Local Art in an International Market,

an Examination of a Potential Bias Towards Artworks by Chinese Artists in the Hong Kong Contemporary Art Market

Student Name: Sjoek Oosting
Student Number: 582299

Supervisor: Alessia Crotta

Cultural Economics & Entrepreneurship
Erasmus School of History, Culture and Communication
Erasmus University Rotterdam

Master's Thesis
June 13th, 2025

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ABSTRACT

The current research examines the presence of a home bias in the Hong Kong market for contemporary art. Home bias, rooted in the academic fields of marketing and behavioural economics, reflects consumer preferences for domestic products. Therefore, in the context of this analysis, a home bias is reflected in a preference for artworks made by Chinese artists. The research approached the assessment of this concept through three economical measurements provided by the literature: price developments, descriptive statistics (sales volumes and volatility), and sensitivity to macroeconomic developments. The analysis draws on a dataset of 7577 auction results from auctions in the modern and contemporary category held between 2012 and 2024 in the Hong Kong locations of Christie's, Phillips and Poly Auctions. To analyse the price developments, the research employs a hedonic regression model incorporating interaction terms. These terms are the composite of dummy variables reflecting the artists regions of origin and the years between 2012 and 2024, enabling the observation of region-specific price developments over time. Besides aiming to reveal a home bias, this stage of the analysis also focusses on whether general region-of-origin effects affect the prices for the regions: Asia excluding China, Europe and North America. The results of this section indicate that region of origin effects influence the prices of all regions under consideration. Contradicting a potential home bias, artworks by Chinese artists are outperformed by those of European artists. However, this arguably does not reflect a preference for European artworks among local buyers, since European artworks sold in Hong Kong generally belong to the highest segment of the market where prices are set on an international stage. The assessment of descriptive statistics revealed that Chinese artworks consistently account for a disproportionate share of total sold lots across the sample period. Furthermore, the volatility observed in the returns of artworks by Chinese artists is considerably lower than those observed for the other regions. To assess the sensitivity to macroeconomic developments, a Shapley value regression is conducted. This regression enables one to compute the contributions to R-squared related to the specific independent variables in the model. In the context of the current research this model was employed to assess the explanatory power local, regional and global GDP-growth rates have over the returns on artworks by artists from the distinct regions under consideration and returns in the overall dataset. The results of this analysis indicate that prices in the overall Hong Kong art market are considerably set by economic developments in China. Combining the results indicate that Hong Kong hosts a relatively stable and large market for Chinese artworks, while the market as a whole is rooted in Chinese economic developments. Therefore, the research draws the conclusion that a home bias is present in the Hong Kong market for contemporary art.

KEYWORDS: Home Bias, Hong Kong, Art Market Research, Contemporary Art, Hedonic Pricing, Explanatory power

Word count: 17,702

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1. Introduction

On the 28th of march, 2025, Jean-Michel Basquiat's *Sabado por la Noche*, headlined the 20th/21st Century evening sale at Christie's Hong Kong (Christie's, 2025). The artwork resurfaced in the Hong Kong market after being previously acquired at Christie's London in 2019 by an undisclosed buyer. This evening, the artwork commanded an impressive hammer price of 112 million Hong Kong Dollar (approx. €13.3 million). Besides this notable painting by Basquiat, the sale included an impressive selection of paintings by high profile artists from all over the globe, such as Yayoi Kusama (Japan), Fernando Botero (Colombia), René Magritte (Belgium) and Zao Wou-Ki (Chinese) (Christie's, 2025). The broad representation of artist from different regions, can be regarded as a culmination of fundamental characteristic and developments in the Hong Kong art market.

First, Hong Kong's ability to access local, regional and international art markets enabled by a combination of factors: a favourable tax system (with no import/export taxes), highly developed financial and trade infrastructure, geographical positioning in the heart of Asia and historic ties to the West. Attracted by these factors, leading international auction houses and galleries dictate the scene, supplying artworks to a growing group of collectors interested in the arts and the social scene surrounding it (Molho, 2021). However, the market has experienced a somewhat turbulent development. Following the 1997 Asian financial crises, the marketisation of the cultural industries was encouraged by the HKSAR government seeking to diversify the economy (Ho, 2017). Although growth was modest at first, the market experienced a boom during the period between 2003 and 2011. This period was characterized by high levels of speculative motivations mainly directed at Chinese contemporary and traditional artworks, which was further enhanced following the 2008 financial as traditional asset classes experienced increased uncertainty (Wu, 2019). However, price developments had become unsustainable and in hindsight experts refer to a period of "irrational expansion" (Wu, 2019, p. 21). Market corrections followed, as the global auction market for Chinese contemporary lost 63% of its value in 2009 and the global auction market for all Chinese artworks dropped by 53% between 2011 and 2012. This period exemplifies the metaphorical immaturity used to describe Hong Kong's art market (Kharchenkova, 2018). However, following the exit of mass speculation and the market corrections in 2009 and 2012, it seems that the market has evolved to a more mature and rationalized state. Museums have increased exposure to unfamiliar art forms and regions by collaborating with their Western counterparties (Kharchenkova & Merkus, 2024). Simultaneously, a new collector base has emerged, mostly comprising of entrepreneurs and western-educated individuals, that expresses increased interest in modern and contemporary art originating in both Western and Asian countries, which is reflected in both demand and supply (Wu, 2019).

The contrasting buyer tastes observed between the boom period and subsequent period of market maturation raise questions on the current structure of demand, particularly in relation to the

persistence of the home bias evident in the former period. In marketing and behavioural economics, home bias is defined as an irrational preference for domestic goods, attributed to familiarity, nationalism or information asymmetries (Al-Sulaiti & Baker, 1998). In the art market it is manifested through a disproportionate representation of artworks made by domestic artists in galleries, auctions and private collections (Renneboog & Spaenjers, 2014; Steiner et al. 2013; Velthuis, 2013). The foundation of the concept can be found in the framework of Country-of-Origin (CoO) effects, suggesting that the origin of a product can significantly discount or elevate the perceived value and willingness to pay related to it (Godey et al., 2014). Especially in relation to cultural goods, where symbolic value and emotional engagement often exceeds functional value, CoO-effects are shown to significantly affect perceived value (D'Astous et al., 2008; Godey et al., 2018).

The framework of CoO and home bias have also been applied to emerging art markets, including China, where home bias is often induced by a motivation to buy back cultural heritage (Codignola, 2018). However, this observation predominantly applies to traditional art genres, while the examination of home bias remains somewhat unexplored in relation to modern and contemporary art. Furthermore, it could be argued that contemporary art forms a more compelling context for such an analysis as contemporary art often explores more globalized themes, rather than those embedded in national identity (Smith, 2011). Against this backdrop the current research aims to provide an answer to the following research question and sub question:

To what extent is the Hong Kong auction market for contemporary art biased towards artworks by Chinese artists?

To what extent can a general region of origin effect be observed in the Hong Kong auction market for contemporary art?

To provide a well substantiated answer to these questions, this study provides a quantitative analysis conducted in two stages. First, hedonic price regressions will be applied using region-year interaction terms to create price indices for the overall sample and the distinct artist regions of origin (ARO). These indices will visualise and enable comparison between the relative performance of artworks from different regions. Second, a Shapley value regression will be conducted to assess the explanatory power of three sources of economic development on the price returns derived in the first stage. This will provide insights into the extent to which price development in artworks by artists from different regions are rooted in domestic, regional and global economic development. The main variable of interest in this analysis is the sales price achieved in modern and contemporary art auctions held at the Hong Kong locations of three auction houses: Christie's, Phillips and Poly Auctions. The data is collected directly from their websites using the process of web scraping. By applying this analysis, the current study will contribute to the literature in several ways. Although

hedonic pricing models have been commonly applied to established markets in the West (Renneboog & Spaenjers, 2014; Vosilov, 2015), these analyses often analyse prices within subsets, requiring large datasets. The use of interaction terms in the current analysis could offer valuable solutions to analyse price development for distinct characteristics in smaller datasets. Furthermore, the research aims to fill a gap observed in the literature on the diversifying tastes among collectors in the Hong Kong market for contemporary art. While existing literature on this topic has been descriptive, this study aims to provide a data-driven perspective on the potential taste diversification, which could be insightful for galleries, collectors and auction houses navigating the market and policy makers trying to understand its inner dynamics.

The study will proceed according to the following structure: Chapter 2 provides a comprehensive review of the literature on CoO effects, with a particular focus on home bias. First, the chapter provides context on the Hong Kong art market, to which the concepts of CoO and home bias can be applied. It then defines the concepts and discusses their implications in the general market for cultural goods and the art market. The chapter concludes by discussing the potential implications of CoO effects and home bias in the Hong Kong art market, followed by a formulation of the hypothesized findings. The models that will be used in the analysis will be discussed in Chapter 3, along with the considerations behind the application of these models. The chapter also defines the research scope and period and discusses the corresponding data sourcing, refinement and operationalization. Chapter 4 presents the empirical results derived from the analysis outlined in chapter three. Besides the results of the hedonic and Shapley value regressions, some context and preliminary insights will be based on a discussion of descriptive statistics. Furthermore, to assess the quality of the models used, the findings of a robustness test are presented. Chapter 5 will conclude the thesis by reflecting on the findings and its relation to the literature, using this information to draw conclusions on the hypothesized findings and make recommendations for future research.

2. Theoretical framework

2.1 Context of the Hong Kong Art Market

The international art market is often described as a collection of fragmented local markets, with their own value systems, collecting habits and cultural history (Codignola, 2018). These fragmented markets converge within the international art market, which is composed of a small number of Western centres, such as New York and London, that are supported by a large number of peripheral regions. While the peripheral regions supply the artworks that satisfy the increasingly internationalized taste of consumers, the centre regions are responsible for assigning their value and orchestrating the market (Quemin, 2006). Resembling this structure, Hong Kong has emerged as the internationalized hub of Asia's growing market. The City's well-developed trade infrastructure, liberal taxation system and geographical positioning in the heart of Asia, enabled the development of a flourishing art trade open to both domestic and international artworks (Poposki & Leung, 2022; Molho, 2021). Although initially focused on the trade in traditional and avant-garde Chinese artworks, Western auction houses with a strong global presence, such as Christie's and Sotheby's, facilitated the bidirectional flow of art between the East and West (Archer, 2020). In this matter Hong Kong's art market has come to reflect both sides of Velthuis' (2012) description of "circuits of commerce," which distinguishes between a global market, that is spectacle-driven and serves the highest segment, and local markets, shaped by national tastes. At the centre of the Asian market, Hong Kong draws in capital from all over the continent. Therefore, the strong supply of artworks is met by a large group of affluent individuals interested in the arts and the social scene surrounding it (Molho, 2021). Combined, these factors have established Hong Kong's status as the Asian 'hub' in the art market, emphasizing its connecting role between local and international markets.

Although the market itself is highly accessible from an international perspective, demand could be considered as transitional. Initially, the market and its participants could be characterized as immature, exemplified in a period of irrational expansion and high commercialization (Kharchenkova, 2018). Rather than having developed from an artistic ecosystem of galleries and artist spaces, where value is assigned by validation from critics and curation in museums, the market mirrored the commercial circuits of Western markets. High-end Western auction houses set prices and decided what genres should be elevated to stardom, especially in the Chinese contemporary segment. Consequentially, these provoked speculative motivations in the market (Archer, 2022; Poposki & Leung, 2022). These developments are also observed in other emerging markets, namely India and Russia, where financial capital enters before value is institutionally validated, or alternatively the accumulation of financial capital supersedes the creation of cultural capital (Krauessl & Locker, 2010). However, following the exit of mass speculation and market corrections in 2012, it seems that

the market has evolved to a more mature and rationalized state (Wu, 2019). As outlined in the introduction, a suggested diversification of taste among Chinese collectors has taken place, many of whom are now expanding their collections to include Western contemporary art. Underlying to this development, is an increased exposure facilitated by private museum initiatives, western educated market participants, and greater accessibility to information (Kharchenkova & Merkus, 2024; Wu, 2019).

The accessibility to local and international markets, rapid development and suspected transitions in demand, make Hong Kong a particularly compelling case for analysing Country-of-Origin effects. The diversification of taste does not necessarily imply the erosion of a home bias or country of origin effect, since international and domestic art could be subjected to different standards in the same market. Furthermore, it would be interesting to observe how country-of-origins are valued in a market where artworks are often treated as conspicuous goods or investments rather than cultural goods (Poposki & Leung, 2022).

2.2 Country-of-Origin Effect

The Country-of-Origin effect (CoO) is a concept rooted in the academic field of behavioural economics and finds application in marketing and consumer theory literature. In a broad sense, CoO influences consumer perception through country images, based on a representation, reputation or stereotype (Godey et al., 2018). The concept is often examined in relation to willingness-to-pay, by analysing how much additional value consumers perceive in a product given that the product is made in a certain country (Al-Sulaiti & Baker, 1998). The literature's findings on the effect of CoO on purchasing intention and value perception differ significantly, raising questions on its relevance. However, it is important to note that this could be a result of the wide range of products and sectors the country-of-origin framework is applied to. In the cultural industries, the assessment of CoO is more nuanced than for functional goods, as the quality of cultural goods is notoriously difficult to define (D'Astous et al., 2008). Artworks and other cultural products are inherently subjective, and quality perceptions can vary significantly across consumers. Moreover, the assessment of artworks relies on both rational evaluation and emotional response to their symbolic meaning. The CoO can affect both, as it may place the artwork in a broader (art)historical context, or portray themes related to ideology or national identity. As a result, the CoO can evoke emotional responses related to national pride, exotic fascination or reputational appreciation. Altogether, CoO can play a significant role in the assessment of cultural products, where symbolic meaning often supersedes functional value (D'Astous et al., 2008).

Accordingly, the effect of CoO on the evaluation of cultural products has been widely established throughout the literature. In Collectible Design – which exhibits increasing intersection

with the art market – a strong CoO effect is determined (Codignola, 2023). This extends to the categorization of design based on CoO, for example Danish or Italian design, where the CoO adds significant value related to the reputation of countries within the broader field of design. A similar logic can be observed in the Japanese art market bubble of the 1980s, where French impressionist paintings commanded historic results. Although the boom was driven by speculative motivations in later stages, the initial demand was rooted in a deep appreciation of the genre's reputation and cultural connection between the two countries, as the impressionist had been influenced by Japanese artworks (Bocart et al., 2011). Another notable example is luxury fashion. In this domain, brand image and CoO were shown to be decisive factors in product evaluation and purchasing intention (Godey et al., 2018). Similarly, art is widely defined as a luxury good, and the art market mirrors the luxury fashion industry, as aesthetics and symbolic meaning are emphasized in both sectors. In both markets, demand is driven by perceived rarity and discretionary wealth, indicating that consumption occurs above a threshold of basic financial needs (Pownall, 2019). In the context of the current research, the parallel between luxury fashion and the arts is especially relevant, since the commodification of art is central to this parallel and aligns with internal value systems observed in the Chinese art market. Contradicting western notions that commodification erodes cultural capital, this is regarded as a signal of quality in the Asian market, indicating that artworks are worthy of being reproduced. (Kharchenkova, 2023). Moreover, CoO are generally more influential for luxury products than for non-luxury products, reinforcing the notion that CoO is particularly important in relation to products that hold high financial and symbolic value (Godey et al., 2018). In addition to these empirical examples where CoO is manifested in an appreciation for foreign cultural products, the literature commonly discusses the opposite.

