The flourishing art market in Poland

The impact of Poland's accession to the European Union in 2004 on the price index of the contemporary Polish artists between 1990 and 2022.

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A girl with chrysanthemums
oil on cardboard, 1984

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Abstract

In 2004 Poland joined to the European Union and became a part of its unified market. Since then, intensive economic development has been observed, especially in the case of the contemporary art market, whose growth rate between 2017 and 2022 has been rapidly increasing. After nineteen years of this occurrence, this study provides not only the first quantitative analysis of the progress on the Polish art market from 1990 to 2022, but also an assessment of a country's admission to the European Union on the domestic art market. Furthermore, in terms of socio-political relevance, this study constitutes an important insight of the economic effects of trade integration. Within the framework of hedonic regression model, a price index of contemporary Polish artists is constructed for years 1990-2022. To further verify the effect of Poland's accession to the European Union, interrupted time series analysis is employed, with year 2004 as a cut-off point. The analysed sample consists of 98 contemporary Polish artists, which resulted in over 13,000 auction records observations. This paper provides significant evidence of an increase in the price index of contemporary Polish artists between 1990 and 2022 and positive impact of Poland's accession to the European Union on that index. As empirical results reveal, the examined effect is stronger for sales abroad. A surge of 226.42 units in the year of accession suggests a positive influence of the economic integration within European market. Furthermore, for an entire sample, a positive long-term impact of Poland's accession to the European Union is noticeable and results in the index growth at rate of 0.86. Joining Poland to the European Union can be regarded as a major stimulus which has boosted not only a price index of contemporary artists, but also the qualitive and quantitative development of the country's art scene in recent years.

Keywords: contemporary artists, price index, economic integration, European Union, Polish art market, hedonic regression, interrupted time series analysis

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For my beautiful country,

with faith to build a future, where good flowers may thrive.

I.　Table of Contents

II.   **List of Tables**

III.   **List of Figures**

IV.   **List of Equations**

1. Introduction

Poland's accession to the European Union in 2004 was a considerable milestone for a country rebuilding its economy and democracy. It enabled Poland to emerge from the remnants of Iron Curtain, become a part of the European Union, open its economy to other markets and increase its importance in the international arena. That event facilitated a noticeable infrastructural development of the country, a significant increase in international trade and general economic growth (European Comission, 2022). As art requires freedom (Lec, 1966), the art market in Poland has also only started to flourish since 1990 (Babiarz, 2000). Despite its young age, the art market, especially the contemporary art market in Poland, has been developing with remarkable dynamism, ranking among the world leaders in terms of revenue generated from auctions (Artinfo.pl, 2021a). Unfortunately, the Polish art market has not been sufficiently addressed by scholars. Although some researchers have provided valuable insights, such as the creation of an artists' price index between 2007 and 2010 (Kompa & Witkowska, 2013), or the calculation of return on investments in works of art on the Polish market (Cichorska, 2015; Grabowska, 2012; Kiedroń, 2015b; Regmunt et al., 2017), a comprehensive examination of the subject, investigating the dynamics of the growth of the art market in Poland in the past few years, and the role played by the fact that Poland joined to the European Union in 2004, remains absent. Moreover, the time horizon considered by previous research was insufficient to allow a comprehensive analysis of the prevailing trends on this market. This work aims to fill the missing gap on development of the Polish contemporary art market between 1990 and 2022, while at the same time contributing to an increase in the research body on the European Union. This paper not only provides the first quantitative analysis of the Polish art market in the period 1990-2022, but also an assessment of a country's admission to the European Union on the domestic art market. Furthermore, in terms of socio-political relevance, this study constitutes an important insight of the economic effects of trade integration. Hereby, the findings of this paper will aim to answer the research question whether Poland's accession to the European Union in 2004 had a significant impact on the price index of contemporary Polish artists. Moreover, this paper will discuss other factors which have shaped the prices of artworks on the domestic art market, as well as the general state of the art market in Poland, together with its development over the period under studies.

This study is organised into five chapters. After the introduction, the second chapter provides a review of the relevant literature theories which concerns building the price index for the art

market, existing hedonic determinants, and the structure of the art market in Poland, which constitutes a baseline for the conducted research. In the third chapter, the methodology of the study is discussed, covering the research objective, outlining applied methods of the hedonic regression and interrupted time series analysis with relevant equations and variables. Moreover, the method of data collection and sample selection is presented. Furthermore, the fourth chapter highlights the results of the study along with an analysis of the obtained statistics. Finally, the paper concludes with a general summary of the findings, limitations of the study and further prospective research venues.

2. Theoretical framework

2.1. Price indices for the art market

The art market, similarly, to the real estate market, has been recognized in existing academic literature as a distinctive market that cannot be fully measured impartially. In fact, the price of each artwork is contingent upon its unique characteristics or circumstances of the sale that constitute the object (Sheppard, 2021). Consequently, ascertaining and predicting the value of a particular artwork in the primary and secondary markets is a pertinent issue for investors, collectors, art dealers, art enthusiasts, and artists alike. As the art market comprises a heterogeneous set of goods, the price formation will differ significantly compared to the majority of markets for other commodities. Certainly, as Schneider and Pommerehne (1983) indicate, demand and supply forces act in this market as well. Nevertheless the market price is not solely the outcome of the interplay between those mechanisms, but also factors related to artist's fame, characteristics of the artworks, features of the market and other macroeconomics determinants (Sagot-Duvaroux et al., 1992). Two main methods are generally used to ascertain the dynamics and determinants of art prices: hedonic regression (Buelens & Ginsburgh, 1993; Renneboog & Van Houtte, 2002) and repeated sales analysis (Anderson, 1974; Baumol, 1986). An additional, less common method is the naïve price indices (Candela & Scorcu, 1997), which has the important disadvantage of being based on subjective perception and the questionable expert opinion, as admitted by the authors. Thereby, this method will not be further considered in the following chapter.

2.1.1. Repeated sales method

The repeated sales method, as the name suggests, pertains to artworks that have been sold at least twice. RSR (Repeated Sales Regression) model may incorporate a regression using the natural logarithm of the ratio of the price of the next sale and the price of the previous sale on a set of artificial time variables (Kräussl & van Elsland, 2008). Alternatively, the regression model can also involve logarithmic price differences obtained in successive transactions, which are aggregated and consolidated to create an index value (Kiedroń, 2015a). The primary advantage is the lack of necessity to quantify the quality of the paintings, provided the quality does not change. However, the disadvantages outnumber the benefits of employing this method. These include many discarded data and a considerably smaller research sample compared to the hedonic regression model. Furthermore, there is a risk of selection bias, and the aforementioned assumption of the invariability of the quality of particular artworks. Leonardo da Vinci's painting "Salvador Mundi" serves as a compelling example highlighting the vulnerability inherent in constructing an index of artworks utilizing the repeat sale method. "Salvador Mundi" had appeared at a Sotheby's auction in London on 25 June 1958 and was sold for £45 (around $72). In 2005, the piece had reappeared at an American auction, where it was bought it for another bargain price of $10,000. Subsequently, in 2013, following confirmation of its authenticity, the painting was sold at a private auction at Sotheby's for $75-80 million. Later that same year, it was resold for $127.5 million to a Russian billionaire. Finally, in 2017, the painting is auctioned at Christie's with a skyrocketing price of $450.3 million (Artnet News, 2017). The considerable upsurge in the price of 'Salvador Mundi' over a relatively short period of time serves as a cautionary note when using the RSR method to construct an artworks index. The spectacular price fluctuations observed in this case illustrate the unreliable nature of the use of this methodology, which is one of its fundamental limitations.

Moreover, the literature suggest that such method should be used for developed art markets, over a period of at least 20 years (Ginsburgh et al., 2006). In the light of these findings, the period examined in this paper, 1990-2022, would appear to be sufficient. However, as data from the Mei-Moses Art Index indicates, the share of repeated sale in the total sales volume was only 13% within a 20-year span and 15% for the period 1971-2000 (Ginsburgh et al., 2006). Given that the Polish art market is young and underdeveloped, with the first auctions resembling Western ones taking place at the turn of the 1980s and 1990s, it is probable that the share of works sold twice at auction during the period investigated would have been too small. Consequently, the research sample

would have been insufficient and biased since, as Gatzlaff & Haurin (1997) indicate, only a small percentage of these type of goods sell each year. Moreover, a sample of those that do sell may have non-random statistical properties. This can result in findings which do not reflect the realities for the selected art market. For this reason, the RSR method is unsuitable for employment in this paper.

2.1.2. Hedonic regression method

When constructing price indices for weakly comparable heterogeneous goods, such as artworks, the most complex, as well as the most accurate method is the hedonic regression method. This is because the price of a painting is assumed to depend mainly on its quality. The hedonic function describes the relationship between the prices of heterogeneous goods and the characteristics of these goods (Triplett, 1991).

The origins of the hedonic price index methodology may be found in agricultural economics, where Waugh's (1928) groundbreaking study applied multiple regression analysis to examine the effects of colour, size and uniformity of the sprout on asparagus prices in Boston to provide producers with useful information on asparagus characteristics appreciated by customers. Court (1939) studied changes in the price of automobiles as a response to the evolution of their technical performance. Chow (1967) used the hedonic index to measure the importance of technological changes in computers on their price. Subsequently, the hedonic regression method was applied to the real estate market (Bailey et al., 1963; Ridker & Henning, 1967). However, it should be mentioned that for a long time the method was not commonly employed. Only after Triplett (2004) published a paper systematising the hedonic regression methodology it became increasingly popular.

Currently, the method is applied mainly to determine price indices of consumer goods, real estate, computer equipment, cars, and art (Ginsburgh et al., 2006). In the case of artworks, a close relationship exists between the price of an artwork and its qualitative attributes. These characteristics can be divided into quantitative (expressed in numbers), e.g., the size of the painting in cm, or qualitative (expressed in words), e.g., the technique used to create the painting or the auction house, where the sale occurred. Essentially, the purchaser is not buying a painting as a coloured piece of canvas stretched over a frame, instead buyer acquires a combination of characteristics relevant to that painting, which may bring certain benefits, and which contribute to the selection of a given set of painting characteristics from among other combinations available on

the market. The aggregate of these characteristics is therefore taken as a measure of the quality of the painting, and the price is understood as the sum of the prices of these features (Triplett, 1991). Consequently, the hedonic index allows to assess the market value of the quality characteristics and incorporate their variations to provide explanations for price changes. Whether the observed changes are due to structural shifts in the market, sampling, or other supply or demand factors. This is because the index is affected by qualitative changes in the overall sales volume rather than the features of a particular artwork. As a result, an increase in the price of one painting compared to thousands of other artworks will not cause a significant change in the whole index.

Chanel et al., (1996) employ both the hedonic regression method and the repeated sales method in their study. They conclude that hedonic regression delivers more accurate estimates and enables to consider all observed artworks instead of those only sold twice. Similarly, Ginsburgh et al., (2006) advocate that for a smaller research sample, hedonic regression delivers more accurate results. Given the period under study, the sample of artists, the availability of data, and the intention to verify whether Poland's accession to the European Union had an impact on the price index of Polish artists, it would appear most appropriate to employ the hedonic regression method. Unfortunately, each model has its limitations. In order to obtain reliable and unbiased estimates, the index must be contaminated minimally with the heterogeneity of the sales structure over time. Furthermore, to correctly account for quality-adjusted prices, the selection of relevant hedonic attributes remains crucial. Therefore, various hedonic characteristics will be discussed in the next chapter of the paper.

2.2. Hedonic determinants

As Triplett states (2004, p. 138), "the first principle for conducting a hedonic study is to know your product". In the literature, various characteristics can be incorporated in the hedonic model to create a price index. The first and most general division aforementioned is the one into qualitative and quantitative characteristics. Furthermore, the selected characteristics may be divided into those related to the qualities of the painting, the traits of the artist, and the circumstances of the sale.

Table 1. Frequently employed characteristics for creating hedonic indexes of artworks.

Artworks	Artists	Sale
• dimensions • medium • technique • support • topic • style • authencity • year of the creation • history of the artwork • colour	• reputation • artist's name • age • living status • nationality • gender	• auction house • time • location • estimate • catalogue

Note: Own compilation based on Barbosa & Campos (2008), Candela & Scorcu (1997), Candela et al. (2004), Chanel et al. (1996a), Chanel et al. (1996b), Fedderke & Li (2020), Ginsburgh et al. (2006), Renneboog & Spaenjers (2013)

2.2.1. Artwork related features

As shown in Table 1, artwork-specific determinants of price are the most numerous. The literature commonly cites size (height, length, surface area) as the most popular determinant, since the price of an artwork is positively correlated with its size (Anderson, 1974; Beggs & Graddy, 1997). However, as Sagot-Duvauroux (2011) suggests, this correlation only maintains to a certain point, as beyond a certain threshold, prices rise at a diminishing marginal rate. For instance, in the American art market, a negative impact on the price of a painting occurs once the surface area exceeds 9526 square inches (Agnello & Xu, 2008). Only museums can acquire and exhibit large artworks, as they have fewer constraints in terms of wall space or physical area compared to private clients (Frey & Pommerehne, 1989). Furthermore, it has been found that paintings with dimensions of 58 x 40 cm (for European painting before 1800- old masters) and 33 x 21 cm for later painting command the highest prices (De la Barre et al., 1994). In Poland, paintings of the typical size, which is usually 50 x 60 cm, has higher liquidity than larger artworks, meaning that they can be converted quicker into cash. However, this observation does not apply to artworks of the most known artists, which are also described as superstars (Bryl, 2016). Finally, orientation of the

painting, as well as its aspect ratio may also shape the price. As Higgs and Foster suggest (2011), horizontal format is more common than vertical one, with only 4% of images, which has been sold in the square shape.

Furthermore, another group of physical attributes correlated with price include medium (such as oil, acrylic, watercolour, tempera, mixed media), technique, and support (i.e., canvas, paper, cardboard, wood panel). In the case of paintings, oil on canvas is widely recognized as the most highly valued form of medium in the market due to its durability, versatility in applying various artistic techniques, and association with high levels of artistic skill (Sproule & Valsan, 2006). For this reason, paintings created using permanent techniques on durable support, such as oil paintings on board or canvas, often fetch higher prices than non-permanent paintings (particularly watercolours on paper). When investigating techniques and trends in Belgian painting, it was found that the premium for oil technique compared to watercolour for Surrealism is about 97%, and for Pointillism 127% (Renneboog & Van Houtte, 2002).

