their living by producing artworks. Nonetheless, there is also a downside of commercialization. The market for artworks is a two-sided one in which experts and intermediaries are crucial for the market outcome. The consequence is that these intermediaries are of major importance for artists too. A concentration of expert and intermediary power might be a consequence of commercialization, as art markets need guidance for collectors, investors, and all other artwork demanders. This power concentration has the advantage that it reduces uncertainty about artwork quality. Insofar, concentrated expert and intermediary power might be inherent to a commercialized art world. Nevertheless, if the upstream market of art experts is not subject to competition, double domination can occur.

As indicated by Ginsburgh and Weyers (2014), it may be possible to diversify and decentralize art markets and art expert markets. Whether and how this might be possible is beyond the scope of this paper. Further research in this direction seems both necessary and promising.

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Data availability The data used in the paper are proprietary data of ArtReview. They are available on the homepage of ArtReview.

Code availability EvIEWS 12 and CumFreq are commercial (EvIEWS 12) and freely available (CumFreq) software packages.

Declarations

Conflict of interest The author declares to have no conflicts of interests/competing interests.

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