2.3 Home Bias and the Art Market

A common manifestation of CoO effects discussed in the literature is a home-country selection bias, further referred to as home bias. This cognitive bias reflects consumer favouritism towards products from their home country and is shown to affect both quality perception and purchasing intention (Al-Sulaiti & Baker, 1998). The preference towards domestic products is closely linked to ethnocentrism, which is defined as "the phenomenon of preference for one's own 'kind' and concomitant dislike of others" (Al-Sulaiti & Baker, 1998, p. 174).

The drivers behind home bias identified in the literature vary substantially, ranging from practical limitations and information asymmetries to consumer behaviour. Practical barriers predominantly concern legal restrictions, costs associated with cross-border artwork acquisitions and the limitations of personal inspection (Renneboog & Spaenjers, 2013; Steiner et al., 2013). Costs related to acquiring an artwork overseas include import and export tariffs often levied on transnational

art transactions, as well as the high costs involved in the transportation of fragile artworks (Renneboog & Spaenjers; 2013). A more direct legal barrier is the export restrictions that many countries have implemented on the arts, particularly regarding cultural artifacts. For example, the export of Old Masters paintings from Italy is prohibited, similar restrictions apply in Mainland China, where an extensive procedure is required to obtain for an export license.

Information asymmetries predominantly arise from consumer familiarity with artists and their work, and the effect it has on consumption capital. As mentioned before the evaluation of art is partially based on cognitive ability (D'Astous et al., 2008), which is strongly affected by consumption capital. The latter concept is linked to the theory that art is positively addictive, that is, the utility derived from art consumption increases if prior consumption and knowledge is higher. Therefore, in case of an unknown foreign artwork, there is a cultural discount since local consumers are less familiar with their work (Schulze, 1999). However, over the past decades evolving market dynamics and innovations in information dispersion have begun to challenge the limitations traditionally posed by information asymmetries (Codignola, 2018). The rise of global museums, the arrival of the internet, and the global expansion of branded Western auction houses, all contribute to the accessibility of information on foreign artworks. Furthermore, it is suggested that buyers in emerging markets, heavily rely on consultants and advisors in their purchasing discissions, substituting personal consumption capital with those of professionals or institutions. This is aligned with the notion that buyers in the highest segment of the market are motivated by reasons of conspicuous or investment consumption, rather than cultural consumption.

The last driver commonly discussed in the literature is somewhat similar to familiarity but expressed on an emotional level rather than rational, namely patriotism. Patriotism expresses itself through consumer ethnocentrism, reflected in loyalty towards buying domestic goods (Vosilov, 2015). One of the factors that is described to contribute to patriotism is a shared identity between artist and consumer reflected in their values and behaviour (D'Astous et al., 2018). Furthermore, the portrayal of traditional themes and elements is described to evoke strong emotions related to nationalism, as well as contribute to familiarity (Steiner et al., 2013). Conversely, the portrayal of traditional themes, and the emotions these evoke, are less prevalent in the context of contemporary art. Smith (2011, p. 183) discusses a "transnational turn" in the themes explored in contemporary art, where artworks are created with a global audience in mind rather than embedded in national identity. This effect is most pronounced for artists that focus on the conspicuous and spectacle driven side of the market, aligning with Velthuis' (2012) description of the global market. Furthermore, contemporary artists that explore local themes tend to contrast or place these in a global perspective. As a result, contemporary art in the internationalized market often appeals to and capitalizes on collectors and institutions that seek to display global prestige (Codignola, 2018).

A combination of all factors explain why international art trade and appreciation of foreign artworks is often larger between neighbouring countries (D'Astous et al, 2008; Schulze, 1999).

Geographic proximity allows for easier physical inspection and minimizes transportation and information costs. Additionally, pre-established economic and political ties improve efficiency and minimize costs of bilateral trade. Nearby, cultures often have similarities in cultural capital, diminishing the cultural discount. The similarities are based on, for example, a shared (art)historical connection, language or general social manners and values (Schulze, 1999).

While geographic proximity may reduce the strength of home bias across regions, the literature consistently reveals that a preference for domestic art remains prevalent in both local supply and demand. Based on the literature, it appears that an interdependent relationship exists between supply that is disproportionately skewed toward domestic art, and demand that reflects a persistent preference for domestic art. Studies on collecting habits reveal that collectors from all continents exhibit a home bias, defined by a disproportionate distribution of domestic artworks in their collections (Steiner et al., 2013). Viewed from a broader perspective, Codignola (2018) observes a strong correspondence between the nationalities of the 200 leading collectors and artists in the world. On the supply side of the market, geographic segmentation in the secondary market is highlighted through market statistics, as 40% of artists have more than 75% of auction sales in their domestic market (Renneboog & Spaenjers, 2014). In the primary market, artists represented by Amsterdam and Berlin galleries are predominantly domestic, at 39.1% and 43.6% respectively, with most other artists originating in nearby Western countries (Velthuis, 2013). Therefore, it seems persistent international differences exist in both supply and demand for art, and there is little evidence to support that markets have become more integrated over time (Codignola, 2018; Renneboog & Spaenjers, 2014). The empirical examples discussed here also allow us to identify the key drivers behind home bias in the art market.

2.4 Home Bias in the Hong Kong Contemporary Art Market

The drivers behind home bias, identified in previous subsection, provide a comprehensive framework to assess the Hong Kong art market's sensitivity to home bias. Applied to the context of the Hong Kong market, practical barriers are less relevant. As a free port, import and export tariffs or restrictions simply do not apply to the Hong Kong market (Poposki & Leung, 2022; Wu, 2019). Furthermore, as established before the market is highly focused on the top segment and draws in capital from affluent parties across Asia (Molho, 2021; Poposki & Leung, 2022). Renneboog and Spaenjers (2014) suggest that transportation costs and inspection limitations could be less significant in the top segment, since costs endured to facilitate these are relatively small compared to the overall sales price. The distinction between lower and the top segment of the market also raises questions on the role of information asymmetries and familiarity (Renneboog & Spaenjers, 2013; Vosilov, 2015). The cultural discount related to foreign artworks is shown to diminish for artworks in the top segment, as their quality is often universally accepted and information widely dispersed (Schulze 2019).

Therefore artists 'fame' serves as a mitigating factor to the home bias. However, with regards to the driver of patriotism, the literature consistently reports that home bias is more pronounced in emerging economical regions, including Asia. Collectors in emerging economies are often motivated to 'buy back' their cultural heritage (Codignola, 2018; Renneboog & Spaenjers, 2013; Steiner et al., 2013; Velthuis, 2012). This pattern becomes particularly evident when assessing the collecting behaviour of Asian collectors, especially in comparison to those from more mature markets. In a global review of 3119 art collections, Steiner at al. (2013) observe that Asian collections contain on average 82% Asian artworks, compared to 43% for European collections. This observation is further supported by Chinese auction market statistics. In 2017, the predominant categories at auction were Chinese modern and classical paintings followed by traditional works of art, such as jade sculptures and porcelain, amounting to 66% and 21% of total auction turnover (Wu, 2019). Although this example represents a brief snapshot of market distribution, it reflects a disproportionate representation of Chinese art in the market.

However, the question arises to what extent the home bias applies to the contemporary art segment, especially in the Hong Kong market. As outlined earlier with respect to contemporary art, tastes are increasingly diversified (Wu, 2019). Therefore, it could be argued that the persistence of a home bias is more ambiguous in this context. On the one hand, Hong Kong is the birthplace of the market for Chinese contemporary art (Preece, 2019). Since early avant-garde Chinese artists were often met with political resistance, the market settled in the liberal Hong Kong environment. Notable examples of these art movement are Cynical Realism, providing ironic portrayals of China's socio-political transition, and Political Pop, depicting traditional Maoist themes in the American Pop Art style, as illustrated in Appendix A, Figures A2 and A3. Based out of Hong Kong, these styles spread across the international art market, in line with the 1990s flow of art from peripheral regions to Western markets (Codignola, 2003), and formed a basis for domestic cultural preferences (Wu, 2019). Simultaneously, Western auction houses assumed the role of 'tastemakers', by introducing artworks belonging to the high-end global contemporary segment. Central to this strategy is the notion that tastes in art have evolved along a predictable pattern throughout history. Although newfound wealth is initially drawn to domestic art stemming from motivations of patriotism, in time collectors develop an international taste. As a Sotheby's official stated: "They don't want to be a local wealthy person, they want to be a global wealthy person" (Degen, 2014; p. 137). Interestingly, it could, furthermore, be argued that appreciation of Western art did not require the mediation of Western auction houses, as it has been persistent since colonial times. In an experimental setting, Hong Kong natives were shown to appreciate Western over Eastern artworks, possibly reflecting persistent colonial influences or general perceptions of Western artistic superiority (Ho et al., 2022). The latter aligns with the observation that cultural products are often directly related to a certain region or country (D'Astous et al., 2008), and additional value is perceived accordingly (Codignola, 2003).

2.5 Hypotheses

The observations on a possible home bias in the Hong Kong art market and identification of the general drivers behind this phenomenon, provide valuable insights to answer the overall research question whether a (home) bias toward Chinese art exists in the Hong Kong contemporary art market. On the one hand, it must be acknowledged that there are sufficient observations of diversifying tastes towards western art. A trend generally consigned to emerging art markets throughout the literature. However, due to the fundamental position of Hong Kong as the initial and primary marketplace for Chinese contemporary art, there is reason to suspect the increased interests towards the West are second to a persistent market dominance of Chinese contemporary art. Therefore, this expectation can be formalized in the following hypothesis:

H1: *The Hong Kong contemporary art market exhibits a bias towards artworks of Chinese origin, reflected in both price and trading volume dominance.*

In addition to the general suspected dominance of Chinese artworks, there are several factors to consider regarding the general country of origin effects. In light of Hong Kong's position as a hub city within the Asian art market and supported by the positive relationship between proximity, both cultural and geographical, and transnational trade established in the literature, there is reason to suspect a large stable market of other Asian artworks. Regarding their price level, it could be argued that other Asian artworks generally cannot equal Chinese contemporary artworks, due to the large appreciation for Chinese contemporary art among both Western and Chinese collectors.

Regarding a possible CoO effect in relation to Western art, there are three main elements to consider based on the discussion above, exposure, accessibility and market segment. Where information asymmetries traditionally limited interests in foreign artworks, these have become less pronounced over the past decades. The internet, institutional collaborations and the mediation of Western auction houses have increased exposure to foreign artworks, and a positive effect can be observed in the diversifying interests of local collectors in the Hong Kong market. As a result, market reports indicate that Western artworks have become increasingly accessible in the Hong Kong market, especially those belonging to the top segment of the market. While these factors have increased traction for Western art in the Hong Kong market, it must be considered as a process in its developing stage. Considering these factors the following hypotheses can be formulated in regard to CoO effects for both other Asian and Western artworks:

H2: *Hong Kong hosts a stable market for Asian artworks originating outside China, although Chinese artworks generally command higher prices.*

H3: *There is an increasing trend over time in both the sales volume and prices of Western contemporary artwork. While price developments are expected to equal those of Chinese artworks, sales volumes are expected to lack behind.*

3. Methodology

To provide a well substantiated analysis of the hypothesized findings formulated in the methodology section, a comprehensive review of CoO effects is required. As mentioned before, CoO effects and home bias are examined in various academic fields, such as behavioural economics, marketing and finance (Al-Sulaiti & Baker, 1998). Correspondingly, the methods employed to assess the effect of this phenomenon vary significantly, ranging from the analysis of value perception (D'Astous et al., 2008) and willingness to pay (Koschate-Fischer et al.,2011) to financial returns (Vosilov, 2015) and sensitivity to macroeconomic developments (Renneboog & Spaenjers, 2014). In the current context, conclusions will be drawn based on an analysis of financial returns and sensitivity to macroeconomic developments, supported by a review of descriptive statistics and data distributions. In the following subsections the overall research strategy is outlined. First, the general approach will be presented, discussing different approaches to analyse financial returns and sensitivity to macroeconomic fundamentals in addition to the scope and timeframe of the analysis. Subsequently, the data corresponding to the scope and timeframe will be reviewed, in terms of sourcing, refinement and variable operationalization. Lastly, the econometric models that will be employed are outlined, including an overview of the various variables that will be incorporated.

3.1 Analytical Approach and Scope

The analysis conducted in this thesis focusses on an examination of financial returns and sensitivity to macroeconomic developments. Specifically, the year-to-year returns on artworks originating in four different regions – Asia excluding China and HK, Europe, China and HK and North America – will be computed to make insightful conclusions on the CoO effect and potential bias towards Chinese art. These returns will allow for a detailed comparison between the general price trends in sales of artworks originating in the different regions. Furthermore, the sensitivity to macroeconomic developments in three different regions, China, East- and Pacific-Asia (EAP) excluding China and the rest of the world, will be assessed by examining the explanatory power of their GDP-growth rates over the returns of artworks per region. In that manner, it can be observed to what extent price developments in artworks from different regions are linked to domestic, regional and international economic conditions.

A general challenge in pricing artworks is the heterogenous nature of artworks as goods, since artworks are generally unique (Baumol, 1985), reflected in different intrinsic characteristic, such as size, medium, signature and subject. To assess true price developments, it is necessary to control for these artwork specific characteristics. The literature commonly suggests two possible methods for this

purpose: repeat sales analysis and hedonic pricing analysis incorporating year dummy variables (Ashenfelter & Graddy, 2002). The former is based on the computation of returns generated between two sales of the same artwork. Since characteristics are constant in both sales and, therefore, perfectly controlled for, true returns are reflected. However, a significant problem arises in data availability, as this method relies on sales pairs. The current research this would require both sales to have occurred in Hong Kong and considering the young nature of the market, this is considered to be unfeasible.

Therefore, the focus is shifted to a Hedonic Pricing Model. This model relies on an Ordinary Least Squares regression, where artwork prices are regressed on an array of artwork characteristics. The relationship between prices and characteristics reflects the value that is assigned to this characteristic in the aggregated market (Chen & Harding, 2015). In this sense, it can be interpreted as an assessment of willingness-to-pay in aggregated terms, rather than from a behavioural standpoint. In the context of art market research, characteristics commonly include intrinsic qualities of the artwork or artist, such as medium, size and artist reputation, or contextual elements related to the sale, such as sales date and auction house. Accordingly, price trends are commonly estimated by incorporating year-of-sale dummy variables as a contextual characteristic (see for example: Garay & Pulga, 2025; Kraeussl & Locher, 2010; Li & Renneboog, 2022). The coefficients of these dummy variables capture the general effect of an artwork being sold in a specific year on its price, holding all other artwork characteristics constant. Furthermore, the coefficients can be visualized in a price index, as these reflect the relative performance of the market compared to a base year (Ginsburgh et al., 2006). Subsequently, year-to-year returns can be computed by observing the difference in the coefficients of consecutive year dummy variables.

In addition to estimating price trends over time, Hedonic Pricing models enable one to emphasize on a certain characteristic's price contribution, for example the gender of the artist (Garay & Pulga, 2025), artistic movement (Garay & Pulga, 2025; Li & Renneboog, 2022), artist popularity and ability (Park et al., 2024), or transaction and auction house features (Singer & Lynch, 1997). Similarly, hedonic regressions can also be applied to examine CoO effects on art prices. In his analysis of home bias in the European market for sculptures, Vosilov (2015) directly incorporates a 'home bias' dummy, that takes the value 1 if a sale occurred in the artist's domestic market. The coefficient of the dummy variable reveals that sculptures auctioned in their domestic market command prices that are on average approximately 14% higher than of those sold abroad. However, incorporating a dummy variable similar to Vosilov's (2015) home bias variable, would limit comparability between regions beyond Chinese and not-Chinese. Therefore, inspiration was drawn from similar research on a different topic, namely the Chinese wine market. Hu and Baldin (2018) examine CoO effects in the Chinese wine market by directly incorporating CoO-dummy variables to compute the average contribution a wine's country of origin has on its sales volumes. Similarly, in this analysis region dummy variables will be included to observe the general effect an artwork's region of origin has on prices.