In addition to the materials used, which enable a variety of techniques to be applied, the composition's subject and the style in which the artwork is created, may determine the hammer price as well (Renneboog & Spaenjers, 2013). However, in Anderson's (1974) study, it was demonstrated that the subject factor of a painting has little effect on its final price. Likewise, Wieand et al. (1998) found that the subject matter of an artwork has only a minor impact on its market value. Furthermore, this hypothesis is also supported by Sagot-Duvauroux et al. (1992), who contend that, particularly in the context of contemporary art, an artwork's subject matter plays no significant role in the determination of its price. In the art markets, a statistical relationship between price dynamics and painting style was observed. Impressionist's paintings were placed in the segment of the market with the highest rates, while the sector with the lowest rates belonged to the expressionist (Goetzmann et al., 2016)

As with subject matter, a general pattern is not apparent in which time of creation variable affects artwork prices, as it correlates closely with other factors including tastes and fashions. Firstly, the time of creation of an artwork is likely to impact the genre and style of the piece. Moreover, it is associated with the artistic period in which the artist was operating when making the artwork. Sometimes it might be a time of peak success and greatest innovation, or artistic incapacity and misguided ideas. Yet as concluded by Anderson (1974) all these aspects can be reflected in the market price. However, according to Bialynicka-Birula (2021), the time of creation

has significantly negative correlation with the auction prices. This implies that older works of art tend to achieve higher prices in the auction market. Therefore, the highest price levels are typical of the oldest pieces, while the bottom prices occur for contemporary artworks.

Authenticity is the next important variable and reflects the value of the artist's originality and oeuvre, which may be expressed, for instance, by the signature on the artwork or appearance in the *catalogue raisonné*. According to Sagot-Duvauroux et al. (1992), once the authenticity of a work of art is questioned, a decline in its market value occurs. Consequently, some authors, such as Renneboog and Van Houtte (2002), revealed that the presence of the artist's signature on the artwork has a positive influence on its price, since it is perceived as an indicator of authenticity. According to Ursprung and Wiermann (2011), the signature on a painting can increase its price by up to approximately 27%. Nevertheless, the signature alone cannot guarantee authenticity, as it can be falsified. Therefore, it may also require expert certification. The higher the certainty that a work of art is authentic, the higher the price that potential buyers are willing to pay, as demonstrated by Ginsburgh et al. (2019a). However, a risk of incorrect attribution remains.

The variables describing the history of work, i.e., mentions in the literature and how many times and where the artwork has been exhibited are slightly less common in existing literature. According to Wieand et al. (1998) the number of exhibitions and publications in which the piece was featured correlates positively with price. However, one can argue that artworks of higher quality are more frequently displayed or reviewed, implying that their higher market value could be attributed to their artistic merit rather than the frequency with which they are exhibited or published. Moreover, the prestige of the venues in which a painting has been exhibited could count more than the number of exhibitions. For example, the price of 2.8 million zlotys (circa 574 thousand euros) achieved by Wojciech Fangor's painting at the auction in Desa Unicum was presumably the result of the solo exhibition at the Guggenheim Museum in New York (Miliszkiewicz, 2015). In addition, the well-documented and long history of the painting contributes to its value. As it appears, knowledge of the work's provenance also plays an important role (Lucińska, 2021). In Poland old master's art have usually an unknown origin, which makes objects with a genesis particularly desirable and valuable. Due to Poland's history, which was abundant in looting, changes in the political system and constant border shifts, many pieces of art with an unknown history, including those stolen from bourgeois houses, have appeared in the trade (Miliszkiewicz, 2016).

The colours on artworks represent another characteristic studied by scholars. The first theories regarding colours and their application in the art history were pioneered by Itten and Kandinsky, who argued that colours affect the human psyche, and thus cause different emotional reactions (Borisov et al., 2023). Within the framework of these concepts, research was conducted to determine the impact of the colours used by artists on the hammer price achieved. The research in the European, American, and Chinese markets found that, in all locations studied, the blue colour generated a price premium of 18,57% and red 17,28%, compared to the other colours on works of art (Ma et al., 2022). Similarly, Borisov et al. (2023) found evidence that the average hammer price is higher for works with blue colours.

2.2.2. Artists related determinants

Another key subset of art price determinants consists of artist-related variables. Among all the factors allocated to the artist section and listed in Table 1, reputation represents the variable that appears to have the strongest impact on the hammer price (Frey & Pommerehne, 1989). Unfortunately, it is a descriptive variable that is rather difficult to quantify, and the literature has failed to systematically include one approach that measures an artist's reputation or the strength of attribution. For instance, Renneboog and Spaenjers (2013) as a measure of an artist's reputation verify whether the artist has been mentioned at least once in one of a selected art history books and whether the artist was exhibited at Documenta in Kassel, which is regarded as a one of the most prestigious exhibitions. Other scholars, such as Frey and Pommerehne (1989) measure the standing by the number of prizes received. The artist's reputation depends also on the gatekeeper's opinion. In the market described by Akerlof (1970), which is characterized by a strong asymmetry of information and uncertainty of quality, the artist's name and consequently the associated reputation is therefore seen as a vector of information that can send differentiated signals to buyers (Radermecker, 2020). Therefore, cultural experts are usually creating rankings of the artists to minimize information asymmetry and ensure the appropriate relation between quality and price of the artwork. Moreover, the name of the artists can be a benchmark of reputation itself, as the artwork consists of the painting, its creator, and its title (Grampp, 1989).

Another widely used characteristic is the age of the artist. The greatest and most expensive paintings by pre-1850 painters, such as Claude Manet or Edgar Degas, were created at the end of the artists' careers. On the other hand, artists such as Pablo Picasso or George Braque, who were

born after 1850, painted the most expensive works at the beginning of their artistic lives. The highest prices for Picasso's masterpieces were recorded when he was between 21 and 34, while paintings after the age of 63 were low-priced (Czujack, 1997). To explain this pattern, one may refer to the diverse approaches to innovation within art and the theory of innovators (Galenson, 2004). In fact, innovators born before 1850 believed that new ideas required craftsmanship accomplished over years, while those born after 1850 created their greatest masterpieces in their youth by exploiting their genius to create novelty in art (Lucińska, 2021). Furthermore, according to Lanyon (1999), in the global market for great artists born between the 17th and 20th centuries and originating from France, England, Italy, the Netherlands, and the USA, prices increase at a rate of 6.4% per year until the age of 31, when artists peak, to then decline at an annual rate of 4.1% until the age of 47 and thereafter slow the decline to 0.7%.

Connected to the age of artists is another hedonic characteristic - living status, which as literature suggests also affects the price of artworks (Kraussl & Schellart, 2007; Renneboog & Spaenjers, 2013; Taylor & Coleman, 2011). Czujack (1997), using the example of the increase in prices of Picasso's paintings, with unchanged price indices across the entire art market, identifies what is known as the "death effect", which refers to an immediate increase in the prices of an artist's artworks after their death. This is since after an artist's death, the supply of their works on the art market remains constant, preventing the market from being flooded with an overproduction of their works that will no longer be produced. This may lead to increased demand and hence higher prices (Ekelund Jr et al., 2000). A similar pattern has also been observed in the Polish painting market (Szyszka & Białowąs, 2019). One additional factor contributing to the escalation of an artist's work price after death is the increased media attention and interest in the life and the oeuvre of the deceased (Itaya & Ursprung, 2016). On the other hand, in a study conducted by Kräussl and Elsland (2008) that used the hedonic method, living status was not statistically significant. In contrast, the results of Agnello and Pierce's (1996) study indicate a positive effect on prices when the artist was alive during the auction. Nonetheless, despite assuming in the analyzed case that all living artists in the sample were contemporary artists, this effect could be more related to the style rather than the fact that the artist was alive at the time of sale.

The gender of the artist is a feature that has received relatively little attention in the existing literature. It seems that global debate around gender inequality in the art world started in 1971 when Nochlin had raised the question, "Why Have There Been No Great Women Artists?". She posits

that the answer lies in the structure of social institutions rather than the inherent lack of individual talent or ability among female artists (Nochlin, 1971). According to Adams et al. (2021), gender culture can lead to price biases in the art market. Their research found that female paintings are subject to significant discounts in art auction prices, which cannot be entirely explained by objective characteristics of the paintings, such as size, style, medium, or the age of the painter. Moreover, a study conducted by Adams et al. (2017) revealed that the sale price of artworks by female artists at auctions was on average 47.6% lower than that of their male counterparts. Furthermore, Bocart et al. (2022) stated that female artists' artworks account for less than 4% of the sales in art auctions. In addition, their empirical findings indicate that, in the case of contemporary artists, artworks of male artists sell for 8,3% more in comparison woman. The reason for described phenomenon perhaps stems from smaller female artists representation in the art market. This in turn may be a result of the historical inaccessibility of women to arts education and resources (Davis, 2015). However, it should be highlighted that the state of gender equality in the art industry has undergone significant changes since the 1950s. Presently, there exists a widespread notion within the art community and the art market that previously marginalized artists, who were disregarded in the past, are gaining greater visibility and recognition that they rightfully deserve (Currier, 2019). Moreover, currently, the number of women receiving a Master of Fine Arts degree in the United States has increased, reaching approximately 50% (Bocart et al., 2022). It is plausible that in the future with increased awareness about gender inequalities and more female graduates, there could be an enhancement in the representation of women among top artists. Upon initial analysis, it seems evident that the notable price disparity between male and female artists has the potential to negatively impact the artists' pricing index, thereby reducing its value. On the other side, notwithstanding the persistently lower participation of women artists in the art market, it appears that in a sample in which they do not represent a majority, their price discount is unlikely to have a substantial impact on the average price of the entire set of artists.

Despite the notion that an artist's nationality should not be a significant factor in artwork valuation, research has shown otherwise. For instance, De la Barre et al.'s (1994) study found that individual nationalities are valued differently. Furthermore, Quemin's (2015) analysis of published artist rankings revealed a dominance of artists from Western Europe and North America. Moreover, in West European countries (such as Belgium, France, Germany, Italy, and the Netherlands), the number of sales of domestic artists far outnumbers that of other nationalities (Smith & Lanyon,

1999). When considering the influence of nationality on the hammer price of a painting, one should further mention the occurrence of home bias pricing, which involves a price premium for domestic artists. However, this phenomenon will be discussed in more detail in chapter 2.3.

2.2.3. Sales related characteristics.

The auction house and location in which the sale takes place are, as the existing literature shows, important variables (Ashenfelter & Graddy, 2003; Chanel et al., 1996). Many artists receive different prices for the same or similar works of art because of the auction house or different regions where the transaction was made (Førsund & Zanola, 2006). Certain auction houses, such as Sotheby's or Christie's, have an international reputation and may be perceived as an indicator of the artwork's quality. For this reason, they usually record the highest price premium as compared to other institutions (Pesando, 1993). Moreover, they tend to sell artworks of high-quality artists and may achieve better results in advertising their sales internationally (Renneboog & Spaenjers, 2015). Similarly, the most popular auction houses in Poland have a more established position on the market and thus a greater share of art sales. For example, the oldest and largest auction house in Poland is Desa Unicum, which on the Polish market together with Polswiss Art, Agra-Art and Sopot Auction House, generates almost 90% of the turnover of the entire auction market (Artinfo.pl, 2021a). In addition, Desa Unicum, as well as Polswiss Art, are among the top 15 auction houses according to tanking for continental Europe for 2021 (Artprice.com, 2021). As Renneboog & van Houtte (2002) revealed, the location of the sales venue also determines its price, particularly with respect to the country. For instance, art achieves the highest prices in the USA, while the United Kingdom follows in second place with a value of 72% of US prices. The Netherlands ranks third in terms of average auction transaction prices corresponding to 35% of the value of US prices. Whereas the prices of artworks on the Polish market have been undervalued for several years (Lucińska, 2021).

The date of sale is also widely included characteristic in the hedonic model (Agnello & Pierce, 1996; Campos & Barbosa, 2009; Higgs, 2012). Usually researchers include years, quarters, or months of the year. Indeed, time of sale is not only relevant from the perspective of the overall state of the global and domestic economy, but also of particular periods during the year. On account of the so-called seasonality of sales, every art market (especially the auction market), follows its own cycle. According to Wieand et al. (1998), artworks can be acquired either at a price premium or at

a discount, based on the month of sale. For instance, Chanel et al. (1994) computed price indices on a four-month basis, since during the third quarter (July-September) there are almost no public art sales.

Auction houses with their experts and pre-sales estimates have a significant influence on the price formation mechanism (Ashenfelter & Graddy, 2003). Therefore, the pre-sale estimate price may serve as a certain type of quality certificate. Clearly, pre-sale estimates reduce quality uncertainty and information asymmetry. Nevertheless, such estimation may already contain some biases. For instance, Ekelund et al. (1998), examining the role of experts in the context of the Latin American auction market, conclude that Sotheby's and Christie's overestimate the value of artworks by roughly 2.7 %. Nonetheless, it appears to be an accessible variable that can incorporate experts' opinions into the price formation of artworks, although it "plays a little role in explaining sales rates" (Campos & Barbosa, 2009, p. 41).

An important variable, somewhat less frequently used in the literature, is content of the catalogues prepared before the auction, which describe the characteristics important for the valuation of the work, confirming its authenticity and rank. Thanks to such an accurate description of the provenance of a painting, its credibility increases, the legend of the work and its creator grows. A catalogue published by an important auction house, is vital for the promotion of the artist, as it makes it easier to obtain a high price for the painting reproduced in it and ennobles both the work and the buyer (Miliszkiewicz & Musiał, 2016). Furthermore, if the pre-auction catalogue prepared by the auction house includes a picture, the auction price achieves a higher value (Agnello, 2010).

2.3.   Macroeconomics factors

Although it is often believed that the art market represents one of most independent sectors in terms of the socio-economic environment (Borowski, 2013), certain external factors, which influence it, exists. For example, the country in which the painting is sold, the general state of the economy, the economic cycle, economic growth, and downturn, as well as the corresponding income and wealth of the society (Towse, 2019).

The relevant literature identifies a substantial impact of the macroeconomic recession on the condition of the art market, particularly affecting artworks in the lowest-price category (Hodgson, 2011). The economic downturn results in a decrease in demand accompanied by an increase in

supply, which in turn may stimulate sales through reduced prices if artworks are purchased for investment purposes (Frey, 1997).