Combining the focus on time dimensions and regional distinction, to create price trends specific to each region, interaction-terms between region and year dummy variables will be incorporated in the Hedonic regression. In a comprehensive review of the different methods of price index computation, Ginsburgh et al. (2006) discuss the use of interaction terms in hedonic regressions as a viable option when price contributions of certain attributes are suspected to vary over time. In the context of the current research, this will enable the observation of price developments specific to artworks originating in each of the four AROs. An alternative method commonly applied throughout the literature (Li & Renneboog, 2024; Renneboog & Spaenjers, 2014) relies on the creation of subsets related to specific characteristics and running separate regressions incorporating year dummy variables in each subset. However, this method poses some limitations. If subsets lack sufficient data, these may also lack statistical power. Furthermore, estimating different regressions for each subset likely leads to inconsistent estimations of control coefficients across characteristics, violating the assumption that coefficients are estimated under equal conditions and challenging comparison between them.

The inspiration to examine the sensitivity of returns to economic fundamentals, was derived from Renneboog & Spaenjers (2014). In their examination of geographical segmentation in the European art markets, the authors first construct distinct market indices and conclude that the valuations of artwork characteristics significantly differ across regions. In a second stage this observation of geographical segmentation is supported through a regression of regional returns on local and international economic developments, namely GDP-growth and stock returns. The results indicate that the introduction of the local economic variables increased the explained variance in price developments by 48% compared to a model containing exclusively international factors, indicating prices are significantly determined locally and substantiating the notion of a home bias. In the context of the current research, it was decided to include not only local and international economic factors, but also regional, namely through EAP. EAP is an economic region delineated by the World Bank (n.d. -a) as a region for strong economic development, that includes most countries in the vicinity of Hong Kong. Under the notion that Hong Kong serves as the Asian art market hub, it was included to investigate the sensitivity of the Hong Kong market to economic development in Asia. The relative explanatory power of the GDP-growth rates can be determined by adding these to a regression in succession and observing the change in R-squared. However, the order in which variables are added to a regression can affect the relative change in R-squared, challenging the assessment of the true explanatory power of variables. Therefore, a Shapley regression is applied. This model constructs all permutations of variable addition; runs the separate regressions; and registers the variables' contribution to R-squared in each model. The overall contribution is then determined by averaging all marginal contributions (Lipovetsky, 2021).

Regarding the price data used to construct price indices and compute the returns required for the assessment of macroeconomic sensitivity, prices will be used from the secondary auction market.

The use of hammer prices is common in art market analysis (see for example: Garay et al. 2022; Kraeussl & Logher, 2010; Li & Renneboog, 2024; Renneboog & Spaenjers, 2014). Compared to the primary market, data is more readily available for auction houses and price reporting is considered to be more transparent and, therefore, more reliable (Archer 2020). In light of the period of high speculative practices during the initial boom of the Hong Kong art market between 2003-2011 (Wu, 2019), this research focusses on the period afterwards, specifically 2012-2024. Not only does this period reflect the development of a more mature market (Kharchenkova, 2018), but it also coincides with the diversifying tastes observed among Chinese collectors (Wu, 2019), making for a more compelling case to assess the CoO effects and a possible bias towards Chinese art. Similarly, the focus on contemporary art was favoured over other genres, as the diversifying tastes of collectors were predominantly mentioned in relation to it. Furthermore, Chinese preference for traditional works of art is well established, therefore further examination would be redundant (Wu, 2019). Regarding the auction houses, the research includes data collected from both Western and domestic auction houses, as it would be interesting to compare price contribution between international and domestic auction houses. This discission was based on the general notion discussed in the literature that the reputation of an auction house can signal quality and legitimacy, which is also shown to influence prices (Ekelund et al., 2012; Li & Renneboog, 2024). Furthermore, in the context of the Hong Kong market, Western auction houses reportedly played a pivotal role in shaping the market (Degen, 2024). Therefore, data was sourced from Christie's, Phillips and Poly Auctions. While the former two are well established auction houses with a global presence, the latter was founded in 2005 during the art market boom in Asia. In the years that followed the company has grown to become the largest auction house in China and the third largest in the world behind Christie's and Sotheby's (Wu, 2019). Besides the aim to include both Western and domestic auction houses, these were selected based on their accessibility for data scraping, which is the main method for the data collection and will be discussed in the following section of this chapter.

3.2 Data Collection and Operationalization

The data used in the current analysis was directly collected from the websites of Christie's, Phillips and Poly Auctions, using a process called data scraping. In the following subsections an overview of this process will be provided, along with a brief description of data refinement and variable operationalization.

3.2.1 Data Collection and Refinement

The data on sales and artwork characteristics were sourced using data scraping, specifically using the Google Chrome extension Webscraper.io. The extension enables a user to build a pathway that starts at a base webpage, from which either text data is collected, or a different webpage is accessed (Webscraper.io, n.d.). The base page was set to the auction results page of the auction house websites, with filters set to include all live art auctions under the modern and contemporary category that were held in Hong Kong (Christies, n.d.; Phillips, n.d.; Poly Auctions, n.d.). Starting at these pages, the pathway was specified to first access all separate auctions and proceed to all individual artwork pages to extract the data. The web scraper makes use of the consistent formatting of the webpage, and the user selects what information should be extracted and where it is positioned within the webpage. For this research raw data was collected on the auction name, auction date, artist name, range of estimates, hammer price, technique, medium, dimensions and whether the artwork had been signed. The data scraping process yielded 10,322 observations across the three auction houses between 2008 and 2025, specifically: 6346 observations for Christie's between 2008 and 2025; 2201 observations for Phillips between 2015 and 2025; and 1775 observations for Poly Auctions between 2014 and 2024. Subsequently, the separate excel files downloaded from webscraper.io were merged to form the raw dataset.

In addition to the data on artworks collected from the auction houses, other sources were consulted to collect data on the artists and macroeconomic factors. First off, the data on artist nationalities. A UNIQUE() function was applied on the column containing scraped artist names in the raw excel dataset, providing a list the distinctive artists containing 1850 artists. Afterwards, the year of birth, year of passing, nationality and, if applicable, second nationality for all artists were sourced manually from Artsy.net (n.d.) and at times verified with Artfacts.net (n.d.) as a secondary source. Besides personal information, it was decided to include a proxy for artist reputation. Throughout the literature the relevance of using such a proxy is underlined, as artist reputation is a crucial factor influencing artwork prices (Kraeussl & Locher, 2010; Park et al. 2024), and implemented in various forms: the number of artist citations in books (Renneboog & Spaenjers, 2014; Singer & Lynch, 1997), number of lines in an online biography (Li & Renneboog, 2024); or through an statistical measure considering several factors (Park et al., 2024). However, in the current research the incorporation of a different proxy is proposed, namely the Artfacts.com (n.d.) top 1000 artist ranking. This ranking is constructed from a perspective of visibility rather than art historic significance or market performance, considering factors such as exhibition activity, for example number and type of exhibition, and position in the art ecosystem, for example global presence and artist collaborations. This is considered a more appropriate in the current context, as it may better reflect the reputation of contemporary artist, who are highly active in the market but not yet established in art historic contexts. Furthermore, the GDP-growth rates necessary for the assessment of market return sensitivity

to economic developments from the World Bank (n.d. -b). An excel file containing the real GDP-growth rates of all regions and countries examined by the World Bank, was directly downloaded from its website. Afterwards the GDP-growth rates of China, EAP and the World between 2011 and 2023 were extracted and stored in a separate excel file to be processed at a later stage.

The raw data collected in the web scraping process and from other sources required a considerable amount of refinement and merging before being operationalized, which was performed in python. The dataset was first merged with the excel file containing artist information, expanding each row with artists' personal information and ranking, which concluded the synthesis of the overall raw dataset. Afterwards, the attention was directed towards filtering the data in multiple steps. Table B1 in Appendix B provides an overview of the implications of each filtering step, in terms of removed and remaining observations. Firstly, bought-ins were removed, since regression models require a complete dependent variable to estimate coefficients. Missing hammer prices would, therefore, compromise the functioning of the model. Although data was sourced between 2008 and 2025, the timeframe of the dataset was restricted to the 2012-2024 as discussed in the methodological approach. Observations from 2025 were excluded from the dataset, due to the incompleteness of the year and a lack of data. The third variable that required filtering was the medium variable. On the auction house websites, medium would predominantly be represented in a short sentence containing the technique and the support of the artwork, separated by the word "on". Since, the technique and support will be included as separate variables in a later stage of the analysis, all rows with medium entries not containing this keyword were removed. Besides removing entries that could not have been processed at a later stage, this filtering requirement also removed some initial sculptures and design items included in the dataset. However, to further ensure consistency and enable fair comparison among artworks, rows with three dimensional artworks were removed. After performing these filtering steps, the dataset contains 7577 observations, reflecting a 73.41 % retention rate. In the following subsection it will be discussed how the data refined data is operationalized for inclusion in the hedonic model, along with an overview of these variables.

3.2.2 Variable Operationalization

In this subsection a discussion will be provided of the procedures that were applied to operationalize the variables for hedonic regression, which were performed in python. To operationalize the dependent variable, hammer price, it is deflated against cumulative inflation that occurred in Hong Kong with respect to the base year, 2012, retrieved from the World Bank (n.d.). Furthermore, deflated values have been transformed to a natural logarithmic scale to improve variable distribution and prevent biased estimations as a result of skewness and outliers. After separating technique and support, these were categorized into 18 and 9 categories respectively, based on a selection of keywords related to certain techniques and supports (Appendix B, Tables B2 and B3). Dimensions

were multiplied resulting in the area variable, which was squared to create an area squared variable. This variable will be included due to a suspected marginal effect of the area of an artwork on its sales price (Ginsburgh et al., 2006; Renneboog & Spaenjers, 2014). The auction year and month variables were extracted from the raw sales date column. Month of sale will be included since high-end sales commonly concentrate around certain months of the year, and, therefore, could be of significance (Renneboog & Spaenjers, 2014) To provide more in depth insights into the price contributions of artist reputation, these were tiered into four categorical dummy variables: 'top 50' (rank ≤ 50), 'high-tier' (50 < rank ≤ 250), 'mid-tier' (250 < rank ≤ 1000) and 'not ranked'. In addition to the rank-dummy variables, most of the variables were transformed into dummy variables or interaction terms. For each distinct year, month, technique, support, auction house and region separate dummy variables were created. Auction house dummy variables are included to control for and observe the structural differences between auction houses, which is particularly important as both sample size and period vary significantly between the three auction houses. Furthermore, 'signed' and 'has passed' dummy variables were created based on the presence of signed keywords ('signed', 'dated' and 'stamped') and a year of death, respectively. In the following subsection the final specification of the hedonic regression will be formulated, that will incorporate these operationalized variables.

3.3 Model Specification

The analysis in this thesis will be conducted in two stages. The first stage focuses on the construction of price indices for different regions of origin within the Hong Kong art market. The second stage will be dedicated to an examination of the extent to which different sources of economic development can explain the returns on artworks originating in different regions. Combining these two approaches allows for a more comprehensive investigation of general country-of-origin effect, with a special focus on a potential bias towards China. This is achieved by not only examining relative performance in the first stage but also by assessing the responsiveness of region's returns to different sources of economic developments in the second stage. In the following subsections, the specific models for both stages will be discussed.

3.3.1 Price Indices

The price indices are created with the intention to visualize the relative performance of artworks from different regions in the Hong Kong art market and to allow for comparison between them. As mentioned before the construction of these price indices will be realized through a hedonic regression model. To enable insightful conclusions on the interplay between regions and time, interactions terms will be included in the hedonic regression model, whose coefficients will eventually reflect the price

development of that origin over time. To illustrate the model, including the interaction terms, it is presented below.

$$\ln(P_i) = \alpha + \sum_{m=1}^{M} \beta_m [Characteristic]_{m,i} + \sum_{r=1}^{R} \sum_{t=1}^{T} \lambda_{r,t} ([Region]_{i,r} * [Time]_{i,t}) + \epsilon_i$$

In the simplified model, the dependent variable is the price of artwork *i*, transformed using the natural logarithm. Log price is regressed on a vector of characteristics m, containing M elements. The 1 x M coefficient matrix β_m, contains all coefficients corresponding to the elements m. In the current analysis these elements are represented by all independent variables, which are incorporated in the model to control for heterogeneity across artworks. A comprehensive review of the elements is presented in Table B3 in Appendix B. The interpretation of these coefficients depends on the nature of the variable. For dummy variables, the coefficient reflects the average change in log price if a characteristic is present in the artwork. For continuous variables, it reflects the average change in log price if the variable experiences a one-unit change. The coefficients of interest, however, are $\lambda_{r,t}$, which correspond to the interaction terms and reflect the approximate average change in price when an artwork, *i*, from a certain region, *r*, has been sold in a specific year, *t*. Since the dependent variable has been transformed to a logarithmic scale, coefficients cannot be directly interpreted, therefore, reflecting the approximate percentage change. However, to observe the real effect of a characteristic, m, compared to the reference characteristic these can be transformed according to the formula below (Ginsburgh et al. 2006).

$$real\ percentage\ change = (e^{\beta_m} - 1) * 100\%$$

To observe the real percentage change in expected price compared to a characteristic other than the reference characteristic, for example k, the following formula can be applied (Ginsburgh et al., 2006).

$$real\ percentage\ change = (e^{\beta_m - \beta_k} - 1) * 100\%$$

In total two different regressions will be run, varying in the inclusion of region and year dummy variables and their composite interaction terms. All three sets of dummy variables cannot be included in the same model, since this would lead to substantial multicollinearity between the interaction terms and year and region dummy variables as the former is a direct composite of latter two. To prevent further sources of multicollinearity one dummy variable per characteristic category will be excluded in the regressions, also forming the base variable for comparison (Appendix B, Table

B3). First, a regression including standard year and region dummy variables will be conducted to assess the main effect of time and regions in our dataset, excluding Europe and 2012 dummy variables. Secondly, a regression including only interaction terms will be conducted, excluding the 2012 interaction term for each region. After obtaining the interaction term coefficients $\lambda_{r,t}$ from regression two and four, these can be transformed to price indices using the following formula (Ginsburgh et al. 2006).

$$Index\ level_{r,t} = 100 * e^{\lambda_{r,t}}$$

The price indices for all regions are normalized to 100 in the base year, 2012, for easier interpretation. However, an important realization to make is that the price indices derived from the coefficients from the second regression do not reflect absolute performance. Rather, these reflect relative performance within each region compared to the base year. Therefore, these do not allow for comparison between different regions. To surpass this problem, a regression will be run on all observations from 2012 in the dataset, excluding year and interaction dummy variables. The region coefficients, $\lambda_{r,2012,}$ derived from this regression will represent the relative performance of the different regions in the year 2012, which can be transformed into a new base according to the formula above. Afterwards the interaction coefficients for the sequential years can be standardized against this newly constructed base into absolute price indices, according to the formula below.

$$Absolute\ index\ level_{r,t} = Base\ Value_r * e^{\lambda_{r,t}} = 100 * e^{\lambda_{r,2012} + \lambda_{r,t}}$$

Since the hedonic models applied in this stage rely on OLS-regressions, these are also subjected to the assumption that no heteroskedasticity is present, implying that the variance of residuals is constant across all levels of the dependent variable. A violation of the assumption could lead to biased standard errors of coefficients and consequentially invalid inferences on the significance of these coefficients. Therefore, a White-test will be applied to all regression models. If the assumption of homoskedasticity is violated, the model will be corrected accordingly by applying robust standard errors.

3.3.2 Macroeconomic Sensitivity

As described above, in this stage of the analysis the economic fundamentals behind returns will be explored. In light of the main research aim, to examine a potential bias towards Chinese art in the Hong Kong art market, it could be insightful to examine to what extent returns in the market can be explained by Chinese and other sources macroeconomic development. As outlined in the general approach to this analysis, a Shapley regression will be employed for this purpose.

However, a problem occurs when regressing returns on the raw growth data of each region. EAP GDP contributes to World GDP and China, listed among EAP countries, contributes to both. Therefore, clear multicollinearity would exist among the regressors. To address the issue of multicollinearity and prevent potential bias, a method will be employed that was also applied by Renneboog and Spaenjers (2014) to surpass the same problem in their analysis, namely serial orthogonalization. First, the GDP-growth rate of one region is regressed against the GDP-growth rate of another region. The residual is saved and represents the part of the dependent GDP-growth variable that cannot be explained by the independent GDP-growth variable. Afterwards the third GDP-growth rate is regressed on both the residual from the first regression and the independent GDP-growth variable from the first regression. The residual of the second regression will reflect the GDP growth of that region orthogonal to the other two regions. To visualize this process, the regressions performed that will be performed in python are presented below.

First stage:

$$W = \alpha + \beta * C + \varepsilon \quad \text{where:} \quad \varepsilon = W^{\perp C}$$
$$E = \alpha + \beta * C + \varepsilon, \quad \text{where:} \quad \varepsilon = E^{\perp C}$$
$$W = \alpha + \beta * E + \varepsilon, \quad \text{where:} \quad \varepsilon = W^{\perp E}$$

Second stage:

$$W = \alpha + \beta_1 * C + \beta_2 * E^{\perp C} + \nu, \quad \text{where:} \quad \nu = W^{\perp C,E}$$
$$E = \alpha + \beta_1 * C + \beta_2 * W^{\perp C} + \nu, \quad \text{where:} \quad \nu = E^{\perp C,W}$$
$$C = \alpha + \beta_1 * E + \beta_2 * W^{\perp E} + \nu, \quad \text{where:} \quad \nu = W^{\perp C,E}$$

GDP-growth variables are presented in a simplified form, where W, E and C, represent the GDP-growth rates of the World, EAP and China respectively. The residuals derived from the second stage reflect the part of a region's GDP growth that cannot be explained by the growth in the other two regions' GDP. Therefore, the process isolates developments that are specific to each region.

After constructing the independent variables for this stage, attention is shifted towards the dependent variable: returns. By rules of logarithmic returns, these can be computed by subtracting the coefficient of year *t - 1* from the coefficient of year *t*, for either the year dummy coefficients, β_t, derived from Regression 1 or interaction term coefficients, $\lambda_{r,t}$, derived from regressions 2 (Renneboog & Spaenjers, 2014). To illustrate the construction of returns, the formula is presented below.

$$r_{r,t} = \ln\left(\frac{p_{r,t}}{p_{r,t-1}}\right)$$

$$r_{r,t} = \ln\left(e^{\lambda_{r,t}-\lambda_{r,t-1}}\right) = \lambda_{r,t} - \lambda_{r,t-1}$$

Similar to the first stage of the analysis, these can be transformed into real returns according to the following formula:

$$real\ return_{r,t} = (e^{\lambda_{r,t}-\lambda_{r,t-1}} - 1) * 100\%$$

An important note is that this step provides logarithmic returns rather than real returns. However, since the explanatory power is of interest, this transformation is irrelevant to our analysis, since it merely shifts the scale of the returns. Furthermore, returns are more likely to be normally distributed if a logarithmic scale is applied. The newly constructed returns can then be regressed on the orthogonal GDP-growth variables, as expressed in the formula below.

$$r_t = \alpha + \beta_1 * C_{t-1}^{\perp E,W} + \beta_2 * E_{t-1}^{\perp C,W} + \beta_3 * W_{t-1}^{\perp C,E} + \epsilon$$

$$r_{i,t} = \alpha + \beta_{1,i} * C_{t-1}^{\perp E,W} + \beta_{2,i} * E_{t-1}^{\perp C,W} + \beta_{3,i} * W_{t-1}^{\perp C,E} + \epsilon$$

the orthogonal GDP-growth variables are presented in a simplified form, similar to the equations of their construction. The returns are regressed against the 1-year lagged GDP-growth variables due to a suspected delayed effect of GDP growth on consumption, commonly discussed in the literature. It is important to note that while the orthogonalization process eliminates multicollinearity, it, consequentially, complicates the interpretation of variables, since the direct effect of GDP-growth on returns can no longer be observed. However, the direct effect is not necessarily of interest here, but rather to what extent the different sources of GDP growth can explain the variations in returns for different regions, reflected in R-squared. It is important to note that, therefore, no conclusions can be drawn on the causality, direction or strength of a potential linear relationships. The R-squared values related to each orthogonalized source of GDP-growth will be constructed in python using a Shapley regression. In the following chapter the empirical results will be presented that were derived through the application of the analysis discussed here.

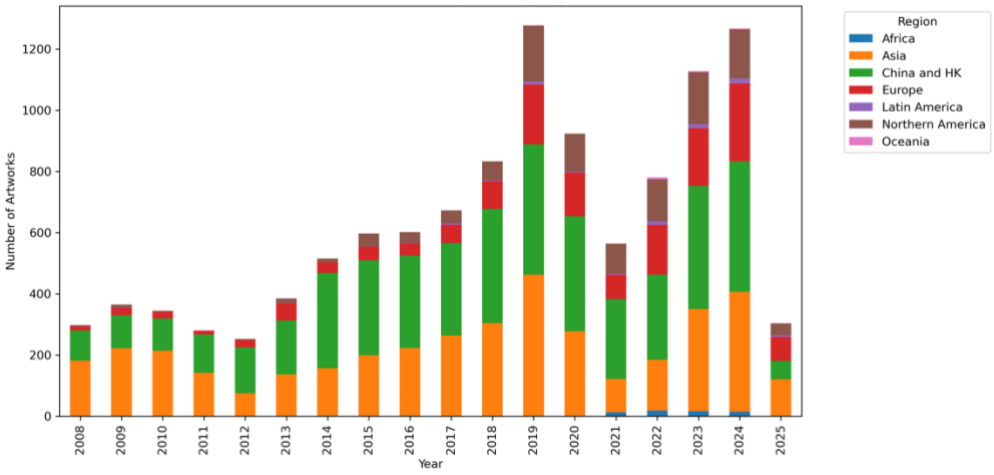
4. Results

This chapter presents the empirical results of the analysis that was performed to provide insights into the relative performance of different regions of origin in the Hong Kong art market, and the economic fundamentals bolstering this performance. To provide a foundation for the analysis to come, we will first present an overview of descriptive statistics, particularly distributions of sales from different regions of origin across auction houses and years. As outlined above, the analysis proceeds in two stages and is presented accordingly. The first stage is dedicated to the creation of price indices for the overall market and separate regions of origin using year dummy variables and region-year interaction terms. The second consists of a Shapley regression performed to examine to what extent different orthogonalized sources of economic development can explain the variation in prices across regions. Special attention is given to the relative performance of Chinese artworks compared to artworks from other regions; to make insightful conclusions on the potential presence of a bias towards Asian and especially Chinese art. Throughout the chapter all models will be subjected to a White-test to test for heteroskedasticity among residuals. To improve interpretation, the expected price changes based on regression coefficients and returns will be transformed from logarithmic to real terms using the formulas outlined in methodology Section 3.3.1 and 3.3.2, respectively. Furthermore, the significance of coefficients is assessed and presented at the customary levels: 10%, 5%, and 1%.

4.1 Descriptive Statistics

In this section, we will briefly discuss some descriptive statistics and distributions of the data under analysis. Although in traditional research the descriptive statistics presented are often focused on individual variables' distribution, examining cross-variable distributions is arguably more insightful for the current research due to the large number of dummy variables and variables in general. Furthermore, to provide a broader perspective, the statistics discussed in this section are based on the full raw dataset, which spans the period 2008-2025 and contains 11,386 artworks. To gain some insight into the general distribution of sales over time and the distribution of sales from different regions over time, figure 4.1 below reflects the number of sales for each year, categorized by the region of origin of artist. The figure is supported by data presented in Table C1 of Appendix C.

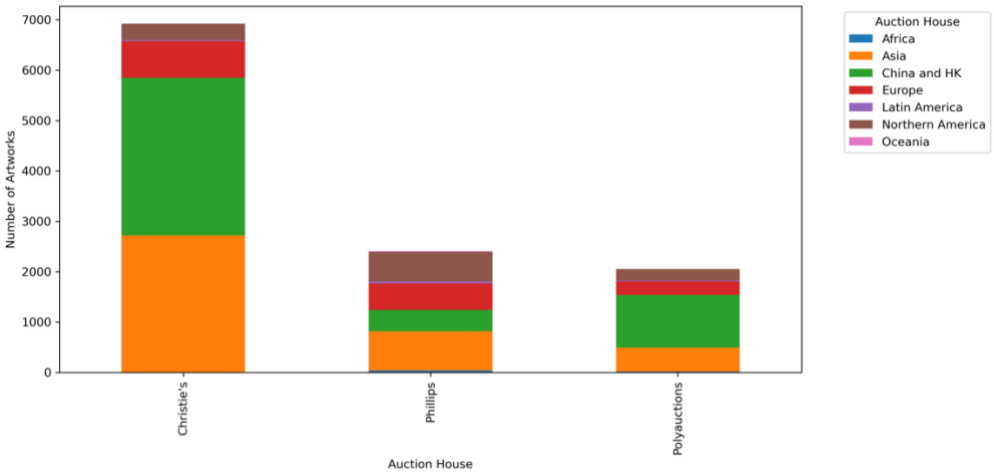
Figure 4.1: Number of Lots Sold Per Year, Categorized by ARO



The distributions reveal that during the sample period the percentage of not-Asian art auctioned in the three auction houses of interest increased significantly from 5.72%, in 2008, to 36,36%, in 2024. This generally supports the observations made in the literature that demand for Western artworks is increasing in the Hong Kong market, driven by diversifying collector preferences (Wu, 2019). Consequentially, the representation of both Chinese and Asian artworks appears to have seceded ground. The former reached a peak share of 60.58% in 2014 and consistently accounted for more than 40% of the observations in the period 2011-2018 but has since declined to approximately 30%. On the other hand, a significant drop in Asian artworks can be observed earlier, decreasing from 50.71% of observations in 2011 to 29.37% in 2012. This drop can be attributed to the overall market correction of that year, which did not necessarily affect the Chinese contemporary art market as it had already undergone a similar correction in 2009 (Wu, 2019). Overall, the distributions indicate a persistent bias towards Chinese contemporary art as it consistently represents the largest sales category, supporting hypothesis 1. On the other hand, the market for Asian art seems to be less stable than hypothesized, considering the large decline in trade volume. However, there is strong evidence suggesting the market is indeed diversifying through increased sales volumes of artworks by non-Asian artists and the home bias is becoming less pronounced, supporting hypothesis 3. A general observation is a significant decline in sales volumes in 2020 and 2021 compared to 2019, which can be attributed to the COVID-19 pandemic.

Furthermore, it is revealed that Asian and Chinese artworks consistently represent a dominant market share during the period 2008-2014. Notably all observations for this period were derived from Christie's, therefore, one might expect a more international focus. To provide insights into the distribution of regions across auction houses, figure 4.2 below provides a bar chart reflecting the number of sales per region conducted in each of the three auction houses. The figure is supported by data presented in Table C2 of Appendix C.

Figure 4.2: Number of Lots Sold per Auction House, Categorized by ARO



Christie's conducted the largest proportion of its sales in Asian art (84.34 %) followed by Poly Auctions (73.68 %) and Phillips (49.94 %). The statistics spark debate on the dual role of Western auction houses in the Hong Kong market, on the hand facilitating the rise and marketisation of Chinese contemporary art (Archer, 2022; Poposki & Leung, 2022; Preece, 2019), while fostering a market for Western art (Wu, 2019). Based on the data, it could be suggested that the former is the primary engagement of Christie's in the Hong Kong market. However, it could also be regarded as a matter of timing. Christie's started hosting contemporary auctions in 2008, preceding Phillips and Poly Auctions first contemporary auctions by 7 and 6 years respectively, the distribution is likely skewed by this period when contemporary Asian art was the predominant category being traded (Wu, 2019). However, Poly Auctions reports the largest overall proportion of Chinese artworks at 50.83 %, conforming the auction house's ties to mainland China. Similarly, Phillips sales volumes reflect its connections with the West, as more than half of the artworks sold originated outside Asia.

In addition to analysing the distributions of AROs over time and across auction houses, a preliminary examination of the relationship between hammer price and region can also be conducted at this stage. Therefore, the mean, median, standard deviation and confidence intervals of log prices are computed per region of origin, along with the Pearson's correlations between the log price variable and ARO-dummy variables, as displayed in table 4.1 and 4.2 below.

Table 4.1: Descriptive Statistics of Log Prices, Categorized by Artist Region of Origin

	N	Mean	Median	Std dev.	Min.	Max.
Africa	64	13.502	13.442	1.642	10.147	17.079
Asia	3,970	12.909	12.806	1.562	6.897	18.289
China and HK	4,595	13.198	12.972	1.748	8.336	19.206
Europe	1,526	13.786	13.715	1.878	8.618	18.938
Latin America	75	13.680	13.580	1.984	9.742	18.119
North America	1,141	13.266	13.134	1.655	8.237	18.119
Oceania	15	13.389	13.629	2.018	10.524	17.049
Total	11,386	13.187	13.008	1.718	6.897	19.206

Note: Columns represent number of observations N, mean, median, standard deviation, minimum and maximum of log prices for each region represented in the rows.

As shown in Table 4.1, Asian and Chinese artworks exhibit the lowest mean, 13.198 and 12.909 respectively, and median, 12.972 and 12.806 respectively, log price. Furthermore, the fact that mean log prices exceed median log prices for both Chinese and Asian artworks indicates that the distribution is right-skewed, characterized by a larger concentration of sales with lower prices and a small number of sales with high prices that inflate the mean price. By contrast, the relatively high mean log prices for not Asian art, ranging from 13.266 to 13.786, can be explained by the fact that prestigious artworks are favoured in the context of Western artworks (Wu, 2019). When combined with the earlier observation that Asian artworks consistently account for higher sales volumes, these price distributions suggest that Asian artworks are traded across a broader segment of the market, whereas sales of not Asian artworks generally occur in higher segments.

This observation is further supported by the Pearson's correlations computed between each region of origin and log prices, presented in Table 4.2. Pearson's correlation coefficients provide a representation of the direction and strength of a linear relationship. A positive coefficient indicates that two variables tend to increase together, while a negative coefficient indicates the opposite. Higher coefficients reflect a stronger linear relationship as these approach the absolute maximum of 1.