Present returns on the stock markets also affect the price and profitability to invest in art. However, this correlation is often observed with a one-year delay (Lucińska, 2021). Furthermore, a close correlation can be found between the art index and the stock market index. As an example, increases in the stock market appear to unleash capital constraints, which can consequently boost art prices (Goetzmann, 1993). Although the art market is characterised by unpredictable long-term changes in tastes and preferences, in the short term, financial markets affect the art market (Chanel, 1995), which has been described in the literature as 'market contagion' (Borowski & Sawicki, 2018). According to Goetzmann et al. (2011), rates of return on the stock markets substantially influence the profitability of investments in artworks. Nevertheless, in the long term, such a relationship has not been identified (Ginsburgh & Jeanfils, 1995).

An interesting comparison exists between the relationship of art indices with stock indices and the macroeconomic GDP (Gross Domestic Product) index with stock market indices. Brzeszczynski et al. (2009) observed a clear correlation between stock price movements on the Warsaw Stock Exchange and the real economy measured by the GDP growth rate. In Poland and other Central and Eastern European countries, the correlation is positive, in contrast to a negative correlation in highly developed countries (Gajdka & Pietraszewski, 2014). It implies that, as opposed to highly developed countries, growth in GDP on the Polish market translates into a bull market on a stock exchange. At the same time, this bull market correlates with an increase in painting prices.

The market prices of artworks may also be determined by the wealth of society. As Goetzmann et al. (2011) showed, in the long-time horizon there is a strong correlation between the wealth of a society, especially the growth in the number of highest income earners, and the demand for art and prices of sale. The wealth of a society has an impact not only on the generated revenue in the art market but may be also reflected in the qualities of artworks. For instance, in the Netherlands, a remarkable increase in the wealth of Dutch society and the growth on the art market had place after the deep economic recession, caused by the war with Spain. It had strongly affected the market for paintings, since even wealthy people were forced to reduce their spending on art. In response, artists began to adjust their style by creating smaller paintings with simplified contents and limited range of colours. As a result, they could propose more affordable prices to customers and stimulate

demand (Bots, 2009). As observed by Goetzmann et al. (2011), prices of paintings are positively correlated with the periods of rising income inequality. For instance, the significant reduction in the economic inequality in the United Kingdom and the United States may be a reason for the absence of record prices from 1926 to 1957. On the other hand, an increase in the society's wealth during last 50 years has caused growth in the number of auction records (wealth effect). This indicates that the rise in expenditures accompanying the perception of wealth leads to an increase in demand for art (Jelveh, 2008). Therefore, the increase in the number of record prices in the art market is attributed to the growth of wealth worldwide, whereas the decrease in the level of achieved price may be result of the declining income inequality in society (Spaenjers et al., 2015).

The connection between the well-being of the society and the prices of paintings at art auctions may concern not only the wealth of the buyers of paintings, but also the welfare of the society and domestic market from which the creator of the dearly sold painting comes. According to Roman Opałka, the price of his painting sold on the Western art market would be at least five times higher if he were a Russian painter, since this country has a lot of wealthy citizens who are willing to pay dearly for domestic art (Torański, 2014). Hence, one may imply that the price level of paintings on world markets depends on the wealth of the society and its willingness to buy from the country where the artist originates. The phenomenon of home bias in pricing, which refers to the tendency of domestic buyers to pay more for domestically produced goods, appears to be less pronounced in the high-end segment of the art market. This disparity may be explained by the fact that the highly ranked artists enjoy international recognition, resulting in foreign prices for their works being less impacted by cultural discount resulting from unfamiliarity (Vosilov, 2015). On the other hand, artworks created by artists with relatively lower recognition may exhibit higher levels of popularity within their domestic regions and remain comparatively unknown to foreign art investors. The popularity and familiarity differences are one possible explanation for home bias in pricing (Schulze, 1999). However, Vosilov's (2015) study indicates that patriotism has a stronger and more consistent effect on home bias rather than the degree of knowledge about artist. This hypothesis is further supported by the art market's boom that was observed in China and Russia. It was caused mainly by demand for domestic artists, which had been generated by home investors (Renneboog & Spaenjers, 2010).

2.4.   Characteristics of the Polish art market

The art market represents a specific and diverse economic landscape with significant disparities among different countries (Spaenjers, 2010). For this reason, a review of the art market's history, its structure, as well as exploration of its shaping forces are crucial to gain a better understanding of its characteristics. The art market in Poland is not strongly interconnected with the global scene as compared to markets in Western Europe (Zalega & Żelazna, 2012), it is mostly due to legal restrictions imposed by the state on the export of works of art. This results in a strongly local character of that market, which at the moment does not encourage foreign buyers to purchase artworks from Poland, despite significant discount as compared to Western auction prices (Lucińska, 2021). Moreover, the Polish art market is relatively young, which leads to the lack of an established position in the global scene. It should be also outlined that the market's growth has mainly occurred in the last two decades, which coincided with the global financial crisis (Lucińska, 2012). In the Polish market, as in other markets, there is no obligation to report the results of art auctions. For this reason, such information has not always been widely published by these institutions (Lucińska, 2021), which contributed to the lack of transparency of this market. Although, uncertainty and information asymmetry are well-known characteristics of the art market (David et al., 2013), the development of the infrastructure and more established position of the biggest auction houses in Poland caused that auction results become widely available on the Polish art market. Furthermore, the introduction of new informational intermediaries, such as internet and greater number of various publications, has increased the knowledge available to buyers and sellers. However, network of expert in the Polish art market is still relatively weak as compared to markets with established positions. There is also a lack of unified legal regulations that would consolidate the Polish art market, by making it more transparent.

2.4.1.   A brief historic review

The history of art sector in Poland is full of richness and complexity. Throughout history, the country has experienced numerous conflicts, uprisings and occupations that led to the loss or destruction of significant artworks. Unfortunately, despite efforts of Polish government, it has not been feasible to determine the total value of artworks lost due to theft or destruction throughout Polish history. However, given that armed conflicts have been present in every century since the country's inception, it is reasonable to presume that this value is substantial. According to the

Ministry of Culture and National Heritage, approximately 516,000 works of art were lost in Poland during the Second World War alone (Supreme Audit Office, 2017). For instance, paintings from a private collection (mainly of the Potocki family), which included artworks by Pieter Brueghel the Younger, van Dyck, Caravaggio, Velázquez, and many others, were on display in a New York exhibition before the outbreak of the war and never returned to Poland. As reported by the New York Times in May 1940, their value was estimated at 12 million dollars at that time (approximately 150 million dollars today). It is possible that some of the paintings were sold in the USA, while others may have been deposited in museums (Kozubal, 2016). As stated by Spaenjers et al. (2015), the low prices and low investment returns on the global art market before 1960 may have been partially caused by the large number of works of art that appeared on the market due to shocks in liquidity resulting from wars and post-war recessions. However, their study does not specify the individual countries from which the mentioned artworks were looted.

In addition, from 1945 until 1989, the Polish art market was under Soviet Union's influence, which resulted in intense political and economic pressure. Not only all cultural institutions were under state supervision, but also the distribution of artworks was strictly controlled (Bołdok, 2004). During the period of political and economic transformation in 1988/1989, signs of an emerging art market in Poland became apparent (Babiarz, 2000). Prior to this, the Desa enterprise held a monopoly over the state, but the establishment of AA Unicum - now known as Desa Unicum - marked the beginning of a competitive art market. This was facilitated by reforms allowing for free economic activity (Sarzyński, 1999). From May 1988 to October 1989, 18 auctions were held in Poland (Babiarz, 2000). However, it was not until the fall of communism in 1990 that auction houses in Poland began to operate regularly, and their auctions began to resemble those in the West (Studziński, 2007). At this time, the first Polish-English magazine "Art & Business" appeared in Poland. It provided information about current prices in auctions, art fairs and other important events in the art world (Babiarz, 2000).

The late development of the art market in Poland can be attributed to the country's historical circumstances. It was only after the fall of communism and the regaining of total sovereignty that the art market in Poland gained momentum and began fully operating. As Lec once stated (1966) "the discipline of art requires freedom", which was lacking during periods of foreign occupation and political repression. Furthermore, the high level of state protectionism, particularly in terms of

legal framework for export of artworks may reflect difficult history, which will be discussed in greater detail later in this paper.

2.4.2. Market structure

Despite the existing barriers, the art market in Poland is expanding significantly, achieving high sales revenues. From July 2021 to June 2022, Poland ranked 8th in the world in terms of generated revenue in the auction market in the contemporary art category, reaching over USD 22.5 million, which accounted for a 0.8 % market share in this category (Artprice, 2022). Moreover, in turnover for fine art and NFT for artists under 40 in the first half of 2022, Poland was ranked 7th in the ultra-contemporary art market (Artprice, 2022). Although year 2020 was marked by the coronavirus pandemic, the art market generated significantly higher sales figures then as compared to the same periods in 2019. The increase was visible also in sales dynamics. From 2017 to 2022 dynamic of sale reached values higher than 17% every year, with slightly less than 72% of surge when comparing the first half of 2021 to corresponding half in 2020 (Artinfo.pl, 2021b). Moreover, since 2000, the number of art auctions in Poland has also been growing. Fifty-five auctions took place in 2000, while the number reached 476 in 2020 (Artinfo.pl, 2021b). Figure 1 is based on information received from 209 art units operating in Poland, including auction houses, art galleries and antique dealers.

Figure 1. Sales structure of artworks in Poland by category in 2021
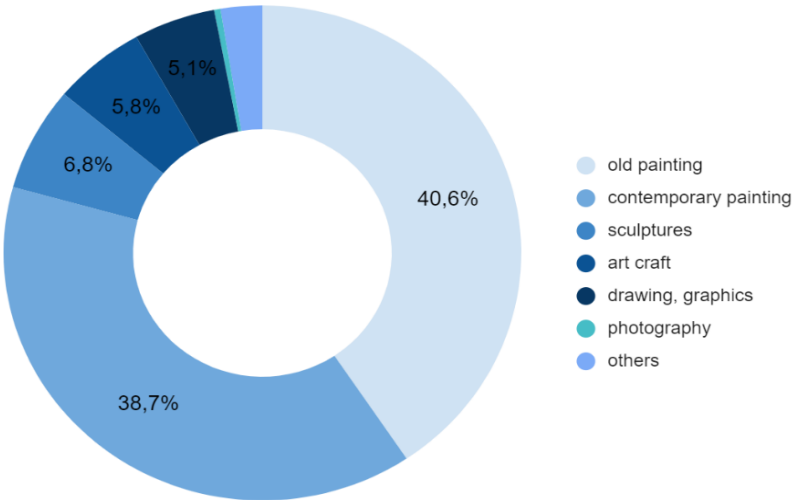
Source: Own compilation, based on data from Central Statistics Office in Poland

The data presented in Figure 1 illustrates the dominance of painting in the Polish art market in 2021, with sales accounting for approximately 80% of the market, equivalent to a sales value of 468.5 million Polish zlotys (around 99,68 million euros). This trend is not exclusive to 2021, as the period from 1990 to 2022 shows that painting has consistently held the largest share of sales on the art market. The auction market also reflects a similar pattern, with painting accounting for 82% of the artworks sold (OneBid, 2022). While old and contemporary painting achieve comparable results each year, the auction market trends suggest a shift towards contemporary painters (Bołdok, 2004). Other art forms continue to have a low market share. For instance, photography accounted only for 0.4% in 2021. Although the demand for most Polish artworks is still created mainly by country's residents, because of the export regulations (Stec, 2016), contemporary art in Poland has gained worldwide recognition over the last decades thanks to the political transformation, which opened the way for venues focusing on innovative, contemporary tastes. The 21st century witnessed a significant increase in modern art sales from 2000 onwards, with the first auctions featuring ultra-modern works appearing in 2006 in Poland (Borowski & Kosmala, 2014). The proliferation of works by emerging artists, who in some cases can be also described as red-chip artists (Reyburn, 2021), has led to a boom in sales. Between summer 2021 and 2022, Poland has witnessed an 63% increase in auction turnover of contemporary art auction (Artprice.com, 2022). Nevertheless, the highest prices on the Polish art market are still mainly achieved by works of old masters.

According to the Central Statistic Office (2022), auction houses remain the primary distribution channel, occupying over 60% of the art market. However, in recent years, internet has emerged as a rapidly growing sales channel, accounting for 10% of the total market in 2021. Despite an increase in the number of art-related events such as fairs and biennales, the percentage generated from the sale of works at such events was only 0.3%.

Overall, the sale on Polish art market is dominated by paintings, with traditional auctions being the most common sales channel. While contemporary art is growing in popularity, achieving international recognition, the sale of art remains concentrated around large cities such as Warsaw and Cracow, where the largest number of art-related institutions is located.

2.4.3. Demand

Existing literature identified a few non-price determinants that significantly impact the demand for art in the market. According to Lucinska (2021), these factors consist of society income,

information technologies, culture capital (taste formation), bandwagon effect (herd behaviour), and existing supply of art in the market.

An increase in the income of a society can led to a corresponding rise in demand for luxury goods, including valuable works of art, due to their higher income elasticity of demand (DiMaggio & Useem, 1978). Works of art are characterized by an income elasticity of demand greater than one, indicating that an increase in income leads to a more than proportional increase in demand (Schulze, 1999). Although the Polish economy has been experiencing rapid growth in recent years, with increasing GDP per capita and rising incomes, Poland has not shaped sufficient attitude towards investing in art. In contrast to affluent nations, post-communist countries, such as Poland, still does not perceive art as a viable investment (Białowąs et al., 2018). The attitude towards buying art among the middle class and wealthy in Poland is not as frequent as in Western European countries, and this reflects in lower price levels (Lucińska, 2021) Despite the growing wealth of Polish society, the sale of artworks accounts for only 0.6% of the luxury goods market. In 2017, the luxury goods market in Poland was valued at approximately 21 trillion Polish zlotys (around 4,68 trillion euros), while the turnover of auction houses amounted to 214,1 million Polish zlotys (circa 47,8 million euros). The largest segment among luxury goods was premium cars, accounting for over 50% of the market, followed by luxury clothing and accessories (13.2%), hotel and spa services (9.4%), real estate (7.4%), furniture (4.1%), and spirits (4.1%) (KPMG, 2017). This may be explained by the previously mentioned factors such as the remnants of the communist regime, low real income of Polish citizens and history. The tradition of collecting art existed in Poland, particularly among the nobility and educated citizens, but was interrupted in 1939 (Lucińska, 2021).