Table 4.2: Pearson's Correlation Coefficients Between Log Art Price and ARO-dummy variables

	Pearson Correlation
Africa	0.0202 * (0.079)
Asia	-0.0531 *** (0.000)
China and HK	- 0.0169 (0.142)
Europe	0.182 *** (0.000)
Latin America	0.0276 ** (0.016)
North America	0.0267 ** (0.020)
Oceania	0.0081 (0.479)

Note: $0 \leq |r| \leq 1$. *Positive coefficients indicate a positive linear relationship, while negative coefficients indicate a negative linear relationship. Furthermore,* $|r| \rightarrow 1$ *implies a stronger linear association. Significance levels:* $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***.

According to the correlation coefficient, -0.0531, very weak negative linear relationship exists between an Asian artist origin and artwork price. The negative nature of the coefficient would suggest that prices tend to decrease if an artwork is made by an Asian artist. However, the correlation is extremely weak, such that this relationship could be considered negligible. Accordingly, the correlations between African, Latin American and North American origin and log prices can also be considered negligible, despite the positive directions. The positive correlation between European artist origin and log prices is slightly stronger, although still considered to be weak. Unfortunately, the correlation between Chinese artist origin and log Prices is not significantly different from 0 and can, therefore, not be interpreted. Altogether, little to no conclusions can be drawn from the correlations above in relation to the hypotheses.

While the assessment of distributions and correlations has provided initial insights into a potential bias towards Chinese artworks, it has also revealed a limitation in regard to the following stage of the analysis. Specifically, a lack of observations for Africa, Latin America and Oceania in most years between 2012 and 2024. Since the creation of price indices relies on consistent data throughout the period of interest, the creation of price indices is not feasible for these regions. Furthermore, the regions will presumably lack statistical power to result in significant coefficients and make robust conclusions on their price contributions and developments. Despite this limitation, the following subsection will continue with the creation of price indices for the overall dataset and remaining regions.

4.2 Construction of price Indices.

The price indices discussed in this section were constructed using the hedonic pricing model outlined in the corresponding section of the methodology. As discussed, price indices are constructed based on the results of two regressions. The first includes year dummy variables to provide insights into the overall effect of ARO on prices, while the second includes region-time interaction terms for the regions Asia, China and HK, Europe and North America to provide a more in-depth analysis of price developments for the AROs. In the following section, these will be discussed in consecutive order, supported by a table composed of the coefficients related to the variables of interest and the plotted price indices. As outlined in the same section, a White-test will be performed to test for heteroskedasticity among the residuals of both regressions, based on the Lagrange multiplier and F-test statistics. Furthermore, a comprehensive overview of the regression results, including all variable coefficients, is provided in Appendix D, Table D1.

4.2.1 Main effects of ARO and Time (Regression 1)

The first regression could be regarded as preliminary exploration of the linear relationships between log sales prices, time and ARO that exist within the dataset. The regression coefficients of year dummy variables and ARO-dummy variables can be seen as the main effect of time and regions of origin on log prices in the dataset. Before estimating and interpretating coefficients, a White-test was conducted to assess the presence of heteroskedasticity in the residuals. As shown in Table E1 of Appendix E, the p-value of both the Lagrange multiplier and F-test statistic are sufficiently low to reject the null hypothesis of no heteroskedasticity. Consequentially, the model will be applied with robust standard errors. Table 4.3 below presents the main effects of the different AROs in our dataset, reflected by the coefficients of the corresponding dummy variables.

Table 4.3: Coefficients of the ARO-Dummy Variables

	Coef.
Africa	0.2682 (0.233)
Asia	-0.5255 *** (0.000)
China and HK	0.1446 ** (0.031)
Latin America	0.2748 (0.282)
Northern America	-0.2736 *** (0.000)
Oceania	0.6534 (0.325)

Note: the coefficients reflect the main effect of the regions on log prices within the dataset. Coefficients are presented above with the related p-value presented in brackets below. Significance levels: $p < 0.1$ ∗, $p < 0.05$ ∗∗, $p < 0.01$ ***.

The European dummy variable and corresponding coefficient are not presented in the table above, since this variable was omitted. Therefore, European log art prices serve as the base to which the other regions can be compared, and the coefficients of the dummy variables reflect the relative performance of different regions compared to Europe. A first observation is that both the Asian and North American dummy variables yield negative coefficients, indicating that these regions generally underperform compared to European artworks by 40.87% and 23.93% respectively. Interestingly, while the Pearson's correlation coefficient between Chinese origin and log art prices was not significantly different from zero, the results indicate a significant positive coefficient. This difference can be explained by the fact that correlations assess the relation between two variables without controlling for external factors. Once these are controlled for, the true effect emerges. Therefore, it can be concluded that Chinese art generally commands the highest prices, outperforming European artworks by 15.56%, North American artworks by 51.90% and Asian artworks by 95.41%. This can be regarded as direct evidence that prices in the Hong Kong art market reflect a bias towards Chinese artworks, supporting Hypothesis 1. Furthermore, this finding aligns with the literature that artworks generally command higher prices in their domestic market (Vosilov, 2015). Since the dummy variables reflecting Asia and North America yield significant coefficients, it can be concluded that a significant CoO effect is also present for these AROs, supporting Hypothesis 2 and 3 respectively. As expected, due to the lack of observations, Africa's, Latin America's and Oceania's dummy variables did not result in significant estimates and can, therefore, not be interpreted. Besides the main effects of the regions of origin, regression one also allows for the assessment of year main effects, presented in table 4.4 below.

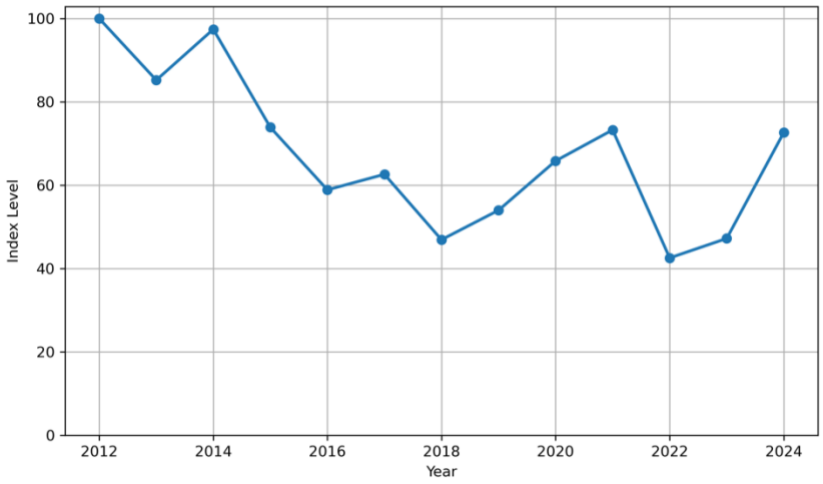
Table 4.4.: Regression Coefficients of The Year Dummy Variable

	Coef.
2013	-0.1599 (0.195)
2014	-0.0261 (0.813)
2015	-0.3026 *** (0.005)
2016	-0.5293 *** (0.000)
2017	-0.4680 *** (0.000)
2018	-0.7564 *** (0.000)
2019	-0.6162 *** (0.000)
2020	-0.4179 *** (0.004)
2021	-0.3110 *** (0.010)
2022	-0.8540 *** (0.000)
2023	-0.7501 *** (0.000)
2024	-0.3197 *** (0.003)

Note: the coefficients reflect the main effect of the sale occurring in a certain year on log prices within the dataset. Coefficients are presented above with the related p-value presented in brackets below. Significance levels: $p < 0.1$ ∗, $p < 0.05$ ∗∗, $p < 0.01$ ***.

Similar to the region effects discussed above, the coefficients can be interpreted as the general effect of a sale occurring in a certain year on log prices relative to the base year 2012, which dummy was omitted. It is immediately apparent that most variables are significantly negative apart from 2013 and 2014, whose coefficients are negative yet insignificant. Therefore, the results indicate that the sales in our dataset stemming from the period between 2015 and 2024 command lower average prices than those conducted in 2012. Although the limited scope of our dataset restricts generalization to the Hong Kong art market as a whole, these results would support an observation that the market has not yet recovered since it's 2011-2012 correction. The relative underperformance peaked during the year 2022, when sales prices were 57.43% lower than in 2012 controlling for all other characteristics. From an enhanced perspective, the data exhibit a period of recovery between 2018-2021, indicating that the peak in underperformance observed in 2022 can be attributed to the Covid-19 pandemic. To visualize the overall price development in the dataset, figure 4.3 presents the plotted price index of the main year effects computed by applying the formula discussed in the methodology section on the coefficients of the year dummy variables.

Figure 4.3: Price Index, Main Year Effects



Note: index levels were computed using the coefficients of the year dummy variables derived from Regression 1 according to the formula discussed in the methodology section 3.3.1.

4.2.2 Interaction Effects Between ARO and Time (Regression 2)

In this section the focus will be expanded beyond overall market developments, by providing an indebt analysis of price developments within AROs and comparing these on an absolute level. As outlined in the methodology section, the price developments were derived from the results of a regression including year-region of origin interaction terms. Similar to Regression 1 a White-test was first applied to assess the presence of heteroskedasticity in residuals. The null hypothesis of no heteroskedasticity can again be rejected based on the p-values presented in Table E2 of appendix E and the model will be applied with robust standard errors. The coefficients of these interaction terms, presented in Table 4.5 below, represent the average change in log price if an artwork made by an artist from a certain region was sold in a particular year. However, an important note is that the values represent within region price developments, since for each region the 2012 variable was omitted. Therefore, no absolute comparisons between groups can be made at this point.

Table 4.5: Coefficients off the Region-Year Interaction Terms

	Africa	Asia	China and HK	Europe	Latin America	Northern America	Oceania
2013		-0.5918 *** (0.000)	0.9453 *** (0.000)	0.5922 *** (0.005)		-2.3158 *** (0.000)	
2014		-0.2559 ** (0.044)	0.6733 *** (0.000)	0.9675 *** (0.000)		-1.0219 *** (0.001)	
2015		-0.2605 ** (0.022)	0.2712 ** (0.014)	1.2302 *** (0.000)		-0.4052 ** (0.010)	
2016		-0.6716 *** (0.000)	0.3043 *** (0.008)	0.7921 *** (0.004)	0.3420 (0.976)	-0.9339 *** (0.000)	
2017		-0.5802 *** (0.000)	0.3485 *** (0.002)	0.4535 * (0.063)	0.2463 (0.888)	-0.4267 (0.150)	
2018		-0.7684 *** (0.000)	-0.0060 (0.957)	0.9547 *** (0.000)	0.5829 (0.822)	-0.4560 (0.142)	
2019		-0.6832 *** (0.000)	0.1087 (0.312)	0.3939 *** (0.005)	0.1180 (0.943)	-0.4024 ** (0.050)	
2020	0.4685 (0.927)	-0.2735 ** (0.045)	0.2539 ** (0.043)	0.2721 * (0.060)	1.8924 ** (0.026)	-0.1437 (0.418)	
2021	0.9301 *** (0.000)	0.3989 *** (0.006)	-0.1144 (0.318)	0.7060 *** (0.000)	0.9239 (0.266)	0.7041 *** (0.000)	
2022	0.4164 (0.415)	-0.7410 *** (0.000)	-0.3143 *** (0.008)	0.0012 (0.994)	1.0332 ** (0.045)	0.0504 (0.786)	2.6039 *** (0.001)
2023	-0.1978 (0.675)	-0.4166 *** (0.000)	0.0659 (0.530)	-0.4191 *** (0.002)	-0.6563 ** (0.021)	-0.4979 *** (0.000)	-0.7010 (0.430)
2024	0.2426 (0.665)	-0.0365 (0.739)	0.1078 (0.290)	0.2420 * (0.063)	0.3834 (0.482)	0.1654 (0.355)	-0.4699 (0.640)

Note: Coefficients were derived from Regression 2 and reflect the average change in log price if an artwork by an artist from a certain region, presented in the columns, was sold in a certain year, presented in the rows. Coefficients are presented above with the related p-value presented in brackets below. Significance levels: $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***.

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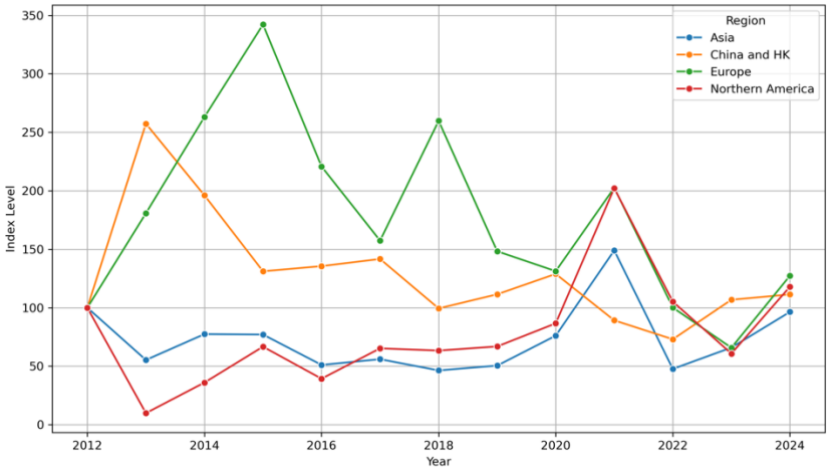
The coefficients indicate that the overall underperformance in respect to 2012 established in Regression 1, are not necessarily reflected in the price developments of the different regions. Artworks by both Chinese and European artists exhibit strong initial price increased and a general outperformance compared to 2012 for most years in the sample period. The outperformance reaches a peak in 2013 for Chinese art and in 2014 for European art, at an average increase in prices of 159.39% and 242.19% respectively. Considering the market adjustment between 2011 and 2012 (Wu, 2019), these finding would suggest the market for contemporary Chinese and European art rebounded shortly after, although no source is available to compare these to pre-correction price levels. On the other hand, Asia and North America both reflect significant negative price development compared to the base year, aligning with the general development of the market established in Regression 1. When assessing the results, the four AROs could be subdivided into two groups characterized by relative underperformance, Asia and North America, and outperformance, Europe and China. Interestingly, both groups would then contain an Asian and a Western region, eliminating a conclusion on a general preference for artworks by Asian or Western artists. To further visualize the results of the regression, these were transformed into price indices and plotted in figure 4.4 below.

Figure 4.4: Price Indices, Categorized by ARO



Note: index levels were computed using the coefficients of the year-region of origin interaction terms derived from Regression 2 according to the formula discussed in methodology section 3.3.1.

A first general observation is that, similar to the sample prices, all AROs experience a decline in 2022, likely caused by the Covid-19 pandemic and its thorough restrictions in China. As discussed before, the plot and table presented above pose some challenges for comparison between AROs, since these reflect the relative performance within AROs compared to the base year, 2012. To circumvent this, a new base level can be computed for each of the different AROs, based on their relative performance in the year 2012. Therefore, a regression is performed on a subset of all observations from 2012. The coefficients of the ARO-dummy variables then reflect their relative starting performance compared to artworks by European artists. The results of this regression are presented in table 4.6 below.

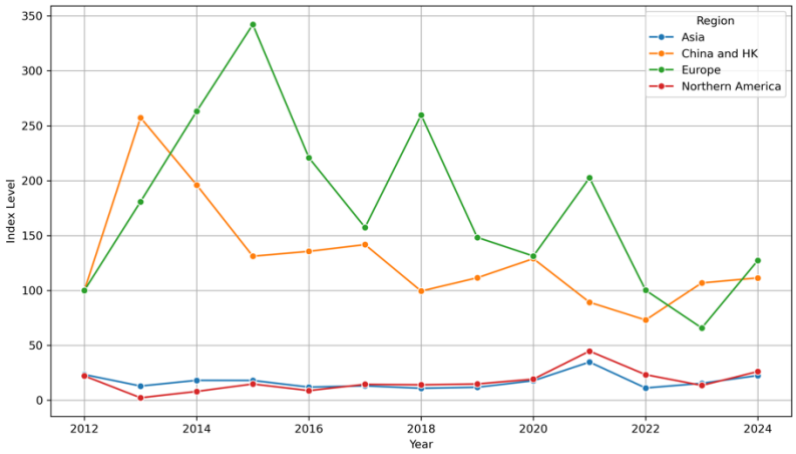
Table 4.6: Coefficients of the ARO-Dummy Variables in 2012 Subset

	Coef.
Asia	-1.4570 *** (0.000)
China and HK	-0.0930 (0.763)
North America	-1.5102 *** (0.000)

Note: If applied to the formula outlined in Section 3.3,1, these reflect the new base performance of artists region of origin compared to artworks by European artists. Coefficients are presented above with the related p-value presented in brackets below. Significance levels: $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***.

Similar to the main effects derived from Regression 1, Asia and North America yield significantly negative coefficients in the 2012 subset. Indicating an underperformance of artworks by artist from these regions compared to artworks by European artists in 2012. Correspondingly, their price indices will experience a downward shift, as the coefficients will be used to construct the new base value. Conversely, the 2012 coefficient for China is not statistically different from zero. Therefore, it can be interpreted that the base value for artworks by Chinese artists does not deviate from that for artworks by European artists, and the coefficients presented in Table 4.5 can be used to compare the relative performance between artworks by Chinese and European artists. By doing so, it can be observed that the coefficients for Europe exceed those for China in 5 out of the 6 years between 2012 and 2024, where both yield a significant coefficient. This observation indicates that the price of an artwork by a European artist commanded a higher average price in those years compared to artworks by Chinese artists. When assessing the home bias from a price development perspective, it can, therefore, be interpreted that our dataset might be biased in favour of artworks by European artists rather than Chinese artists. Notably, this observation does not align with the positive coefficient related to the main effect of Chinese artist origin that resulted from regression one, which suggested that artworks by Chinese artists command higher average prices than those by European artists. Reflecting on this finding, it could be inferenced that the coefficient derived from Regression 1 is inflated as a result of high prices and a large number of observations for artworks by Chinese artists in the first years of the sample period, supported by the information in figure 4.4 and 4.2 respectively. To enable the comparison between all artists regions of origin, the new base levels are applied resulting in the absolute price indices presented in figure 4.5 below.

Figure 4.5: Absolute Price Indices, Categorized by ARO



Note: Index levels were computed using the coefficients of the year dummy variables derived from Regression 1, which were added to the base coefficients for the year 2012, according to the formulas discussed in the methodology section 3.3.1. The 2012 coefficient for China was manually set to 0 in line with it statistical insignificance.

When assessing the plotted price indices, the distinction between the under- and outperforming groups, mentioned above, becomes even more apparent. The plot suggests that artworks by Asian and North American artists structurally underperform compared to those by Chinese and European artists. However, it must be noted that these conclusions should be made cautiously, as several of the coefficients displayed in Table 4.5 are not statistically significant. Regarding the hypotheses, the analysis discussed in this subsection –focusing on distinct AROs– provided valuable insights, contradicting hypothesis 1, supporting hypothesis 2 and complicating the interpretation of hypothesis 3. As mentioned before, the results suggest that the dataset is biased in favour of artworks by European artists rather than Chinese artists when approached from a price development perspective, contradicting hypothesis 1. However, it must be acknowledged that average prices for artworks by Chinese artists were higher in most years of the sample period compared to the base year, indicating a persistent appreciation for domestic art. In line with hypothesis 2, the average prices of artworks by Asian artists consistently underperform compared to those by Chinese artists. Based on the frameworks established in the literature, which suggest that buyers in emerging economies prefer domestic art (Codignola, 2018; Renneboog & Spaenjers, 2013; Steiner et al., 2013; Velthuis, 2012), Hong Kong serves as the marketplace for many Asian countries (Poposki & Leung, 2022), and draws in collectors from these different countries, it could be argued that the results indicate lower average spending by not-Chinese Asian collectors than by Chinese collectors.

The interpretation of hypotheses 3 is complicated by the significant difference in price performance between artworks made by European and American artists. On the one hand, the price development of artworks by European artists supports the hypothesis through an overperformance compared to those made by Chinese artists, while artworks by American artists contradict the hypothesis through a strong underperformance compared to those made by Chinese artists. Although the literature generally discusses that demand and supply of Western art have been increasing (Wu, 2019), evidence from the current dataset suggests that a clear distinction exists between the regions of origin classified as Western. To provide a clear and well-substantiated answer to the research questions at hand, the results of the last stage of the analysis will be discussed in the following subsection, providing insights into the sensitivity to different sources of macroeconomic development.

4.3 Economic Fundamentals

As discussed in the methodology chapter, section 3.3.2, the coefficients derived from regression one and two can be transformed into log returns, reflecting the overall market and ARO-specific price developments, respectively. In this section, the interconnectedness between the log returns and macroeconomic trends will be assessed. However, before proceeding to this stage of the analysis, it is worthwhile to assess the descriptive statistics of returns, as these could offer insights into their overall stability and distribution.

4.3.1 Descriptive Statistics of Returns

Similar to the previous stage, log returns are transformed to real returns before being discussed according to the formula outlined in methodology section 3.3.2. The descriptive statistics of log returns are presented in Table 4.7 below.

Table 4.7: Descriptive Statistics of Sample and ARO Log Price Returns

	N	Mean	Median	Std. Dev.	Min.	Max.
Sample	11	-0.027	0.083	0.272	-0.543	0.430
Regional						
Asia	11	-0.003	0.088	0.509	-1.140	0.672
China and HK	11	0.009	0.038	0.383	-0.402	0.945
Europe	11	0.020	0.070	0.499	-0.705	0.661
Northern America	11	0.014	0.156	0.949	-2.316	1.294

Note: Columns represent mean, median, standard deviation, minimum and maximum of log prices for each ARO represented in the rows.

An initial observation is that region mean returns appear largely positive, while the sample mean return is negative. This discrepancy can be explained by the fact that the sample mean return is based on equal weights for the years in our sample. In a dataset where the distribution of sold lots per ARO fluctuates over time, this can cause disproportionate contributions to overall returns by some regions. Specifically, if a region experiences negative returns during a period and simultaneously accounts for a large sales volume, it can drag down the returns over that year.

Regarding the mean returns, the data indicates that artworks by European artists command the highest average returns (2,02%), followed by North American (1.41%), Chinese (0.09%) and Asian (-0.03). Notably, Asian is the only artists region of origin to average a negative return. Furthermore, an assessment of the standard deviations (σ) sheds light on the stability of returns, as these reflect the

average deviation from mean returns and are often used as a proxy for volatility. The standard deviations indicate that artworks by Chinese artists ($\sigma \approx 0.38$) have the most stable price development and could, therefore, be considered the least volatile within the dataset. Artworks by European ($\sigma \approx 0.499$) and Asian ($\sigma \approx 0.509$) artists exhibit elevated volatility, while log returns on artworks by North American artists are considerably more volatile than the other regions ($\sigma \approx 0.95$). Compared to the findings in the literature the standard deviations are considerably higher, as for example Renneboog and Spaenjers (2014) compute a maximum standard deviation of 0.21 in their analysis across 13 European countries. However, it must be noted that the higher volatilities are likely a result of the limited timeframe of the current dataset, as Renneboog and Spaenjers (2014) examine a period of 36 years. The statistics also reveal that for most AROs returns are skewed to the left, indicated by a median return exceeding the mean return. This suggests occasional large negative returns, such as in 2022 following Covid-19, decrease mean returns, despite positive returns in general.

The volatility of price developments in different AROs, expressed through the standard deviation, also provide a basis to make inferences into consistency of demand which can be helpful to answer the hypothesis. The relatively low volatility for China can be interpreted as the result of a consistent demand that increases price stability. Combined with the observations on sales volumes and price distributions from section 4.1, one could argue that a stable demand exists for artworks by Chinese artists reflected in a broad market segment, supporting Hypothesis 1. This conclusion also applies to the market for artworks by Asian artists, supporting Hypothesis 2. Regarding the market for artworks by Western artist, a distinction between those made by European and American artists again arises. The positive mean return and moderate volatility of the former region suggest a relatively stable demand resulting in a steady price increase over time. On the other hand, the strong volatility observed suggests demand for artworks by American artists experiences stronger instabilities. Therefore, these findings again complicate the interpretation of Hypothesis 3.

4.3.2 Shapley Value Regressions

As outlined in the methodology section, Shapley value regressions consider all permutations of variable addition in a regression model to determine variables' average contribution to R-squared. In the current research, the method is applied to examine the extent to which economic developments stemming from different regions can explain developments in art prices. The regions under consideration, with regards to macroeconomic developments, are China, EAP and the rest of the world. To mitigate overlap within their GDP-growth rates, these were orthogonalized according to the regressions discussed in methodology section 3.3.2. Heteroskedasticity tests were not applied to the Shapley regression, as R-squared is not affected by potential variance in residuals.

A general remark in relation to the results of the Shapley regressions is that the ability to draw robust conclusions on the hypotheses is limited by the volatile and relatively short sample period in

the current analysis. As it aims to examine how price developments in the dataset reflect economic developments, a longer period under examination would provide more stable and generalizable results. For example, Renneboog and Spaenjers (2014) use a period of 36 years, containing multiple economic cycles and averaging out the effects of short-term fluctuations. Conversely, the period under consideration in this context could be regarded as quite volatile. Not only does it include the Covid-19 pandemic, which caused significant short-term fluctuation in the market, reflected in the sales volumes and price indices (see Sections 4.2 and 4.1, respectively), but it also resembles a period of recovery following an overall market boom (Poposki & Leung, 2022; Wu, 2019). Therefore, R-squared values should be interpreted cautiously, as they may not reflect long term sensitivity of returns to macroeconomic developments. The results of the first Shapley value regressions, which incorporated the sample returns derived from Regression 1 as the dependent variable, are presented in Table 4.8 below.

Table 4.8: Shapley Regressions R-Squared Values, Sample Returns

	R^2
World	0.166
EAP	0.161
China	0.215

Note: The R-squared values in the second column reflect the average contribution to model fit of the orthogonalized residual GDP-growth rates of the regions in the first column.

The R-squared values for the distinct sources of GDP-growth reveal that Chinese GDP-growth holds the largest explanatory power over the overall returns in our dataset at an R-squared of 0.215, followed by world GDP-growth, 0.166, and EAP GDP-growth, 0.161. As R-squared reflects the proportion of variance in the dependent variable that is explained by the independent variable, the results indicate that 21.5%, 16.6% and 16.1% of variance in the sample log returns is explained by GDP-growth in China, the world and EAP, respectively. Following the reasoning of Renneboog and Spaenjers (2014) it could be inferred that overall returns in the dataset are set by economic developments across the three reasons, with Chinese economic development being the main contributor to explanatory power. This finding corresponds to the portrayal of Hong Kong as the primary marketplace for Chinese collectors in the context of contemporary art (Wu, 2019) and affirms the hypothesized home bias. Despite Hong Kong's role as a hub city for the Asian art market, it seems the market is related closer to international economic developments than Asian, although the difference is marginal. Besides the sample returns, Shapley value regressions were also performed on the returns on artwork from the four distinct regions of origin, whose results are presented in Table 4.9 below.

Table 4.8: Shapley Regressions R-Squared Values, ARO Returns

	World R^2	China R^2	EAP R^2	Total R^2
Asia	0.240	0.194	0.229	0.663
China and HK	0.029	0.097	0.055	0.181
Europe	0.343	0.056	0.134	0.532
Northern America	0.061	0.019	0.042	0.122

Note: The R-squared values in the second column reflect the average contribution to the model fit of the orthogonalized GDP-growth rates of the AROs in the top row.

The R-squared values derived from the Shapley regressions on the AROs returns provide more detailed insights into the macroeconomic development that may underly these returns. A first interesting and arguably expected observation is that log returns on artworks by Chinese artist are linked closest to developments in Chinese GDP, whereas international and regional development hold limited explanatory power. However, it must be noted that the GDP-growth rates generally have little explanatory power over these returns, with approximately 81.9% of variance in returns left unexplained. Therefore, it could be concluded that other internal market dynamics drive demand and, in turn, prices for Chinese contemporary art. Based on the literature, a likely contributor is the branding strategies employed by major auction houses to foster the market for Chinese contemporary art (Preece, 2014). This observation neither affirms nor contradicts the hypothesized home bias, as it only highlights the limited explanatory power of economic developments in China. A similar conclusion can be drawn in regard to the returns on artworks by North American artists. The price developments in artworks by European artists are best explained by international economic development, at 34.3%. This could be regarded as a result of the global market for European art, where prices are set internationally and respond to worldwide economic developments. Similarly, the data suggests that variation in Asian art prices are linked closest to worldwide economic developments, supporting the notion prices are set on a global stage rather than on regional markets, although the difference is marginal at 1.1% additional variance explained.

In the following subsection, the analysis will be concluded by performing interquartile regressions as a robustness check, to observe whether the linear relationship, discussed in section 3.2.1 of this chapter, varies across different ranges of log price.

4.4 Robustness Check: Quartile Regressions

This section discusses the results of the quartile regressions, which were performed with the same model specifications as Regression 1 (see section 3.2.1). Quartile regressions, a type of quantile regressions, are commonly used as a robustness check to assess whether the linear relationship between the dependent and independent variables is consistent across different ranges of the dependent variable (Vosilov, 2015). In the context of the current analysis, the results will indicate whether the CoO-effects and possible home bias in prices very across different segments of the market. This is particularly relevant, as the literature suggests that artworks traded in the global market generally belong to the highest segment, especially in global market hubs such as London, New York and Hong Kong (Smith, 2011; Velthuis, 2012). Artworks in higher segments have also been shown to be less susceptible to CoO effects and home bias is generally less relevant (Renneboog & Spaenjers, 2014; Vosilov, 2015), as these do not experience the same cultural discount caused by a lack of familiarity as artworks being traded in lower segments of the market (Schulze, 1999).

To run the regression, the dataset was first divided into 4 equal quartiles based on the value of the log price variable, and the model specified in Regression 1 was applied to the observations in both the top and bottom quartile. To ensure the validity of coefficient estimations, a White-test for heteroskedasticity was performed on the bottom and top models, with the results presented in Tables E3 and E4 of Appendix E, respectively. Consulting the results, implies that heteroskedasticity is present in both models and these will, therefore, be applied using robust standard errors. The coefficients of the ARO dummy variables are presented in Table 4.9 below along with the corresponding coefficients of Regression 1 to allow for easy comparison. An overview of the estimated of all variables is provided in Table D2 of Appendix D. Furthermore, to aid the interpretation of some coefficients a table containing the number of observations for the bottom and top quartile, categorized by ARO, is provided in Appendix C, Table C5.