Moreover, in the context of Poland, there appears to be a lack of cultivation of taste for art in society, which hinders the formation of artistic taste from a young age (Cebula, 2013). A taste for art can be either acquired or discovered and the art consumption rate grows over time with exposure (Lévy-Garboua & Montmarquette, 2011). This process is commonly referred to as taste formation, where an individual's current preferences are the culmination of a lifetime of relevant experiences with similar cultural products (McCain, 2003), which is the opposite of the classical economic principle of decreasing marginal utility stating that an increase in the consumption of a good causes a decrease in the consumption of the next unit of it. Despite the existence of prestigious art institutions, such as the Academy of Fine Arts, elementary art education in Poland is generally considered to be insufficient. Educational objectives of art are often at the end of the priorities' list

in museums (Szeląg, 2010) and traditional form of exhibitions usually does not attract young audiences. This results in lower exposure to and consumption of art from the young age. It should be also highlighted that there is a significant disparity in access to cultural institutions between urban and rural areas in Poland, with only the largest cities possessing a well-developed artistic infrastructure, where less than 15% of the Polish population resides (National Centre for Culture Poland, 2023).

Considering the global literature on the demand for cultural production, it appears to be applicable also to trends in the Polish contemporary art market. For this reason, the remaining part of this chapter will introduce theoretical concepts from the field of cultural economics, which will later be applied to the Polish market. The market for cultural products can be considered a market for experience goods. Nelson's (1970) theory suggests that experience goods are those for which consumers are unable to assess the quality until they have purchased and consumed them. Towse (2019), on the other hand, characterizes experience goods as those whose value is derived from the accumulation of past experiences. Both theories originate from the problem of the imperfect knowledge, nevertheless, Nelson (1970) refers specifically to information problems and quality uncertainty, while Towse (2019) addresses the problem of taste formation and cultural consumption capital. In line with Nelson (1970), as the quality is not certain the sellers attempt to transform this type of goods more into search goods to reduce imperfect knowledge of customers. In the art market, sellers are therefore trying to decrease information asymmetry through so-called pre-purchase information, which in the case of secondary market artworks can take the form of auction catalogues. According to Frank and Cook (2010), the development of information technology has resulted in an increase in information availability, which, in turn, has led to a surge in demand for cultural goods. In the art market, the adoption of technological advancements such as online auctions and digital catalogues has considerably improved access to information and participation in auctions. Consequently, the pool of prospective buyers for artworks has expanded, leading to a rise in the demand for art. The COVID-19 pandemic has accelerated the trend of online purchases of artworks in Poland, with the percentage of online sales soaring from slightly above 0% to 10% within a few years (Central Statistical Office, 2022).

A further approach to reducing information asymmetry is following the behaviour of others market players. Since quality uncertainty and incomplete information often occurs in the art market, the purchase of a single painting can create a bandwagon effect. This effect is characterized by herd

behaviour or information cascade, where the demand for a particular artist's work increases with the number of individuals who have already purchased it (Bikhchandani et al., 1992). As noted by Banerjee (1992), such demand is not based on independent judgments, but on the behaviour of others. In the Polish art market, there is a recent interest in certain artists such as Fangor, Abakanowicz, and young artists in general. This has resulted in an increase in the prices of their artworks and a surge in demand. In addition, the so called "buzz effect" can be noted, as current trend caused increased discussion in the media, the press and among other art market participants. Often it leads to the emergence of superstar's effect or snowballing effect, which cause both an increase in demand and prices for the works of a given artist (Adler, 1985; Rosen, 1981). One example of this is Zdzisław Beksiński, whose prices moderately rose with a fairly balanced supply from 2001 to 2015. However, since 2016, following the release of the film "The Last Family" about the artist's life and increased media coverage of his career, there has been a dynamic increase in interest in his art. For the past four years, there has been a strong and stable relationship between the annual maximum price for a Beksiński piece and the average price, which experts at Agra-Art interpret as a sign of growing interest in the artist (Rosik, 2021). The superstar effect phenomenon occurs in the art market, fulfilling the Pareto conditions, according to which 20% of causes produce 80% of effects (Lucińska, 2021). It has been noted that the distribution of prices and incomes has an asymmetric, right-skewed character with a steep slope of the income curve in the upper part of the scale, indicating that even small differences in talent lead to large differences in compensation (Rosen, 1981). Certainly, this phenomenon has a wider scope than just the art market. However, the superstar phenomenon can apply to describe the distribution of income and prices of paintings on the Polish art market, where in the years 2007-2010, only 19.8% of transactions generated 80.6% of total turnover (Lucińska, 2011), in line with the long tail effect (Anderson, 2006).

2.4.3.1.   Museums

Museums play three essential roles in the art market: buyers, sellers, and experts (gatekeepers). Although these institutions can be considered both in the supply and demand side, they are acting more as buyers and gatekeepers rather than sellers. This is because deaccessioning, which is "the removal of artworks from museum's collection" (Burgess & Shane, 2011, p. 170) , is perceived as one of the most controversial activities within museum management (O'Hagan, 1998; Vecco & Piazzai, 2015). According to the Act on Museums (1996), as registered buyers, museums have the

pre-emption right. Moreover, under this legislation, as supply-side institutions, museums may engage in the exchange, sale, or donation of museum artifacts, subject to the approval of the Minister of Culture and Heritage Protection, and provided that any funds received from the sale are used solely to supplement the museum's collections. Although in Poland the deaccession is allowed by law, it is not a common practice, mostly due to the tragic history of national heritage (Zalasińska, 2013). Considering Polish art scene, it is crucial to acknowledge the interdependence between museums and the state, which can affect their independence and limit their ability to collaborate with private collectors, as well the protectionist nature of these institutions. As a result, museums' collections predominantly consist of traditional art, with little investment in contemporary art. A similar example is given by the cultural Italian art sector. The public policies have prioritized the preservation and management of a country's cultural heritage instead of supporting for the creation and dissemination of contemporary culture. The establishment of contemporary art museums in Italy was uncommon until the beginning of the 1980s (Zorloni, 2005). In Poland, museums dedicated solely to contemporary art have also emerged relatively recent. The most important are the Museum of Modern Art in Warsaw, MOCAK in Krakow, Museum of Art ms2 in Lodz and the Center of Polish Sculpture in Oronsko. In 2021, there were in general 939 museums (including branches), of which 70.5% belonged to the public sector. They were visited by 25.3 million people. Museums presented 2,500 permanent exhibitions and organised 3,600 temporary exhibitions in the country (including 33 exhibitions from abroad) (Central Statistical Office, 2022).

2.4.4. Supply

The supply of art is shaped by many external factors, which may include the development of art market institutions, random factors, the influence of the state on the size of supply, and scarcity in the art market (Lucińska, 2021). Together with artists, suppliers of artwork in this market include institutions or venues such as art galleries, auction houses, museums (seldomly), art fairs, and biennales. The quantity and quality of these institutions, as well as the range of services they offer, along with their interconnectivity, play a significant role in determining supply and demand within the art scene. In Poland, the owners of antiques stores, and auction houses are voluntarily affiliated with the Association of Polish Antiquarians and Trade Dealers. Nevertheless, the art market is characterized by a relatively underdeveloped network of cultural institutions acting as gatekeepers, as compared to its Western counterparts.

2.4.4.1.   Artists

Censuses of the professional artists in the Europe are usually based on a declaration of individuals (Bille, 2020). Since the labour art market is characterised by multiple jobholding, such censuses may not always be accurate (Throsby, 1994). Artists receiving incomes from the other non-art related jobs can report it as the main source of the revenues which leads to imprecise classification. Polish government is currently preparing a project of legislation concerning the status of professional artist. Artists, who posses a diploma from a secondary-level art school and have documented body of work would be eligible to obtain such title. However, as of this moment the official statistics which differentiate artists from self-employed are not obtainable. Moreover, according to Polish classification of economic activities, artistic activity is defined in section 90.00 (Council of Ministers, 2007). For individual artists, such activity is classified in the subclass 90.03. However, it consists not only of painters, sculptors, or graphic designers, but also writers, independent journalists and individuals who renovate artworks, what makes distinction between artists unclear. After the Second World War, only one study has been conducted on the number of artists in Poland. According to Gruszka - Dobrzyńska et al. (2020), the term artist can be applied to 60,000 of Polish citizens, 12,500 of whom belong to the visual arts. Comparing these figures to the entire Polish population, it accounts for only 0,15%, and 0,03% respectively. Certainly, it is not a large group of profession. However, when taking into account multiple jobholding and its coefficient of 2,5, the number of artists rises to 150.000 (Gruszka Dobrzyńska et al., 2020). Not only in Poland professional artists constitute a small fraction of the total workforce around. For instance, in the France it amounted 1,9% in 1995 (Observatoire de l'emploi culturel, 1996) and 1,5% in the USA in 1998 (Heilbrun & Gray, 2001). Nevertheless, compared to these countries, the percentage of artists in Poland is considerably lower.

2.4.4.2.   Auction houses

Commencing in the 1990s, a shift in the Polish art market became apparent with the emergence of various transformations, including the establishment of auction houses alongside traditional showrooms. In 1990/1991 ten auction companies organized a total of 48 professional auctions. These events resulted in the sale of approximately 20-40% of the available objects (Bołdok, 1992).

At the end of the 1990s, some auction companies suspended their operation, while others transformed themselves into well-established professional auction houses (Białowąs et al., 2018).

Figure 2. Number of auctions on Polish art market between 2000-2021.
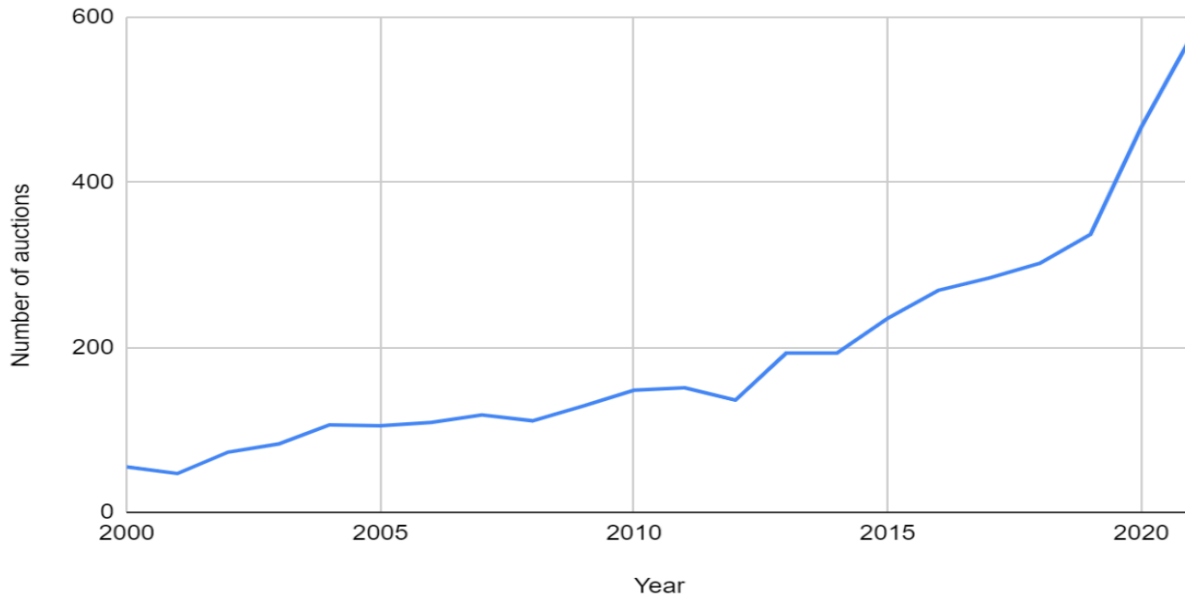
Note: Own compilation, based on data from Artinfp.pl

As the empirical data presented in Figure 2 proves, an increasing number of art auctions has been observed in almost every year since 2000. Moreover, auction houses have been increasingly expanding their operations by promoting auctions as cultural events through various media platforms. They are attempting to broaden their customer base by offering diverse types of auctions and making the process more accessible by providing online catalogues and enabling online auctions. This strategy seeks to appeal to a new segment of customers by offering a more affordable range of services (Borowski & Kosmala, 2014).

In 2017, there were 49 institutions conducting auctions on the art market in Poland (Lucińska, 2021). However, only half of them organize auctions on a regular basis. In the period from 1990 to 2000, 90% of the total value of sales was generated in Warsaw (Borowski & Kosmala, 2014). To this day, the Warsaw metropolitan area has generated the highest sales of artworks and paintings, with a remarkable 76.9% of the overall sales (Central Statistical Office, 2022).

Moreover, the largest market share is held by the oldest auction houses with established market position such as Desa Unicum, Polswiss-Art, Sopocki Dom Aukcyjny, Agra-Art, Warszawski Dom Aukcyjny, Pragaleria or Rempex. The Desa Unicum auction house recorded a turnover of 53.2

million euro in 2021 in the painting and sculpture category, selling 3,458 objects. These results give it a 49.7% share of the Polish art market and a leading position in Poland and Central and Eastern Europe. In the ranking of European auction houses in 2021, DESA Unicum ranked 8th, as it did in 2020, when turnover reached 33.5 million euros. In 2019 it achieved 9th position in this ranking (Desa Unicum, 2022).

2.4.4.3.   Galleries

Art galleries constitute an integral aspect of the primary art market and fulfill a crucial curatorial role. In addition to displaying and facilitating the sale of artwork, these institutions possess the capacity to promote artists and thereby shape prevailing trends and valuations within the market (Ginsburgh et al., 2019b). Essentially, they are considered as intermediaries between buyers and sellers in the art market, namely collectors and artists (Di Caro et al., 2020). The development and evolution of these institutions in Poland is evident through the consistent increase in the number of art galleries, which consequently results in increased competition among them, as well as an increase in the frequency of exhibitions and expositions. This development is encountered by a growing audience, which is reflected in the steady growth in the number of visitors to these events (Szafrański, 2019). According to Central Statistical Office (2022) there are currently 313 art galleries in Poland, 63.3% of which belong to the public sector. In 2021 art galleries organised a total of 3054 exhibitions in Poland (677 more than in 2020), consisting of national (2682), international (217) and foreign (155) exhibitions. When considering the ten most important galleries, there is a strong clustering in Warsaw, however the highest number of them is present in Cracow (58). Unfortunately, Poland lacks legal and organisational solutions which would demonstrate an active role of state in supporting private collectors, which would encourage owners of private galleries to collect works of art and to occasionally share their private collections to the public (Lucińska, 2021). For instance, the aTAK gallery of the collector Władysław Musiał organises exhibitions of coveted artists, publishes catalogues of these exhibitions and conducts commercial activities. Exhibitions of works owned by Grażyna Kulczyk were organised at the Art Starts Foundation Gallery in Poznań (Kuc, 2015). This activity was supported by the Grażyna Kulczyk Foundation. However, in each of the cases mentioned, the operators financed the activities

with their own funds, as they were not entitled to any additional privileges or subsidies (Lucińska, 2021).