Table 4.9: Coefficients ARO Variables, Regression 1 and Quartile Regressions

	Africa	Asia	China and HK	Latin America	Northern America	Oceania
Main effects (Regression 1)	0.2682 (0.233)	-0.5255 *** (0.000)	0.1446 ** (0.031)	0.2748 (0.282)	-0.2736 *** (0.000)	0.6534 (0.325)
Bottom Quartile	0.0850 (0.701)	0.0722 (0.253)	0.1810*** (0.003)	0.3732* (0.067)	0.0607 (0.288)	-0.2032 (0.257)
Top Quartile	0.1022 (0.499)	-0.1717** (0.022)	0.4727*** (0.000)	0.2911 (0.269)	0.0068 (0.942)	1.5427** (0.047)

Note: Coefficients were derived from Regression 1 and Quartile regressions and reflect the average change in log price if an artwork by an artist from a certain region estimated in the sample, bottom quartile and top quartile. Coefficients are presented above with the related p-value presented in brackets below. Significance levels: $p < 0.1$ ∗, $p < 0.05$ ∗∗, $p < 0.01$ ***.

A general observation is that the coefficients of the variable related to North American artists, are insignificant in both the bottom and top quartile in contrast to the main model and cannot be interpreted. Interestingly, Oceania exhibits a strong significantly positive coefficient in the top quartile (1.5427), indicating these outperform artworks by European artist by 367.72% on average in this price range. However, as only 3 observations in the top quartile correspond to artworks by Oceanian artists, these results should be interpreted with caution, as they may reflect the results of three exceptional sales rather than consistent market trends. Conversely, the results indicate that artworks by Latin American artists significantly outperform those by European artists in the bottom quartile, on average by 45.24% controlling for all other factors.

Regarding possible inconsistencies in the model, no reversal in signs of coefficients occur, indicating that there are no inconsistencies in the directions of the effects estimated in the three models. However, a notable inconsistency can be observed in the strength of coefficients between the main and top quartile model, particularly in the coefficients for Asia and China. The coefficients for Asia (-0.5225, dataset, and -0.1717, top quartile) suggest artworks by Asian artists' relative performance compared to artworks by Europeans is 42.02% better in the top quartile compared to the sample. Meanwhile, China's coefficients (0.1446, dataset, and 0.4727, top quartile), indicate an improvement in relative performance of 38.08% compared to Europe when shifting from the sample estimation to the top quartile. These results indicate a strong inconsistency in the model. A review of all control variables incorporated in the model revealed the likely cause, namely the rank variable used as a proxy for artists reputation. This inference is based on an assessment of the distribution of artists from each region across ranks, presented in Table C4 of Appendix C. Consulting the table, reveals that 24.02% of European artists receive one out of the three proposed ranks, whereas 0.88% of Chinese and 3.33% of Asian artists receive a rank. Therefore, it could be interpreted that the rank dummy variables control for reputational factors for European artists, but not for Asian and Chinese artists, inflating the coefficients of the corresponding variables. A general interpretation could be that Artfacts.com is a European database and unconsciously reflects a bias towards Western preferences. Alternatively, it could be inferred that reputations of Asian and Chinese artists are based on different domestic value systems which are not reflected in the ranking.

Altogether this notion not only forms a major limitation to the top quartile model, but also to Regression 1 and 2 discussed in section 4.2.1 and 4.2.2. Therefore, the expectations on the hypothesis should be adjusted accordingly, as the coefficients corresponding to Asian and Chinese artists and their interaction terms are most likely inflated. First, we conclude that Artworks by European artists tend to outperform those by Chinese artists, partially supporting H2 and contradicting H1. Second, neither supporting nor contradicting hypotheses but still notable, artworks by North American artists presumably outperform those by Asian artists. Regarding the relative performance between artworks made by Chinese and North American artists, no conclusion can be drawn without proper adjustment to the model specification.

Moreover, the results of the quartile regressions highlight a key advantage of the model used in Regression 2, namely that the use of interaction terms is more applicable in situations where limited data is available. A comparison between Table D1 (presenting the results of Regression 2) and D2 (presenting the results of the quartile regressions) of Appendix D, reveals that the quartile regressions yield considerably less significant coefficients than Regression 2. This outcome could most likely be attributed to the different number of observations the regression are applied to, as the formed estimates control coefficients in a unified model applied to the entire dataset, while the latter regressions are run on subsets containing a quarter of the observations. Being able to apply a regression to a larger subset improves efficiency in coefficient estimations and, therefore, incorporating interaction terms could be seen as a viable option in situations where limited data is available. This observation supports the validity of the model specification. In the following chapter these and other insights on the hypotheses will be formulated into a final answer to the research question.

5. Conclusion

Overall, this research confirms Hypothesis 1, concluding that a home bias is present among buyers in the Hong Kong market for contemporary art, reflected in a consistent preference for artworks made Chinese artists. Drawing upon existing literature, the effect of home bias was assessed through three economic measures commonly applied, namely relative price performance, descriptive statistics and macroeconomic sensitivity.

While an initial review of the former appeared to confirm the presence of a home bias in the dataset, a closer examination considering the development of prices over time contradicted this finding. Specifically, the analysis showed that the price development for artworks by European artists generally exceeds that for artworks by Chinese artist. For this conclusion, the use of a hedonic pricing model incorporating interaction terms was particularly insightful, as it provided a more detailed review on the development of ARO-specific price effects over time. This finding highlights the importance of providing a more detailed analysis on price developments rather than main price effects, as fluctuations in trading volumes over time would have led to overgeneralised conclusions. In contrast, the market for modern and contemporary art by Chinese artists consistently represents a dominant market share and exhibits the lowest volatility in returns. Furthermore, the overall market is shown to be related closest to domestic economic developments, indicating that the prices in the Hong Kong market for contemporary art are set by economic development in China. A combination of the three factors reflects a stable market rooted in the economic development of the domestic region. When assessed through the definition of home bias provided in the literature, stating that a home bias is reflected in a general preference for domestic goods, it could be argued that a large stable market is more meaningful than one commanding the highest prices. In relation to Asian art a similar conclusion can be drawn, as stable supply and relatively low volatility can be observed. However, it must be noted that prices were considerably lower for this ARO than expected based on by the literature's portrayl of Hong Kong as the art market hub of Asia.

Regarding Western artworks, a significant region of origin effect is reflected in the average prices of both European and American artists. Artworks made by European artists convincingly outperformed the other regions, especially in light of the artist rank serving as relatively robust control for the reputation of European artists in comparison to artists from other regions. Based on the literature, a likely reason behind the ARO's relative outperformance is that a large proportion of these artworks is sold in the highest segment of the market. Therefore, prices of these artworks are set in the global market unaffected by regional fluctuations in demand, affirmed by the high explanatory power of global GDP growth over the returns in this ARO. This perspective also allows for the re-evaluation of home bias based on prices. If set internationally, prices for artworks by European artists are not necessarily driven by local demand but rather by global demand, therefore, not reflecting a local

preference for these artworks but rather a worldwide interest. Moreover, a significantly negative country of origin effect can be observed for artworks made by American artists, indicating a strong distinction between the two regions this research classifies as Western. No concrete evidence of a potential reason behind this can be found in the literature, besides a possible appreciation of European art based on historic ties or consumption patterns influenced by conspicuous motivations. Although prices deviate, it can be concluded that the market for Western artworks is gaining traction based on the increasing number of lots sold between 2012 and 2024.

The model specification used to derive at the results, incorporating interaction terms, is considered to be a valid alternative to the methods observed in the literature, which are based on distinct subsets regressions. The use of interaction terms facilitates the comparison of variables across AROs and is applicable in situations where limited data is available. Furthermore, compared to the latter it is considered to be more applicable in the context of a research design with a smaller scope, for example within a single market or auction house. Subset analysis applied on a transnational scale, could still be valid, as value systems could presumably vary across countries reflected in inconsistent control variable estimations across subsets. However, in a single market or market segment this is unlikely, and an analysis based on interaction terms should be considered. That said, the analysis also faces considerable limitations. First off, the sample period under consideration was arguably volatile, therefore, in future research a long-term perspective should be applied in order to make more robust conclusions on the development of prices and the economic sensitivity of artwork returns. The main limitation however is the proxy used to examine artist reputation. The variable derived from Artfacts.com is likely unconsciously biased towards Western artists, as it is based on measurements reflecting Western value systems such as artist exhibition history and position within the cultural ecosystem. It could be argued that these measurements are not applicable in the Eastern market, which reflects value systems based on conspicuous and investment driven motivations. Therefore, in future research on Asian art markets a more comprehensive proxy of artist reputation should be applied, approached from the perspective of Eastern value systems.

Regarding further recommendations for future research on home bias, a more thorough examination of the thematic uses in modern and contemporary art could provide valuable insights into the exact characteristics that appeal to buyers in the globalized market. The literature outlined that contemporary art is not necessarily bound by traditional themes, and explores themes on a spectrum ranging between local and traditional, either contrasting, combining, or transcending these altogether. Therefore, an analysis of the valuation of artworks positioned at different points on this spectrum could be valuable to gain insights into how much art consumers value traditional themes in artworks that are increasingly being made with a global audience in mind.

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Appendix A: Artworks

Figure A1: Jean-Michel Basquiat's *Sabado por la Noche* (1984)

Note: Christie's (2025)

Figure A2: Wang Guangyi's *Great Criticism – Coca Cola*, 1994

Note: A quintessential example of Political Pop's artistic style, combining traditional Maoist and American themes. Source: Tate (n.d).

Figure A3: Yue Minjun's *Execution*, 1995

Note: A quintessential example of Cynical Realism's artistic style, portraying indirect criticism on the political transition of China, specifically the Tiananmen square demonstrations, in a cynical matter. Source: Sotheby's (2007).

Appendix B: Data Preparation and Variable Descriptions

Table B1: Implications of Filtering Steps

	Deleted Observations	Remaining Observations
Start		10322
Removing sales before 2012 and in 2025.	1510	8812
Removing bought ins.	222	8590
Removing all rows for which medium entry did not contain 'on'.	582	8008
Removing all remaining three-dimensional entries.	431	7577

Note: Rows represent the filtering step and columns the corresponding number of removed and remaining observations.

Table B2: Technique Key Words

	Keywords
Acrylic	'acrylic'
Oil	'oil', 'aniline'
Lacquer	'lacquer', 'lacquers'
Watercolor	'watercolor', 'watercolor', 'gouache', 'water paint', 'batik dye', 'color', 'casein', 'indigo'
Ink	'ink', 'inkjet', 'calligraphy', 'marker pen', 'marker', 'pen', 'sepia'
Graphite	'graphite', 'pencil', 'carbon powder', 'charcoal', 'inkwash', 'ash', 'coloured pencils', 'carbon', 'caran'
Collage	'collage', 'book', 'hanji paper', 'envelopes', 'cyanotype', 'pinned'
Spray paint	'spray paint', 'aerosol', 'vinyl paint'
Ceramic	'enamel', 'mosaic', 'ceramic tiles', 'painted stone', 'painted stones'
Pigment	'pigment', 'stone pigment', 'Japanese pigment', 'Korean traditional pigment', 'mineral pigments', 'enamel', 'tempera'
Print	'screenprint', 'screenprints', 'lithograph', 'etching', 'drypoint', 'monotype', 'print', 'digital', 'ultrachrome', 'ipad', 'c-print', 'toner', 'xerox', 'printed', 'printing'
Gunpowder	'gunpowder', 'gun powder', 'lithographs'
Crayon	'crayon', 'conté crayon', 'wax crayon', 'pastel', 'oilstick'
Fabric	'thread', 'embroidery', 'stitching', 'fabric', 'cloth', 'denim', 'silkscreen', 'vinyl'
Resin	'resin', 'synthetic-resin paint', 'epoxy', 'gloss', 'alkyd', 'synthetic polymer paint'
Etching	'embossed', 'etching', 'etchings', 'woodcut', 'linocut'
Miscellaneous	'gold', 'glass beads', 'lead', 'flowers', 'chalk', 'blades', 'plastic blocks', 'glitter', 'silver', 'platinum', 'metallic'
Mixed media	'Mixed media', 'mixed medium', 'polyurethane paint and steel', 'flashe and neon', Presence of keywords related to more than one of the categories above.

Note: Some unknown techniques were verified through CASS Art (n.d.), an online art supply store.

Table B3: Support Key Words

	Keywords
Canvas	'canvas', 'canvasboard'
Linen	'linen'
Silk	'silk', 'silkscreen'
Paper	'paper', 'card', 'cardboard', 'parchment', 'vellum', 'paperboard', 'poster', 'envelope', 'newspaper', 'screen', 'photograph', 'showcard', 'book page', 'carton', 'kyro', 'papers', 'scroll', 'advertisement', 'magazine', 'cover', 'book', 'c-print'
Wood	'wood', 'wooden', 'plywood', 'hardboard', 'fiberboard', 'panel', 'board', 'Masonite', 'panels', 'pedestal', 'ply', 'skateboard', 'basswood'
Metal	'aluminum', 'metal', 'chrome', 'copper', 'bronze', 'iron'
Fabric	'fabric', 'cloth', 'cotton', 'tartan', 'jute', 'muslin', 'textile', 'hemp', 'satin', 'velvet', 'lame', 'burlap', 'calico', 'poplin'
Plastic	'plexiglass', 'polyester', 'dibond', 'frp', 'eva', 'plastic', 'drafting film', 'pvc', 'Plexiglas', 'fiberglass', 'fiber gloss', 'acetate'
Ceramic	'clayboard', 'ceramic tile', 'ceramic tiles', 'concrete'
Mixed Media	Presence of keywords related to more than one of the categories above.

Note: Some unknown supports were verified through CASS Art (n.d.), an online art supply store.

Table B4: Variable Descriptions

	Variable Name	Variable Type and Measurement	Categories
Artwork Characteristics			
Technique	Tech_[category]	Dichotomous: takes value 1 if an artwork's technique matches the category, 0 otherwise.	Acrylic, Lacquer, Watercolor, Ink, Graphite, Collage, Spray paint, Ceramic, Pigment, Print, Gunpowder, Crayon, Fabric, Resin, Etching, Miscellaneous, Mixed Media. Oil serves as reference.
Support	Sup_[category]	Dichotomous: takes value 1 if an artwork's support matches the category, 0 otherwise.	Linen, Silk, Paper, Wood, Metal, Fabric, Plastic, Ceramic, Mixed Media. Canvas Serves as reference.
Area	Area	Continuous, presented in M^2	n.a.
$Area^2$	$Area^2$	Continuous, presented in M^2	n.a.
Signed	Signed dummy	Dichotomous, takes value 1 if an artwork is signed, 0 otherwise	Signed. Not Signed serves as reference.
Sales Characteristics			
Year	yr_[category]	Dichotomous: takes value 1 if an artwork's year of sale matches the category, 0 otherwise.	All years in the period 2012-2024. 2012 serves as reference
Month	mon_[category]	Dichotomous: takes value 1 if an artwork's month of sale matches the category, 0 otherwise.	All months except February since no sales occurred. December serves as reference.
Auction House	ah_[category]	Dichotomous: takes value 1 if an artwork's auction house of sale matches the category, 0 otherwise.	Christie's, Phillips. Poly Auctions serves as reference.
Artist Characteristics			
Region of origin	reg_[category]	Dichotomous: takes value 1 if an artist's region of origin or second region of origin matches the category, 0 otherwise.	Africa, Asia, China and HK, Northern America, Latin America, Oceania. Europe serves as reference.
Reputation	rank_[category]	Dichotomous: takes value 1 if an artist's ranking matches the category, 0 otherwise	Top 50, Mid tier, High tier. Not ranked serves as reference.
Has passed	Has passed	Dichotomous: takes value 1 if an artist has passed, 0 otherwise.	Has Passed. Alive serves as reference.
Subject Variable			
Year-region interaction term	reg_[region category]_yr_[year category]	Dichotomous: takes the value 1 if an artwork sales year matches year category and artist's region of origin matches the region category, 0 otherwise.	Region categories: Africa, Asia, China and HK, Europe, Northern America, Latin America, Oceania. Year categories:

Appendix C: Descriptive Statistics

Table C1: Sales per Year, Categorized by Region of Origin

	Africa	Asia	China and HK	Europe	Latin America	Northern America	Oceania	Total
2008	0 (0.0%)	181 (60.94%)	99 (33.33%)	14 (4.71%)	0 (0.0%)	3 (1.01%)	0 (0.0%)	297
2009	0 (0.0%)	222 (60.82%)	108 (29.59%)	24 (6.58%)	1 (0.27%)	10 (2.74%)	0 (0.0%)	365
2010	0 (0.0%)	214 (62.21%)	106 (30.81%)	20 (5.81%)	0 (0.0%)	4 (1.16%)	0 (0.0%)	344
2011	0 (0.0%)	142 (50.71%)	125 (44.64%)	13 (4.64%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	280
2012	0 (0.0%)	74 (29.37%)	151 (59.92%)	24 (9.52%)	0 (0.0%)	3 (1.19%)	0 (0.0%)	252
2013	0 (0.0%)	136 (35.32%)	176 (45.71%)	56 (14.55%)	1 (0.26%)	15 (3.9%)	1 (0.26%)	385
2014	0 (0.0%)	156 (30.29%)	312 (60.58%)	35 (6.8%)	0 (0.0%)	12 (2.33%)	0 (0.0%)	515
2015	0 (0.0%)	199 (33.33%)	310 (51.93%)	45 (7.54%)	0 (0.0%)	43 (7.2%)	0 (0.0%)	597
2016	0 (0.0%)	223 (37.04%)	301 (50.0%)	41 (6.81%)	1 (0.17%)	36 (5.98%)	0 (0.0%)	602
2017	1 (0.15%)	262 (38.93%)	303 (45.02%)	60 (8.92%)	4 (0.59%)	43 (6.39%)	0 (0.0%)	673
2018	0 (0.0%)	304 (36.49%)	373 (44.78%)	91 (10.92%)	3 (0.36%)	62 (7.44%)	0 (0.0%)	833
2019	0 (0.0%)	462 (36.18%)	426 (33.36%)	196 (15.35%)	10 (0.78%)	183 (14.33%)	0 (0.0%)	1277
2020	1 (0.11%)	276 (29.9%)	376 (40.74%)	143 (15.49%)	3 (0.33%)	124 (13.43%)	0 (0.0%)	923
2021	13 (2.3%)	108 (19.15%)	261 (46.28%)	80 (14.18%)	4 (0.71%)	98 (17.38%)	0 (0.0%)	564
2022	18 (2.31%)	166 (21.28%)	278 (35.64%)	163 (20.9%)	12 (1.54%)	137 (17.56%)	6 (0.77%)	780
2023	16 (1.42%)	334 (29.61%)	403 (35.73%)	188 (16.67%)	14 (1.24%)	169 (14.98%)	4 (0.35%)	1128
2024	14 (1.1%)	392 (30.94%)	427 (33.7%)	254 (20.05%)	17 (1.34%)	160 (12.63%)	3 (0.24%)	1267
2025	1 (0.33%)	119 (39.14%)	60 (19.74%)	79 (25.99%)	5 (1.64%)	39 (12.83%)	1 (0.33%)	304

Note: Distributions reflect raw dataset, containing 10322 observations. Absolute value is presented above with the distribution of the total sales of the year presented below.

Table C2: Sales per Auction House, Categorized by Region of Origin

	Africa	Asia	China and HK	Europe	Latin America	Northern America	Oceania
Christie's	8 (0.12%)	2711 (39.16%)	3128 (45.18%)	731 (10.56%)	20 (0.29%)	323 (4.67%)	2 (0.03%)
Phillips	40 (1.66%)	780 (32.41%)	422 (17.53%)	527 (21.89%)	40 (1.66%)	585 (24.30%)	13 (0.54%)
Poly Auctions	16 (0.78%)	479 (23.3%)	1045 (50.83%)	268 (13.04%)	15 (0.73%)	233 (11.33%)	0 (0.0%)

Note: Distributions reflect raw dataset, containing 10322 observations. Absolute value is presented above with the distribution of the total sales of the auction house presented below.

Table C3: Sales for Bottom and Top Quartile, Categorized by ARO

	Africa	Asia	China and HK	Europe	Latin America	Northern America	Oceania
Bottom Quartile	10 (17.86%)	674 (25.37%)	995 (26.99%)	173 (14.91%)	14 (23.33%)	162 (20.35%)	4 (28.57%)
Top Quartile	22 (39.29%)	603 (23.49%)	888 (21.67%)	479 (41.29%)	24 (40.00%)	205 (25.75%)	3 (21.43%)

Note: Absolute value is presented above with the distribution of the total sales of the specific ARO presented below.

Table C4: Artist per Region of Origin, Categorized by Rank

	Top 50	High-tier	Mid-tier	Not ranked
Africa	0 (0.00%)	2 (6.06%)	5 (15.15%)	26 (78.79%)
Asia	2 (0.27%)	12 (1.60%)	11 (1.47%)	725 (96.67%)
China and HK	1 (0.15%)	1 (0.15%)	4 (0.59%)	674 (99.12%)
Europe	9 (3.80%)	24 (10.12%)	29 (12.23%)	175 (73.84%)
Latin America	0 (0.00%)	1 (5.56%)	2 (11.11%)	15 (83.33%)
Northern America	7 (3.06%)	16 (6.99%)	32 (13.97%)	174 (75.98%)
Oceania	0 (0.00%)	0 (0.00%)	0 (0.00%)	4 (100.00%)

Note: Absolute value is presented above with the distribution of the total artist originating in a specific region presented below.

Appendix D: Additional Regression Output

Table D3: All Regression Results

	Regression 1	Regression 2
constant	13.0903 ***	12.3049 ***
	(0.000)	(0.000)
Painting Variables		
tech_acrylic	-0.1994 ***	-0.1711 **
	(0.000)	(0.002)
tech_ceramic	-0.5197	-0.4546
	(0.221)	(0.277)
tech_collage	0.7900	0.7350
	(0.465)	(0.491)
tech_crayon	-0.4854 **	-0.3884 *
	(0.036)	(0.097)
tech_etching	-1.3198	-1.4822
	(0.170)	(0.115)
tech_fabric	-0.4045	-0.3451
	(0.131)	(0.190)
tech_graphite	-0.5478 ***	-0.5578 ***
	(0.000)	(0.000)
tech_gunpowder	0.0706	0.0747
	(0.843)	(0.840)
tech_ink	-1.0213	-0.9921
	(0.000)	(0.000)
tech_lacquer	-0.8945 ***	-0.8712 ***
	(0.000)	(0.001)
tech_miscalaneous	-0.1592	-0.2850
	(0.8370)	(0.7140)
tech_mixed media	-0.4232 ***	-0.4025 ***
	(0.000)	(0.000)
tech_pigment	-0.7554 **	-0.6862 *
	(0.047)	(0.059)
tech_print	-1.1012 ***	-1.0545 ***
	(0.000)	(0.000)
tech_resin	-0.2736	-0.2041
	(0.385)	(0.521)
tech_spray_paint	-0.3540	-0.4372
	(0.525)	(0.478)
tech_watercolour	-0.6068 ***	-0.6625 ***
	(0.000)	(0.000)
sup_ceramic	-0.7932 *	-0.6752
	(0.064)	(0.139)
sup_fabric	-0.0622	-0.0204
	(0.798)	(0.933)
sup_linen	-0.0525	-0.0564
	(0.662)	(0.632)
sup_metal	-0.0851	-0.0432
	(0.751)	(0.881)
sup_mixed media	-0.2378 ***	-0.2004 **
	(0.003)	(0.011)
sup_paper	-0.5698 ***	-0.4981 ***
	(0.000)	(0.000)
sup_plastic	-0.6589 **	-0.6858 *
	(0.053)	(0.052)
sup_silk	0.3307 ***	0.3350 ***
	(0.010)	(0.008)
sup_wood	0.1966 **	0.2106 **
	(0.044)	(0.034)

signed dummy	0.3767 ***	0.3873 ***
	(0.000)	(0.000)
area	0.2763 ***	0.2868 ***
	(0.000)	(0.000)
$Area^2$	-0.0094 ***	-0.0099 ***
	(0.000)	(0.000)
Sales Information		
mon_January	0.0394	0.0340
	(0.848)	(0.865)
mon_March	0.2575 *	0.3188 **
	(0.064)	(0.017)
mon_April	-0.2985 **	-0.1292
	(0.026)	(0.317)
mon_May	-0.1474	-0.1187
	(0.210)	(0.282)
mon_June	0.1994	-0.0180
	(0.147)	(0.893)
mon_July	-0.0662	-0.0264
	(0.481)	(0.782)
mon_August	2.3798 ***	2.3410 ***
	(0.006)	(0.004)
mon_September	0.0742	0.0582
	(0.586)	(0.662)
mon_October	-0.4956 ***	-0.3294 **
	(0.000)	(0.012)
mon_November	-0.2738 **	-0.2452 **
	(0.018)	(0.025)
ah_Christie's	0.2596 ***	0.4516 ***
	(0.000)	(0.000)
ah_Phillips	-0.0118	0.0906
	(0.885)	(0.276)
Artist Variables		
rank_Mid tier	1.2315 ***	1.1414 ***
	(0.000)	(0.000)
rank_High tier	1.0124 ***	0.9079 ***
	(0.000)	(0.000)
rank_Top 50	1.8967 ***	1.8645 ***
	(0.000)	(0.000)
has passed	0.8963 ***	0.8328 ***
	(0.000)	(0.000)
adj. R^2	0.277	0.300

Note: ARO and year coefficients for Regression 1 and interaction term coefficients for Regression 2 are left out, as these are presented in the Results section 4.2.1 and 4.2.2 respectively. Significance levels: $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***.

Table D2: All Regression Results, Quartile Regressions

	Regression Bottom Quartile	Regression Top Quartile
constant	11.0050***	14.3799***
	(0.000)	(0.000)
Painting Variables		
tech_acrylic	0.0208	-0.0625
	(0.674)	(0.305)
tech_ceramic	0.0000*	-1.0694
	(0.059)	(0.933)
tech_collage	-0.2109	1.0944
	(0.556)	(0.259)
tech_crayon	0.0885	0.4556
	(0.420)	(0.493)
tech_etching	0.1955	-0.9958
	(0.306)	(0.866)
tech_fabric	0.1743	-0.5693
	(0.522)	(0.196)
tech_graphite	-0.0083	-0.7396***
	(0.951)	(0.000)
tech_gunpowder	0.1006	-0.2369
	(0.347)	(0.565)
tech_ink	-0.0396	-0.6990***
	(0.534)	(0.000)
tech_lacquer	0.0562	-0.9157***
	(0.832)	(0.000)
tech_miscalaneous	0.1634	2.0179
	(0.405)	(0.894)
tech_mixed media	-0.0061	-0.2701***
	(0.903)	(0.000)
tech_pigment	-0.0648	-0.3453
	(0.815)	(0.576)
tech_print	-0.4473**	-0.3581
	(0.014)	(0.370)
tech_resin	0.0000	-0.5927***
	(0.617)	(0.000)
tech_spray_paint	-0.3953**	0.5041
	(0.019)	(0.276)
tech_watercolour	-0.0791	-0.4914*
	(0.468)	(0.056)
sup_ceramic	0.0000*	0.0000
	(0.051)	(0.978)
sup_fabric	-0.0371	0.1318
	(0.918)	(0.764)
sup_linen	0.0011	0.2064*
	(0.991)	(0.077)
sup_metal	0.6484***	-0.3404
	(0.000)	(0.389)
sup_mixed media	0.0447	-0.1352
	(0.522)	(0.169)
sup_paper	-0.0603	-0.0751
	(0.275)	(0.382)
sup_plastic	-0.0392	-0.1018
	(0.868)	(1.000)
sup_silk	-0.0133	0.1595
	(0.895)	(0.175)
sup_wood	0.0808	0.2614**
	(0.395)	(0.011)
signed dummy	0.0556	0.1164
	(0.154)	(0.124)
Area	0.0679*	0.1251***
	(0.053)	(0.000)
$Area^2$	-0.0064	-0.0055***
	(0.310)	(0.000)

Sales Information		
yr_2013	-0.0584 (0.745)	0.1026 (0.388)
yr_2014	0.0805 (0.657)	0.0216 (0.839)
yr_2015	-0.0020 (0.991)	-0.0982 (0.375)
yr_2016	-0.0294 (0.868)	-0.0954 (0.440)
yr_2017	-0.0479 (0.785)	0.0167 (0.891)
yr_2018	-0.1862 (0.289)	0.1003 (0.398)
yr_2019	-0.1711 (0.326)	0.1305 (0.248)
yr_2020	-0.1438 (0.460)	0.1408 (0.430)
yr_2021	-0.0734 (0.685)	-0.1319 (0.331)
yr_2022	-0.1564 (0.387)	-0.1696 (0.280)
yr_2023	-0.2006 (0.259)	-0.1238 (0.320)
yr_2024	-0.0912 (0.609)	0.0957 (0.400)
mon_January	0.0349 (0.857)	-0.0451 (0.851)
mon_March	0.2283** (0.033)	0.1377 (0.446)
mon_April	-0.0169 (0.876)	0.2267 (0.222)
mon_May	0.1330 (0.126)	0.1260 (0.445)
mon_June	0.1447 (0.175)	0.2964* (0.089)
mon_July	0.0757 (0.410)	0.0408 (0.754)
mon_August	0.0000 (0.633)	0.7532 (0.405)
mon_September	0.3041*** (0.006)	0.1422 (0.419)
mon_October	-0.0031 (0.978)	0.1600 (0.399)
mon_November	0.0622 (0.483)	0.1905 (0.239)
ah_Christie's	-0.0742 (0.206)	0.0806 (0.362)
ah_Phillips	-0.1826*** (0.006)	0.3849*** (0.000)
Artist Variables		
rank_Mid tier	0.1158 (0.305)	0.6583*** (0.000)
rank_High tier	0.1463* (0.096)	0.6267*** (0.000)
rank_Top 50	0.3151*** (0.009)	0.8858*** (0.000)
has passed	0.1623*** (0.000)	0.5236*** (0.000)
adj. R^2	0.069	0.205

Note: ARO coefficients are left out for both top and bottom quartile regressions, as these are presented in the Results section 4.4. Significance levels: $p < 0.1$ ∗, $p < 0.05$ ∗∗, $p < 0.01$ ***.

Appendix E: Heteroskedasticity Tests

Table E1: Results of White-test for Heteroskedasticity, Regression 1

	Value	p-value
Lagrange Multiplier	2203.385	0.000
F-statistic	2.672	0.000

Table E2: Results of White-test for Heteroskedasticity, Regression 2

	Value	p-value
Lagrange Multiplier	2929.861	0.000
F-statistic	2.2489	0.000

Table E3: Results of White-Test for Heteroskedasticity, Regression Bottom Quartile

	Value	p-value
Lagrange Multiplier	627.262	0.0331
F-statistic	1.1667	0.0139

Table E4: Results of White-Test for Heteroskedasticity, Regression Top Quartile

	Value	p-value
Lagrange Multiplier	670.806	0.000
F-statistic	1.3532	0.000