2.4.4.4. Art fairs

Art fairs play a crucial role in the international art business, especially in relation to contemporary art. During the art market boom since the turn of the century, they have become one of the most important channels of distribution and marketing for art dealers and galleries (Single, 2020). Moreover, they serve as a meeting point for gaining insight into current trends and establishing and maintaining relationships between art professionals, collectors, and enthusiasts. This network effect generates a powerful driving force for the art scene (Vermeylen, 2015). The presence of such events is therefore crucial to the development of the art market and the achieved sales volume. The total number of biennials, triennials, art fairs, and other similar events in Poland amounts to 24 (Artfacts.net, 2022). The largest international art fair in Poland is the Warsaw Art Fair, which has been organized since 2003. It is a cyclical cultural event aimed at promoting contemporary and old master's art, which host more than 80 leading modern art galleries, antique shops, and auction houses from Poland and abroad. In 2021, the fair drew in around 9000 visitors over the course of three days (Warsaw Art Fair, 2021). Another interesting event is the Warsaw Gallery Weekend, which is an annual festival of contemporary art organized by private art galleries since 2011. It may be argued that the development of such events positively affects the demand in the art market as well as the creation and strengthening of networks among the key players in the industry (Morgner, 2014). Nevertheless, it should be noted that in the case of Poland over the last twenty years, its share in the value of sold art objects has not exceeded 1% (Central Statistical Office, 2022).

2.5. Cultural policy

The transformation of art markets is linked to country-specific conditions such as cultural norms, legal frameworks, and political dynamics. These factors play a crucial role in shaping the way in which the art market operates within a particular nation, and as such, they are integral considerations in any analysis of art market development (Kolodko, 2009; Kornai, 2000). Over the past 25 years, significant developments have taken place in Poland's cultural management landscape. The responsibility for cultural policy has shifted from being solely under the purview of the central government's Ministry of Culture to encompassing local governments. Although

local governments are not always enthusiastic, they are increasingly involving citizens in the decision-making process. Citizens are becoming more aware of their rights and are more often included as experts or representatives of the local community (Szulborska-Łukaszewicz, 2015a). Nevertheless, over the past 30 years, the self-building art market in Poland has functioned not only without significant support from the state, but also without any visible interest from political decision-makers and with numerous unrealized legislative ideas, ranging from free trade models to mixed models to regulation (Szafrański, 2019). Legislation related to various elements of cultural heritage protection began to grow in Poland over the last 15 years. This is the result not only in adopting international or European regulations, but also of the actual growth of heritage, the need to categorize it to ensure its protection and funding, and the state's own cultural policy.

Moreover, according to Orzechowski (2004) Poland, as one of the few countries from European Union, does not have an organized pool of experts for cultural research purposes. This is mainly due to the often changes of the political options of successive governments, as well as the political dependencies of culture ministers, which have prevented such collaboration for the benefit of culture and its consumers.

In recent years, there have been rising concerns about the state of cultural policy in Poland. Critics allege that the government's policies are limiting artistic freedom and therefore threat the cultural diversity. These concerns have focused mainly on issues such as the censorship, restrictions on public funding for certain types of art or artists, and also rising government's control over cultural institutions (Kopeć, 2020). The cultural policy of the Law and Justice party, which is currently a ruling party, is strongly ideological and emphasise on subordinating culture sector to the state. The government sees itself as the guardian of culture, with a focus on history, identity, tradition, as well as promoting Christian and patriotic values (Kubecka, 2015). This lies in contrast to the vision of Civic Platform's, which perceive culture as a laboratory of change, pluralism, and future. This results in emergence of the ineffective organizational structures and subsidies mainly for organizations that align with the party's ideological vision. This centralized trend is visible in the excessive concentration of the public sector on protecting cultural heritage instead of promoting new cultural values and types of art (Kopeć, 2020). Public funding is a major source of financing culture in Poland, with subsidies from the government accounting for 55% of the income of both public and non-governmental organizations (Adamiak et al., 2016). Therefore, cultural institutions might be treated instrumentally, forfeiting their autonomy to conduct cultural programs. Several

instances have occurred where cultural institution directors were replaced by managers who aligned with the Law and Justice's cultural policy vision, which has adversely impacted the cultural organizations' performance (Sethi et al., 2022). This situation is detrimental to the cultural policy's effectiveness since cultural institutions should meet various citizens' expectations and other stakeholders involved in cultural policy (Chaciński, 2019).

Polish government protects its national heritage. The Act on the Protection of Monuments and Care of Monuments (2003) states that oil paintings which are older than 50 years and with a value exceeding 40,000 zlotys (around 8,500 euros) require a special export permit issued by the Ministry of Culture. Typically, those seeking such a permit are met with an initial refusal Jarecka (2007). This results in considerable uncertainty, coupled with possible enormous expenses and extensive bureaucratic requirements, which effectively discourages foreigners from acquiring works of art in Poland (Adamowska, 2008). Consequently, this has become one of the principal reasons why international auction houses are hesitant to participate in the Polish art market. Notwithstanding, the import of artworks into Poland has been unrestricted and free of customs duties since Poland's membership in the EU (European Union). However, due to the Polish art market's years of isolation, it has become marginalized in the global context.

2.6. Accession to the European Union

In 2004, Poland joined the European Union under the Accession Treaty signed on April 16, 2003, in Athens. The accession to the EU was one of the key priorities of country's foreign policy after 1989, when the first partially free general elections ended the era of communism and dependence on the Soviet Union. From a historical perspective, it is arguable that Poland's accession to the European Union represents one of the most significant events in its recent history, if not its entire history. Accession brought enormous benefits to Poland and significantly influenced the dynamics of its economic development. At the time of accession, country's GDP was approximately 30 % of the EU average. After more than 15 years in the European community, this indicator has exceeded 70%. Moreover, it should be outlined that the inflow of foreign direct investment (FDI) doubled during that time, and the net inflow of FDI increased by over 30% (European Comission, 2022). Thanks to the received subsidies, many institutions, including the cultural ones, had an opportunity to start their businesses, broad the scope of their activities, develop their structure, or introduce innovations in their branches. As a result, Polish economy

began to grow in strength and became competitive on the European scene. Poland's accession to the EU has also opened country's borders, allowing for the free flow of goods and being a part of European market. As a result, the value of Polish exports that was estimated at 48 billion euros in 2003, increased more than fourfold, reaching 220 billion euros in 2018 (European Comission, 2022). Moreover, the country became subject to treaty provisions concerning export restrictions, which have had a significant impact on legal issues. As a result, limitations on exports have been restricted to cultural goods of high importance to national heritage. Therefore, most works of art and antiques in circulation can be freely exported. Given that prices in the early 1990s were relatively low compared to global standards, such investments were likely to be profitable. Nowadays, export restrictions have less of an impact as a factor hindering the development of the art market (Stec, 2016). However, the issue of controlling illegal exports, which is relatively easy in the era of open borders, has become a more pressing concern.

Although joining Poland to European Union has been a great opportunity for development of Polish art scene thanks to the additional subsidies, it seems that available resources are often consumed unreasonably by institutions and government, with the structural problems that are left unsolved (Tukan, 2010). Nevertheless, cultural institutions are trying to enhance innovation in the sector, by using new media channels for more efficient communication with their audiences, such as email, social media platforms, and crowdfunding initiatives. Moreover, they are investing in marketing activities, which were previously treated as an area for cutting the costs (Szulborska-Łukaszewicz, 2015a).

2.7.   Hypotheses

Overall, following Poland's accession to the European Union in 2004, notable advancements were observed in its economy, innovation, and development of the country. A substantial economic growth and a significant qualitative and quantitative expansion of various cultural institutions have contributed to flourishing art market in Poland (Szulborska-Łukaszewicz, 2015b). The expansion of cultural institutions not only results in an increase in the supply of cultural goods, but also stimulates demand within the market (Towse, 2019). Even though the art market in Poland is not yet fully developed, it is growing year by year, as empirical data presented in chapter 2.4. indicate. Given the aforementioned dynamics, it is crucial to investigate the underlying drivers of this phenomenon, specifically whether Poland's accession to the European Union has influenced the

value of the Polish artists' index. Based on the presented theoretical background and market data on the noticeable economic development in Poland after joining the European Union, the following predictions can be presented.

Hypothesis 1. *There will be an increase in the price index for Polish contemporary artists from 1990 to 2022.*

Hypothesis 2. *Poland's accession to the European Union in 2004 had a positive impact on the price index.*

3. Methodology and Data

The objective of this chapter is to outline the methodology employed in the study. Firstly, the research objective, consistent with research question, is presented. Subsequently, after outlining the sample selection process and data sources employed in the research, the econometric analysis is described in detail. Using hedonic regression, an index of Polish artists during the period of 1990-2022 is constructed. Interrupted time series analysis (ITSA) is adopted to ascertain the effect of accession to EU. Finally, dependent and independent variables are described in details.

3.1. Research objective

The present theoretical framework highlights the growth of the art market in Poland in recent decades. As such, it is important to explore whether this development is reflected in the prices of artworks produced by Polish artists and to identify the underlying factors driving this trend. Hence, the findings of this study will serve to address the research question of how the price index for Polish contemporary fine artists over the selected timeframe changed, and whether Poland's accession in the European Union in 2004 has played a significant role in driving changes in the price index during the periods under review. Therefore, this study will contribute to the growing body of research on the contemporary art market in Central and Eastern Europe, namely the Polish art market, and the impact of EU accession on national cultural industries.

3.2. Data collection and sample selection

To construct a price index for contemporary Polish artists, the initial step involved the careful selection of a representative sample. As noted in the existing literature, a purely subjective approach to selecting a sample of the most popular Polish artists could potentially introduce biases into the results (Collins et al., 2009). Therefore, to ensure a more objective sample selection process, the list of artists was obtained from the ranking 'Kompas Sztuki', which was published in 2020. This ranking includes artists who have engaged in creative activity in the field of visual art after 1945. This ranking is overseen by cultural experts in Poland, including the owners or directors of the country's leading contemporary art galleries, both commercial and public, such as Le Guern, BWA Zielona Góra, Art Agenda Nova, CSW Łaźnia, PGS in Sopot, Bielska Gallery, Artemis, BWA Wrocław, Zderzak, Starmach Gallery, Propaganda and Stefan Szydłowski Gallery (Kompas Młodej Sztuki, 2020). The initial list of artists obtained from the 'Kompas Sztuki' ranking included 279 artists. However, only those who have a minimum of 50 auction records on artprice.com are included in the sample in at least one of the following categories: paintings, sculpture-volume, drawing-watercolour, print-multiple, and photography. This assumption led to a further reduction in the sample size and resulted in a final selection of 98 contemporary Polish artists, which gave more than 27,000 observations of auction records. However, some of data, such as the hammer price, year of creation, size, were missing, leading to further reduction in the sample size. In total, 13,978 observations are used in the analysis. They contain information about artist's name, ranking position, artist's living status, year of artwork's creation, size, medium, artwork's category, date of sale, name of auction house, country of sale. All the auction records were retrieved from artprice.com.

3.3. Research design

As discussed in the theoretical framework, two methods can be employed for constructing art market price indices: hedonic regression and repeat sales method. Due to the specifics of the Polish art market, which is regarded in literature as a young and unstable market with a short auction history, and the focus on contemporary artists creating after 1945, the sample under examination is too limited to show frequent repeat sales of contemporary Polish artworks. For this reason, hedonic regression model seems to be the most suitable one. The hedonic index is defined as an additive function of its characteristics, representing the sum of their valuations, and factors reflected in the

random factor (Kräussl & van Elsland, 2008). In order to control the correspondence of the chosen hedonic characteristics with the model, and to determine the influence of each of these features on the prices of contemporary Polish artists, the proposed model adopts the following form:

Equation 1. Basic regression model

$$\ln P_{i,t,q} = \alpha_0 + \sum_{j=1}^{k} \alpha_j X_{ij,t} + \sum_{t=1}^{\tau} \beta_t Z_{i,t} + \sum_{q=1}^{q} \gamma_q \omega_q + \varepsilon_{i,t,q}$$

where:

- $\ln P_{i,t,q}$- the logarithm of the hammer price of the i-th painting (i=1, 2, …., I) sold in year t, in quarter q

- α_0 – intercept

- $X_{ij,t}$ – j−th characteristic (j=1, 2, ..., k) of the i−th painting sold in year t in quarter q

- $\alpha_j, \beta_t, \gamma_q$ – regression parameters

- $Z_{i,t}, \omega_q$ – year dummy variable

- ω_q – quarter dummy variable

- $\varepsilon_{i,t,q}$ – random factor

From the hedonic regression, an annual price index for Polish contemporary artists covering the period 1990-2022 is obtained. This index is in fact based on the results from the hedonic regression equation, namely the exponent of the coefficients of time dummies, as proposed by Renneboog and Spaenjers (2013). Subsequently, this index will be analysed using interrupted time series analysis (ITSA) to verify the effect of joining Poland to the European Union in 2004. ITSA is a quasi-experimental study, which examines the effect of various types of interventions, such as social, public policy changes, regulatory action or even health technology assessment (Biglan et al., 2000; Ramsay et al., 2003). One of the main advantages is that control groups can be added to the study (multi-group comparison), although it is not required (single treatment group). Moreover, data may adopt an aggregated form (Linden, 2015), such as price index. For single treatment group the equation can take a following form.

Equation 2. ITSA single treatment group model

$$Y_t = \alpha + \beta_1 T_1 + \beta_2 X_t + \beta_3 X_t T_t$$

Where:

- Y_t – aggregated outcome variable, which is measured at each equally spaced time t
- α – intercept
- β_1 – the slope of the outcome variable until the intervention starts
- β_2 – change in the level of the output in the period immediately after the introduction of the intervention
- β_3 – difference between pre-intervention trajectory and post-intervention slope
- T_1 – time since the study began
- X_t – intervention dummy variable (pre-intervention period 0, otherwise 1)
- $X_t T_t$ - interaction term

To identify the effect of Polish accession year 2004 will be designated as the cut-off point, coinciding with Poland's entry into the European Union. Indicators of interest are β_2 to identify an immediate treatment effect or in β_3 to identify a treatment effect spread over time (Linden & Adams, 2011)

3.4. Variables

As described in chapter 2.2, hedonic regression allows for the employment of a wide range of variables, also the qualitive one. This chapter lists the variables that were chosen for the hedonic regression model in this research. Notably, these variables appear to be the most commonly included in the literature, as they are easily extractable from auction records.

3.4.1. Dependent Variable

In the case of the hedonic method, two commonly used approaches can be distinguished: one where the independent variable is the hammer price obtained during the sale of an artwork at an auction, and another where the logarithm of the hammer price is used. As the sample includes various categories of art, such as paintings, photography, sculpture-volume, drawing watercolour, and print-multiple, which have different price categories, the distribution of hammer prices is highly asymmetric, and therefore the logarithm of the hammer price will be employed. This transformation helps to flatten the effect of price differences among categories of artworks, enabling analysis on a

dataset that follows a distribution resembling a normal distribution. Furthermore, as Maddala and Lahiri (1992) indicate, the logarithmic transformation is routinely employed as a remedy for heteroscedasticity, which significantly reduces the efficiency of estimated parameters.

3.4.2. Independent Variables

In the analysed sample, ten variables are included in the first equation. The majority of the variables are defined as nominal variables, which are also known as categorical variables. They have two or more categories without specified order. Those variables distinguish between qualitative features and may have two values: 1 if a given item has a given feature, or 0 otherwise (Allan & Jenkins, 1983). Table 2 lists all variables used in the constructed hedonic model.

Table 2. Independent variables

	Variable name	Type of the variable	Measure	Values
Artist's characteristics	*Ranking*	nominal	Ranking's position in "Compass of Art"	top10, top11-20, top21-30, top31-40, top40+
	Living status	dichotomous	Year of death, year of sale	living, deceased
Artworks characteristics	*Category*	nominal	Type of artwork from auction record	painting, sculpture-volume, print-multiple, photography, drawing-watercolour
	Technique	nominal	Type of technique used in artwork	oil, acrylic, pastel, mixed media, watercolour, drawing, graphic/printing techniques, sculpture, photography, others
	Ln(surface)	continuous	Natural logarithm of volume of artwork	2,48 - 12,1
	Age of artwork	continuous	Year of sale, year of creation	0 - 95
Sales characteristics	*Auction house*	nominal	Ranking position and revenue generated available Artprice.com and artinfo.pl	Top Houses World, Top Houses Poland, Other Houses
	Country of sale	dichotomous	Country of the artwork's sale	Poland, abroad
	Year	nominal	Year of artwork's sale	1990 - 2022
	Quarter	nominal	Quarter within the year in which sales occurred	Q1, Q2, Q3, Q4

3.4.2.1.   Artist's related variables

As the group of artists is homogeneous, the artist's name variable will not be included. Instead, the ranking variable will be used as a proxy for the artist's name and reputation, which contains the names of artists grouped according to the ranking of the 'Kompas Sztuki', from which the initial number of top artists was selected. The *Ranking* variable was divided into five categories: TOP 10, TOP 11-20, TOP 21-30, TOP 31-40, TOP 41+, which are nominal variables. When a particular artist belongs to a given category, the variable takes the value of 1, and in other cases, it takes the value of 0. As the initial ranking contained 276 artists but had to be reduced due to the lack of necessary data, it turns out that the obtained sample of 98 artists is within the range of 0-50 in the same ranking. In analysed sample, there are 10 artists in both the TOP 10 and TOP 11-20 categories, 14 artists in the TOP 21-30 category, 38 artists in the TOP 31-40 category, and 24 artists in the TOP 40+ category. The variable "TOP 40+" will be considered the reference variable in the analysed sample.

The second binary variable associated with the artist is their life status during the auction. In cases where the artist was alive during the auction, the variable received the status "LIVING," and in the opposite case, "DECEASED." In the studied sample, just under 61% of observations were assigned the "DECEASED" status.

3.4.2.2.   Artworks related variables

The first dummy variable related to the characteristics describing the artwork is the *Category* variable, which determines the affiliation of the artwork to five categories: painting, sculpture-volume, print-multiple, photography, drawing-watercolour. The watercolour-drawing variable will be used as the reference variable. The largest number of observations is for paintings, which account for over 51% of the studied sample, while the smallest number is for photography accounting for 2.7%.

The next dummy variable determines the technique used by the artist during creation. In total, 81 subcategories have been distinguished, which were further grouped into 10 categories. The frequently occurring techniques are oil and acrylic, which together account for 46,4% of the observed cases.

Another variable related to the characteristics of the artwork is its surface. Since the studied sample included different categories with varying numbers of dimensions, such as 1 or 3

dimensions for sculpture, and 2 dimensions for paintings and in line with the transformation of hammer price, the size variable, which is a continuous variable, was presented as the natural logarithm of the surface to ensure comparability of the results (Kraeussl & Logher, 2010). For cases where only one value was given, such as for spherical sculptures, the formula for the surface of a sphere was used. The other common method employed by scholars is to square the surface (Czujack, 1997; Worthington & Higgs, 2006). However, incorporating the first method resulted in a dataset that was more closely aligned with a normal distribution compared to the largest values squared. Ultimately, this variable was named LN(SURFACE).

Another continuous variable is ARTWORK_AGE. It specifies the age of the artwork at the time of sale and is calculated by subtracting the year of sale from the year in which the artist completed the artwork. This variable adopted values in the range 0-95, where 0 represents sales in the year of creation. The average age at which paintings were sold at auction is approximately 32 years.

3.4.2.3. Sales related characteristics

The first selected characteristic is the dummy variable *Auction house*. As mentioned in the theoretical part, some auction houses have a better reputation, a larger market share, and an established position, which significantly affects the value of a work of art, as it serves as a kind of quality certificate for works sold by a particular organization. For this reason, this variable takes three categories, namely TOP WORLD, TOP POLAND, and OTHERS (reference variable). Category affiliation was established based on the revenues generated by the auction houses in recent years and their position in the rankings from Artprice.com and artinfo.pl. The TOP WORLD category includes four auction houses: Sotheby's, Christie's, Bonhams, and Phillips. The TOP POLAND category includes the best auction houses in Poland, namely Desa Unicum, Agra-Art, Rempex, Polswiss Art, and Sopocki Dom Aukcyjny. The remaining auction houses, both in Poland and worldwide, belong to the third category OTHERS.

The next binary variable is the country of sale of the artwork. In the examined sample, sales were made in 28 countries, of which 81.2% of the artworks sold were in Poland. The remaining 18.8% were sold at foreign auctions, mainly in the USA (4.3%), France (3.8%), and Germany (3%). Therefore, in the case of the *Country of sale* variable, two possibilities will be considered - sale in

Poland and sale outside the country. The value 1 will be assigned to sales in Poland, and 0 to sales outside Poland.

The next set of dummy variables pertains to time. The first variable, *Year*, takes values from the range of 1990-2022, where 1990 will be reference variable. This variable takes a value of 1 if the sale occurred in a given year and 0 otherwise. The second variable, *Quarter*, determines the month's association with one of the four quarters of the year. This is intended to measure the influence of seasonality on the results obtained during the year. The highest number of observed sales occurred in the fourth quarter, while the lowest was in the summer period, which is often correlated with achieved hammer prices, as demonstrated by the literature (Agnello, 2022).

Table 3. Descriptive statistics of continuous variables.

	Minimum	Maximum	Mean	Std. Deviation
Age of artwork	0	95	31,71	18,249
ln(surface)	2,4849066498	12,100712130	7,9840323184	1,2845210255
Hammer price	10	2465795	16926,62	63494,858
ln (hammer price)	2,302585093	14,71802483	8,254182002	1,707067799

Note: Hammer price is given in euro.

4. Results and Discussions

In this chapter, the findings of the research described in methodology part will be presented. Specifically, the results of the conducted hedonic regression, the construction of price indexes for contemporary Polish artists, and the analysis of interrupted time series (ITSA) will be discussed. The results of all conducted tests can be found in the appendices.

4.1. Hedonic regression

The main model underlying this study is a hedonic regression model, specified by Equation 1, where the dependent variable is the natural logarithm of the nominal price, estimated using ordinary least squares (OLS). Based on the obtained results, it can be concluded that approximately 68.3% of the observations can be explained by the constructed model. This is a significantly satisfactory

outcome, especially considering the diversity of the studied artworks. Moreover, ANOVA results further indicate the rejection of the null hypothesis of no predictive power in the population. Therefore, the entire model is considered significant, and the conducted analysis is useful for making predictions about the population of the contemporary Polish artists. The results of the conducted regression are presented in Table 4. As observed, most of the variables are statistically significant. Table 4 presents the impact of each hedonic variable, which can be approximated by taking the exponent of the coefficient and subtracting one, as employed by Renneboog and Spaenjers (2013).

Table 4. Hedonic regression results

	Unstandarized Coefficients			Stand. Coef.		
	B	**Std. Error**	**Price impact (%)**	**Beta**	**t**	**Sig.**
(Constant)	3,151	0,380			8,300	0,000
Artist characteristcs						
Living status						
LIVING	ref					
DECEASED	0,402	0,020	49,51	0,115	20,525	0,000
Ranking						
TOP 10	ref					
TOP 11-20	-0,691	0,031	-49,92	-0,134	-22,506	0,000
TOP 21-30	-1,063	0,024	-65,45	-0,286	-44,295	0,000
TOP 31-40	-1,357	0,026	-74,25	-0,349	-51,218	0,000
TOP 41+	-1,721	0,034	-82,11	-0,309	-51,236	0,000
Artworks characteristics						
LN SURFACE	0,446	0,007	56,17	0,336	60,027	0,000
AGE OF ARTWORK	0,008	0,001	0,82	0,087	15,301	0,000
DRAWING-WATERCOLOUR	ref					
PAINITNG	0,742	0,049	110,02	0,217	15,073	0,000
PHOTOGRAPHY	0,301	0,139	35,14	0,029	2,174	0,030
PRINT-MULTIPLE	-1,844	0,126	-84,19	-0,351	-14,654	0,000
SCULPTURE-VOLUME	1,070	0,083	191,62	0,166	12,879	0,000
Techniques						
OTHERS	ref					
OIL	0,422	0,091	52,53	0,119	4,626	0,000
ACRYLIC	0,380	0,094	46,21	0,069	4,052	0,000
PASTEL	0,182	0,099	20,00	0,018	1,838	0,066
MIXED MEDIA	0,093	0,086	9,71	0,014	1,073	0,283
WATERCOLOUR	0,148	0,089	15,93	0,027	1,667	0,096
PAINTING	0,396	0,240	48,59	0,008	1,647	0,100
DRAWING	-0,076	0,090	-7,28	-0,014	-0,844	0,399
GRAPHIC	0,286	0,105	33,09	0,058	2,710	0,007
SCULPTURE	0,620	0,080	85,93	0,084	7,789	0,000
PHOTOGRAPHY	0,174	0,153	18,96	0,009	1,133	0,257
Sales characteristics						
Auction house						
OTHERS	ref					
TOP WORLD	1,068	0,043	191,09	0,144	24,931	0,000
TOP POLAND	0,153	0,026	16,54	0,042	5,893	0,000
Country of sale						
POLAND	ref					
ABROAD	0,079	0,034	8,23	0,018	2,322	0,020
Quarter						
Q4	ref					
Q1	-0,183	0,023	-16,73	-0,043	-7,988	0,000
Q2	-0,153	0,020	-14,19	-0,041	-7,643	0,000
Q3	-0,333	0,028	-28,35	-0,062	-11,858	0,000

Note: This table shows the hedonic regression results of Equation 1, estimated with OLS regression. The year dummies are included in the estimation, but will be presented in the Table 5.

As presented in Table 4, all variables related to the artist are statistically significant. It can be observed that prices are, on average, 49.5% higher for deceased artists compared to the living ones. Additionally, a significant price discount is observed for artists who are not in the top-ranking category. For artists in the TOP 41+ category, the average price reduction exceeds 82% compared to artists in the top ten positions. Both findings confirm the trend described in the literature and discussed in the theoretical framework of this study, which highlights the price premium for artists with a high reputation and recognition, as can be measured in this case by their ranking position. Moreover, the obtained results also emphasize the price premium for artworks by deceased artists.

Statistical significance was also observed in all variables related to the characteristics of the artwork, except for some variables in the Techniques category. In line with the literature, the evaluated model shows that an increase in surface area causes an average price rise of slightly more than 56%. However, when considering another artwork related variable, the age of the artwork, the price increase is merely 0.82%. One of the causes of this phenomenon may be the focus on contemporary art in the studied segment, which appears to favour creativity and invention over the age of the piece of art, especially when compared to the work of the great masters. Paintings and sculptures attract the biggest price premiums relative to drawing-watercolour among the analysed categories, with average artwork prices rising by 100.02% and 191.62%, respectively, over the reference category. Furthermore, in terms of the applied techniques, oil, which is frequently cited in the literature, commands a significant price premium. Nevertheless, in the studied sample, sculptures receive an even higher premium. However, it should be highlighted that since sculptures combine a variety of components and materials, this result may be influenced by higher prices in the category sculpture-volume rather than solely the techniques employed.

When it comes to the sales variables, it should be noted that Polish artists unfortunately do not benefit significantly from domestic sales. As the regression results indicate, sales abroad achieve an average price premium of 8.23% compared to sales in Poland. Furthermore, a substantial price disparity exists between the leading auction houses worldwide and those operating in Poland. Sales in the top international institutions yield a growth of just over 191% in comparison to reference variable, while in Poland the price of the artwork increases by an average of 16.5% as compared to the exact same variable. Nonetheless, it is crucial to acknowledge the profound differences between top institutions in Poland and worldwide which account for the obtained results, such as the volume and characteristics of sales, market power and capacity of these houses.

An important factor influencing sales is also the timing within the year. The highest price premium is observed in the fourth quarter, encompassing the months of October, November, and December. In comparison to this quarter, sales during the summer months, corresponding to the third quarter, result in an average price decrease of slightly over 28%. Hence, according to the conducted regression analysis, the best periods for selling artwork appear to be the fourth quarter and the second quarter of the year.

4.2.   Price Index

Based on the exponent of the coefficients of time dummies, an index of Polish artists has been constructed for the period from 1990 to 2022. The reference year is 1990.

Table 5: Price Indexes

Years	B	Std. Error	Index	Beta	t	Sig.
Y1990	ref		100,00			
Y1991	-1,225	0,466	29,37	-0,020	-2,630	0,009
Y1992	0,117	0,515	112,41	0,002	0,227	0,820
Y1993	-0,167	0,423	84,59	-0,004	-0,395	0,692
Y1994	0,507	0,416	165,96	0,012	1,217	0,224
Y1995	-0,207	0,406	81,34	-0,006	-0,509	0,611
Y1996	0,310	0,412	136,29	0,008	0,752	0,452
Y1997	0,724	0,397	206,35	0,022	1,823	0,068
Y1998	0,887	0,403	242,73	0,024	2,199	0,028
Y1999	0,758	0,389	213,44	0,026	1,947	0,052
Y2000	0,870	0,378	238,68	0,042	2,304	0,021
Y2001	1,064	0,373	289,85	0,064	2,854	0,004
Y2002	1,095	0,374	299,03	0,061	2,926	0,003
Y2003	0,862	0,374	236,68	0,048	2,301	0,021
Y2004	0,979	0,370	266,28	0,071	2,645	0,008
Y2005	1,320	0,374	374,26	0,076	3,531	0,000
Y2006	1,222	0,369	339,40	0,096	3,309	0,001
Y2007	1,619	0,370	504,70	0,115	4,370	0,000
Y2008	1,620	0,369	505,33	0,131	4,390	0,000
Y2009	1,172	0,369	322,79	0,092	3,174	0,002
Y2010	1,309	0,370	370,07	0,096	3,536	0,000
Y2011	1,424	0,368	415,18	0,129	3,866	0,000
Y2012	1,368	0,368	392,85	0,125	3,717	0,000
Y2013	1,443	0,367	423,51	0,147	3,930	0,000
Y2014	1,489	0,367	443,11	0,166	4,056	0,000
Y2015	1,402	0,366	406,52	0,195	3,830	0,000
Y2016	1,525	0,366	459,66	0,226	4,168	0,000
Y2017	1,693	0,366	543,58	0,275	4,629	0,000
Y2018	1,710	0,366	553,11	0,286	4,677	0,000
Y2019	1,693	0,366	543,78	0,279	4,630	0,000
Y2020	1,812	0,366	612,09	0,318	4,955	0,000
Y2021	2,056	0,365	781,37	0,390	5,625	0,000
Y2022	2,074	0,366	795,75	0,380	5,675	0,000

Note: Index is calculated based on the coefficients of time dummies from Equation 1 conducted with OLS regression for collected data. 1990=100.

Based on the data from Table 5, the graphical trend of the index over the analysed period is presented in the Figure 3.

**Figure 3**. Annual indexes of Polish contemporary artists from 1990-2022.
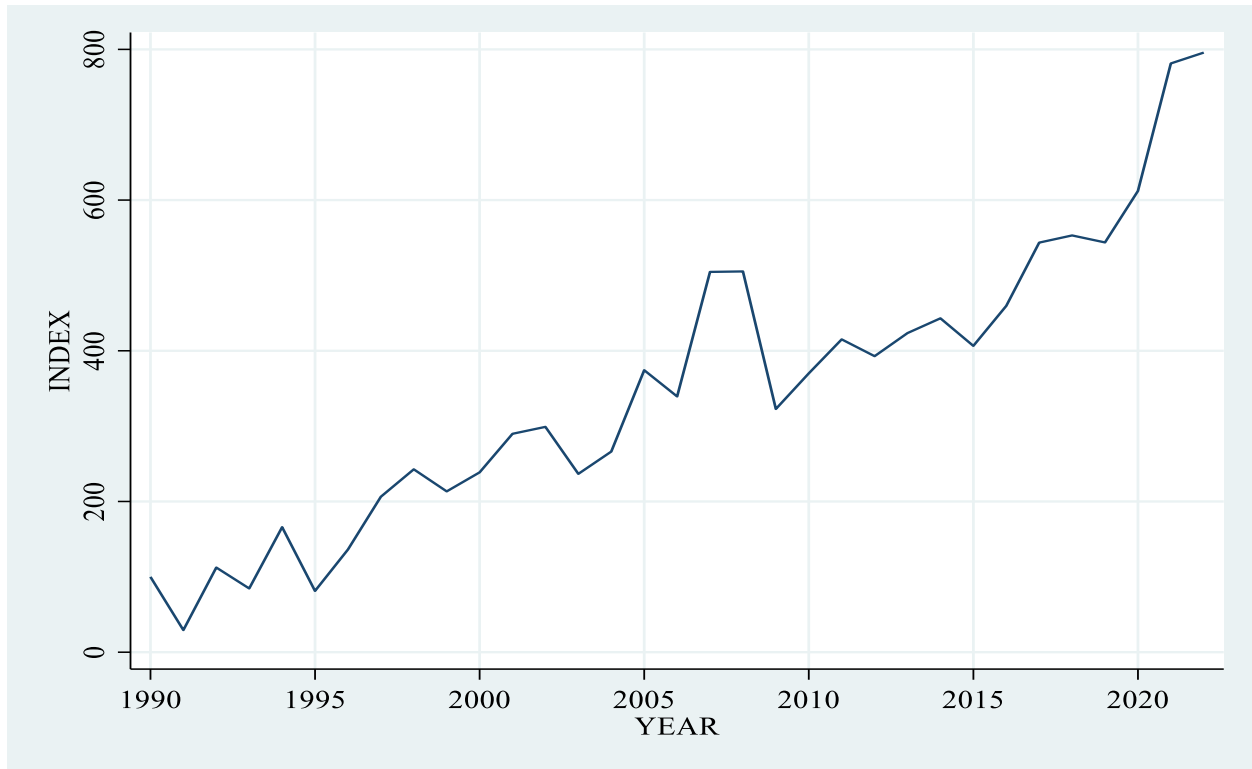
Note: Based on the hedonic regression, 1990=100

Overall, the trend of the price index for contemporary Polish artists over the analysed period was upward. Following a gradual increase after 2004, there was a sharp decline during 2008-2009, reflecting the serious global economic crisis during that time. However, only slight decreases occurred subsequently, and even during the COVID-19 pandemic, the declines were not substantial. Notably, since 2015, there has been a surge in the index's growth.

4.3. Interrupted Time Series Analysis

To verify whether the effect of Poland's accession to the European Union affected the artist price index, an interrupted time series analysis was conducted. To account for autocorrelation and heteroskedasticity, Newey-West standard errors were estimated with a 6-period lag, as proposed by Linden (2015), and Baum and Schaffer (2015). Autocorrelation was present at lag 1, but not any higher lag orders (up to six lags tested). Therefore, the constructed model should correctly account for corelation. Figure 2 shows the results of the study estimation for the selected sample on an annual basis, where 2004 was selected as the intervening time.

Figure 4. Single interrupted time series analysis for index of contemporary Polish artists
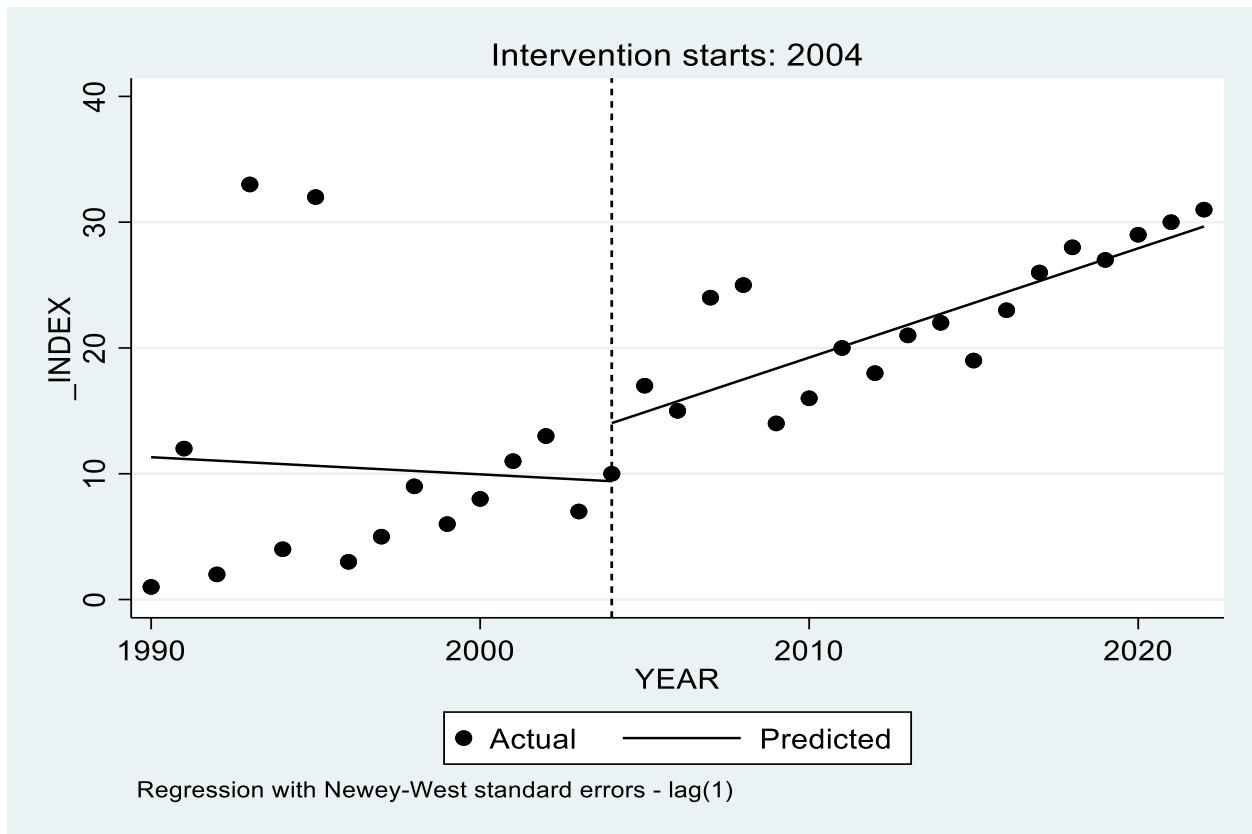

A noticeable upward trend in the index of contemporary Polish artists after 2004 may indicate the relevance of Poland's accession to the European Union. The variable which examines the effect of Poland's accession to the European Union in 2004 on the price index has the coefficient of 4.619722 with a standard error of 3.05. It is not statistically significant (t-value = 1.52, p = 0.14), indicating that there is no clear intervention effect after Poland's accession to the EU in 2004. Nonetheless, when considering the variable "x_t_2004", whose coefficient is estimated to be 1.00 with a standard error of 0.46 it indicates that different intervention effects occurred during analysed period. As the output is statistically significant (t-value = 2.17, p = 0.04), the positive coefficient value implies a positive impact of Poland's accession to the EU on the price index. Furthermore, as observed from the linear combination estimate produced by specifying "posttrend," following Poland's accession to the EU in 2004, the coefficient for the variable "Treated" is estimated to be 0.87 with a standard error of 0.15. The result is statistically significant with t-value = 5.82 and p < 0.001, which implies a significant increase in the price index after the intervention at a rate of 0.87. Overall, the results of the Interrupted Time Series Analysis (ITSA) suggest that Poland's accession to the European

Union in 2004 had a positive impact on the price index of Polish contemporary artists. There is a significant increase in the price index after the intervention, and there is also differentiation in the intervention effect over time.

However, it may appear that Poland's accession to the European Union itself could have a stronger effect on foreign markets, as the country's importance on the international arena has increased thanks to this occurrence. Since Poland had become part of the economic community, and opened its market, Poland's relevance in the European market increased. For this reason, the studied effect may be more powerful for sales occurring outside the country.

Figure 5. Single Interrupted Time Series Analysis for abroad sale
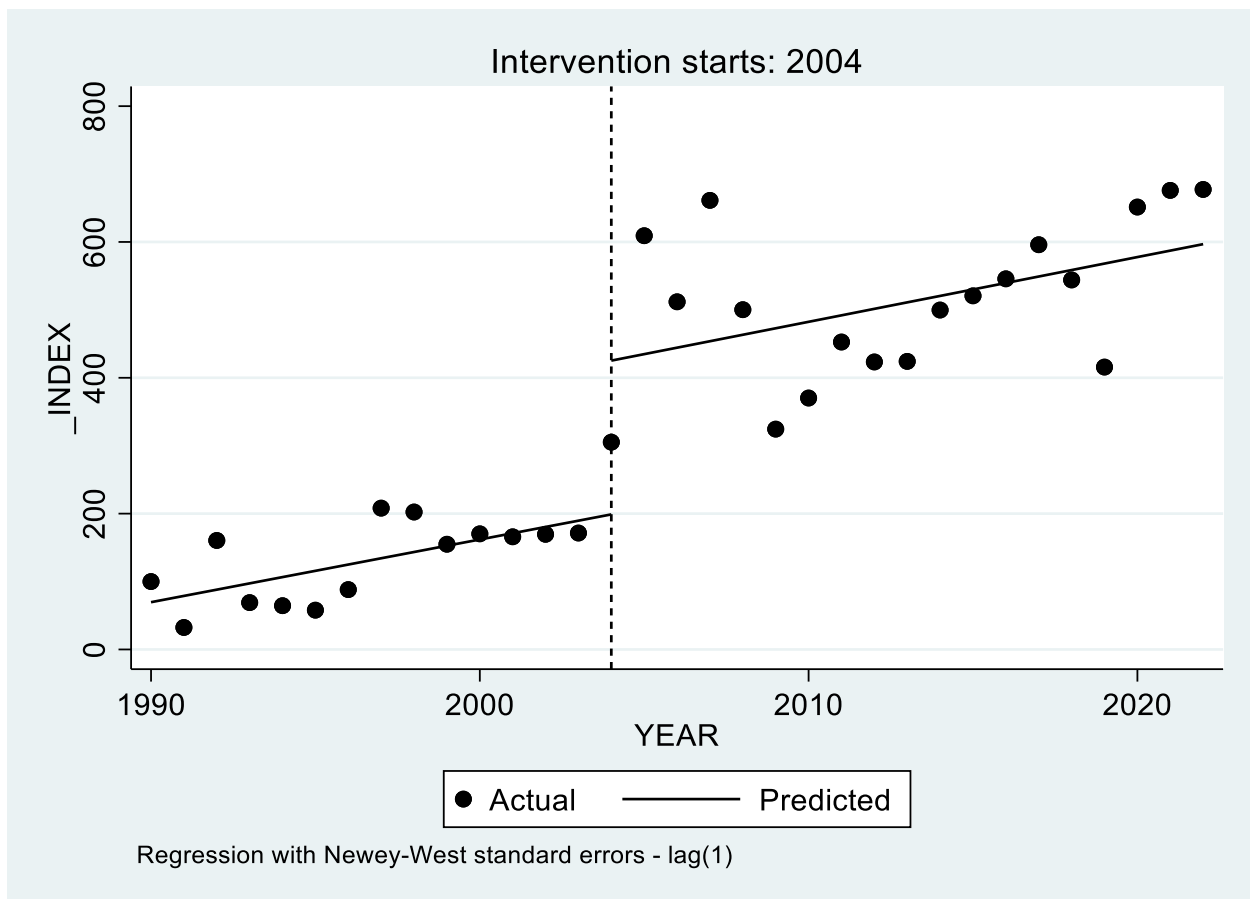
As Figure 5 reveals, it appears that for foreign sales, the intervention which occurred in 2004 had a much stronger effect compared to the results presented on Figure 2. The variable examining the effect of Poland's accession to the European Union in 2004 on the price index has a coefficient of 226.42 with a standard error of 64.61, which is statistically significant (t-value = 3.50, p = 0.002).

These results indicate the existence of an intervention effect after Poland's accession to the EU in 2004. Moreover, the value of the coefficient itself implies an increase in the price index after accession. In conclusion, the results of the ITSA analysis for sale abroad indicate the existence of a positive upward trend in the price index of Polish contemporary artists before the accession to the EU in 2004. After the accession, an intervention effect was noted, manifested by an increase in the price index. Although the upward post trend with coefficient of approximately 9,52 was found after the intervention, which suggest long term effect of the price index it was not statistically significant.

5. Conclusion

This study has analysed overall trends in the Polish contemporary art market between 1990 and 2022 and examined the consequences of Poland's accession to the European Union in 2004 on the price index of the most prominent contemporary Polish artists. As outlined in the theoretical part, the country has experienced significant economic development in recent years as a result of its entry to the European Community. The empirical analysis reveals a substantial qualitative and quantitative development of cultural institutions, including auction houses, art galleries and museums. The number of auctions and revenue generated from them, as well as the number of exhibition activities, have increased over the period under review. The results of the research carried out from a sample of more than thirteen thousand auction records of 98 contemporary artists suggest that an upward trend in the index prevailed between 1990 and 2022. The top ranking artists command the highest prices. Moreover, a price premium for deceased artists at the time of the action occurs. Painting and sculpture achieve the highest price premium among the current categories. Furthermore, the highest prices are obtained from works sold abroad at auction houses Christie's, Sotheby's, Bonhams and Phillips. It should also be noted that average auction results are highest in the fourth quarter. Therefore, the findings indicate that trends in the flourishing Polish market are also observable by researchers in other art markets. Interrupted time series analysis was undertaken to display the effect of Poland's accession to the European Union in 2004. As the ITSA analysis revealed, Poland's accession to the European Union had a positive impact on the price index of Polish artists, increasing the average prices obtained from sales in both analysed cases. While considering the entire study sample, although in the first year of intervention the increase in prices is not statistically significant, the positive long-term impact of Poland's accession to the

European Union is evident and results in the index growth at rate of 0.86. Moreover, at the year of accession, the price index of contemporary Polish artists for sales abroad surged by around 226,42 units (statistically significant), as compared to an uplift of 4,62 units for the entire sample (p>0.05). It implies that the examined effect is stronger for sales abroad, what indicates positive influence of the economic integration within European market. As results reveals, joining Poland to European Union in 2004 enhanced sales of the artworks of Polish artists. Furthermore, it resulted in a significant premium for contemporary Polish artists, which may also suggest a growing importance of the contemporary Polish artists in the European art market.

In conclusion, the hypotheses of an increase in the contemporary Polish artists' price index from 1990 to 2022 and positive impact of Poland's accession to the European Union in 2004 on that index can be confirmed. Certainly, the economic integration of the Polish art market with the European Union is reflected in the prices of the contemporary artists, which may suggest that EU is moving towards the fulfilment of one of its fundamental objectives, namely the creation of a single market for its member states. Moreover, country's accession to the European Union can be regarded as a major stimulus which has boosted not only a price index of contemporary Polish artists, but also the development of the art market in recent years. If the current growth rate is maintained, the art market in Poland certainly has the potential to gain a well-established position not only in Europe, but also on the international art scene.

5.1. Limitations and further research

The incomplete information is one of the characteristics of the art market. Unfortunately, majority of the art market analyses presents only a fraction of it, as in the case of this research, since there is a well-known problem of lacking data for the primary market. For this reason, scholars employ secondary market data, which are mostly archive auction records. However, even secondary data from auction records contain limitations, because usually they consist of the artworks sold by the most recognizable artists.

First of all, it should be outlined that the sample of 98 most prominent contemporary Polish artists, employed in this study, is not representative of the entire population. Secondly, auction records are often incomplete, which resulted in reduction of more than half due to missing data on selected hedonic characteristics. Another limitation regards the uneven number of observations in the analysed period. For example, the number of observations for the years 1990-1995 is less than

100, while for the years 2017-2022, each year exceeds 1000. It is also necessary to remember the limitations of the hedonic model itself, as discussed in chapter 2.1.2. Additionally, the selected variables may be insufficient to build a complete price index model for contemporary Polish artists. There are factors, which have been mentioned in the theoretical framework chapter due to their proven significance, such as the signature on the painting, the artist's number of exhibitions, reputation, circumstances of the auctions, and the theme presented in the painting, which were not included in the model due to a lack of available data.

Therefore, to improve and perform a more thorough analysis, a greater and more diversified group of artists could be included in the study, for example modern art or old masters, to observe whether the studied effect also applies to these styles and to determine more precisely its strength. Furthermore, using monthly data in the ITSA analysis could provide a more accurate measure of the studied effect. Finally, extending the analysis to other countries which joined the European Union in 2004, to compare the effect of the results obtained, without limiting the analysis to just one art market would be highly recommendable.

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7. Appendix

7.1. Appendix A1: Regression model summary for collected sample

A1. Regression Model Summary for collected sample

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,827ª	0,683	0,682	0,962295381134204

Note: Estimated in SPSS

7.2. Appendix A2: ITSA for collected sample

A2 ITSA for collected sample

Index	Coefficient	Std.err.	t	P>|t|	[95% conf. interval]	
_t	-0,126264	0,43263	-0,31	0,755	-1,0211	0,7485733
_x2004	4,618722	3,04792	1,52	0,14	-1,61398	10,85343
_x_t2004	1.004685	0,46339	2,17	0,038	0,056948	1,952421
_cons	11.31429	4,4144	2,56	0,016	2,285817	20,34275
treated (postlinear trend)	0.864211	0,14933	5,82	0	0,562989	1,173843

Note: Calculated with regression with Newey–West standard errors. Analysed period is 1990-2022 with intervention in 2004.

7.3. Appendix A3: Regression model summary for sales abroad

A.3. Regression model summary for sales abroad

Model Summary				
Model	R Country_of_Sale_1=Abroad = 1 (Selected)	R Square	Adjusted R Square	Std. Error of the Estimate
1	,809[a]	0,654	0,647	1,051749987708590

Note: Estimated in SPSS

7.4. Appendix A4: Price index for sales abroad

A4. Price index for sales abroad

Year	B	Std. Error	Index	Beta	t	Sig.
Y1990	ref		100			
Y1991	-1,127	0,51	29,36985	-0,041	-2,211	0,02·
Y1992	0,473	0,591	112,4115	0,013	0,8	0,42·
Y1993	-0,371	0,502	84,59374	-0,014	-0,739	0,46
Y1994	-0,439	0,587	165,962	-0,012	-0,748	0,45·
Y1995	-0,547	0,483	81,33686	-0,023	-1,133	0,25·
Y1996	-0,126	0,495	136,2909	-0,005	-0,255	0,79·
Y1997	0,733	0,48	206,3466	0,032	1,525	0,12·
Y1998	0,705	0,484	242,7295	0,03	1,457	0,14·
Y1999	0,438	0,502	213,4383	0,017	0,872	0,38·
Y2000	0,532	0,503	238,6788	0,02	1,058	0,29
Y2001	0,506	0,47	289,8544	0,024	1,077	0,28·
Y2002	0,528	0,495	299,0327	0,021	1,066	0,28·
Y2003	0,539	0,461	236,6831	0,027	1,168	0,24·
Y2004	1,116	0,431	266,2821	0,079	2,586	0,01
Y2005	1,807	0,432	374,2588	0,127	4,188	<,00·
Y2006	1,633	0,417	339,4022	0,158	3,92	<,00·
Y2007	1,889	0,417	504,6976	0,18	4,527	<,00·
Y2008	1,61	0,413	505,3312	0,172	3,898	<,00·
Y2009	1,177	0,413	322,7905	0,125	2,848	0,00·
Y2010	1,309	0,415	370,0732	0,131	3,151	0,00·
Y2011	1,51	0,414	415,1815	0,158	3,647	<,00·
Y2012	1,443	0,413	392,8478	0,157	3,494	<,00·
Y2013	1,445	0,41	423,5125	0,179	3,527	<,00·
Y2014	1,609	0,409	443,1058	0,202	3,929	<,00·
Y2015	1,65	0,409	406,5248	0,206	4,031	<,00·
Y2016	1,697	0,408	459,6641	0,232	4,158	<,00·
Y2017	1,785	0,407	543,5797	0,263	4,387	<,00·
Y2018	1,694	0,406	553,1126	0,257	4,171	<,00·
Y2019	1,425	0,407	543,7814	0,218	3,504	<,00·
Y2020	1,874	0,41	612,0883	0,244	4,575	<,00·
Y2021	1,911	0,407	781,3671	0,285	4,692	<,00·
Y2022	1,913	0,407	795,7465	0,295	4,703	<,00·

7.5. Appendix A5: Hedonic index for sales abroad

A5. Hedonic index for sales abroad
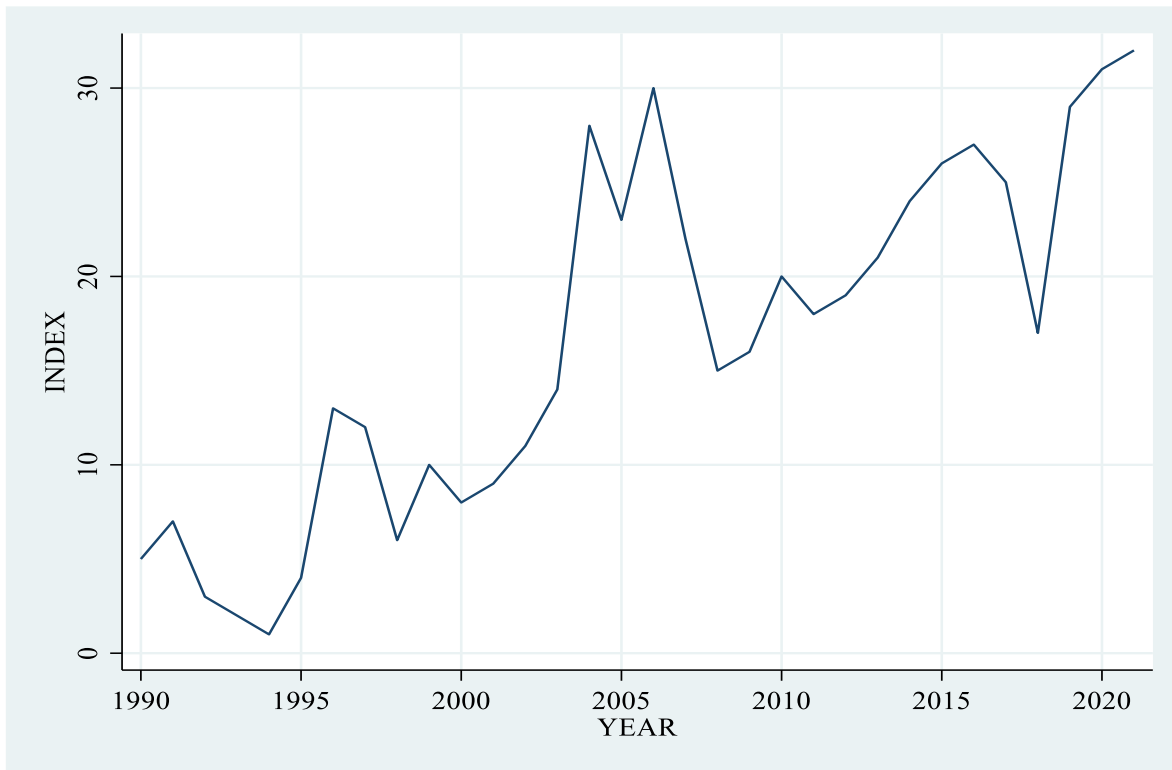
Note: Hedonic price index of contemporary Polish artists for sales abroad between 1990-2022. 1990=100.

7.6.   Appendix A6: ITSA for sales abroad

A6. ITSA for sales abroad

Index	Coefficient	Std.err.	t	P>|t|	[95% conf. interval]	
_t	9,231447	1,72258	5,36	0	5,708375	12,75452
_x2004	226,4156	64,6124	3,5	0,002	94.25845	358,5627
_x_t2004	0,2960382	5,70675	0,05	0,959	-11,37558	11,96765
_cons	69,63418	18,5299	3,76	0,001	31,73619	107.5322
treated (postlinear trend)	9.527485	5,33643	1,79	0.085	-1,386732	20,4417

Note: Calculated with regression with Newey–West standard errors. Analysed period is 1990-2022 with intervention in 2004.